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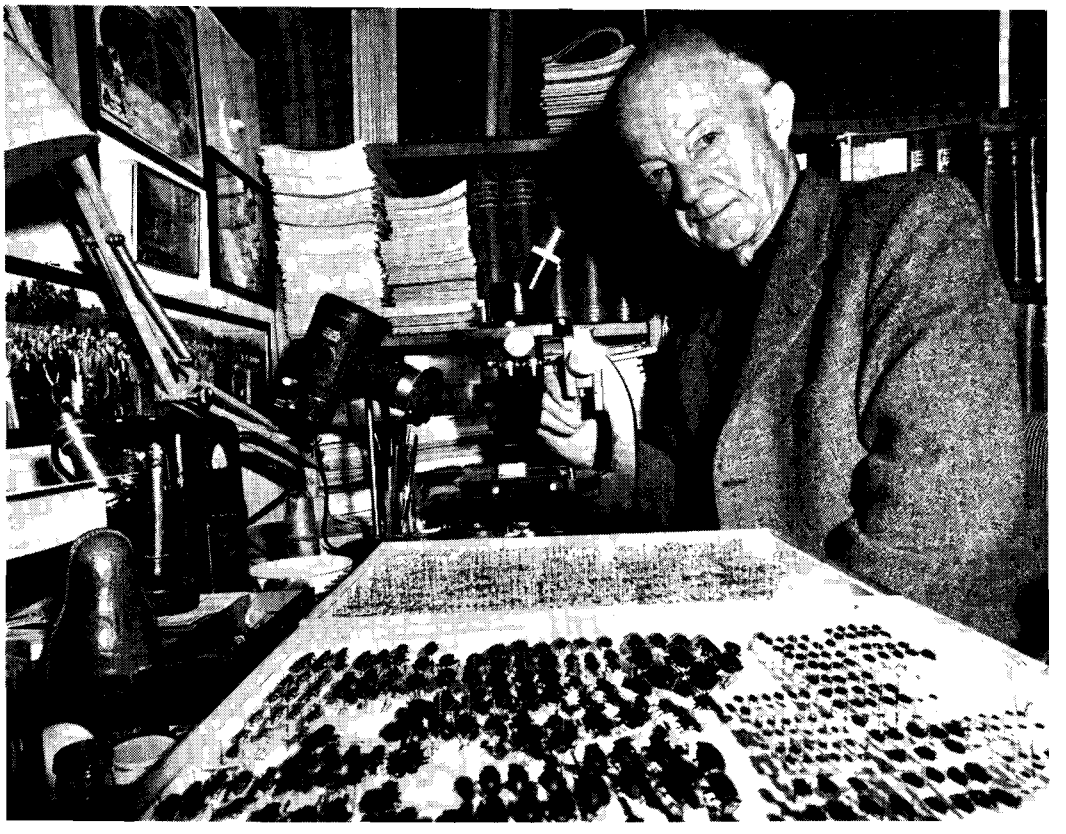
Dr. philos. h.c. Andreas Strand.



Den 8. februar døde tidligere kontorsjef i Telegrafstyret, dr.philos. h.c. Andreas Strand etter et lengere sykeleie, nær 85 år gammel.

Strand ble født i Haugesund 11. juni 1895. Etter middelskole og artium ble han ansatt i Telegrafverket på sitt hjemsted hvor han arbeidet frem til 1917. Han flyttet da til Oslo og overtok en ny stilling i Telegrafstyret hvor han senere ble kontorsjef i Utenriksavdelingen, en stilling han innehadde til han gikk av med pensjon i 1962.

Strands interesse for naturvitenskap begynte allerede i skoledagene, men det mangelfulle vitenskapelige miljø på hans hjemsted ga ham liten inspirasjon og materialet innsamlet i hans ungdomsår mangler i stor utstrekning i hans samling. Først da han flyttet til Oslo og fikk kontakt med Münster og andre fremstående entomologer ble hans interesse vakt for alvor, særlig for billene, som etter hvert ble hans store altoppslukende hobby. Allerede tidlig interesserte han seg sterkt for de palearktiske arter av slekten *Carabus* og ved iherdig korrespondanse og byttevirksomhet tilveiebrakte han en spesialsamling som vel mangler sidestykke i Norden. Denne samlingen gikk senere over til Zoologiska Institutionen i Lund hvor den ved siden av professor Lindroths materiale gir et meget verdifullt bidrag til denne slekts palearktiske arter. Etter hvert tok imidlertid Strands interesse for billene en annen retning. Han konsentrerte seg om Nordens coleoptera, i særlig grad da de nordnorske, og allerede i 1932 finner vi i Norsk Entomologisk Tidsskrift hans første bidrag til faunaen i denne landsdel. Til tross for at Strand i embets medfør i Telegrafstyret har foretatt reiser i de fleste verdensdeler har han aldri samlet biller utenlands. Jeg har flere ganger spurt ham hvorfor han ikke har tatt med seg mulighetene til innsamling av biller under sine utenlandsopphold og har alltid fått svaret at det er nordiske biller hans interesse knytter seg til.

Materialet fra hans mange samlereiser nordover sammen med kontrollbestemmelser av private og de nordiske museers samlinger dannet

grunnlaget for hans hovedverk «Nord-Norges Coleoptera» som ble utgitt av Tromsø Museum i 1946. Med sine over 600 sider med funnforhold og utbredelse til den minste detalj gir denne publikasjon et levende bilde av Strands grundighet.

Med sitt inngående kjennskap til norske Coleopteras taxonomi og utbredelse var han en selvskreven medredaktør av Coleopterorum Fennoscandiae et Daniae fra og med første utgave i 1939 og likeledes Enumeratio Coleopterorum Fennoscandiae et Daniae, som ble utgitt i 1979 snaut 1 år før hans død.

Strand var uhyre aktiv som coleopterolog både ved innsamling av materiale og ved å gjøre sine iakttagelser og erfaring tilgjengelig for andre. Hans 120 publikasjoner hovedsakelig i Norsk Entomologisk Tidsskrift vidner om den bredde hans virksomhet spente over. Hans kritiske sans og nøkterne vurderingsevne ved bedømmelse av en arts berettigelse illustreres best ved at bare 7 av de 49 nye artene, han har beskrevet senere har vist seg å være synonymer, til dels med arter fra andre regioner. En fullstendig liste over Andreas Strands vitenskapelige publikasjoner vil bli gitt av Astrid Løken i Entomologica Scandinavica.

Andreas Strand var også en betydelig inspirator for yngre samlere. Også folk med liten erfaring og innsikt ble tatt hyggelig imot og oppmuntret til å fortsette. Han var meget flink til å gå nye veier i innsamlingsarbeidet, og tok gjerne tid til å forklare metodene for andre. Han hadde merket seg at flomstore elver gjerne har en betydelig mengde insekter i løsmaterialet de fører med seg, og han utviklet metoder til å fange disse før de rakk å fly bort. De mange sjeldne og lite tilgjengelige arter som er knyttet til dyrebol og dyreekskrementer forsøkte han å trekke til seg ved bruk av åte av hønselort. Strand tok også i bruk bilen i innsamlingsarbeidet. Strand satt ved siden av føreren og holdt sin insekthåv ut gjennom det åpne bilvinduet, i håp om å fange svermende biller. Fangsten var ofte enorm, og metodens muligheter er blitt demonstrert til fulle.

Strand var meget beskjeden av natur og lot aldri skinne gjennom hvilken kunnskapsbredde han innehadde og hvilke ytelser han hadde tilført norsk entomologi. Ikke minst hans venner gledet seg derfor over de vitenskapelige anerkjennelser han ble tildelt. Foruten Kongens Fortjenestmedalje i gull for sin vitenskapelige virksomhet, ble han som den første amatørentomolog i Norge utnevnt til æresdoktor ved Bergens Universitet. Som æresmedlem av Norsk Entomologisk Forening var han selvskreven, og han var også æresmedlem i Entomologiska Föreningen i Stockholm samt korresponderende medlem av Tromsø Museum, Entomologiska Sällskapet i Lund, Suomen Hyönteistieteelinen Seura samt Societas Pro Fauna et Flora, begge Helsingfors.

For mange som ikke hadde daglig kontakt med Strand kunne han kanskje virke noe kort og «tilknappet», men bak hans beskjedne vesen skjulte seg en menneskelighet og en humor som det kanskje var få forunt å bli delaktig i. Man gikk aldri til Strand uten å få hjelp til de problemer man måtte ha innen coleopterologien og helt til det siste var hans hjerne og hukommelse krystallklar. Han var kjent for sin raske behandling av bestemmelser og selv om et stort materiale ble overlatt ham gikk det ikke mange dagene før det kom en kort telefonbeskjed: «Materialet er ferdig, det kan hentes».

De mest besøkte møter i Norsk Entomologisk Forening var vel høstmøtene hvor de enkelte medlemmer skulle berette om sommerens fangst. I de senere år hadde ikke Strand anledning til å delta i disse møtene og yngre medlemmer har kanskje ikke opplevet hans levende, humoristiske og saklige beretninger om hva han hadde funnet siden siste møte og ikke minst, under hvilke omstendigheter, noe som ofte vakte stor munterhet. Disse møtene vil for meg alltid stå som et minne om det menneskelige, det nøkternt vitenskapelige og den personlighet Andreas Strand representerte.

Under Strands senere år hadde jeg inntrykk av at han næret stor bekymring for hvor og hvorledes hans entomologiske livsverk, hans samling og notater som var foretatt over funnforhold og utbredelse, skulle oppbevares for å kunne være tilgjengelige og kunne tjene fremtidige entomologiske forskere. Det var derfor en stor lettelse for ham at Bergens Universitet med glede påtok seg å ivareta såvel hans samling, sannsynligvis den største i Norge, som hans notater.

Jeg har kjent vennen Andreas i over 45 år, og hatt daglig kontakt med ham, dels via telefonen, dels ved besøk i hans hjem på Røa, hvor hans kone Ruth og barna Lars og Kirsten alltid har møtt unge og eldre entomologer med en hjertelighet og imøtekommenhet som av oss alle vil bli dypt savnet.

Det vil gå mange år før den inspirasjon og de råd Strand har kunnet gi kan erstattes, og hans bortgang vil etterlate et tomrom som vanskelig vil kunne fylles. Han vil alltid forbli en «ener» innen norsk entomologi.

Eivind Sundt

The fauna of predatory bugs (Heteroptera, Miridae and Anthocoridae) in Norwegian apple orchards

MARIT PRESTHEGGE AUSTRENG & LAURITZ SØMME

Austreng, M.P. & Sømme, L. 1980. The fauna of predatory bugs (Heteroptera, Miridae and Anthocoridae) in Norwegian apple orchards. *Fauna norv. Ser. B, 27,* 3—8.

The fauna of heteropterous bugs of the families Miridae and Anthocoridae in apple orchards was studied throughout one summer season at Ås, eastern Norway. About 35 species were collected, of which *Atractotomus mali* made up 38 percent and *Orthotylus marginalis* 13 percent of the total number of bugs. *Psallus ambiguus, Malacocoris chlorizans, Blepharidopterus angulatus, Phytocoris tilia* and *Anthocoris nemorum* were represented with 3 to 9 percent of the material.

Graphs are presented showing the fluctuations in population sizes for these seven species from May till October, as well as the time intervals for the occurrence of the different nymphal instars and the adults. All species had one generation only per year under the present conditions. In most species more females than males were collected from the apple trees.

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INTRODUCTION

The importance of predators for the control of noxious insects in fruit orchards has been the subject of a great number of studies. Several species of predators are commonly found, among which heteropterous bugs of the families Miridae and Anthocoridae represent an important group.

According to Sørum (1977) *Anthocoris nemorum* is the most common species of predatory bugs in fruit orchards in Sogn, Western Norway. At Sem, in the eastern part of the country Baeschlin & Taksdal (1979) found that *Malacocoris chlorizans* is dominating. Apparently the fauna may differ with geographical area, but it is also likely that it may differ from orchard to orchard depending on local ecological conditions. Yearly differences in the populations sizes of the various species may also be expected.

For these reasons more faunistical data on predatory heteropterous bugs from Norwegian fruit orchards are needed. Only when their population dynamics are better investigated may it be possible to evaluate the importance of each species as predator. The purpose of the present investigation was to contribute with more information in this field by conducting studies on the seasonal occurrence of bug populations in apple orchards at Ås in southern Norway.

MATERIAL AND METHODS

The present study way carried out in 1971 on apple trees in eleven private fruit orchards at Ås, about 30 km south of Oslo. Most of the trees belonged to seven different varieties, and were mainly well-kept trees of middle to old age. No pesticides were applied to the orchards during the summer. The balloon stage and opening of sideflowers took place in the last ten days of May. Meterological conditions during the summer season were about normal.

Insects were collected at regular intervals from the middle of May till the middle of October. The beating method («Klopfmetode») of Steiner (1962) was used, in which the branches are knocked with a stick, and falling insects collected in a net with an opening frame of 0.25 m^2. On each day of collection a total of 50 branches were knocked, each receiving fifteen rapid knocks. As far as possible new trees were used for each collection, and an equal number of branches on the sunny side and in the shade were utilized.

RESULTS AND DISCUSSION

A total of 3435 bugs of the families Anthocoridae and Miridae were collected during the summer season. The different species and number of

specimens are presented in Table I. The list includes 35 species, but since some *Orius* spp. and some *Psallus* spp. could not be identified with certainty, the number may be slightly higher. *Anthocoris* spp. listed in Table I were unidentified larvae, probably of the species already presented. The family Miridae made up about 80 percent of the specimens that were collected.

Seven of the species were represented with about one hundred or more specimens. These were considered as the potentially most important predatory bugs in the present material. A closer examination of their occurrence in the orchards is presented below.

Orthotylus marginalis **Reuter**

The species is distributed throughout Europe (Abraham 1936), and is found on apple and a number of other deciduous trees (Collyer 1953a). In Norway it has been found as far north as Nordland (Warloe 1924).

During the present study nymphal instars of *O. marginalis* were found at the first date of collection, on 19 May (Fig. 1A). The first adult appeared on 12 June (Fig. 1B), and no nymphs were found after 5 July. The last adult were collected in early August. The ratio of females:males in the total material was 1:1, but the males disappeared earlier, and females were dominating at the end of the season.

From Fig. 1B it it seen how the successive nymphal instars followed each other, and each stage appeared only once during the season. The data show that *O. marginalis* has one generation per year under the present conditions.

One generation per year has also been reported for this species from other European countries (Dicker 1968) where it normally occurs from May throughout August. The rapid decline in number of specimens on apple may partly be due to male mortality shortly after copulation (Abraham 1936), and partly due to migration to other plants (Speyer 1934), the ground vegetation included (Collyer 1953a).

Psallus ambiguus **(Fallén)**

P. ambiguus is found all over Europe on apple and other host plants (Morris 1965). According to Warloe (1924) the species is common all over Norway.

During the present study *P. ambiguus* was found regularly from 25 May till 1 August (Fig. 1A). Due probably to the method of collection, no first stage nymphs and only one second stage nymph appeared in the material. The data, however, indicate that first stage nymphs will appear in the middle of May, which is in agreement with the observations of Kanervo (1961) in Finland. In several other countries eggs of *P. ambiguus* are reported to hatch in April (Korcz 1971). The first adults appeared on 9 June (Fig. 1B) and the last nymphs on 30 June. The results clearly show that *P. ambiguus* has one generation only during the summer season.

The ratio of females:males in the total material was 1.7:1. Males were most numerous for a

Table I. List of species of the families Anthocoridae and Miridae collected on apple during the summer of 1971 at Ås, southern Norway.

Species	No of specimens
ANTHOCORIDAE	
Temnostethus gracilis (Horvath)	38
Elatophilus nigricornus (Zetterstedt)	16
Anthocoris nemorum (L.)	221
A. nemoralis (Fabricius)	20
A. gallarum-ulmi (De Geer)	28
A. pilosus (Yakovlev)	13
A. butleri Le Quesne	8
A. minki Dohrn	1
A. confusus Reuter	21
A. limbiatus Fieber	2
A. visci Douglas	4
Anthocoris spp.	47
Orius-sp.	203
MIRIDAE	
Megalocoleus molliculus (Fallén)	3
Orthonotus rufifrons (Fallén)	1
Psallus ambiguus (Fallén)	325
P. roseus (Fabricius)	6
Psallus spp.	15
Atractotomus mali (Meyer-Dür)	1314
Plagiognathus arbustorum (Fabricius)	5
Campylomma verbasci (Meyer-Dür)	11
Pilophorus perplexus Douglas & Scott	24
Malacocoris chlorizans (Panzer)	252
Drysophilocoris flavoquadrimaculatus (De Geer)	1
Blepharidopterus angulatus (Fallén)	278
Orthotylus marginalis Reuter	441
O. viridinervis (Kirschbaum)	1
Lygus wagneri Remane	2
L. rugulipennis Poppins	9
Lygocoris viridis (Fallén)	1
L. contaminatus (Fallén)	10
Calocoris fulvomaculatus (De Geer)	4
Phytocoris tiliae (Fabricius)	94
P. longipennis Flor	9
P. ulmi (L.)	7

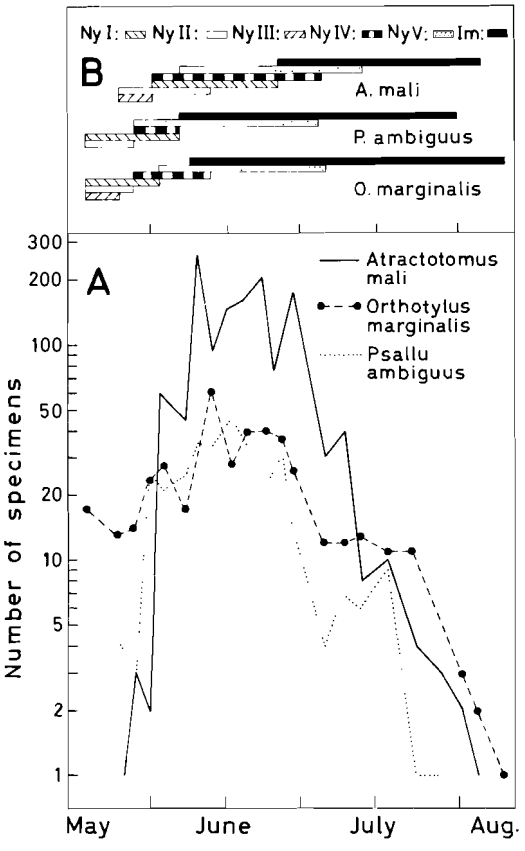

Fig. 1. The occurrence of predatory, heteropterous bugs on apple at Ås, Norway during the summer of 1971. A. Number of specimens per 50 branches. B. Time intervals for the presence of nymphal stages and adults.

short period after the adults have appeared, but females were dominating for the rest of the season.

Atractotomus mali (Meyer-Dür)

A. mali has been recorded from Europe and North America (Lord 1972). It occurs mainly on apple (Kullenberg 1946), but may also be found on other trees. In Norway it has been found in Drøbak and at Ringerike, south-eastern Norway (Warloe 1924).

In the orchards used for the present study *A. mali* was the most common species (Fig. 1A), and made up more than 35 percent of the bugs collected during the summer season. The nymphs were found from 28 May till 9 July, the first adults were collected on 30 June, and the last ones in early August (Fig. 1B). The manner in which the nymphal instars and adults follow each other clearly shows that *A. mali* had one generation only during the summer season. These observations agree with the results from other countries, although the first nymphal instars usually occur earlier in the spring at lower latitudes (Dicker 1968, Korcz 1971).

While a large number of specimens were collected as third, fourth and fifth instars, the number decreased rapidly after the adults appeared (Fig. 1). The reason for this may be both a short lifespan and migration to other plants. On apple the eggs are probably deposited shortly after the adults have appeared. While the males were initially more numerous, females were found in the orchards for a slightly longer period. The total ratio of females:males in the present material was 1.4:1.

Blepharidopterus angulatus (Fallén)

According to Collyer & Massee (1958) *B. angulatus* is common all over Europe, and is also reported from North America (Lord 1972). It occurs on apple and a number of other plants (Collyer 1948). In Sogn, Western Norway it was one of the most common predatory bugs in the orchards studied by Sørum (1977), and is found from Stavanger to Trondheim, at the west coast of Norway (Warloe 1924).

B. angulatus was found regularly from 7 June till 12 October during the present study (Fig. 2A). As has also been stated by Collyer (1953b) the eggs apparently hatch over a longer period in the spring, since some first instar nymphs still were present after other nymphs had reached the third and fourth stage (Fig. 2B). The first adults were collected on 5 July. Initially the males were more numerous than the females, but the females dominated during the last part of the season. While one male only was collected in September, females were found as late as 12. October. The ratio of females:males in the total material was 1.7:1.

Malacocoris chlorizans (Panzer)

M. chlorizans is distributed all over Europe, and occurs on apple as well as on other deciduous trees (Southwood & Leston 1959). It is commonly found in Norway (Warloe 1924), and was the dominating predatory species of heteropterous bugs in orchards studied by Baeschlin & Taksdal (1979).

During the present study *M. chlorizans* was found from early June till the middle of October.

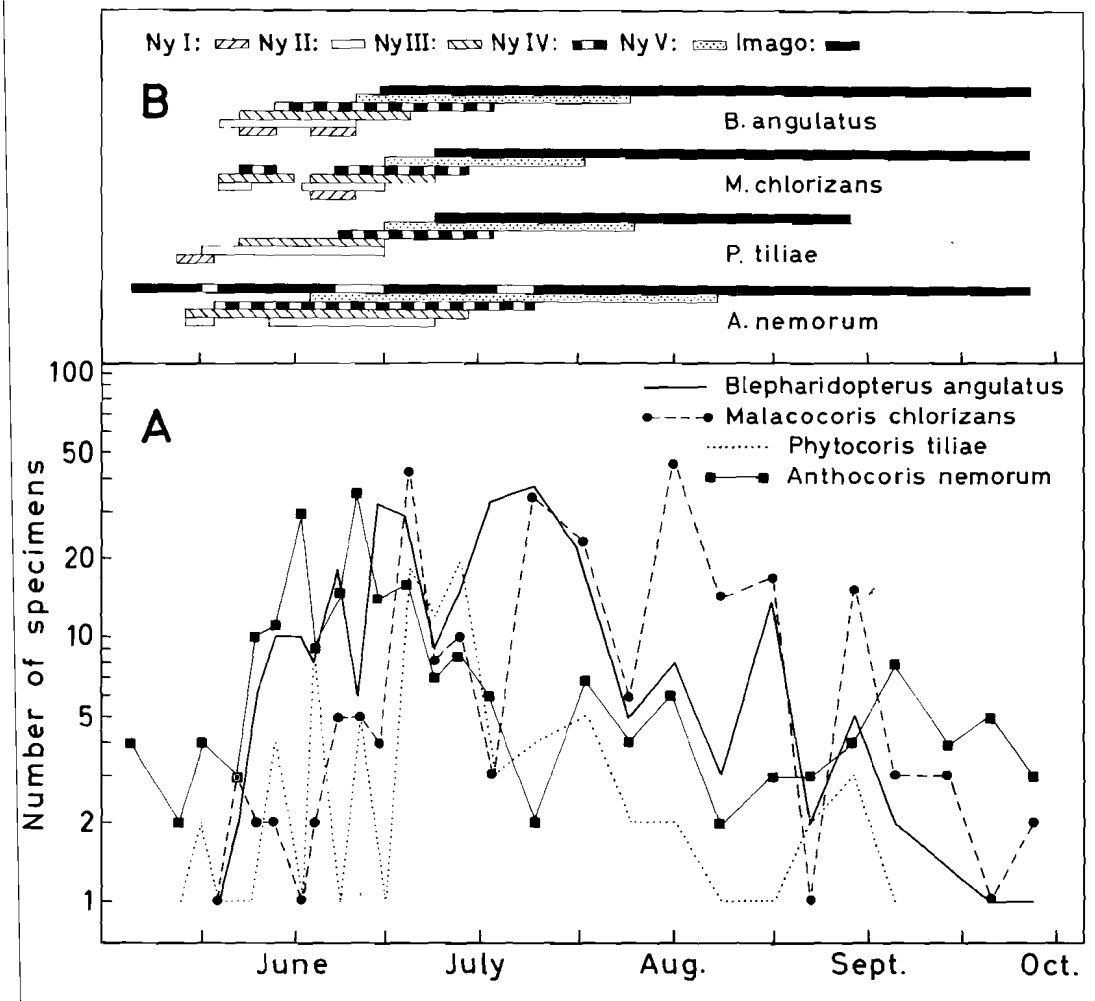

Fig. 2. The occurrence of predatory, heteropterous bugs on apple at Ås, Norway during the summer of 1971. A. Number of specimens per 50 branches. B. Time intervals for the presence of nymphal stages and adults.

The number of specimens changed irregularly during the season (Fig. 2A), which may have been caused by uneven distribution in the orchard. The first adults were collected on 13 July (Fig. 2B). The total ratio of females:males was 1.8:1. Males were most numerous early in the season, while females dominated during the end of the summer.

From Fig. 2B it appears that *M. chlorizans* has one generation only per year during the present conditions. This is in agreement with the observations of Vrie (1965) from Holland, while two generations per year has been reported from England, France and Switzerland (Geiger & Baggiolini 1952, Southwood & Leston 1959, Carle 1965).

Phytocoris tiliae **(Fabricius)**

P. tiliae has been reported from several European countries, and is found on apple and other deciduous trees (Southwood & Leston 1959). In Norway this species has been found on ornamental trees and shrubs at Ås (Taksdal 1965) and by Warloe (1924) at Oslo, Risør and Hvaler.

In the orchards used for the present study *P. tiliae* was found from 1 June till 12 October (Fig.

2A). Adults appeared from 13 July (Fig. 2B) and the last nymphs were collected on 1. August. The species was not particularly numerous, and most specimens were in the fourth or fifth nymphal instar when they were caught. Only 17 adults were collected, and the majority of these were females.

Anthocoris nemorum (L.)

According to Butler (1923) *A. nemorum* is found all over Europe and in parts of Asia and Africa. It is considered as one of the most important predatory bugs in fruit orchards, but is also found on a number of other plants. In Norway Taksdal (1965) collected this species from a large number of ornamental trees and shrubs at Ås, and it made up more than 80 percent of the predatory bugs collected by Sørum (1977) in Sogn. In the present study, however, *A. nemorum* presented only 6.5 percent of the heteropterous bugs listed in Table I.

A. nemorum spend the winter in the adult stage (e.g. Collyer 1967), and was present in the orchards when collecting started in the middle of May (Fig. 2). Nymphs were found from the end of May, indicating that eggs are deposited early in the spring. In England egglaying starts as early as March (Collyer 1967). The population of the species was largest in June and July (Fig. 2A), at a time when most specimens were in the nymphal stages. An increase in the number of adult bugs took place in the end of July and early August, and the last nymphs were collected on 15 August (Fig. 2B). All adults collected in the spring were females, indicating that few or no males overwinter. Males, which probably belonged to the new generation, were collected for the first time on 5 July. In August the males became more common, and were more numerous than females during most of September.

As pointed out by Collyer (1967) eggs are deposited over a long period. During the present study the nymphal stages were found for a long time during spring and summer. From Fig. 2B it is seen that the stages followed each other in chronological order, which shows that *A. nemorum* had one generation only under the present conditions.

CONCLUSIONS

In agreement with the results of Sørum (1977) and Baeschlin & Taksdal (1979) the present study shows that heteropterous bugs is an important group of predators in Norwegian fruit orchards. A total of 35 species were collected, of which the seven most abundant ones made up about 85 percent of the total material.

The bugs were present in the orchard from the end of May till the middle of October, but were most numerous in June and July. All of the seven most abundant species had only one generation per year. In most species a larger number of females than males were collected.

Atractotomus mali was the dominating species in the apple orchards during the present study. As mentioned in the introduction other species were dominating in the orchards studied by Sørum (1977) and Baeschlin and Taksdal (1979). From these three studies it appears that the fauna of heteropterous bugs in fruit orchards may vary considerably. Several factors may be of importance in this connection, and should be the subject of further studies in this field.

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The geographical distribution of the members of the tribe Bembidiini (Col., Carabidae) in Northern Norway

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The geographical and regional distribution of the members of the tribe Bembidiini occurring on river banks and lake shores in northern Norway is presented. *Bembidion lunatum* (Duftschmid) is a southern species (northern limit in Nordland province), whereas *B. hyperboraeorum* Munster and *B. mckinleyi scandicum* Lindroth are northern species (not south of the polar circle in Norway). *B. quadrimaculatum* (L.) and *B. velox* (L.) are eastern species lacking in Nordland province. The rest of the species have been found in all the three province of northern Norway, most of them in coastal as well as inland areas. Some of the species, however, e.g. *B. petrosum siebkei* Sparre Schneider, are continental. The species of the tribe show a high degree of sympatry, especially in the inner parts of Troms and Finnmark provinces. *B. hasti* Sahlberg, *B. hyperboraeorum* Munster and *B. fellmani* (Mannerheim were the only species found outside or above the timber line.

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INTRODUCTION

In connection with an ecological investigation of the tribe Bembidiini occurring on river banks and lake shores in northern Norway it was necessary to get information about the geographical and regional distribution of the species.

The basic knowledge about the distribution is already given by the works of Lindroth (1945) and Strand (1946). Most of the finds published in these two works, however, are quite old (made before 1938). Many of their finding sites or their vicinities thus were reexamined and in addition many new localities were visited. These investigations (made in the years 1969—1979) have yielded so much new information that it seemed justified to give an up-to-date-survey of the distribution of the species in northern Norway.

Although this work primarily concerns species occurring on banks and shores, investigations in other habitats (roadsides, arable land) were made at several localities. The present paper, however, does not deal with species lacking or only occasionally occurring on river banks or lake shores.

MATERIAL AND METHODS

Altogether 155 localities throughout northern Norway were investigated (Table 1, Fig. 1). The collecting methods used are basically the same as in Andersen (1970a).

At some localities in Troms county (59—63, 64, 70, 71, 83 and 102) quantitative methods were used. Most of the investigations, however, are based on handcollecting with time noting. The mean collecting effort per locality is about the same in the inner parts of Nordland and Finnmark province whereas several localities in Troms have been investigated more intensively.

Troms no doubt is the best investigated among the three provinces. It is a good representation of coastal as well as of inland localities, and especially in the inner part of the province there is a rather dense net-work of localities. The inner parts of Nordland province are rather well investigated while the outer parts (except for the Lofoten and Vesterålen islands) are poorly or not at all investigated. The weather conditions during the investigations have mostly been sufficiently favourable (above 12°C, no rain) to secure a high chance of discovery of the beetles. The localities 40—48 were investigated during very bad weather conditions (6—8°C, rain), however, and this may have reduced the yield. Most of the localities were investigated in the months of June—July, some in August and a few in May or September.

Scandinavia has been divided into bio-geographical regions or zones in various ways (vide Abrahamsen et al. 1977). For the present purpose it seemed most reasonable to make a divi-

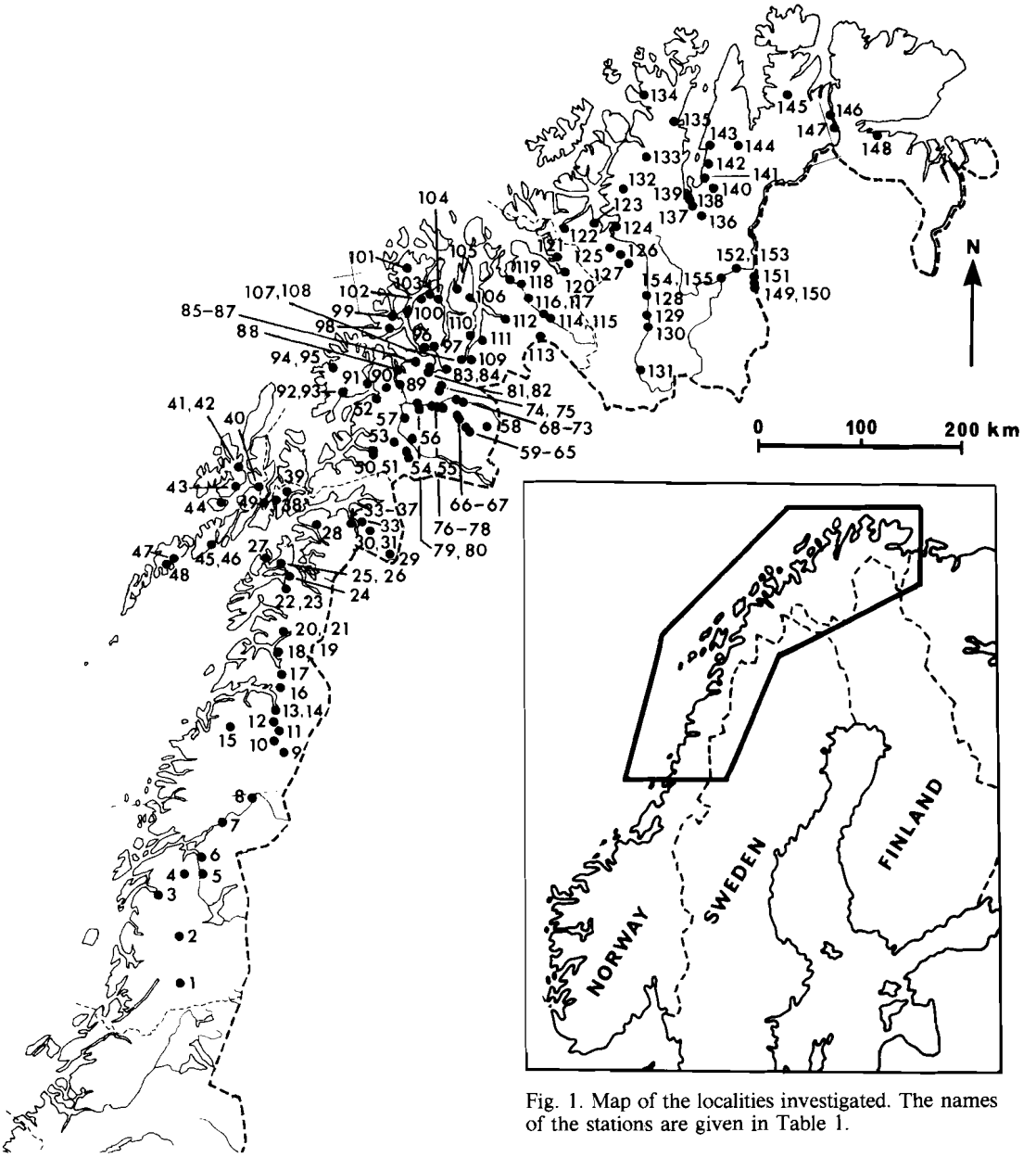

Fig. 1. Map of the localities investigated. The names of the stations are given in Table 1.

sion in accordance with Hämet-Ahti (1963) and Franz (1979): coniferous zone, birch zone, arctic and alpine zone. About one fourth of the localities are situated in the birch zone, whereas 7 stations are situated in the alpine or arctic zone. This uneven representation of the different zones must be considered when evaluating the regional occurrences of the different species.

Taxonomical remarks

Most of the individuals of *Bembidion lunatum* (Duftschmid) found in northern Norway deviate from those from southern Norway by having dark femora. Furthermore the males have no distinct subapical pale spot on the elytra. Such individuals also have shorter elytra than the typical *B. lunatum*. In the outer and inner struc-

Table I. Localities investigated. The position of the localities are shown in Fig. 1.

1. At Lake Store Svenningsvatn
2. Grane, at the river Vefsna
3. Mosjøen, near the outlet of the river Vefsna
4. Lake Luktvatn, 136 m a.s.l.
5. Sjøfossen, at the river Røssåga and Olderneset, at the river Leirskarelva.
6. Bjerka. At the mouth of the river Bjerka
7. 5 km east of Mo i Rana, at the river Ranaelva
8. Storvollen, at the river Ranaelva
9. Polar camping, at the river Saltdalselva
10. Bleiknes, at the river Saltdalselva and at the outlet of the river Russåga in the river Saltdalselva
11. At the river Sauelva
12. Potthus, at the river Saltdalselva
13. Rognan, at the river Saltdalselva
14. Saltdal, at the outlet of the river Saltdalselva
15. Beiarn, at the river Storåga
16. At the stream between the lakes Øvrevatn and Nedrevatn
17. At Lake Straumvatn and at the outlet of the stream from this lake
18. Gyltvik, at a fastrunning brook
19. Aspfjorden, at a fastrunning brook
20. Bonnå, at the river Bonnåga
21. At Lake Horndalsvatn
22. At Lake Rotvatn
23. At the outlet of the brook Sagaelv
24. Notvann, at the sea
25. At Lake Skillvatn
26. At Lake Kaldvågvatn
27. At Lake Brennvikvatn
28. At a small lake near Skafossen
29. At the lakes Gautelisvatn and Vannaksvatn, 825 and 854 m a.s.l.
30. Grønnvoll, at the river Skjoma
31. Gamnes, at the river Skjoma
32. Elvegård, at the outlet of the river Skjoma
33. Forselv. Piece of arable land with silty substratum
34. Forselv, at the outlet of the river Forså
35. At Forså, higher up in the river, about 300 m a.s.l.
36. Klubbvik, at the outlet of the river Klubbvikelva
37. Klubbvikvatn, at the outlet of a small brook, 341 m a.s.l.
38. Kanstadbotn, at the river Heggedalselva
39. Kongsvik, at the river Storelva
40. Sigerfjord, Fallow field. Sandy moraine
41. Jennestad. At the outlet of a brook in the sea
42. At the outlet of a small river near Jennestad
43. Small brook near Kleiva
44. Near Stokmarknes (on Hadseløya). Gravel pit
45. Near Helle. At the outlet of a brook
46. Near Helle, about 2 km S of locality 45. At the sea
47. Between Skifjord and Palsfjord. At a roadside
48. Storfjordvik. At the mouth of a small brook
49. Gullesfjordboth, at the river Lakselva
50. Soløy in Lavangen, at the sea
51. Near or at the outlet of the river Mølnelva in Lavangen
52. At the river Tømmerelva
53. Sørskogen in Bardudalen, at a small stream
54. Melhus, at the river Sørdalselva
55. 4 km S og Melhus, at the river Sørdalselva
56. Straumsmo, at the river Barduelva
57. Langstrand, at the outlet of a small river
58. Lake near the mountain Stuora Namna in Skakterdalen, 660 m a.s.l.
59. Near Fossbua, at the river Dividalselva
60. Dividalselva, 50 m above the outlet of the river Skakterelva
61. Skakterelva, near or at the outlet of the river
62. Skakterelva, about 1 km from the outlet of the river
63. At the outlet of the brook Kvernelva in the river Dividalselva
64. At the river Dividalselva, about 30 m from the outlet of Kvernelva.
65. Between Kvernelva and the brook Sleppelva, at a roadside
66. Høgskarhus, at the river Dividalselva
67. Ulaberg, at the river Dividalselva
68. Rostaelva, near the outlet of the river
69. At Lake Rostavatn, about 0.5 km E of Rasdalen
70. Rostavatn, at the outlet of a brook near Rasdalen
71. Near Øvergård, at Lake Rostavatn
72. Near Øvergård, at a small brook
73. Øvergård, at a roadside
74. Fjellfrøsvatn, at the outlet of a small stream and at the lake
75. Near Rognmoen, at the river Tamokelva
76. At the outlet of the river Beinelva
77. Near the outlet of the brook Revelva
78. At the small river Tverrelva
79. Holmestrand, at the river Kirkeselva
80. Rundhaug, at the river Målselva
81. At Lake Sagelvvatn
82. Near the outlet of the river Tømmerelva in Sørkjosen
83. Near and at the outlet of the river Buktelv in Nordkjosen
84. Vollan, at the outlet of the river Nordkjoselva
85. Nordfjordbotn, at the outlet of a brook
86. Mestervik, at or near the outlet of a brook
87. Nordbynes. At the outlet of a small river
88. Målsnes. At the outlet of the river Målselva
89. Kjellmoen. At the river Målselva
90. At Lake Andsvatn
91. Islandsbotn in Laksfjorden, at the outlet of a small brook
92. Storjord in Tranøyboth. At a roadside
93. Near Gamalseter in Tranøybotn. At the river Aanderelva
94. Near Heggeli. At the river Heggelva
95. Straumsbotn, at the outlet of the river Krokelva

96. Svartnes, at the sea, near the outlet of a brook
97. Kantornes, near the outlet of a small river
98. Straumsbukta, at the river Vollelva
99. At the stream Skavelva in Sørbotn
100. Tromsøya, arable land, waste places, grassplots
101. Skogsfjordvatn. At the outlet of the lake
102. Tønsvika, near or at the outlet of the river Tønsvikelva
103. Skittenelv, near the outlet of the river Skittenelva
104. 1 km V of Oldervik, at the river Oldervikelva
105. At Lake Jægervatn
106. Russedalen, at the river
107. About 1 km SV of Oteren, at the river Balsfjordelva
108. Oteren, at the sea
109. About 1,5 km E of Storfjord, at the river Kittdalselva
110. Furuflaten, at the river Lyngdalselva
111. Near Skibotn, at the river Skibotnelva
112. Holmen, at the river Kåfjordelva
113. Little stream near Guolasjavrre, 750 m a.s.l.
114. Sarelv, at the river Sarelva
115. Near the outlet of the river Puntaelva
116. Bergmo, at the river Reisaelva
117. Near the outlet of the river Doaresjokka
118. Moskodalen, at the river Moskoelva
119. 1 km SE of Storslett, at the river Reisaelva
120. Kvænangsbotn, at the river Kvænangselva
121. Kjækan, at the stream Kjækanelva
122. Langfjordbotn at the river Bognelva
123. Melsvik, at the outlet of a small river
124. Øvre Alta, at the river Altaelva
125. At the river Trangedalselva
126. 48 km N of Masi, at the river Eibyelva
127. About 3 km S of the northern end of the lake Trangdalsvatn
128. Masi. At the river Masijokka
129. About 20 km S of Masi, at the river Kautokeinoelva
130. Gæidnovuoppe, at the river Kautokeinoelva
131. At Lake Suoppatjavre, 323 m a.s.l.
132. Sennaland, at the river Bastinjokka, near the mountain Duolbagielas. Leg. A. Nilssen
133. Near Skaidi, at the river Repparfjordelva. Leg. A. Nilssen.
134. At Lake Snøfjordvatn. Leg. A. Nilssen.
135. Olderfjord, at the river Olderfjordelva
136. At Lake Gaggajavre. Leg. A. Nilssen.
137. At the mouth of the river Vuolajokka
138. Nedrevatn. At the river Lakselva. Leg. A. Nilssen
139. Kjøkenes. At the river Lakselva
140. At the river Luostejokka and at two small streams near Luostejokka, about 440 m a.s.l.
141. At the river store Bjørnelva
142. Several places at the river Caskeljokka
143. Børselv, at the river Børselva
144. 12 km SV og Storfjordbotn, at the river Luobbaljokka
145. 12 km V of Bielv, at the river Storelva
146. Maskjok, at the outlet of the river Maskejokka in the river Tana
147. Tana bru, at the river Tana
148. Nyelv, at the river Nyelva
149. Near the mouth of the river Iskurasjokka
150. About 8 km N of Iskuras. Near the outlet of a small river into the river Anarjokka
151. About 3 km S of Dorvvinjargga, at the river Anarjokka
152. Karasjok, at the river Karasjokka
153. At the river Daktejokka
154. Assebakte, at the outlet of the river Jiesjokka in the river Karasjokka
155. About 1 km S of Assebakte, at the river Karasjokka

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ture of the penis the specimens seem to be identical with the typical *B. lunatum*. At present the status of the abovementioned form is uncertain although it seem quite obvious that it belongs to the species *B. lunatum*. The relationship between the form described here and the dark specimen from Gaula in Sør-Trøndelag mentioned in Andersen (1970a) is obscure.

According to Lindroth (1945) the Scandinavian specimens of *B. schueppeli* Dejean should be brachypterous. Some specimens collected at the locality 80: Rundhaug, however, had fully developed wings and also have been observed attempting to fly. The Scandinavian distribution of the macropterous form remains to be shown.

THE DISTRIBUTION OF THE SPECIES

The distribution of most of the species is shown in Figs. 2—4.

Asaphidion pallipes (Duftschmid) (Fig. 2A). The species has been found along all the large water systems in northern Norway. The distribution is mainly continental. The occurrence at locality 2: Grane, together with the finds at Namsen (Andersen 1970a) shows that there is no reason to regard the distribution in northern Norway as separated from that of southern Norway (vide Lindroth 1945). *Asaphidion pallipes* has its main occurrence in the coniferous zone. In the birch zone it was found at a single locality only.

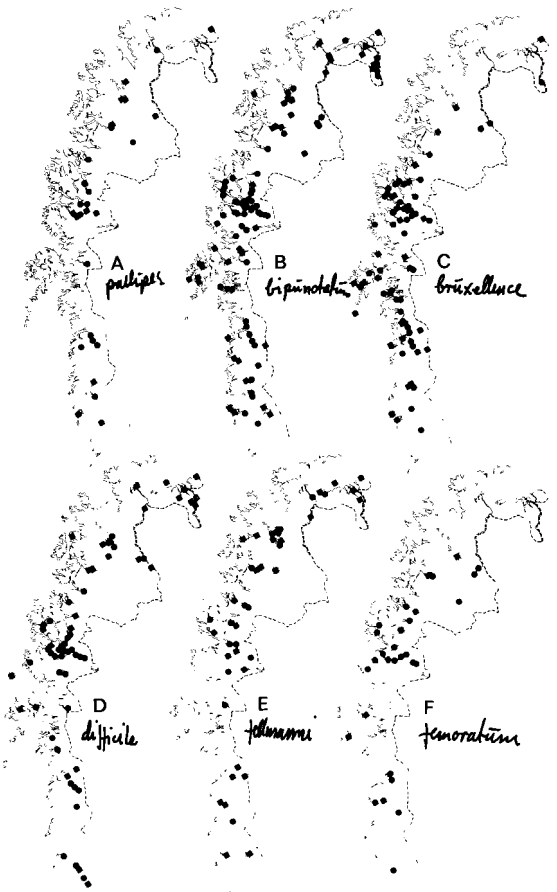

Fig. 2. Distribution of the Bembidiini species in northern Norway. A. *Asaphidion pallipes* (Duftschmid). B. *Bembidion bipunctatum* (L.) C. *B. bruxellence* Wesmaël. D. *B. difficile* (Motschulsky). E. *B. fellmanni* (Mannerheim). F. *B. femoratum* Sturm. Filled circles indicate finds made by the present investigation (after 1969) and by Andersen (1970 a, b). Finds made by other authors (before 1966) are indicated by squares.

Bembidion bipunctatum (L.) (Fig. 2B). This species is distributed all over northern Norway both at the coast with the islands and in the inner parts of the country. It is common in both the coniferous zone and the birch zone.

B. bruxellense Wesmaël (Fig. 2C) is very densely distributed in the provinces of Nordland and Troms, whereas in Finnmark the species seems to be more scattered. There is no hiatus between the distributions in southern and northern Norway as also supposed by Lindroth (1945). This is evident from the find at Grane (locality 2) and previous finds from Namdalen (Andersen 1970a). *B. bruxellense* is common in both the coniferous zone and the birch zone.

B. difficile (Motschulsky) (Fig. 2D). The species is continuously distributed throughout northern Norway, both in the continental areas and on the outermost islands. It is abundant in the coniferous zone as well as in the birch zone.

B. fellmanni (Mannerheim) (Fig. 2E) is rather evenly distributed in northern Norway. In the provinces of Troms and Finnmark it is also found at the coast, but it seems to lack in Lofoten and Vesterålen. *B. fellmanni* is the only species that has been found more often in the birch zone than in the coniferous zone. One find of the species was made outside the timber line.

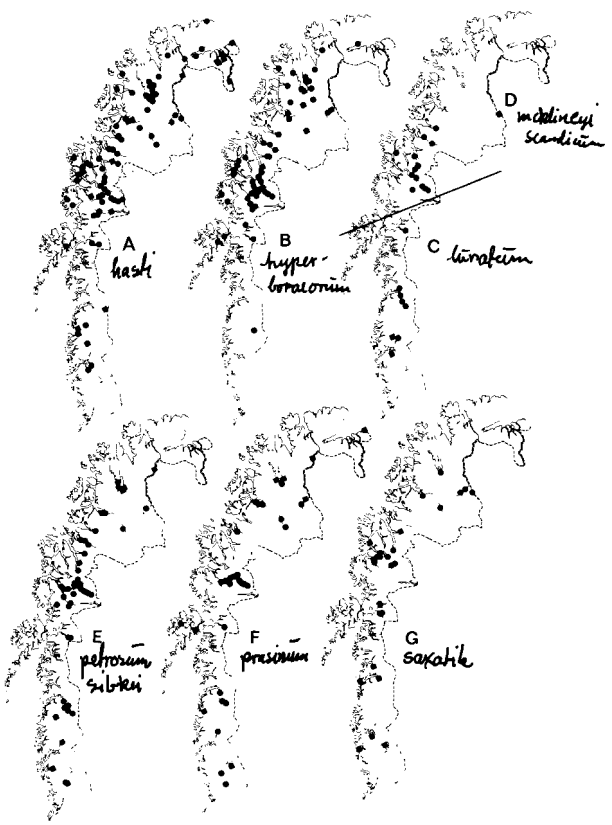

Fig. 3. Distribution of the Bembidiini species in northern Norway. A. *Bembidion hasti* Sahlberg. B. *B. hyperboraeorum* Munster. C. *B. lunatum* Duftschmid. D. *B. mckinleyi scandicum* Lindroth. E. *B. petrosum siebkei* Sparre Schneider. F. *B. prasinum* (Duftschmid). G. *B. saxatile* Gyllenhal. For further explanation see Fig. 2.

B. femoratum Sturm (Fig. 2F). According to Lindroth (1945, 1949) the distribution of this species is markedly bicentric. The present finds and the finds by Johnson (1967) from Nordland as well as those from Namdalen (Andersen 1970a), however, clearly demonstrate that the species is continuously distributed from southern to northern Norway. *B. femoratum* occurs frequently in both the coniferous zone and the birch zone.

B. hasti Sahlberg (Fig. 3A). This is one of the most densely distributed species in Troms and Finnmark, whereas the distribution in Nordland is more scattered. It is regularly distributed in the coniferous zone and the birch zone as well as outside and above the timber line.

B. hyperboraeorum Munster (Fig. 3B) is densely distributed in Troms, Finnmark and the northernmost parts of Nordland. A quite isolated find was made at the river Ranaelva. The species is present in the alpine and arctic zones although it is mainly found within the timber line.

B. lapponicum Zetterstedt has exclusively been found along the large rivers and thus is rather scattered. The occurrence at the river Namsen (Andersen 1970a), however, shows that the species cannot be regarded as bicentric as suggested by Lindroth (1949). It has been found only in the coniferous zone.

B. lunatum (Fig. 3C). In northern Norway this species has been found only in Nordland and rather scattered, mostly along the large rivers north to the river Skjoma. Finds at the river Namsen (Andersen 1970a, Andersen unpublished data) unites the distributional area of southern and northern Norway. The species has been found only in the coniferous zone.

B. mckinleyi scandicum Lindroth (Fig. 3D). This obviously is a northern subspecies known only from Troms and Finnmark. Although it has been found at the coast at one locality, the species seems to have its main distribution in the inland. As *B. mckinleyi scandicum* also has been found at Lake Bajkal (Lindroth in lit) it is no Scandinavian endemism (vide Andersen 1970b). It is present in both the coniferous zone and the birch zone.

B. obliquum Sturm. Only one specimen has been found in northern Norway. It was collected 24 July 1973 at locality 93 at the mouth of the river. The same place was thoroughly investigated in July 1974, but no specimens were found. Obviously no populations exists in Troms. The only specimen was collected during a heatwave with south-eastern winds and it is likely that it was brought to the place by anemochorous dispersal. The distance to the nearest permanent occurrences in Sweden and Finland is, however, long.

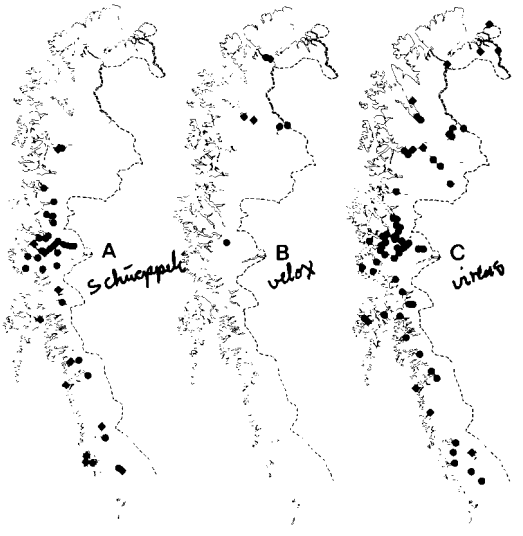

Fig. 4. Distribution of the Bembidiini species in northern Norway. A. *B. schueppeli* Dejean. B. *B. velox* (L.) C. *B. virens* Gyllenhal. For further explanation see Fig. 2.

B. petrosum siebkei Sparre Schneider (Fig. 3E) is frequent along running waters in northern Norway. The distribution is continental as the subspecies only has been found in the inner parts of the fjords and in the inland valleys. Finds at the river Namsen (Andersen 1970a) connects the area in southern Norway with that of northern Norway, and the subspecies cannot be regarded as bicentric (vide Lindroth 1949). It occurs regularly in both the coniferous zone and the birch zone.

B. prasinum (Duftschmid) Fig. 3F) is rather evenly distributed in the whole part of the country, and also is present on some of the large islands. The species occurs in both the coniferous zone and the birch zone.

B. quadrimaculatum (L), has been found by me in the inner part of Finnmark on the localities 150 and 152 (vide also Strand 1946). In northern Norway it is otherwise known only from Reisadalen (Strand 1953). The species has been found in the coniferous zone only.

B. saxatile Gyllenhal (Fig. 3G). On the map of Lindroth (1945) the species is represented by a point at or near Melby in Vesterålen. This point is omitted on the present map as Strand (1946) has no records of this species from the Lofoten

or Vesterålen islands. Although present in all parts of northern Norway the distribution of the species is somewhat scattered. In the northernmost part of Nordland and in Troms it has been found only at the sea or at the outlet of streams into the sea. The only exception is the occurrence at Lake Rostavatn in Troms where the species is abundant. In Finnmark on the other hand, the species is found along streams far from the sea. *B. saxatile* is present in both the coniferous zone and the birch zone.

B. schueppeli (Fig. 4A). On the map of Lindroth (1945) this species is represented by a point at Lanes on the island Ringvassøya in Troms. Obviously this is a misunderstanding. According to Strand (1946) the correct place must be Lanes in Malangen. The species is rather evenly distributed in Nordland and in the province of Troms, whereas in Finnmark it has been found only at the river Altaelva. The species is common in both the coniferous zone and the birch zone.

B. velox (L). (Fig. 4B). The species has an eastern distribution in northern Norway. It is not recorded from Nordland and in Troms it has been found on one single locality: 74 Fjellfrøsvatn. In the eastern part of Finnmark *B. velox* is present within the water system of the rivers Lakselva and Tanaelva. The species occurs in both the coniferous zone and the birch zone.

B. virens Gyllenhal (Fig. 4C) is rather densely distributed throughout northern Norway. In Nordland and Troms it is found at the coast as well as inland. The species occurs in the coniferous zone as well as in the birch zone.

DISCUSSION AND CONCLUSION

Not all parts of northern Norway have been investigated equally well. The intensity of investigation on each locality as well as the density of localities, however, is sufficient to show the main distribution of the species.

It is natural to group the species in the following distributional categories. I. Southern species. Present in Nordland, but not in the provinces of Troms and Finnmark: *B. lunatum*. II. Northern species. Probably not present S of the polar circle: *B. mckinleyi scandicum, B. hyperboraeorum* (in Sweden further to the South). III. Eastern species. Present in Finnmark and the inner parts of Troms, but probably lacking in Nordland: *B. quadrimaculatum, B. velox*. IV. Species present in all the provinces of northern Norway. Some of these species (marked with c) mainly have a continental distribution. Several

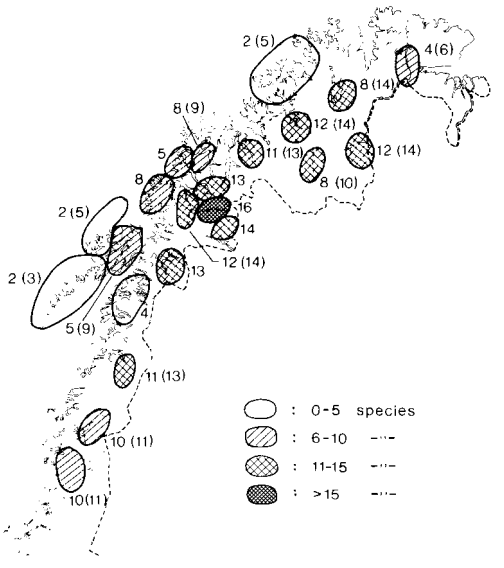

Fig. 5. The number of Bembidiini species found in different areas of northern Norway by the present investigation. Figures within brackets give the total number of species found within the areas.

of the species with a wide distribution in northern Norway are absent from S Scandinavia although some of them are present in Central Europe. These species thus have a northern distribution in Fennoscandia (marked with N). The actual species in group IV are the following: *Asaphidion pallipes* (c), *Bembidion lapponicum* (c, N), *B. bipunctatum, B. bruxellense, B. difficile* (N), *B. fellmanni* (N), *B. femoratum, B. hasti* (N), *B. petrosum* siebkei (c, N), *B. prasinum* (N), *B. saxatile, B. scueppeli* and *B. virens* (N). V. Species with an accidental occurrence in northern Norway: *B. obliquum*.

From this review it is clear that the members of the tribe Bembidiini to a very large extent occur sympatrically in northern Norway (Fig. 5). Quite limited areas of inner parts of Nordland, Troms and Finnmark harbour more than ten species, in some areas of inner Troms and Finnmark as many as 14—16 species are present. Areas of similar size along the coast of Troms harbour up to 9 species. The Lofoten islands (localities 45—48) and the area between Fauske and Skjomen (localities 18—24) have strikingly few species. The first mentioned area has 3 species, the last mentioned 4 species. These areas deviate from most of the others by the lack of larger water systems. Suitable habitats for many of the Bembidiini species are thus few or not present. In addition, dispersal barriers may have

hindered some species to colonize these areas, especially the Lofoten islands.

Lindroth (1945, 1949) supposed that the species *Asaphidion pallipes, Bembidion femoratum, B. lapponicum, B. lunatum, B. petrosum* and *B. fellmanni* were bicentric or with a hiatus between the distribution in S and N Scandinavia. As is evident from the present data this hiatus does not exist for the five first mentioned species. Whether *B. fellmanni* is a bicentric species or not still is uncertain.

Three species were found only in the coniferous zone. Among these species, however, *B. lapponicum* also is present in the birch zone in other parts of Fennoscandia whereas *B. lunatum* and *B. quadrimaculatum* seem to be absent from this zone. The rest of the species occur regularly in both the coniferous zone and the birch zone although some of them (e.g. *Asaphidion pallipes)* may be most abundant in the coniferous zone. This is in full accordance with the results from other parts of Fennoscandia.

B. fellmanni was the only species found more often in the birch zone than in the coniferous zone. As the birch zone was underrepresented compared with the coniferous zone regarding investigated localities, it is most likely that the birch zone is the optimal zone of this species (vide also Lindroth 1945).

Among the species considered in the present work, six have been found in the arctic or alpine zone in Fennoscandia (Fridén 1956, Lindroth 1945, 1949). Three of these species *(B. bipunctatum, B. difficile, B. virens)* occur seldom or perhaps only accidentally in these zones, whereas *B. hasti, B. hyperboraeorum* and *B. fellmanni* have a regular occurrence here. The three last mentioned species were also the only ones found outside or above the timber line in the present investigation.

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Received 7 Ja

Anaphes cultripennis Debauché, 1948 (Hymenoptera, Mymaridae) in Norway

PER SVEUM AND JOHN O. SOLEM

Sveum, P. & Solem, J.O. 1980. *Anaphes cultripennis* Debauché, 1948 (Hymenoptera, Mymaridae) in Norway. — *Fauna norv. Ser. B* 27, 17—18.

Anaphes cultripennis Debauché, 1948 is reported from Norway, and biometrics for a population from the mountainous areas of Central Norway (Kongsvoll in the County of Oppdal) are given. Norwegian specimens have larger body, but shorter antennae than continental European specimens, and follow Bergman's and Allen's rules.

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INTRODUCTION

The female *Anaphes cultripennis* was described by Debauché (1948) from Héverle and Campenhout in Belgium. To our knowledge the species has not been reported from outside the type-localities. The male was considered unknown, although the collection of Debauché contains a single male labelled Héverle, 19.9.41, no. 159, and identified by him as *A. cultripennis*. The male resembles the female in the type series totally, except for the sexual characters, i.e. unclubbed antennae, no ovipositor, and penis present. The antennae of *A. cultripennis* are of the typical *Anaphes*-type. That is, with cylindershaped segments carrying four symmetrical sensory ridges on each segment.

MATERIAL AND RESULTS

On the regio subalpina (900 m a.s.l.) at Kongsvoll in the District of Sør-Trøndelag, Central Norway, a considerable number of an *Anaphes* species, both sexes, was sampled in suctiontraps during August 1978 (leg. Anders Olsen). The ratio between females and males was about 5:2; 272 females and 54 males. The Norwegian females fitted the description of *A. cultripennis* given by Debauché (1948) very well regarding qualitative characters; regarding biometrics, considerable deviations were found. When comparing the series of Norwegian specimens, however, with the series of types from Belgium, the two series were found to be clearly conspecific. The species concept and the identification of the *Anaphes* species are much dependent on quantitative characters, and biometrics are given in Table 1. The description given by Debauché (1948) is good, and we do not find it necessary to give additional informations.

As was the case with the single male *A. cultripennis* in the collection of Debauché, the Norwegian males deviate from the female only in sexual characters. Biometrics are given in Table 1.

Bakkendorf (1960) indicated, when describing *Anaphoidea chrysomela* (= Anaphes chrysomela, Anaphes sensu Hellén 1974), that more knowledge on intraspecific variability will fill the gap between forms described as species, and thus provide the knowledge necessary to establish synonyms. The variability in biometrics of *A. cultripennis*, presented above, may be a further indication of this.

The body of the Norwegian specimens is longer than the measurements of the types, the length and width of the anterior wings are within the same range in ours and Debauché material, and tibia III is longer in ours than in the type series. However, the antennae are, in general, shorter in the Norwegian series than in Debauché's type series. Scapus and the 9th segment are much shorter in the nordic — than in the type series. From pedicellus and up to the 8th segment, the segments on our specimens are only slightly shorter, except for segment 3, which is equal in length in ours and Debauché collections. The body length and the length of the antennae seem to vary inversely. Long bodies and short antennae appear in the northern population, and short bodies and long antennae in the more southern population, and these

Table 1. Biometrics of *Anaphes cultripennis* Debauché, 1948. Measurements (in mm) obtained from specimens mounted in Canadabalsam. Type measurements is taken from Debauché (1948)

	Norwegian specimens				Type material
	Females		Males		Females
	n	$\bar{x} \pm SD$	n	$\bar{x} \pm SD$	x
Total body length	50	0.765—0.083	10	0.773—0.058	0.662
Length of anterior wing	52	0.880—0.088	10	0.922—0.040	0.860
Width of angerior wing	50	0.183—0.030	10	0.188—0.017	0.165
Length of tibia III	50	0.338—0.027	10	0.249—0.012	0.284
Length of tarsus III	50	0.254—0.027	10	0.171—0.010	0.240
Length of scapus	50	0.086—0.008	10	0.096—0.007	0.120
Length of pedicellus	49	0.036—0.003	10	0.048—0.004	0.050
Length of 3rd antennal segment	50	0.019—0.003	10	0.080—0.005	0.050
Length of 4th antennal segment	50	0.058—0.007	10	0.087—0.006	0.070
Length of 5th antennal segment	50	0.059—0.006	10	0.085—0.004	0.080
Length of 6th antennal segment	50	0.057—0.005	10	0.083—0.003	0.070
Length of 7th antennal segment	50	0.054—0.005	10	0.080—0.003	0.072
Length of 8th antennal segment	50	0.050—0.005	10	0.078—0.005	0.064
Length of 9th antennal segment	50	0.102—0.010	10	0.077—0.005	0.140
Length of 10th antennal segment			10	0.080—0.004	
Length of 11th antennal segment			10	0.078—0.005	
Length of 12th antennal segment			10	0.081—0.004	

morphological variations thus follow Bergman's and Allen's rules. Similar results have been demonstrated for *Mitopus morio* (Slagsvold 1979) and other poikilotherms (Ray 1960). However, it must be noticed that tibia III of *A. cultripennis* show the opposite variation that Allen's rule predicts.

A. cultripennis seems to be associated with *Salix* sp. and might thus, as some other species of the genus, parasitize chrysomelid beetles (Bakkendorf 1960). During the summer of 1979, with continuous sampling, only single specimens was obtained earlier than the middle of August, when the density rised considerably.

The material is kept at Zoology Department, Royal Norwegian Society of Sciences and Letters, the Museum, Trondheim.

ACKNOWLEDGEMENTS

We are indebted to Dr. Paul Dessart, Institut Royal des Sciences Naturelles de Belgique, Brussel, who provided type material from Debauché's collection and to Dr. Karl-Johan Hedqvist, Stockholm, who kindly examined some specimens of *A. cultripennis*. Finally, thanks to Anders Olsen, Trondheim, for permission to sort out Mymaridae from his suction traps.

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Faunistical notes on Norwegian Proctotrupidae (Hymenoptera)

PER SVEUM

Sveum, P. 1980. Faunistical notes on Norwegian Proctotrupidae (Hymenoptera). *Fauna norv. Ser. B* 27, 19—21.

Some new records of Proctotrupidae are presented, and previous Norwegian records of the family are reviewed and commented upon.

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The present paper presents new records of *Proctotrupidae* from Norway, and gives a complete review of previous Norwegian records in order to create a starting point for subsequent work on the family.

MATERIAL AND IDENTIFICATION

The new records have been obtained from material collected by Dag Dolmen/IBP (DD), Sigmund Hågvar (SH), Anders Olsen (AO) and myself (PS). Methods of collecting: Colour traps by DD (Yellow) and AO (brown), pitfall traps by SH and sweeping by PS. The material collected by DD was collected in rich deciduous forests, by SH in coniferous wood, by AO in coniferous forest (STi: Oppdal, Kongsvoll), deciduous forest at the edge of a cultivated field (STi: Trondheim, Vold) and close to *Salix*-shrubs (STi: Oppdal, Kongsvoll), by PS in *Salix*-shrubs (STi: Oppdal, Kongsvoll) and on *Carex* sp. at the edge of a small pond (VE:Tjøma, Mostranda).

The nomenclature and identification follows Pschorn-Walcher (1971). The males of the genus *Codrus* are considered difficult to identify (Pschorn-Walcher 1971). The available keys (Nixon 1938, Pschorn-Walcher 1971) does not work well on the males from the present material, and thus I found it necessary at this point to delete *Codrus*-males from the list. The geographical division follows Strand (1943) with names and limits updated. The material is kept in the collection of The Royal Norwegian Society of Sciences and Letters, The Museum.

NEW RECORDS

Cryptoserphus laricis (Haliday, 1839) STi:Oppdal, Kongsvoll 6 Aug. 1978, 1 ♂, AO.

C. foveolatus (Möller, 1882) AAy:Åmli 19 Sept. 1978, 4 ♀ ♀, SH.

C. cumaenus Nixon, 1938 AA4:Åmli 29 Aug. 1978, 2 ♀ ♀, SH.

C. aculeator (Haliday, 1839) MRy:Bøfjord, Kallset 10 Nov. 1971, 1 ♂, DD.

Brachyserphus laeviceps (Thomson, 1858) Nsi: Beiarn, Arstad 28—30 June 1972, 1 ♀, DD.

Disogmus areolator (Haliday, 1839) MRi:Rindal, Dalsegga 12—20 June 1972, 1 ♀, DD;STi:Oppdal, Kongsvoll 2—16 Sept. 1978, 2 ♀ ♀, 1 ♂, PS; Støren, Rognes 9—10 Sept. 1972, 1 ♂, DD. None of the specimens have signs of reddish brown on the mesonotum as *D. nigripennis* Thomson, 1858, which Pscorn-Walcher (1971) considers a colour-variant only of *D. areolator*.

Proctotrupes gravidator (L., 1758) MRi:Rindal, Dalsegga 6—9 Juni 1971, 2 ♂ ♂, DD.

Partenocodrus elongatus (Haliday, 1839) AAy:Åmli 19 Sept. 1978, 1 ♀, SH; STi:Trondheim, Steinan 21 Sept. 1978, 1 ♂, PS.

Phaenoserphus calcar (Haliday, 1839) MRy:Tingvoll, Eikren 12—14 July 1971, 2 ♂ ♂, DD; Tingvoll, Vulvik 12—18 July 1971, 1 ♀, DD; MRi:Rindal, Dalsegga 19—20 June 1972, 1 ♀, DD; STy:Snillfjord 17—18 Aug. 1971, 1 ♂, DD; STi:Byneset 21 June 1971, 1 ♂, DD; Trondheim, Vold 2 Aug. 1978, 1 ♀, ♂, AO; Selbu, Nedal 6 Aug. 1972, 1 ♂, DD; NTy:Nærøy, Grytsoger 9 Aug. 1971, 1 ♀, DD.

Ph. pallipes (Latreille, 1809) MRy:Rindal, Dalsegga 6—9 July 1971, 1 ♀, DD; STi:Støren, Rognes 9—10 Aug. 1972, 1 ♂, DD, Byneset, Mule 25 Aug. 1972, 1 ♂, DD; Nsi:Beiarn, Arstad 28—30 June 1972, 2 ♂ ♂, DD.

Ph. vexator Nixon, 1938 STi:Støren, Rognes 18—19 Aug. 1971, 2 ♀ ♀, DD; NTi:Steinkjer, Byahalla 5—7 July 1972, 1 ♀, DD.

Ph. fuscipes (Haliday, 1839) MRi:Rindal, Dalsegga 12—20 Aug. 1972, 1 ♀, DD; STi:Orkdal, Dragset 15—16 Aug. 1972, 1 ♀, DD; Oppdal, Kongsvoll 23 Aug.—5. Sept. 1978, 2 ♂ ♂, PS. 2 Aug. 1978, 1 ♂, AO; Klæbu, Målsjøen 15 July 1978, 1 ♂, AO; Nsi: Beiarn, Arstad 28—30 June 1972, 1 ♀, DD.

Ph. viator (Haliday, 1839) STi:Trondheim, Vold 2 Aug. 1978, 1 ♀, AO; Støren, Rognes 18—19 Aug. 1971, 1 ♀, DD; Byneset, Mule 25 Aug. 1972, 1 ♀, DD.

Ph. dubiosus Nixon, 1938 MRi:Rindal, Dalsegga May 1972, 1 ♂, DD.

Codrus brevicornis (Haliday, 1839) MRy:Tingvoll, Eikren 12—14 July 1971, 1 ♀, DD; MRi:Rindal, Dalsegga 19—20 June 1972, 1 ♀, DD; STi:Støren, Rognes 9—10 Aug. 1972, 1 ♀, DD; Trondheim, Steinan 27 Sept. 1978, 4 ♀ ♀, PS (habitat unknown).

C. ligatus Nees, 1834 VE:Tjøme, Mostranda 19 Aug. 1978, 1 ♀, PS; STy:Snillfjord 17—18 Aug. 1971, 1 ♀, DD; STi:Støren, Rognes 9—10 Aug. 1972, 1 ♀, DD; Byneset, Mule 16—21 June 1971, 1 ♀, DD; Nsi:Beiarn, Arstad 28—30 June 1972, 1 ♀, DD.

C. microcerus (Kieffer, 1908) MRy:Tingvoll, Eikren 12—14 July 1971, 2 ♀ ♀, DD; STi:Klæbu, Målsjøen 2 July 1978, 1 ♀, AO; Trondheim, Vold 2 Aug. 1978, 1 ♀, AO; Nsi:Rana, Alteren 1—2 July 1972, 1 ♀, DD.

C. ater Nees, 1834 MRi:Rindal, Dalsegga 15—20 June 1972, 1 ♀, DD; STi:Trondheim, Vold 15 July 1978, 1 ♀, AO.

C. gracilis (Nixon, 1938) NTi:Steinkjer, Byahalla 5—6 July 1972, 1 ♀, DD; Snåsa, Seemskog 3—4 July 1972, 1 ♀, DD.

PREVIOUS RECORDS

No revision of the identifications regarding previous records have been carried out. Comments concerning species status or nomenclature are therefore in no way meant to be complete. Such comments are based on the most modern works on *Proctotrupidae,* i.e. the works by Hellén (1941), Nixon (1938) and Pschorn-Walcher (1958, 1971). In cases when names are unrecognized in these modern works, this has been noted.

The first to give records of Norwegian *Proctotrupidae* was Thomson (1857). He recorded *Proctotrupes pallipes* (Jurine) (*Proctotrupes* Latreille = *Codrus* Panzer), *P. niger* (Panzer) (*Codrus niger* Panzer sensu Nixon 1938) and *P. clavipes* (Thomson) (= ?*Codrus ligatus* Nees sensu Hellén 1941) from Dovre and *P. ater* (Nees) (= *Codrus ater* Nees sensu Nixon 1938) without any other locality than Norway.

Strand (1898) lists Thomson records (Thomson 1857) and in addition *Proctotrupes gravidator* (= ?*P. gravidator* (L.)), however, without any notes on the locality.

Kieffer (1912) reported *Phaenoserphus viator* Haliday, *Ph. viator* var *Testaceicornis* Kieffer, *Ph. micrurus* Kieffer, *Ph.* sp. from NTi:Overhalla, and *Codrus* sp. from Tønset (unrecognized locality). As stated by Pschorn-Walcher (1957) most species described by J.J. Kieffer are invalid. This is probably also the case for *Ph. micrurus* and *Ph. viator* var *testaceicornis.* The later subspecies might be a junior synonym of *Ph. viator.*

Hellén (1966) recorded the following species from SFi:Aurland: Phaenoserphus elongatus (Haliday, 1839), *Ph. calcar,* Ph. *borealis* Hellen, 1941, *Cryptoserphus brevimanus* (Kieffer, 1914), and *Codrus microcerus. Ph. borealis* which in the addition to the record from Aurland is known only from a few localities in Finland (Hellèn 1941), was by Pschorn-Walcher (1971) regarded as a doubtful species. The same author did not mention *C. brevimanus* as a good species (Pschorn-Walcher 1958, 1971). Neither was the species mentioned by Nixon (1938) in his review of British species, although Kieffer (1914) described the species from England (and not recorded by him from outside the type-locality). The species was also listed by Kloet and Hincks (1945), however, probably based only on the record by Kieffer (1914). *Ph. calcar* has been transfered by Pschorn-Walcher (1958) to be hitherto monotypic genus *Parthenocodrus* Pschorn-Walcher.

COMMENTS

Pschorn-Walcher (1971) stated that the species of Proctotrupidae are very widely distributed showing few if any species specific distributional patterns. We might therefore expect that most species occurs in most parts of Norway. It is, however likely that extensive collecting will reveal several species new both to the country and to science.

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I am indebted to Mr. Dag Dolmen, Trondheim, Mr. Sigmund Hågvar, Ås and Mr. Anders Olsen, Trondheim who all supplied material, and especially to Prof. Dr. Hubert Pschorn-Walcher, Kiel who kindly checked identifications. Finally I would like to thank Senior Curator John O. Solem, Trondheim for practical help and critical reading of the manuscript.

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On the occurrence of Beraeidae (Trichoptera) in Western Norway

TROND ANDERSEN

Andersen, T. 1980. On the occurrence of Beraeidae (Trichoptera) in Western Norway. *Fauna norv. Ser. B, 27,* 22—24.

Records of *Beraea maurus* (Curtis, 1834), *B. pullata* (Curtis, 1834) and *Beraeodes minutus* (Linnaeus, 1761) from Western Norway are given. *B. maurus* must be regarded as new to Norway. *B. minutus* has previously been recorded only once from Norway. Flight periods and habitats are briefly discussed.

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INTRODUCTION

The first records of Beraeidae from Western Norway were given by McLachlan (1903). In the summer of 1902 the rev. A.E. Eaton and his wife had made a short excursion across southern Norway from Oslo to Bergen. They caught *Beraea pullata* (Curtis, 1834) at Vossevangen, Voss, and probably also *Beraea maurus* (Curtis, 1834) at Skjervet, Granvin. However, the latter record was uncertain as only one female was caught. Later Brekke (1946) added *B. pullata* from outer Hordaland.

The present paper gives further information on the occurrence of *B. pullata* as well as *B. maurus* and *Beraeodes minutus* (Linnaeus, 1761) from Western Norway. These are the only three species of Beraeidae taken in Norway. An uncertain record of a fourth species, *Ernodes articularis* (Pictet, 1834), from southern Hedmark was given by Morton (1901), but the presence of this species in Norway has not been confirmed. The nearest localities of *E. articularis* is situated in the southernmost part of Sweden (Forsslund & Tjeder 1942).

THE SPECIES

Beraea maurus (Curtis, 1834). Material examined: Børveneset (UTM: 32VLM685852), HOi: Ullensvang 2 Aug. 1979 1 ♂ 1 ♀, netted in the vegetation along a small trickle draining a meadow.

An uncertain record of *B. maurus* from Norway was given by McLachlan (1903):«? — Skjervet, July 21st, at an oozy dribble draining a meadow; ♀ only, and uncertain». Forsslund (1936) stated that *B. maurus* probably belonged to the Norwegian fauna, even though not verified with certainty. In latter check-lists on the Norwegian caddisflies (ie.: Brekke 1946, Svensson & Tjeder 1975) the species have been omitted. The present record from inner Hardanger must therefore be regarded as the first reliable record of *B. maurus* in Norway. It is, however, interesting to note that the locality Skjervet, given by McLachlan (1903) is situated only some 30 km to the north of the present locality (fig. 1) and that the localities are very similar.

B. maurus is distributed in Southern and Central Europe north up to England and Denmark (Botosaneanu 1967). In Sweden it is recorded from Skåne, Gotland and Södermanland (Forsslund & Tjeder 1942). The larvae is semi-terrestrial, living among moist, decaying leaves or among moist moss (Wiberg-Larsen 1979). According to Mosely (1939) the species often is found in the herbage bordering rocky springs or small waterfalls. In northern England the flight period covers the last half of June, July and August (Brindle 1965).

Beraea pullata (Curtis, 1834). Material examined: Herdla, HOy:Askøy 5 June 1936 1 ♂, N. Knaben leg. Eidsvåg (UTM: 32VKN975062), HOy:Bergen 17 June 1970 1 ♂ 3 ♀, 19 June 1970 1 ♂, L.G. Jensen leg., netted at a small pond rich in vegetation Revheim (UTM:32VLN089127), HOy: Osterøy 20 June 1973 2 ♂, netted in the vegetation along a lake.

The first record of *B. pullata* from Western Norway was given by McLachlan (1903) from Vossevangen, Voss, in inner Hordaland. In his list of the Norwegian Caddisflies Brekke (1946) also recorded the species from outer Hordaland, probably based on the specimen collected by Knaben on the Island of Herdla (see above). *B. pullata* seems to be widely distributed in Norway. In addition to the records from Hordaland, Brekke (1946) recorded *B. pullata* from northern Opland, eastern Buskerud, inner South-Nordland and outer Troms. Later Solem (1967) have recorded the species from outer Sør-Trøndelag. *B. pullata* is distributed all over Europe (Botosaneanu 1967).

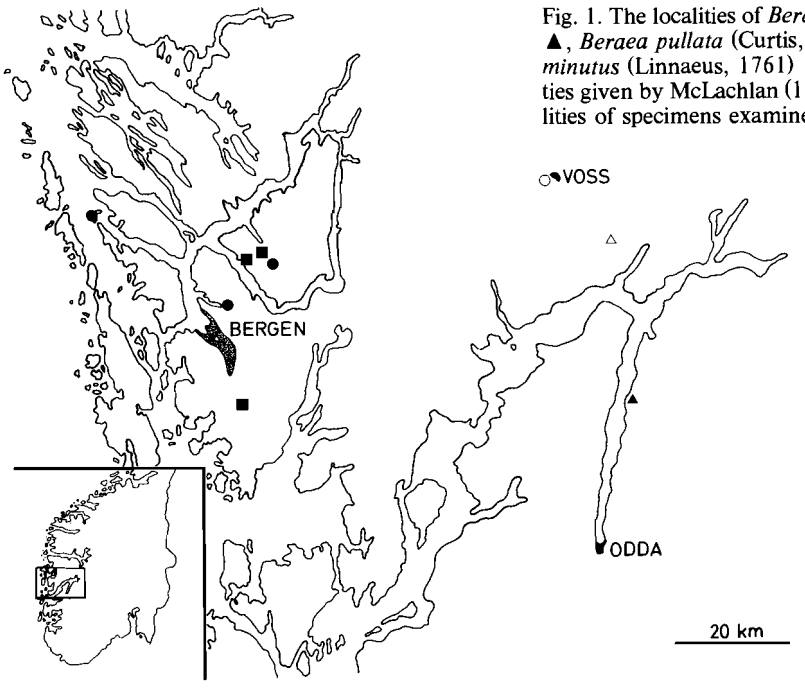

Fig. 1. The localities of *Beraea maurus* (Curtis, 1834) ▲, *Beraea pullata* (Curtis, 1834) ●, and *Beraeodes minutus* (Linnaeus, 1761) ■. Open symbols: localities given by McLachlan (1903), black symbols: localities of specimens examined by the author.

In Scandinavia it reaches as far north as Torne Lappmark in Sweden and to Regio Kuusamöensis in Finland (Malicky 1978, Nybom 1960). In Denmark *B. pullata* occurs in forest ditches or slow-flowing streams, living among the moist leaves along the banks (Wiberg-Larsen 1979). The flight period in northern England covers June, July and the first half of August (Brindle 1965).

Beraeodes minutus (Linnaeus, 1761). Material examined: Valestrandsfossen (UTM: 32VLN041134), HOy: Osterøy 29 May—2 June 1972 1 ♂, in a light trap at a small lake with rich vegetation. Revheim (UTM: 32VLN085131), HOy: Osterøy 7—12 June 1972 1 ♂, in a light trap at a lake with rather sparse vegetation. Kalandsvann (UTM: 32VLM022874), HOy:Bergen 18 June 1973 4 ♂ 4 ♀, netted along a small slowly running river near the inlet of the lake. The species was observed flying late in the afternoon in between the vegetation bordering the river, about 1 m above the water surface.

The only previous record of *B. minutus* from Norway was given by Morton (1901) from Seterstøa («Saeterstoen»), Sør-Odal, in southern Hedmark, where it was common at a forest brook. *B. minutus* is distributed in most parts of Europe as far north as Lule Lappmark in Sweden and Lapponia kemensis in Finland (Botosaneanu 1967, Nybom 1960, Tobias 1969). According to Hickin (1967) *B. minutus* lives near the inlet of streams into lakes. The flight period in northern England covers the last three weeks of June (Brindle 1965).

DISCUSSION

Considering the rather small number of specimens caught, the Beraeidae species seems to be rare in Western Norway. However, the species are small and it appears that they live concealed in the vegetation near their larval habitats. Nielsen (1942) recorded *B. pullata* flying at sunset and also in the middle of the day in cloudy weather. During the present study *B. minutus* were seen flying in the afternoon, but only in between the bushes bordering the river.

The Beraeidae species are appearently poorly attracted to light traps. At a small stream in southern Sweden Svensson (1972) caught all three species in greater numbers in Malaise traps than in light traps. In the present study only two males of *B. minutus* were taken in light traps despite the traps beeing operated close to the water at both Valestrandsfossen, Revheim and Kalandsvann as well as at other promising localities during the flight periods.

The best method for collecting species of Beraeidae seems to be the use of sweepnets. *B. pullata* and *B. minutus* should be searched for in the vegetation along ponds, lakes and slowflowing rivers. Further collecting will probably reveal that these species have a wide distribution in southern Norway, even though always encountered in small numbers. *B. maurus* should be

searched for in the vegetation along small streams and trickles. This species probably is very rare and local in Norway, and is perhaps restricted to the south-western parts of the country.

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Relative abundance and flight periods of Trichoptera at Lake Vassbygdvann, West Norway

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Andersen, T. 1980. Relative abundance and flight periods of Trichoptera at Lake Vassbygdvann, West Norway. *Fauna norv. Ser. B, 27,* 25—31.

A total of 16639 specimens of Trichoptera belonging to 18 species were taken in a light trap at the lower end of Lake Vassbygdvann in 1968 and 1969. Five species are previously not recorded from inner Sogn and Fjordane, viz: *Oxyethira flavicornis* (Pictet, 1834), *Mystacides azureus* (L. 1761), *Limnephilus centralis* (Curtis, 1834), *L. femoratus* (Zetterstedt, 1840), and *L. rhombicus* (L., 1758).

Limnephilidae were the dominating family, 12 species comprised 93% of the material. The most abundant species were *Apatania stigmatella* (Zetterstedt, 1840) 62%, *Potamophylax latipennis* (Curtis, 1834) 30%, *Rhyacophila nubila* (Zetterstedt, 1840) 7%, and *L. rhombicus* 1%. The other 14 species made up only 0.5% of the total. The flight period of most of the species was restricted to the last half of July, August and September.

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INTRODUCTION

During the last decades invertebrates in several West Norwegian watercourses have been studied in connection with the hydroelectric exploitation of these watercourses. The investigations have mainly been based on bottom samples, estimating larval densities and biomasses. Trichoptera has been shown to be an important group in most of these watercourses (Steine 1972, Raddum 1974 a, b). However, the Trichoptera larvaes have usually not been identified below family level, and our knowledge of the Trichoptera fauna in the inner parts of Western Norway is still sparse. The present paper deals with a collection of Trichoptera imagines taken in a light trap at Lake Vassbygdvann in Aurland in inner Sogn and Fjordane before the Aurland watercourse was exploited.

STUDY AREA

The Aurland valley is running in an south-east direction from the end of the Aurlandsfjord, a branch of the innermost part of the Sognefjord. The valley is narrow and the surrounding mountains reach 1200 to 1600 m altitude. Lake Vassbygdvann is situated about 5.5 km from the fjord, at an altitude of 54 m a.s.l. The lake is about 3 km long, with a maximum dept of 64 m. Shallow littoral zones are found only near the inlet and the outlet.

Vassbygdvann has a high flow-through rate. The theoretical renewal time is 0.75 months. However, the water flow is highly variable,

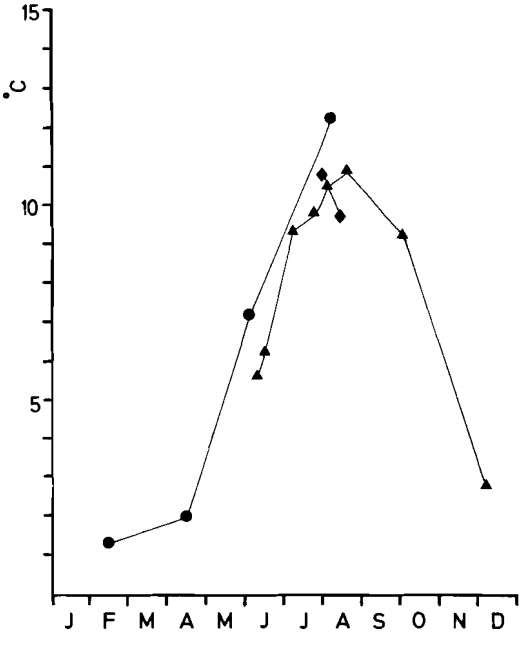

Fig. 1. Yearly variation in surface temperature in Lake Vassbygdvann. ▲ -1971, ● —1972 and ♦ —1973 (Data from Steine 1974).

Table I. Trichoptera taken in the light trap at Lake Vassbygdvann in 1968 and 1969.

Species	1968		1969	
	males	females	males	females
Oxyethira flavicornis (Pictet, 1834)		1		
Rhyacophila nubila (Zetterstedt, 1840)	131	185	320	446
Eomystra intermedia (Klapálek, 1892)				2
Plectrocnemia conspersa (Curtis, 1834)		1	2	2
Polycentropus flavomaculatus (Pictet, 1834)			2	
Mystacides azureus (L., 1761)			1	
Apatania stigmatella (Zetterstedt, 1840)	6265	1961	1592	434
A. zonella (Zetterstedt, 1840)		9		21
Limnephilus centralis (Curtis, 1834)	1			
L. coenosus (Curtis, 1834)			1	
L. femoratus (Zetterstedt, 1840)			1	
L. rhombicus (L., 1758)	37	90	12	52
Potamophylax cingulatus (Stephens, 1837)	5		4	
P. latipennis (Curtis, 1834)	824	1091	1932	1183
P. nigricornis (Pictet, 1834)	2	1	1	1
Micropterna sequax McLachlan, 1875			1	
Halesus digitatus (Schrank, 1781)	1	2	4	3
H. radiatus (Curtis, 1834)	1		11	4

with a low flow-through during the ice covered period in the winter and a high flow-through during the snow melting in early summer.

In 1971, 1972 and 1973 Steine (1974) made investigations in the lower part of the watercourse. The following figures refers to one of his stations situated approximately in the middle of the lake. The surface temperatures recorded are shown in Fig. 1. The water usually freeze in late December and the lake can be icecovered until April—May. The surface temperatures measured in June varied between 5.6°C and 7.2°C, and the temperature seemed not to reach 10°C until late July. During periods with calm weather and high insolation late in the summer the surface temperature could rise still higher. The highest surface temperature recorded, 12.0°C, was measured on 6 Aug. 1972. The oxygen content of the surface water varied between 88.2 and 102.1% saturation, the acidity between pH 6.1 and 6.7, and the concentration of calsium between 1.0 and 1.8 mg/l, of magnesium between 0.19 and 0.33 mg/l, of sodium between 0.33 and 1.55 mg/l, and of potassium between 0.18 and 0.43 mg/l during the same period. The lake must be regarded as oligotrophic.

The trap was situated at the lower end of the lake, (UTM:32VMN057502), only about 150 m from the outlet. This part of the lake has a shallow littoral zone. The bottom is covered with stones and gravel, and there is some sand and mud on deeper waters. A small brook crosses the shore near the trapping site.

METHODS AND MATERIAL

The material was collected by Gerd Hansteen during 1968 and 1969 when she studied the Chironomidae in the lake (Hansteen 1972). The light trap used was fitted with a mercury vapour bulb and placed on the shore near the water edge. In 1968 the trap was operated from 28 July to 31 August, with breaks on the 14 and on the 29 and 30 August. In 1969 it was operated from 21 to 26 June, 11 to 16 July, 31 July to 7 August, 21 to 28 August and 12 to 17 September.

A total of 16639 specimens belonging to 18 species were collected (Tab. I). Five of the species are previously not recorded from inner Sogn and Fjordane, viz.: *Oxyethira flavicornis* (Pictet, 1834), *Mystacides azureus* (L., 1761), *Limnephilus centralis* (Curtis, 1834), *L. femoratus* (Zetterstedt, 1840), and *L. rhombicus* (L., 1758). Further, in previous papers on the Trichoptera from inner Sogn and Fjordane (Brekke 1946, Løken 1966) *Potamophylax cingulatus* (Stephens, 1837) and *P. latipennis* (Curtis, 1834) have not been recognized as separate species and the name *P. (Stenophylax) stellatus* have been used for both.

RESULTS

Relative abundance

Limnephilidae was the dominating family, 12 species comprised 93% of the material. Two species of Polycentropodidae were taken, and

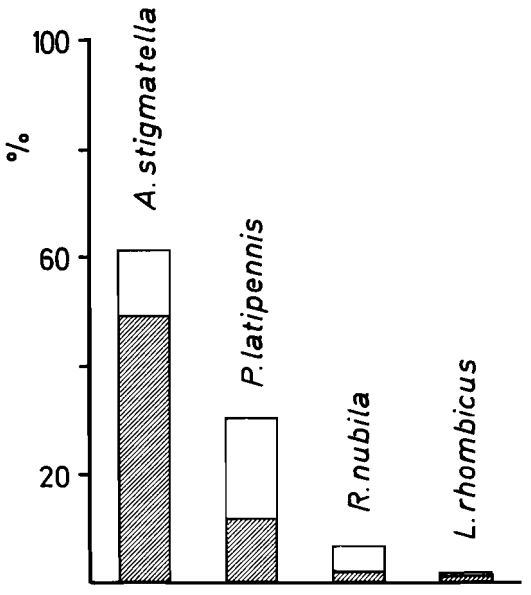

Fig. 2. The abundance of the Trichoptera species constituing more than 1 % of the total in the light trap catches at Lake Vassbygdvann. Hatched column indicate the contribution from the 1968 catches, white coloumn the contribution from 1969.

the remaining four families, viz.: Hydroptilidae, Rhyacophilidae, Glossosomatidae, and Leptoceridae, were each represented with one single species. Of these only *Rhyacophila nubila* (Zetterstedt, 1840) (Rhyacophilidae) were abundant.

The relation between the most abundant species are shown in Fig. 2. *Apatania stigmatella* (Zetterstedt, 1840) made up 62 % of the material (78 % in 1968 and 34 % in 1969) According to Lepneva (1966) *A. stigmatella* inhabit the open litoral zone of lakes, occuring on stones and pebbles, but rarely on sand; it is also found close to the banks in rivers and rivulets with solid bottom. In the inner part of West Norway the species is widespread and common (Andersen 1979a). At the River Storelvi near Odda in Hardanger 56 % of a light trap material belonged to this species (Tab. II).

Potamophylax latipennis made up 30 % of the material (18 % in 1968 and 52 % in 1969). *P. latipennis* has also a wide ecological range. In the lake district in England Kimmins (1944) recorded the species from larger streams, rivers and the littoral zone of the lakes. On the mountain plateau of Hardangervidda in West Norway, 1050 m to 1250 m a.s.l., *P. latipennis* was found at lakes, ponds and pools, while it at lower altitudes was taken at slowly running rivers (Andersen 1979a). In the light trap catches at Storelvi it accounted for 19 % of the specimens (Tab. II).

About 7 % of the specimens were *Rhyacophila nubila* (3 % in 1968 and 13 % in 1969). In West Norway *R. nubila* is a common species in streams and rivers (Andersen 1979a). The short distance from the trapping site to the outlet of the lake makes it possible that most of the specimens of this species might have originated in the river below the lake. However, according to Lillehammer (1978) *R. nubila* inhabit the exposed littoral zone of Lake Øvre Heimdalsvann, 1090 m a.s.l., and an occurrence in the littoral zone of Vassbygdvann is therefore not unlikely.

Limnephilus rhombicus made up 1 % of the material both in 1968 and 1969. According to Mosely (1939) the larvae of *L. rhombicus* inhabit lakes and ponds, and can sometimes be found in slowly running rivers. In outer Hordaland the species is regularly taken at lakes, ponds and slowly flowing rivers and streams (Andersen 1976). From inner Hordaland Dyrrdal (1972) recorded the species as abundant in Lake Leknesvann, a small lake with sparse vegetation situated at an altitude of 582 m a.s.l.

Together, the other 14 species made up less

Table II. The number of specimens of the Trichoptera species constituing more than 1 % og the total in the light trap catches at the River Storelvi (Hildal UTM:32VLM642537, HOi:Odda) between 23 Juni and 8 August 1976. A total of 2638 specimens belonging to 17 species were caught.

Species	males	females	%
Apatania stigmatella (Zetterstedt, 1840)	639	827	55,6
Potamophylax latipennis (Curtis, 1834)	469	30	18,9
Oxyethira frici (Klapálek, 1891)	46	367	15,7
Rhyacophila nubila (Zetterstedt, 1840)	42	9	1,9
Limnephilus extricatus McLachlan, 1865	14	33	1,8
Polycentropus flavomaculatus (Pictet, 1834)	32	9	1,6
Lepidostoma hirtum (Fabricius, 1775)	29	6	1,3
Potamophylax cingulatus (Stephens, 1837)	30	3	1,3

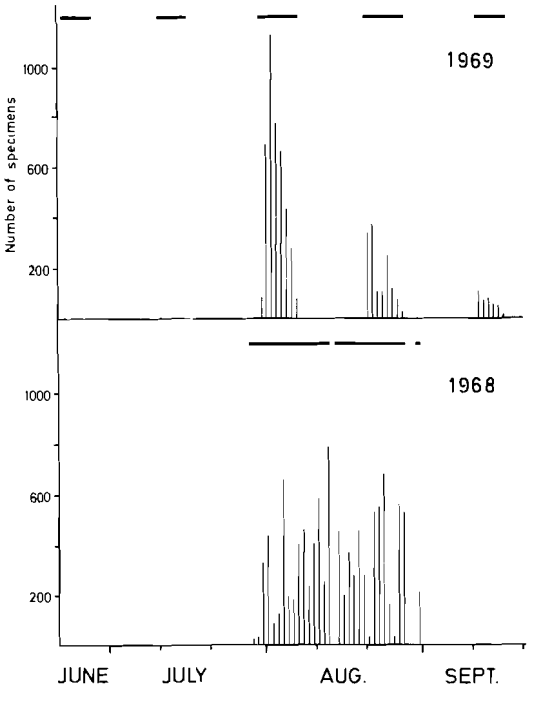

Fig. 3. The daily light trap catches at Lake Vassbygdvann in 1968 and 1969. The trapping periods are indicated by an interrupted line in the top of the figure.

than 1 % of the material. Among these there are also a predominance of species preferring lotic habitats, or inhabiting both lotic and lentic habitats (Botasaneanu 1967, Lepneva 1964, 1966), viz.: *Eomystra intermedia* (Klapálek, 1892), *Plectrocnemia conspersa* (Curtis, 1834), *Polycentropus flavomaculatus* (Pictet, 1834), *Apatania zonella* (Zetterstedt, 1840), *Limnephilus centralis* (Curtis, 1834), *L. coenosus* (Curtis, 1834), *Potamophylax cingulatus* (Stephens, 1837), *P. nigricornis* (Pictet, 1834), *Micropterna sequax* McLachlan, 1875, *Halesus digitatus* (Schrank, 1781) and *H. radiatus* (Curtis, 1834). Several of these species may have come from a small brook near the trapping site or from the river below the lake. However, records of *P. conspersa, P. flavomaculatus, A. zonella, P. cingulatus, H. digitatus,* and *H. radiatus* from Øvre Heimdalsvann (Lillehammer 1978), makes an occurrence of these species in Vassbygdvann probable.

Only *Oxyethira flavicornis, Mystacides azureus* and *Limnephilus femoratus* are usually encountered at lentic conditions in West Norway, although *O. flavicornis* also have been taken at slowly running rivers (Andersen 1976, 1979b). *L. femoratus* is a mountain species in West Norway (Andersen 1979a) and the single male found in Vassbygdvann probably originated in the surrounding mountains. The two other species probably originated in the lake, but both have to be rare as only single specimens were taken. In Øvre Heimdalsvann *M. azureus* was the dominant species on sandy bottom below a depth of 3 m (Lillehammer 1978).

Flight periods

The daily catches at Vassbygdvann are shown in Fig. 3. Judging from the interrupted trapping periods the main flight period of the Trichoptera was restricted to the last part of July, August and September with a maximum in August. In contrast to localities in the lowland in outer Hordaland, Trichoptera at Vassbygdvann seem to have a late flight period. On Osterøy Trichoptera started to fly in May and maximum catches were made in late July—early August. (Andersen 1976).

The catches of *R. nubila, A. stigmatella, L. rhombicus* and *P. latipennis* from 1969 are shown in Fig. 4. Only few specimens of *R. nubila* were trapped in the middle of July, but then the species was taken regularly during the trapping periods in August and September without showing any marked maximum. In the lowland in outer Hordaland *R. nubila* is flying from late May until November, while it at Ekso (580 m a.s.l.) in Eksingedalen in inner Hordaland was trapped between early August and the middle of October (Andersen et al. 1978). Accordingly, the duration of the flight of this species in western Norway seems to be rather variable, and a particular flight maximum usually is not found. *A. stigmatella* was also trapped in small numbers in the middle of July, while the largest samples were taken at the end of August. In the mountain areas of Hardangervidda the species was taken between 12 July and 30 October (Andersen 1979a). At Vassbygdvann *L. rhombicus* was first trapped in the beginning of August. The catches during this trapping period (31 July—7 August) were larger than during the succeeding periods. According to Novak and Sehnal (1963) the females of *L. rhombicus* hatch in Czechoslovakia in the spring or early summer with undeveloped ovaries and live for months in an imaginal quiescence. The development of the reproductive system starts in late summer and autumn, and oviposition take place during the autumn. In Skåne in southern Sweden the flight period of *L. rhombicus* last from the end of June

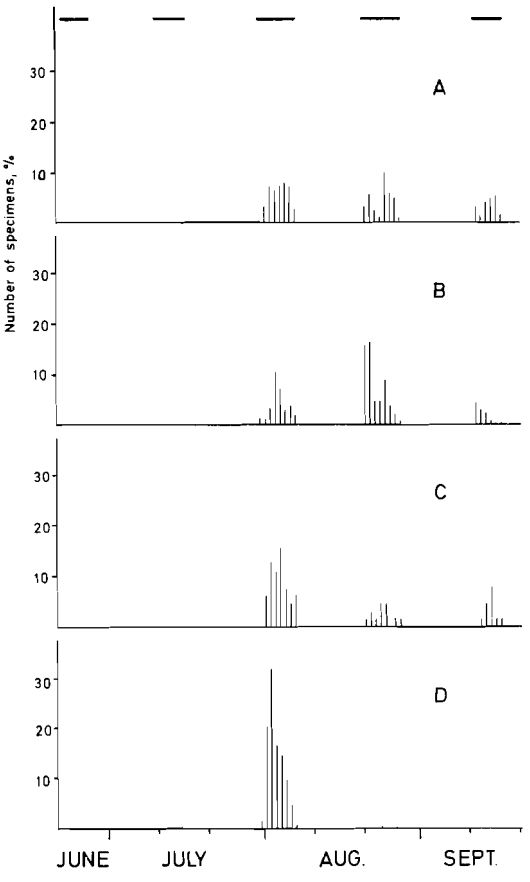

Fig. 4. The daily catches of A — *Rhyacophila nubila* (Zetterstedt, 1840), B — *Apatania stigmatella* (Zetterstedt, 1840), C — *Limnephilus rhombicus* (L., 1758), and D — *Potamophylax latipennis* (Curtis, 1834) in 1969. The trapping periods are indicated by an interrupted line in the top of the figure.

until the middle of September and the imaginal quiescence is reduced to about one month (Svensson 1972). On Osterøy in outer Hordaland this species started to fly at the end of May, with a maximum in late June—early July. Only single males were caught after the beginning of August, the last one arriving between 1 and 10 September (Andersen 1976). At Leknesvann Dyrrdal (1972) caught imagines of *L. rhombicus* from the end of June until the middle of September. Thus, there is a large variation in the time of the flight period of *L. rhombicus* in Western Norway. At Vassbygdvann the species can hardly have any imaginal quiescence. *P. latipennis* seems to have a very short flight period at Vassbygdvann, with a pronounced maximum in the beginning of August. In the Hardangervidda area this species was taken between 30 July and 13 August (Andersen 1979a).

DISCUSSION

Many Trichoptera are known to be strong flyers, and it is often difficult to decide whether a specimen collected in a light trap situated close to a particular habitat actually originated in this habitat, or if it has come from more distant localities. During the present study no larvae were collected to confirm the presence of the different species in Vassbygdvann. However, most specimens of the abundant species have undoubtedly hatched in the littoral zone of the lake, even though the short distance to the outlet probably implies that a not negligible portion of the material consist of specimens from the upper part of the river.

Many of the species taken at Vassbygdvann were found also in Øvre Heimdalsvann (Lillehammer 1978). The abundance figures given for Øvre Heimdalsvann are based on bottom samples and emergence traps, and can hardly be compared to light trap abundance. It is, however, evident that the ranking of the species in the two lakes differs, and it is interesting to note that the position of *P. latipennis* in Vassbygdvann seems to have been taken over by *P. cingulatus* in Øvre Heimdalsvann.

The composition of the Trichoptera fauna of Vassbygdvann shows many similarities to the fauna of Storelvi. The two most abundant species, *A. stigmatella* and *P. latipennis*, hold up the same positions at both localities, while the third most abundant species at Vassbygdvann, *R. nubila*, ranged as number four at Storelvi. Compared to the smaller and faster Ekso only *R. nubila* was among the most abundant species in both localities (Andersen et al. 1978). The composition of the fauna of Vassbygdvann are even less consistent with the fauna recorded from lotic and lentic localities in outer Hordaland (Andersen 1976).

The relative late flight period of the Trichoptera at Vassbygdvann probably is due to the low water temperatures during spring and early summer. Göthberg (1970) studied the flight period of Trichoptera at two neighbouring streams with different water temperatures. He showed that low water temperatures gave a delayed flight period of the early species, while the

species flying in late summer and autumn arrived at the same time at the two streams. He also claimed that species with an early flight period might have difficulties in establishing themselves in the coldest stream. At Vassbygdvann more than 90% of the catches were limnephilids, a group having a late flightperiod (Crichton 1960, Svensson 1972). Non-limnephilids, with an early flight period, nearly lack in the material.

Only 18 Trichoptera species were caught at Vassbygdvann. If the trapping had been continued in October and November, *Chaetopteryx villosa* (Fabricius, 1798) would probably also have been taken. But nevertheless, the figure is low when compared to the number of species taken during comparable studies in West Norway. The two most abundant species at Vassbygdvann made up 92% of the total, and the four most abundant species 99.5%. At Ekso 25 Trichoptera species were caught, of which the two most abundant species made up only 42% of the material (Andersen et al. 1978). In a light trap at a small lake rich in vegetation at Valestrandsfossen in outer Hordaland, a total of 60 species of Trichoptera were caught, of which the two most abundant species made up 55% of the total (Andersen 1976).

The low diversity of the Trichoptera fauna in Vassbygdvann is undoubtedly connected with the oligotrophic conditions of the lake. At the outlet, where the trap was situated, the bottom is mainly composed of stones and gravel. There are hardly any macro-vegetation in the lake. The flow-through rate is high, and the wave movements can be strong in this part of the lake. The low water temperature especially in the spring and early summer probably also reduce the number of species which can inhabit the lake. The species that are common in Vassbygdvann are species that are also abundant at slow flowing rivers in the inner parts of western Norway.

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Lepidoptera new to Norway

LEIF AARVIK

Aarvik, L. 1980. Lepidoptera new to Norway. *Fauna norv. Ser. B 27.* 32—33.

The following species are reported new to Norway: *Bucculatrix maritima* Stainton, *Coleophora tanaceti* Mühlig, *Biselachista scirpi* (Stainton), *Monochroa tetragonella* (Stainton), *M. ferrea* (Frey), *Archips betulana* (Hübner), and *Pammene luedersiana* (Sorhagen).

Remarks on diagnostic characters (sometimes only a reference to relevant literature), distribution, and food-plants are given.

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In 1979 the author collected Microlepidoptera in Rygge, Østfold and Elverum, Hedmark. Five species new to Norway were found. In addition two previously unrecognized species were discovered in the collection of Alf & Sigurd Bakke.

Unless when otherwise stated the material has been collected and identified by the author.

Lyonetiidae

Bucculatrix maritima Stainton

3 ♂♂ 3 ♀♀ Sildebauen, Rygge Ø (EIS 19), 2 June 1979, ex pupa, imagines 15—19 June 1979 and 1 ♂, same locality, 6 July 1979. The latter was netted in the evening. Cocoons were found attached to the stems of different herbaceous plants growing together with *Aster tripolium* L. which is the food-plant (Svensson 1971).

B. maritima is an easily recognizable species. The wings have a characteristic pattern, and it is usually larger than other *Bucculatrix* species. Svensson (1971) figures both genitalia and wings of the species.

The Norwegian locality is a salt marsh where *Aster tripolium* is plentiful.

B. maritima has been captured in the other Nordic countries. In Sweden it has been taken along the coasts of eight provinces from Skåne to Bohuslän and Uppland (Benander 1946, Svensson 1974).

Coleophoridae

Coleophora tanaceti Mühlig

2 ♂♂ Vestad, Elverum HEs (EIS 55), 11 June 1979. The two specimens were netted in the evening.

Patzak (1974) figures the case and genitalia of both sexes.

Due to parasitation by Hymenoptera imagines are rare (Hackman 1945). This probably explains why there is no earlier Norwegian record of the species.

The food-plant is *Chrysanthemum vulgare* (L.) (Patzak 1974), and this plant is growing abundantly in the locality at Elverum.

In Sweden it has been captured in eight provinces from Skåne to Södermanland (Benander 1946, 1953, Svensson 1974, 1978) The species is distributed in Denmark and Finland as well.

Elachistidae

Biselachista scirpi (Stainton)

1 ♂ Sildebauen, Rygge Ø (EIS 19), 6 July 1979. The specimen was netted in the evening. It was taken in the same salt marsh as *Bucculatrix maritima* Stt.

The species' wings and genitalia are figured in the monograph by Traugott-Olsen & Nielsen (1977).

The larva of *B. scirpi* mines the leaves of *Scirpus maritimus* L., *Juncus gerardii* Lois., and *J. compressus* Jacq. (Traugott-Olsen & Nielsen 1977). At least *Scirpus maritimus* is common in the locality.

In Sweden it is distributed along the coasts of the Kattegat and the Baltic Sea up to Bohuslän and Småland. There are several records from Denmark, but only one from south Finland (Traugott-Olsen & Nielsen 1977).

Gelechiidae

Monochroa tetragonella (Stainton)

1 ♂ Sildebauen, Rygge Ø (EIS 19), 15 July 1979. The specimen was netted in the evening on a sea shore.

The male genitalia are figured by Benander (1945).

The species' food-plant is *Glaux maritima* L. (Benander 1945) which is a common plant on sea shores north to Troms (Lid 1974).
In Sweden it is distributed along the coasts of the Kattegat and the Baltic Sea up to Bohuslän and Småland (Benander 1946, 1953, Svensson 1974). There are also records of the species from Denmark and Finland.

Monochroa ferrea (Frey), synonym: *M. latiuscula (Heinemann), M. luteella* sensu auct.

3 ♂ ♂ Vestad, Elverum HEs (EIS 55), 30 June 1979. The specimens were netted during day-time at the sandy bank of the river Glomma.
The male genitalia are figured by Benander (1945).
According to Ole Karsholt (pers. comm.) the biology of *M. ferrea.* is not known.
The species is known from the other Nordic countries. In Sweden it is recorded from Skåne, Öland, and Gotland only (Benander 1946, Svensson 1974, 1976).

Tortricidae

Archips betulana (Hübner), synonym: *A. decretana (Treitschke)*

1 ♂ Rauøy, Onsøy Ø (EIS 19), 26 July 1960, Alf Bakke leg.
The specimen was captured together with a few *A. podana* (Scopoli) which it also resembles. However, it can be separated from that species by the whitish ochreous suffusion in the costal half of the hindwing. The genitalia are figured by Bentinck & Diakonoff (1968).
The larva has been found on *Myrica, Corylus, Betula, Quercus,* and *Vaccinium* (Bentinck & Diakonoff 1968, Bradley et al. 1973).
In Sweden *A. betulana* is recorded from Blekinge, Halland, Västergötland, and Bohuslän (Benander 1946, 1953). It has also been found in Denmark and Finland.

Pammene luedersiana (Sorhagen)

1 ♂ Helgesjøen, Eidskog HEs (EIS 38,15 May 1976, Sigurd Bakke leg. The specimen was netted in a bog.
Bradley et al. (1979) figures the wings and genitalia of this species.
The larva feeds between spun leaves of *Myrica* (Bradley et al. 1979). Bentinck & Diakonoff (1968) states that it has been reared from *Biorrhiza*-galls on *Quercus.*
In Sweden *P. luedersiana* has been recorded from six provinces ranging from Skåne to Västerbotton (Benander 1953, Svensson 1974, 1978). It has also been recorded in Denmark and Finland.

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I wish to express my gratitude to Dr. Alf Bakke for loan of material and to Ole Karsholt for verifying the identification of the two gelechiids.

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New records of horse flies from Norway (Diptera, Tabanidae)

KNUT ROGNES

Rognes, K. 1980. New records of horse flies from Norway (Diptera, Tabanidae). *Fauna norv. Ser. B, 27,* 34—38.

Detailed records of 242 specimens of horse flies belonging to 20 species are given. The Norwegian distribution of *Hybomitra sexfasciata* (Hine, 1923) and *H. kaurii* Chvála & Lyneborg, 1970 are mapped. *H. kaurii* is distributed as far north as *H. sexfasciata,* to about 70° N. Some nomenclatorial remarks concerning *H. nigricornis* (Zetterstedt, 1842) are given. *Tabanus cordiger* Meigen, 1820 is recorded possibly for the first time from Norway.

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INTRODUCTION

Tabanids collected from localities all over the country during the last three years form the basis of the present study. Detailed records, including EIS square numbers (cfr. Økland 1977), are given for 242 specimens belonging to 20 species. Most specimens have been collected by the author and are deposited in his private collection. Other collectors are mentioned in the text. The site of deposition for specimens deposited elsewhere is given. The following abbreviations have been used: TN = Tore R. Nielsen, private collection; ZMB = Museum of Zoology, Bergen; ZMO = Museum of Zoology, Oslo.

Identification of species and sequence of species treated follow Chvála, Lyneborg & Moucha (1972). As regards previously published records, only the most recent literature has, generally, been taken into consideration.

SYSTEMATIC LIST

CHRYSOPS NIGRIPES **Zetterstedt, 1838.**

NORDLAND: Nsi: Rana, Grønlia, 5 ♀♀ 5 July 1978, EIS 123; Nnv: Lødingen, Kanstad, 4 ♀♀ 7 July 1978, EIS 138; TROMS: Tri: Storfjord, Oteren, 5 ♀♀ 10 July 1979, I. & T. Nielsen, EIS 155, TN; Lyngen, Larsberg, 6 ♀♀ 22 July 1978, EIS 163; FINNMARK: Fn Porsanger, Lakselv, 1 ♀ 26—27 July 1979, I. & T. Nielsen, EIS 174, TN.

The species was described by Zetterstedt (1838: 519) on the basis of a single female specimen captured at Bossekop (Fi: Alta) 8 Aug. 1821. Records from recent times are given by Kauri (1964 : 99) and Davies, Golini & Raastad (1971). The distribution is holarctic. It is not known from Denmark (Chvála, Lyneborg & Moucha 1972).

CHRYSOPS DIVARICATUS **Loew, 1858.**

BUSKERUD: Bø: Øvre Eiker, Krekling, 1 ♀ 2 Aug. 1977, EIS 27; Flesberg, Hvila, 1 ♀ 27 July 1979, EIS 27; VESTFOLD: VE: Hof, Thorrud, 1 ♀ 28 July 1979, EIS 28.

The species was recorded for the first time from Norway by Andersen & Kauri (1977) from localities in Vestfold (VE). It is an eastern palearctic species and the record from Flesberg (9° 35' E) is apparently the westernmost European record (cfr. Leclercq 1960; 1966: 234). The dot for Denmark in Leclercq (1960: Map 17) is obviously misplaced and ought to be moved to Zealand, the only Danish record being from Hestehave, Hillerød, Zealand (Lyneborg 1960:166).

CHRYSOPS CAECUTIENS **(L.)**

AUST-AGDER: AAi: Åmli, Sandå, 1 ♀ 28 June 1978, EIS 10; TELEMARK: TEy: Drangedal, Tørnes, 1 ♀ 28 June 1978, EIS 18; NORD-TRØNDELAG; NTi: Steinkjer, Gulbergaunet, 4 ♀♀ 26 July 1978, EIS 101.

Apparently no records from Norway have been published in this century.

CHRYSOPS RELICTUS **Meigen, 1820**

ØSTFOLD: Ø: Fredrikstad, Øra, 1 ♀ 24 June 1979, EIS 20; BUSKERUD: Bø: Flesberg, Belgen, 1 ♀ 27 July 1979, EIS 27; Hvila 3 ♀♀ 27 July 1979, EIS 27; Kongsberg, Meheia, 1 ♀ 26 July 1979, EIS 27; TELEMARK: TEy: Drangedal, Tørnes, 1 ♀ 28 June 1978, EIS 18; Nome, Vårbu, 1 ♀ 7 Aug. 1979, EIS 18; TEi: Sauherad, Nordagutu, 5 ♀♀ 26 July 1979, Ø. & A & T. & K. Rognes, EIS

18; Hjartdal, Sønnlandsvatn, 3 ♀ ♀ 2 Aug. 1977, EIS 26; Kviteseid, Heggtveit, 1 ♀ 24 July 1979, EIS 17; ROGALAND: Ry: Bjerkreim, Nedrabø, 2 ♀ ♀ 10 July 1977, EIS 7; Sandnes, Bråstein, 1 ♀ 14 Aug. 1977, Ø. & K. Rognes, EIS 7; MØRE OG ROMSDAL: MRi: Sunndal, Innerdalen, 1 ♀ 28 July 1978, EIS 85; NORDLAND: Nnø: Hamarøy, Innhavet, 1 ♀ 6 July 1978, EIS 134; Nordkil, 1 ♀ 23 July 1978, EIS 138; Nnv: Lødingen, Kanstad, 4 ♀ ♀ 7 July 1978, EIS 138; TROMS: TRi: Målselv, Rundhaug, 1 ♀ 22 July 1978, EIS 154.

Chrysops relictus has in recent times been recorded by Davies, Colini & Raastad (1971).

HYBOMITRA TARANDINA **(L.)**

TELEMARK: TEy: Drangedal, Tørnes, 1 ♀ 28 June 1978, EIS 18.

Hybomitra tarandina has been recorded by Davies, Golini & Raastad (1971) in recent times.

HYBOMITRA AURIPILA **(Meigen, 1820)**

VESTFOLD: VE: Hof, Thorrud, 1 ♀ 28 July 1979, EIS 28; TELEMARK: TEy: Drangedal, Tørnes, 1 ♀ 28 June 1978, EIS 18; NORD-TRØNDELAG: NTi: Røyrvik, Holmmo, 5 ♀ ♀ 4 July 1978, EIS 108; NORDLAND: Nsi: Grane, Laksfors, 1 ♀ 4 July 1978, EIS 115; Hemnes, Bjerka, 2 ♀ ♀ 5 July 1978, EIS 118; Rana, Grønlia, 29 ♀ ♀ 5 July 1978, EIS 123; Røssvoll, 1 ♀ 5 July 1978, EIS 123; Virvassdalen, 5 ♀ ♀ 24 July 1978, EIS 124; Nnø: Sørfold, Mørsvikbotn, 1 ♀ 6 July 1978, EIS 134; Nnv: Lødingen, Kanstad, 11 ♀ ♀ 7 July 1978, EIS 138; TROMS: TRy: Tromsø, Breivikeidet v/Nyskog, 13 ♀ ♀ 10 July 1978, EIS 163; Finnvikdalen—Kvaløy, 1 ♀ 25 June 1979, I. & T. Nielsen, EIS 162, TN; TRi: Målselv, Andselv, 1 ♀ 12 July 1979, I. & T. Nielsen, EIS 154, TN; Bålsfjord, Nordkjosbotn, 1 ♂ 13—14 July 1979, I. & T. Nielsen, EIS 154, TN; Storfjord, Oteren, 1 ♀ 10 July 1979, I. & T. Nielsen, EIS 155, TN; Kåfjord, Djupvik, 1 ♀ 10 July 1978, EIS 163; Nordreisa, Andsjøen—Storslett, 1 ♀ 8 July 1979, I. & T. Nielsen, EIS 164, TN; Rotsundelv, 1 ♀ 22 July 1978, EIS 163; Sandnes, 3 ♀ ♀ 21 July 1978, EIS 164; Storslett, 1 ♀ 9 July 1979, I. & T. Nielsen, EIS 164, TN; Vaddas, 9 ♀ ♀ 10 July 1978, EIS 164; Kvænangen, Burfjorddal, 7 ♀ ♀ 21 July 1978, EIS 172; Gildetun—Kvænangsfjell, 2 ♀ ♀ 7 July 1979, I. & T. Nielsen, EIS 172, TN; FINNMARK: Fi: Alta, Gargia, 2 ♀ ♀ 1 July 1979, I. Nielsen, EIS 165, TN; Grønnåsen—Gargia, 2 ♀ ♀ 30 June 1979, I. & T. Nielsen, EIS 165, TN; Øvre Alta, 3 ♀ ♀ 20 July 1978, EIS 173.

Andersson (1975) has resolved some confusion, as far as Scandinavia is concerned, in the monograph of Chvála, Lyneborg & Moucha (1972) regarding this species and *H. aterrima* (Meigen). From 1907 the name *aterrimus* Meigen has been used for *H. auripila* in Scandinavia. Recent records are published by Davies (1954), Kauri (1964), Leclercq (1966) and Davies, Golini & Raastad (1971).

HYBOMITRA BOREALIS **(Fabricius, 1781)**

AUST-AGDER: AAi: Åmli, Sandå, 3 ♀ ♀ 28 June 1978, EIS 10; NORD-TRØNDELAG: NTi: Grong, Heia, 1 ♀ 3 July 1978, EIS 102.

Hybomitra borealis has been recorded by Ringdahl (1951: 119, as *Tabanus lapponicus* Wahlberg), Kauri (1968: 63, as *Hybomitra lapponica* (Wahlberg)) and Davies, Golini & Raastad (1971) in recent times.

HYBOMITRA SEXFASCIATA **(Hine, 1923)**

TROMS: TRi: Nordreisa, Storslett, 1 ♀ 9 July 1979, I. & T. Nielsen, EIS 164, TN; FINNMARK: Fi: Karasjok, Halddenjargga, 3 ♀ ♀ 19 July 1978, EIS 166.

Hybomitra sexfasciata has previously been reported by Kauri (1951: 103, as *Tabanus borealis anderi* ssp.n.) from the following localities: Norvegia, 1 ♀, Zetterstedt; TRy: Tromsø, Tromsø 1 ♀, Ardø, EIS 162; TRi: Kvænangen, Sørstraumen, 4 ♀ ♀, Ardø, EIS 164; Finnmark, 1 ♀, Zetterstedt; Fi: Alta, Bossekop, 2 ♀ ♀, Zetterstedt, EIS 173; Fø: Sør-Varanger, ?1oc., 1 ♀, Schøyen, EIS 169 ?. No further Norwegian localities are given by Kauri (1958, 1968).

The distribution of *H. sexfasciata* in Norway is shown in Fig. 1 A.

HYBOMITRA KAURII **Chvála & Lyneborg, 1970**

AUST- AGDER: AAi: Åmli, Sandå, 1 ♀ 28 June 1978, EIS 10; NORDLAND: Nsi: Grane, Laksfors, 1 ♀ 4 July 1978, EIS 115; Hemnes, Bjerka, 1 ♀ 5 July 1978, EIS 118; Nnv: Lødingen, Kanstad, 1 ♀ 7 July 1978, EIS 138; TROMS: TRy: Tromsø, Breivikeidet v/Nyskog, 1 ♂ 10 July 1978, EIS 163; TRi: Kvænangen, Burfjorddal, 1 ♀ 21 July 1978, EIS 172, (69° 55' N).

Recent records of *Hybomitra kaurii* are reported by Davies (1954, as *H. borealis* Loew) from Nsy: Meløy, Holandsfjorden v/Engabreen, EIS 122; by Kauri (1958: 97, as *H. borealis* Meigen) from TRi: Kvænangen, Sørstraumen, EIS 164, (one of the four specimens caught by Ardø and originally determined by Kauri (1951) as *Tabanus borealis anderi,* see above under *Hybomitra sexfasciata* (Hine, 1923)); and by Davies, Golini & Raastad (1971) from HEn: Rendalen, Renådalen seter, EIS 64. The records from Norway in Leclercq (1966: 103, as *H. borea-*

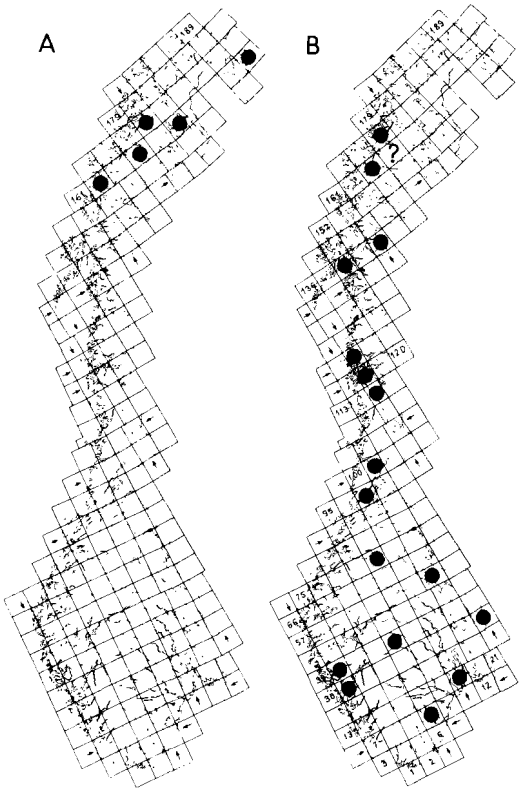

Fig. 1. Distribution in Norway of A) *Hybomitra sexfasciata* (Hine, 1923) *(Tabanus borealis anderi* Kauri, 1951) and B) *Hybomitra kaurii* Chvála & Lyneborg, 1970 *(borealis* auctt. nec Fabricius, 1781). Records from Kauri (1951, 1958, and in litt. 17 Sept. 1979), Davies (1954), Davies, Golini & Raastad (1971), and records published in the present paper. ? = single specimen from TRi: Kvænangen, Sørstraumen (Kauri 1958: 97, as *H. borealis* Meigen).

lis Meigen) («Tromso, Finmark») probably refer to localities reported by Kauri (1951, 1964) concerning specimens of *H. sexfasciata,* which species Leclercq does not recognize as distinct from *H. kaurii.* Kauri (in litt. 17 Sept. 1979) reports material in the possession of ZMB from localities in the following provinces: Hedmark (HEs), Buskerud (Bv), Vestfold (VE), Hordaland (HOi, HOy), Sør-Trøndelag (STi, STy), Nord-Trøndelag (NTi) and Nordland (Nnø). The localities are situated in the following EIS squares: EIS 19, 31, 38, 40, 43, 79, 97, 101, 140.

The distribution of *H. kaurii* in Norway is shown in Fig. 1 B. It is distributed as far north as *H. sexfasciata,* both to about 70° N.

HYBOMITRA NIGRICORNIS **(Zetterstedt 1842: 112)**

HORDALAND: HOi: Odda, Grytingstøl, 800 m above sea level, (Valldalen), 1 ♂ 22 July 1979, EIS 24.

Records of this species from recent times are published by Davies (1954) and Kauri (1968). Zetterstedt described his *Tabanus alpinus* (synonym to *nigricornis* Zetterstedt according to Chvála, Lyneborg & Moucha 1972) partly from a male specimen captured «in Raschstind insulae Schiervoe Nordlandiae» (TRy: Skjervøy, Skjervøy?) 27 July 1821 (Zetterstedt 1838: 516). Both Leclercq (1966: 14) and Chvála, Lyneborg & Moucha (1972: 209), however, make it appear that it was originally described in Diptera Scandinaviae (Zetterstedt 1842: 116) rather than in Insecta Lapponica (Zetterstedt 1838), although the description was only repeated there in an abbreviated form. Even though antedating *nigricornis, alpinus* cannot be used for naming the present taxon since *Tabanus alpinus* Zetterstedt, 1838 is a junior primary homonym to *Tabanus alpinus* Scopoli, 1763 (*Silvius alpinus)* (cfr. Chvála, Lyneborg & Moucha 1972: 152).

HYBOMITRA LURIDA **(Fallén, 1817)**

ROGALAND: Ry: Sandnes, Selvikvåg, 1 ♀ 4 June 1978, A. B. Larsen, EIS 7; NORD-TRØNDELAG: NTi: Grong, Heia, 1 ♀ 3 July 1978, EIS 102; NORDLAND: Nnv: Lødingen, Kanstad, 1 ♀ 7 July 1978, EIS 138; FINNMARK: Fi: Kautokeino, Mieron, 2 ♀ ♀ 19 July 1978, EIS 157; Karasjok, Halddenjargga, 1 ♀ 19 July 1978, EIS 166.

Records from recent times are published by Ringdahl (1954), Kauri (1964 :105) and Davies, Golini & Raastad (1971).

HYBOMITRA NITIDIFRONS **(Szilady, 1914) subsp.** *confiformis* **Chvála & Moucha, 1971**

AUST-AGDER: AAi: Åmli, Sandå, 2 ♀ ♀ 28 June 1978, EIS 10; FINNMARK: Fi: Kautokeino, Mieron, 5 ♀ ♀ 19 July 1978 EIS 157; Karasjok, Halddenjargga, 4 ♀ ♀ 19 July 1978, EIS 166.

This species was first recorded from Norway by Ringdahl (1954: 46). Since then it has been reported by Kauri (1964: 105; 1968: 63) and Davies, Golini & Raastad (1971). All these records have been published under the name *H. conformis* Frey.

HYBOMITRA LUNDBECKI **(Lyneborg, 1959)**

FINNMARK: Fi: Kautokeino, Mieron, 1 ♀ 19 July 1978, EIS 157; Karasjok, Halddenjargga, 2 ♀♀ 19 July 1978, EIS 166; Fø: Sør-Varanger, Vaggatem, 1 ♀ 15 July 1978, EIS 160.

Recently recorded by Kauri (1968) and Davies, Golini & Raastad (1971). All the new records are well north of Maunu and Karesuando, Torne Lappmark, Sweden, the hitherto northernmost published records from Scandinavia (Kauri 1964: 107; Chvála, Lyneborg & Moucha 1972: 222), the one from Halddenjargga being farthest to the north (69° 27' N).

HYBOMITRA MONTANA **(Meigen, 1820)**

ROGALAND: Ry: Bjerkreim, Ørsdalen, 5 ♀♀ 10 July 1977, EIS 8; 1 ♀ 10 July 1977, EIS 8, ZMB; AUST-AGDER: AAi: Åmli, Sandå, 2 ♀♀ 28 June 1978, EIS 10; NORDLAND: Nnø: Hamarøy, Ulvsvåg, 1 ♀ 7 July 1978, EIS 138; Nnv: Lødingen, Kanstad, 4 ♀♀ 7 July 1978, EIS 138; TROMS: TRi: Kåfjord, Djupvik, 1 ♀ 10 July 1978, EIS 163, ZMB; Lyngen, Larsberg, 1 ♀ 22 July 1978, EIS 163; 2 ♀♀ 22 July 1978, EIS 163, ZMB; FINNMARK: Fi: Alta, Bossekop—Alta, 1 ♂ 5 July 1979, I. & T. Nielsen, EIS 173, TN.

Hybomitra montana has previously been recorded by Kauri (1968) and Davies, Golini & Raastad (1971). Ringdahl (1951: 120, as *Tabanus montanus flaviceps* Zetterstedt) reports it from «Norge». He probably refers to the single female specimen captured by Zetterstedt at «Oestre Næs» (NTi: Verdalen) 8 July 1840 (Zetterstedt 1842: 111), on the basis of which he described the species *Tabanus flaviceps*, now considered a synonym to *H. montana* (Chvála, Lyneborg & Moucha 1972: 224).

HYBOMITRA MUEHLFELDI **(Brauer, 1880)**

(Brauer, 1880) AUST-AGDER: AAi: Åmli, Sandå, 2 ♀♀ 28 June 1978, EIS 10.

The species was recorded for the first time from Norway by Andersen & Kauri (1977) from localities in Vestfold (VE).

HYBOMITRA BIMACULATA **(Macquart, 1826)**

AUST-AGDER: AAi: Åmli, Sandå, 3 ♀♀ 28 June 1978, Eis 10.

The species has been reported from Vestfold (VE) and Østfold (Ø) by Kauri (1968).

ATYLOTUS FULVUS **(Meigen, 1820)**

AUST-AGDER: AAi: Åmli, Sandå, 1 ♀ 28 June 1978, EIS 10.

Atylotus fulvus is not listed from Norway by Chvála, Lyneborg & Moucha (1972: 23), but in the text it is reported from «all Scandinavian countries» (*ibid.*: 272). It has previously been reported by Siebke (1877: 3, as *Tabanus fulvus* Meigen) from «Christianiam» (AK: Oslo) (cfr. also Schøyen 1889: 4), by Bidenkap (1892: 227, as *T. fulvus*) from Vestfold (VE), and by Leclercq (1966: 129) from «Norvége». It is known in Sweden from Skåne to Lule Lappmark (Kauri 1954, 1964).

In ZMO is a male specimen from «Kr.ania» (AK: Oslo) (Esmark leg.) (ZMO no. 6150) determined as *Tabanus fulvus* Meigen. The head is lost, but the specimen certainly does not belong to that species.

TABANUS CORDIGER **(Meigen, 1820)**

TELEMARK: TEi: Sauherad, Nordagutu, 1 ♀ 26 July 1979, K. & A. & Ø. & T. Rognes, EIS 18.

Tabanus cordiger is not listed by Chvála, Lyneborg & Moucha (1972: 25) from Norway, neither by Kauri (1978). Siebke (1877: 1, as *Tabanus latifrons* Zetterstedt and *T. atricornis* Meigen) reports both female and male specimens from localities in the South Eastern part of the country.

TABANUS BROMIUS **L.**

AKERSHUS: AK: Bærum, Øverland, 1 ♀ 23 June 1979, EIS 28.

Tabanus bromius has in recent times been recorded from Telemark (TEi: Bø, Bø) by Davies, Golini & Raastad (1971: 115).

HAEMATOPOTA PLUVIALIS **(L.)**

TELEMARK: TEy: Nome, Vårbu, 2 ♀♀ 7 Aug. 1979, EIS 18; TEi: Sauherad, Nordagutu, 1 ♀ 26 July 1979, K. & A. & Ø. & T. Rognes, EIS 18; AUST-AGDER: AAi: Åmli, Sandå, 1 ♀ 28 June 1978, EIS 10; ROGALAND: Ry: Bjerkreim, Nedrabø, 1 ♀ 10 July 1977, EIS 7; Ørsdalen, 1 ♀ 10 July 1977, EIS 8; Sandnes, Lura, 1 ♂ 19 July 1979, EIS 7; Stavanger, Krossberg, 1 ♀ 11 July 1977, EIS 7; NORD-TRØNDELAG: NTi: Levanger, Hammer, 1 ♀ 3 July 1978, EIS 98; Steinkjer, Gulbergaunet, 1 ♀ 26 July 1978, EIS 101; NORDLAND: Nsi: Rana, Virvassdalen 1 ♀ 24 July 1978, EIS 124; Nnv: Lødingen, Kanstad, 1 ♀ 7 July 1978, EIS 138; Andøy, Andenes, 1 ♀ 7 July 1978, EIS 152; TROMS: TRi: Målselv, Takelvdal, 1 ♀ 12 July 1979, I. & T. Nielsen, EIS 154, TN; Storfjord, Oteren, 1 ♀ 10 July 1979, I. & T. Nielsen, EIS 155, TN.

Judging from the list of provincial records from Norway given by Lyneborg & Chvála (1970: 35), the above records from Telemark, Aust-Agder and Nord-Trøndelag are new. Recent records have been published by Davies (1954), Kauri (1964) and Davies, Golini & Raastad (1971).

ACKNOWLEDGEMENTS

I wish to express my gratitude to Hans Kauri, Bergen, who kindly has verified my identifications and given important information. Many thanks also to Tore R. Nielsen, Sandnes for having allowed me to include some horse flies from his private collection in the present study, to Kaare Aagaard, Tromsø for help regarding an old locality name, to Albert Lillehammer, Oslo for loan of material, and to Leif Lyneborg, Copenhagen for comments on my views concerning a nomenclatorial problem.

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The blow-fly genus *Lucilia* Robineau-Desvoidy (Diptera, Calliphoridae) in Norway

KNUT ROGNES

Rognes, K. 1980. The blow-fly genus *Lucilia* Robineau-Desvoidy (Diptera, Calliphoridae) in Norway. *Fauna norv. Ser. B. 27,* 39—52.

Norwegian material of the genus *Lucilia* Robineau-Desvoidy, 1830 in the collections of The Royal Norwegian Society of Sciences — The Museum, Trondheim; Tromsø Museum, Tromsø; Museum of Zoology, Bergen; Museum of Zoology, Oslo; and the author have been examined and revised. A key to the eight *Lucilia* species known at present from Norway, viz. *L. sericata* (Meigen, 1826), *L. regalis* (Meigen, 1826), *L. richardsi* Collin, 1926, *L. fuscipalpis* (Zetterstedt, 1845), *L. silvarum* (Meigen, 1826), *L. bufonivora* Moniez, 1876, *L. caesar* (L.) and *L. illustris* (Meigen, 1826), is given. Some new features are incorporated. The male frons and terminalia of most species are figured. Lists of records for all species are given, and their distribution mapped in terms of the 50 km squares of the European Invertebrate Survey system for Norway.

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INTRODUCTION

Blow-flies belonging to the genus *Lucilia* Robineau-Desvoidy, 1830 have a characteristic shining green metallic colour. This they share with certain members of the families Muscidae and Tachinidae but they are easily distinguished as calliphorids by the presence of a row of hypopleural setae and by the absence of a postscutellum. Adult members of the genus are further characterized by the following combination of characters: mouthparts normal, outermost posthumeral seta external to a longitudinal line through presutural seta, stem vein (common origin of subcosta and radius) naked above, propleuron and prosternum hairy, suprasquamal ridge with anterior and posterior tufts of hairs, thoracic squama bare on upper surface, squamopleuron (metapleuron) with short pubescence only, without hairs (Zumpt 1956).

The genus has received much interest mainly because of the suspected or proven significance of its members in the transmission and spread of certain diseases affecting man (poliomyelitis, enteric diseases), but also because of their ability to cause myiasis in mammals including man, birds and amphibians (Lundbeck 1927, MacLeod 1943a, 1943b, Zumpt 1956, Nuorteva 1959a, 1959b, 1959c, 1959d, 1959e, 1960, Schumann 1971, Smith 1973, Brinkmann 1976a, 1976b, Nielsen, Nielsen & Walhovd 1978).

The taxonomy of the genus has until quite recently been insufficiently known and only with the description published by Mihályi (1977) of the female of *L. pilosiventris* Kramer, 1910 and *L. regalis* (Meigen, 1826) may the taxonomy be regarded as settled.

Zumpt (1956) reports 14 species from the Palaearctic region, of which 10 (11?) occur in Europe. The species occurring in Denmark, Sweden and Finland and their distribution are rather well known (Lundbeck 1927, Cragg 1950, Ringdahl 1952, Nuorteva 1959a, 1959d, 1963, 1964, Nuorteva, Kotimaa, Pohjolainen & Räsänen 1964, Nuorteva & Laurikainen 1964, Nuorteva & Vesikari 1966, Nielsen, Nielsen & Walhovd 1978). The same cannot be said about Norway. Species recorded from that country by different authors are tabulated in Table 1. For reasons mentioned above most of the early records are highly unreliable.

During the past three years I have collected and received as gifts species of this genus, and new species and new localities for previously reported ones have been discovered. A revision of the existing Norwegian material of the genus therefore seems useful in order to obtain basic knowledge as to the specific composition and distribution of the Norwegian *Lucilia* fauna.

MATERIAL AND METHODS

The following museum material of the genus *Lucilia* were revised: 18 specimens in the Royal Norwegian Society of Sciences — The Museum,

Table 1. Species of *Lucilia* Robineau-Desvoidy, 1830 occurring in Norway according to previously published sources.

Source	*sericata* (Meigen)	*fuscipalpis* (Zetterstedt)	*silvarum* (Meigen)	*caesar* (L.)	*illustris* (Meigen)	*cornicina*[2] (Fabr.)	*splendida*[3] (Meigen)	*ruficeps*[4] (Meigen)
Zetterstedt (1845)	—	X	—	—	X	—	—	—
Siebke (1877)	X	X	—	X	X	X	X	—
Storm (1891, 1895, 1907)	X	—	—	X	—	—	—	—
Bidenkap (1892)	—	—	X	X	—	X	—	X
Strand (1900)	—	—	—	X	—	X	—	—
Bidenkap (1901)	—	—	—	X	—	X	—	—
Ringdahl (1944a)	—	—	—	—	X		—	—
Ringdahl (1944b)	—	—	—	X	X		—	—
Ringdahl (1951)	—	X	—	—	—		—	—
Ringdahl (1952)	—	X	—	—	X		—	—
Ringdahl (1954)	—	X	—	—	—		—	—
Ardø (1957)	X	—	—	—	—		—	—
Natvig (1950, 1959)	X	—	—	X	—		—	—
Brinkmann (1976a, 1976b)	—	—	—	X	X		—	—

1) Published by Zetterstedt in the genus *Sarcophaga* Meigen, by Ringdahl in the genus *Acrophagella* Ringdahl. 2) Muscidae. 3) *L. splendida* (Meigen) is a synonym to *L. caesar* (L.) (Aubertin 1933, Zumpt 1956). 4) *L. ruficeps* (Meigen) is a synonym to *L. caesar* (L.) according to Lundbeck (1927). The name is not mentioned by Zumpt (1956).

Trondheim (previously published by Ringdahl 1944a), 35 specimens in Tromsø Museum, Tromsø (mostly previously published by Ringdahl 1944b), 53 specimens in Museum of Zoology, Bergen (previously unpublished), and 40 specimens in Museum of Zoology, Oslo (some previously published by Siebke 1877). In addition 14 females were left unidentified (see Note below).

From the author's private collection 202 specimens were examined. All the latter ones have been caught individually with a hand net, and most have as a matter of routine been mounted with the terminalia exposed. Thus a total of 348 identified specimens from Norway form the basis of the present study.

Identifications follow Richards & Collin (1926), Lundbeck (1927), Aubertin (1933), Spence (1954), Emden (1954), Zumpt (1956), Schumann (1971) and Mihályi (1977).

The key, presented below, has been based on all available Norwegian material, as for *L. regalis* (Meigen) also on my own material of that species from Denmark (see below). For some species certain new features have been included. This applies to the hairiness of the beret (i.e. ridge on upper part of hypopleuron between anterior end of posterior spiracle and upper posterior corner of sternopleuron), position of anteriormost frontal seta relative to ptilinal suture and eye margin, the extent of the basal excavation of the abdomen, hairiness of the fourth tergite (apparent third) in the female, and length of third antennal segment in comparison with greatest length of an eye viewed exactly in profile.

Certain ratios also are presented. In the males the width of frons has been measured at its narrowest point, the head width as the horizontal distance between the two most distant points of the head, and the parafacialia along an imaginary line starting at the insertion of the arista and meeting the inner eye margin at right angles. In the females measurements of the width of frons, parafrontalia and interfrontal stripe have been made at level of the anteriormost orbital seta. All measurements have been made with a Wild wide field measuring eyepiece (10 x, with scale 12 mm : 120 and crosshair).

The figures have been prepared by means of a Wild M8 drawing tube from pinned specimens.

In the lists of localities Løken's (1973) modification of Strand's (1943) system has been used. All lists give the EIS square number (see below) for the locality in question. The name of the collector is stated except when this is the author. The following abbreviations indicate the site of deposition: DKNVS = Royal Norwegian Society of Sciences—The Museum, Trondheim, TM = Tromsø Museum, Tromsø, ZMB = Museum of Zoology, Bergen, ZMO = Museum of Zoology, Oslo. No indication is given for specimens depo-

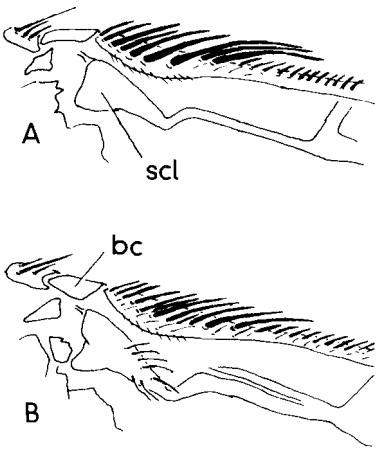

Fig. 1. Base of left wing from below showing basicosta (bc) and subcostal sclerite (scl). A) *Lucilia sericata* (Meigen, 1826), male. B) *L. caesar* (L.), male.

sited in the author's collection, neither for unverified records.

The maps of Norway show the distribution of the species according to new, revised and unverified reliable records in terms of the 189 numbered 50 km squares of the European Invertebrate Survey system for Norway (cf. Økland 1977). *Lucilia* species have been recorded from a total of 44 EIS squares.

Key to species of *Lucilia* Robineau-Desvoidy recorded from Norway

The key covers the eight species up to now found in Norway. For the identification of the remaining two European species, *L. pilosiventris* Kramer, 1910 and *L. ampullacea* Villeneuve, 1922 the reader is referred to Mihályi (1977). *L. pilosiventris* has neither been caught in Sweden (Ringdahl 1952), Finland (W. Hackman, Helsinki, in litt.), Denmark (S. Andersen, Co-

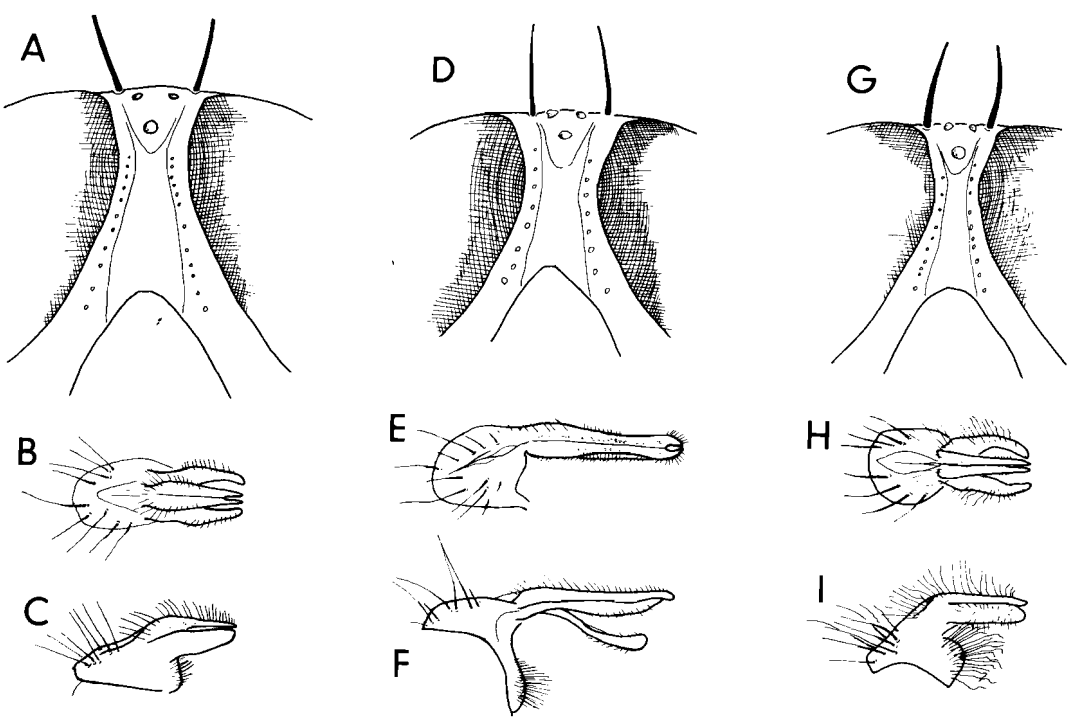

Fig. 2. Male frons (A, D, G), and male terminalia seen from behind (B, E, H) and in profile (C, F, I). A—C) *Lucilia sericata* (Meigen, 1826). D—F) *L. regalis* (Meigen, 1826). G—I) *L. richardsi* Collin, 1926.

penhagen, in litt.) nor Great Britain (Emden 1954). Cragg (1950:70—71), however, reports to have trapped 39 females in Denmark (East Jutland, Mols mountains). As the female of this species has been unknown until quite recently (Mihályi 1977), this record cannot be accepted without reservation. *L. ampullacea* has been recorded from Skåne and Gotland in Sweden (Ringdahl 1952), from Denmark (Lundbeck 1927, S. Andersen, Copenhagen, in litt.) and Great Britain (Emden 1954), but not from Finland (W. Hackman, Helsinki, in litt.), and may very well be found in Norway.

1 (6) Basicosta white or yellow; subcostal sclerite with microscopic pubescence only, without black setulae near apex (Fig. 1A); three postsutural acrostichal setae; ♂ ♂: frons broader than parafacialia; ♀ ♀: basal dorsal excavation of abdomen broadly separated from hind margin of second tergite.

2 (3) A single anterodorsal seta on middle tibia; palpi yellow or brown; median marginal setae of third tergite weak, sometimes hairlike, adpressed, about as strong as paramedian ones, equal to or shorter than half the length of fourth tergite; ♂ ♂: frons 0.12—0.14 times head width (Fig. 2A); surstyli short, apically rounded; lower part of epandrium with hairs not curly at tip (Fig. 2B, C); ♀ ♀: abdominal dusting strong, divided at midline according to direction of light; parafrontalia half as wide as interfrontal stripe. . . . . 1. *Lucilia sericata* (Meigen, 1826)

3 (2) Two or more anterodorsal setae on middle tibia (occasionally a single one on one side); palpi darker.

4 (5) Fifth tergite with strong discal setae intermingled with short hairs less than half as long as the discal setae, shortest hairs about as long as or shorter than hairs covering disc of fourth tergite; two or four median marginal setae on third tergite strong, erect, longer than half the length of fourth tergite; beret naked, occasionally with one or two small thin hairs; palpi yellowish to black; ♂ ♂: frons 0.16—0.19 times head width (Fig. 2D); cerci and surstyli very long and slender (Fig. 2E, F); ♀ ♀: abdominal dusting rather strong, divided at midline according to direction of light; disc of fourth tergite with adpressed short hairs except about midline where they are erect; parafrontalia about half as wide as interfrontal stripe. . . . . 2. *Lucilia regalis* (Meigen, 1826)

5 (4) Fifth tergite without strong discal setae, with long hairs of rather uniform length only, shorter hairs longer than hairs covering disc of fourth tergite; median marginal setae on third tergite weak, more or less adpressed, shorter than half the length of fourth tergite; beret with three to six small thin hairs; palpi greyish brown; ♂ ♂: frons 0.10—0.11 times head width (Fig. 2G); surstyli rather short, parallel-sided, apically rounded, lower part of epandrium with long hairs, curly at tip (Fig. 2H, I); ♀ ♀: abdominal dusting very

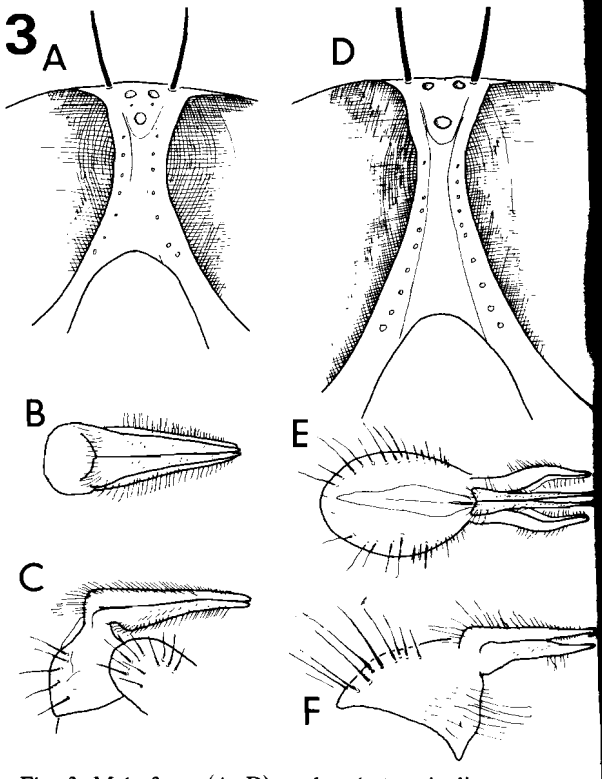

Fig. 3. Male frons (A, D), and male terminalia seen fron behind (B, E) and in profile (C, F). A—C) *Lucilia fuscipalpis* (Zetterstedt, 1845). D—F) *L. silvarum* (Meigen, 1826).

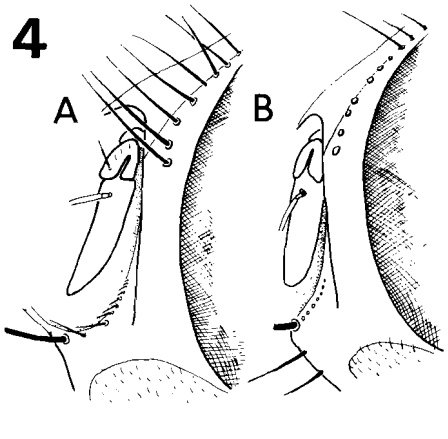

Fig. 4. Left parafacial and neighbouring regions showing position of anteriormost frontal seta. A) *Lucilia silvarum* (Meigen, 1826), male. B) *L. bufonivora* Moniez, 1876, male.

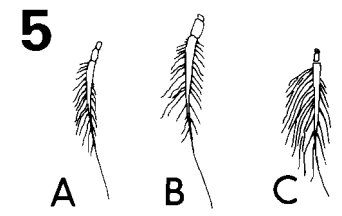

Fig. 5. Left arista. A—B) *Lucilia fuscipalpis* (Zetterstedt, 1845); A, male, B, female. C) *L. silvarum* (Meigen, 1826), male.

weak, abdomen shining; disc of fourth tergite with semierect short hairs all over; parafrontalia much less than half as wide as interfrontal stripe ..... 3. *Lucilia richardsi* Collin, 1926.

6 (1) Basicosta dark brown or black.

7 (12) Subcostal sclerite with microscopic pubescence only, without black setulae near apex (as in Fig. 1A); fifth tergite with discal setae; second tergite black, contrasting strongly with green colour of succeeding tergites; palpi greyish brown to black; ♂♂: frons broader than parafacialia; ♀♀: basal dorsal excavation of abdomen broadly separated from hind margin of second tergite.

8 (9) Arista with short hairs, naked on outer third or half, somewhat swollen at base (Fig. 5A, B); presutural intraalar seta absent; three postsutural acrostichal setae; one or two anterodorsal setae on middle tibia; palpi greyish brown; median marginal seta on third tergite not very strong, nor strikingly different from paramedian ones, semierect, half as long as fourth tergite or shorter; third antennal segment more than half as long greatest length of eye viewed in profile; ♂♂: frons 0.14 times head width (Fig. 3A); face strongly protruding; beret naked; cerci and surstylus rather long, tapering, surstylus slightly curved (Fig. 3B, C); ♀♀: third antennal segment very large; in front of suture between acrostichal and dorsocentral rows of setae a thin longitudinal pruinose line on each side, extending backwards slightly behind transverse suture ..... 4. *Lucilia fuscipalpis* (Zetterstedt, 1845).

9 (8) Arista normal, with long hairs (Fig. 5C); presutural intraalar seta present; a single anterodorsal seta on middle tibia; two or four median marginal setae on third tergite strong, strikingly different from paramedian ones, erect, as long as or longer than half the length of fourth tergite; third antennal segment half as long as greatest length of eye viewed in profile, or less.

10 (11) Three postsutural acrostichal setae; palpi brown, black on outer third or half; beret naked, occasionally with a single hair; distance in front of suture between acrostichal rows of setae equal to distance between acrostichal and dorsocentral rows; ♂♂: frons 0.08—0.11 times head width (Fig. 3D); head at lunula not protruding; anteriormost frontal seta as distant from eye margin as

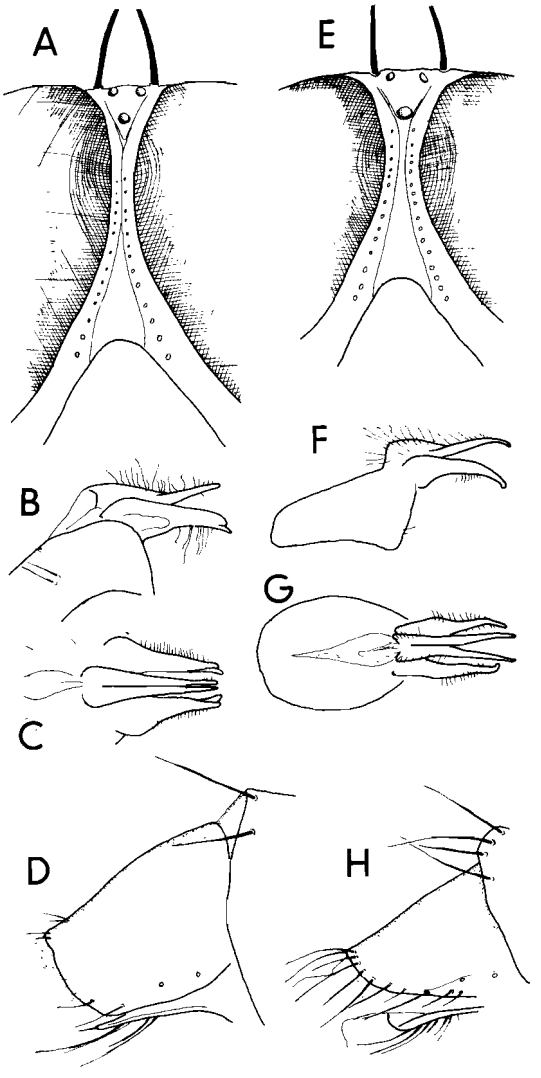

Fig. 6. Male frons (A, E), male terminalia seen in profile (B, F) and from behind (C, G), and sixth tergite of female seen in profile (D, H). A—D) *Lucilia caesar* (L.). E—H) *L. illustris* (Meigen, 1826).

from ptilinal suture, or slightly closer to the latter (Fig. 4A); cerci narrow, cleft to middle, each arm with a slight knob at apex, surstyli six times longer than broad, apical half tapering (Fig. 3E, F) ..... 5. *Lucilia silvarum* (Meigen, 1826)

11 (10) Two postsutural acrostichal setae; palpi brown; beret with one to five short thin hairs; distance in front of suture between acrostichal rows of setae distinctly less than distance between acrostichal and dorsocentral rows; ♂♂: frons 0.09 times head width; head at lunula somewhat

protruding; anteriormost frontal seta twice as distant from eye margin as from ptilinal suture (Fig. 4B); surstyli four times longer than broad, almost parallel-sided (Mihályi 1977). . . . . 6. *Lucilia bufonivora* Moniez, 1876

12 (7) Subcostal sclerite with small black setulae near apex in addition to microscopic pubescence (Fig. 1B); two postsutural acrostichal setae; a single anterodorsal seta on middle tibia; second tergite shining green, sometimes dark but not contrasting strongly with colour of succeeding tergites; palpi yellow; ♂ ♂: median marginal setae of third tergite generally somewhat more erect than paramedian ones, though similar in size; ♀ ♀: median marginal setae on third tergite rather weak, not different from paramedian ones in size or direction, adpressed, shorter than half the length of fourth tergite; basal dorsal excavation of abdomen narrowly but distinctly separated from hind margin of second tergite.

13 (14) ♂ ♂: frons distinctly narrower than parafacialia, 0.03—0.05 times head width (Fig. 6A); epandrium large, swollen, shining, broader than length of fifth tergite at midline; surstyli with two-pointed apex (Fig. 6B, C); ♀ ♀: sixth tergite (innermost segment of postabdomen) with short marginal setae at middorsal line and ventrally on each side, middle section of hind margin at each side naked; viewed in profile middorsal edge more or less convex (Fig. 6D). . . . . 7. *Lucilia caesar* (L.)

14 (13) ♂ ♂: frons about as broad as parafacialia, 0.05—0.09 times head width (Fig. 6E); epandrium of normal shape and size, narrower than length of fifth tergite at midline; cerci cleft to about middle, distal arms diverging; surstylus tapering, curved, with a slight knob apically (Fig. 6F, G); ♀ ♀: sixth tergite with long marginal setae along the whole hind margin, no naked sections; viewed in profile middorsal edge straight (Fig. 6H) . . . . . 8. *Lucilia illustris* (Meigen 1826)

SYSTEMATIC LIST

1. *Lucilia sericata* (Meigen, 1826)

Total material examined: 22 ♂ ♂ and 33 ♀ ♀.

New and revised records:

ØSTFOLD: Ø: Fredrikstad, Øra, EIS 20, 1 ♂ 24 June 1979, G. N. Rognes; 1 ♂ 1 ♀ 24 June 1979, A. Rognes; 1 ♀ 24 June 1979.

AKERHUS: AK: Bærum, Høvik, EIS 28 1 ♀ 29 Aug. 1848, ?leg., ZMO no. 6115 (positioned as *L. caesar*); Oslo, ?loc., EIS 28, 3 ♂ ♂ 23 ♀ ♀ 14 July 1936, F. C. Bishopp No. 26 497, ZMO nos. 6191, 6193—6212, 6214—6217 (D.G. Hall det.), 6529.

BUSKERUD: Bø: Kongsberg, Kongsberg, EIS 27, 1 ♂ 1 ♀ 27 June 1979, A. Rognes; 12 ♂ ♂ 4 ♀ ♀ 27 June 1979; 3 ♂ ♂ 1 ♀ 28 June 1979; Hvittingfoss, EIS 19, 1 ♂ 6 Aug. 1979.

ROGALAND: Ry: Klepp, Vik, EIS 7, 1 ♀ 16 Aug. 1963, T. Nielsen, ZMB.

Unverified records:

AKERSHUS: AK: Nesodden, Langøyene, EIS 28 (Natvig 1959: 174, cf. Natvig 1950: 171, where no reference to *L. sericata* is made).

ROGALAND: Ry: Klepp, ?loc., EIS 7, ?sex, 20 July 1953, P. Ardø (Ardø 1957: 164).

Siebke (1877: 97) reports *L. sericata* from Sarpsborg, Oslo, and Romsdal. These records are totally unreliable considering the fact that the only specimen in the collections of ZMO determined by Siebke as *L. sericata* is a female *L. illustris* (ZMO no. 6149) (Brinkmann 1976a: 327). Storm (1895: 238, 1907: 4) reports *L. sericata* from «Stadsbygden og Rissen» (STy: Rissa) and Trondheim (STi: Trondheim). The only specimen labelled *sericata* in what remains of Storm's collection in DKNVS, however, is a male specimen of *L. illustris* (Ringdahl 1944a, and below).

Remarks on the localities:

All the specimens from Kongsberg were taken on flowers bordering a parking lot in the centre of the city, except two (A. Rognes leg.) which were caught at a camp site close to the city's centre. Those from Øra and Hvittingfoss were caught not far from industrial plant areas and human habitations, respectively. The specimens reported by Natvig (1959) from Langøyene were from the refuse depot of the city of Oslo in use before the Second World War. The records from Klepp by Ardö (1957) were from a sandy beach at the «dune ridge».

Distribution and ecology (Fig. 7A):

L. sericata obviously is a southern synanthropic species in Norway. The northernmost record is from about 60° N. In Sweden the northernmost reports are from Bohuslän, Östergötland and Västergötland (Ringdahl 1952), all apparently south of 59° N. In Finland the northern limit of its normal range is about 61° N (Nuorteva 1959a), but an occasional find as far north as 62° 53' N has been reported (Nuorteva et al. 1964).

A very high dependence on human settlements is shown for *L. sericata* in Finland (Nuorteva 1963).

Remarks on biology:

L. sericata is the primary cause of sheep myiasis in Europe (Haddow & Thomson 1937, MacLeod 1943a, 1943b, Cragg 1950, Emden 1954, Schumann 1971). The species is not involved in sheep strike in Norway (Brinkmann 1976a, 1976b).

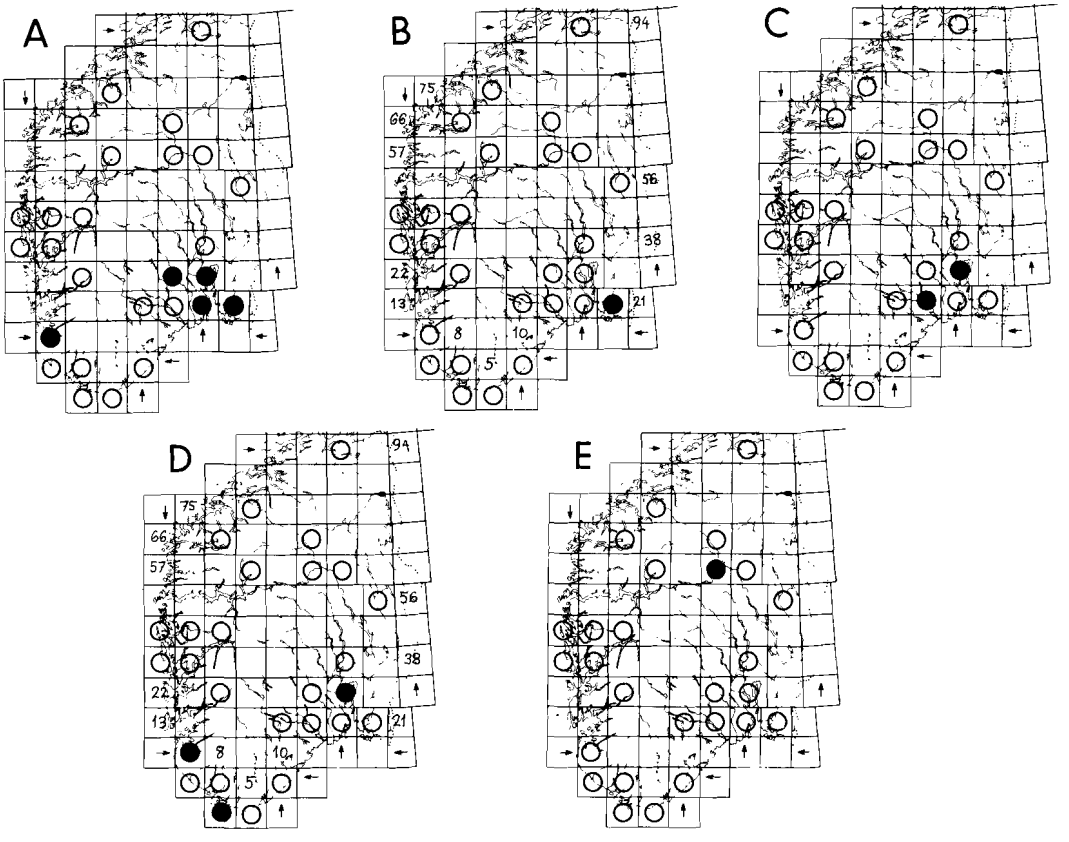

Fig. 7. Records from Norway (filled circles) of A) *Lucilia sericata* (Meigen, 1826), B) *L. regalis* (Meigen, 1826), C) *L. richardsi* Collin, 1926, D) *L. silvarum* (Meigen, 1826), and E) *L. bufonivora* Moniez, 1876. Open circles indicate squares where other *Lucilia* species have been recorded.

2. *Lucilia regalis* (Meigen, 1826)

Total material examined: 1 ♂ (Norway); 5 ♂ ♂ and 1 ♀ (Denmark).

New record:

ØSTFOLD: Ø: Fredrikstad, Øra, EIS 20, 1 ♂ 24 June 1979. This is the first record from Norway.

Remarks on the locality: The specimen was caught in a meadow on the flowers of a plant belonging to Apiacea. The locality is some distance away from an industrial plant area.

Distribution (Fig. 7B):
In Sweden Ringdahl (1952) reports it from Skåne. Lundbeck (1927) does not record it from Denmark, but in my collection are 6 specimens caught on the beach about 7 km NE of the centre of the city of Århus, East Jutland (Dania, EJ, NH 73, Tålfor Strand, 1 ♂ 1 ♀ 22 July 1977, A. & K. Rognes; 4 ♂ ♂ 7 July 1979, A. & Ø. & K. Rognes). S. Andersen, Copenhagen, also reports it from Denmark (in litt.). It has not been recorded from Finland (W. Hackman, Helsinki, in litt.). The record from Øra (59° 11' N) is the northernmost European record.

3. *Lucilia richardsi* Collin, 1926

Total material examined: 3 ♂ ♂ and 1 ♀.

New records:

AKERSHUS: AK: Bærum, Nordby gård, EIS 28, 1 ♀ 21 June 1979.
VESTFOLD: VE: Hof, Thorrud, EIS 28, 2 ♂ ♂ 28 July 1979.
TELEMARK: TEi: Sauherad, Nordagutu, EIS 18, 1 ♂ 26 July 1979, K. & A. & Ø. & T. Rognes. These are the first records from Norway.

Remarks on the localities:

The specimens from Nordby gård and Thorrud were caught in a meadow some distance away from farm

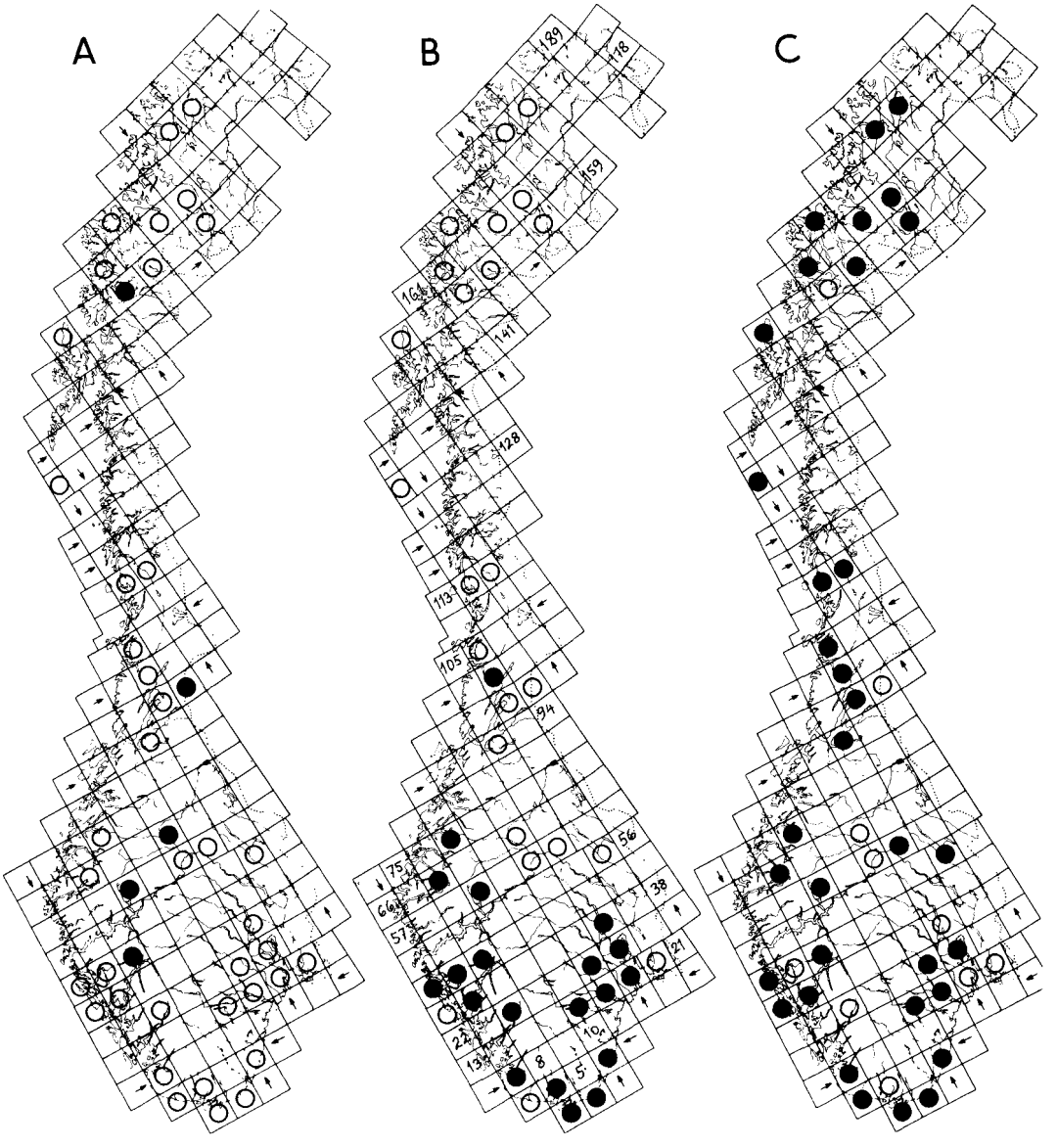

Fig. 8. Records from Norway (filled circles) of A) *Lucilia fuscipalpis* (Zetterstedt, 1845), B) *L. caesar* (L.) and C) *L. illustris* (Meigen, 1826). Open circles indicate squares where other *Lucilia* species have been recorded.

buildings. The specimen from Nordagutu was caught on plants growing in a gravel pit close to the road in mixed decidous and coniferous forest in a farm district.

Distribution and ecology(Fig. 7C):

L. richardsi is a southern species in Norway. From Sweden it is reported from Gotland (Nuorteva & Laurikainen 1964), and from Finland north to about 64° 13' N (Ostrobottnia kajanensis: Kajaani) (Nuorteva 1963: 18) (cf. also Nuorteva & Skarén 1960). S. Andersen, Copenhagen,

(in litt.), reports it from Denmark. According to Nuorteva (1963) it is much less synanthropic in Finland than *L. sericata*.

Remarks on biology:

Nuorteva (1959e) reports to have reared three males of *L. richardsi* in a case of wound myiasis in the nightjar (*Caprimulgus europaeus* L.).

4. *Lucilia fuscipalpis* (Zetterstedt, 1845)

Total material examined: 1 ♂ and 3 ♀ ♀.

New and revised records:

OPPLAND: On: Dovre, Fokstua (952 m a.s.l.), EIS 71, 1 ♀ 24 July 1853, H. Siebke, ZMO no. 6147 (Siebke 1877: 97, as *L. splendida* (Meigen). The date published differs from that on the label which is cited here).

HORDALAND: HOi: Voss, Rong (about 500 m a.s.l.), EIS 41, 1 ♀ 12 July 1964, A. Løken, ZMB.

TROMS: TRi: Balsfjord, Nordkjosbotn, EIS 154, 1 ♂ 1 ♀ 13—14 July 1979, I. & T. Nielsen.

Unverified records:

SOGN OG FJORDANE: SFi: Luster, Turtagrø (909 m a.s.l.), EIS 60, 1 ?sex 5—6 July 1949, O. Ringdahl, (Ringdahl 1954: 49, as *Acrophagella fuscipalpis* Zett.).

NORD-TRØNDELAG: NTi: Verdal, Sul, EIS 99?, 3 ♂ ♂ 3 ♀ ♀ 27 June—5 Aug. 1840, J.W. Zetterstedt, (Zetterstedt 1845: 1306, as *Sarcophaga fuscipalpis)*. This latter record is repeated by Siebke (1877: 95) and probably also by Ringdahl (1951: 172, as *A. fuscipalpis* (Zett.), from «Norge»; 1952; 1954).

Distribution and ecology (Fig. 8A):

In Finland *L. fuscipalpis* is not recorded south of 68° N (Nuorteva 1959a). In Sweden it is known from Torne Lappmark, Härjedalen and Jämtland (Ringdahl 1952). The Norwegian record from Rong (60°31' N) is the southernmost Scandinavian record. The species is not known in Europe outside Fennoscandia, but it occurs in Alaska (Zumpt 1956). Ringdahl (1951) regards the species as arctic-subarctic, and according to Nuorteva (1959a, 1963) it is purely asynanthropic.

5. *Lucilia silvarum* (Meigen, 1826)

Total material examined: 12 ♂ ♂ and 7 ♀ ♀.

Notes on taxonomy:

Some of the specimens from Øverland (see below) are aberrant with regard to the chaetotaxy of the thorax. One male specimen has four postsutural acrostichal setae on each side, two other ones have three such setae on the right side but only two on the left. Two females have only two pairs of postsutural acrostichal setae, resembling in this respect *L. bufonivora*.

New and revised records:

AKERSHUS: AK: Bærum, Øverland, EIS 28, 9 ♂ ♂ 7 ♀ ♀ 23 June 1979; Oslo, Tøyen, EIS 28, 1 ♂ 12 Aug. 1846, H. Siebke, ZMO no. 6119 (positioned as *L. cornicina).*

VEST-AGDER: VAy: Lindesnes, Jørgenstad, EIS 1, 1 ♂ 20 July 1979, T. Nielsen.

ROGALAND: Ry: Klepp, Frøyland bridge, EIS 7, 1 ♂ 20 Aug. 1978.

Unverified record:

The only previous record of *L. silvarum* from Norway is by Bidenkap (1892) from Vestfold (VE). A confusion with *L. bufonivora* Moniez, 1876 cannot be excluded since the distinguishing characters were first established by Villeneuve in 1914 according to Lundbeck (1927: 145). I have not put Bidenkap's record on the map.

Remarks on the localities:

The specimens from Øverland and Frøyland bridge were caught sunning themselves on leaves of low herbs along the road close to a river. Both localities are in rural districts.

Distribution and ecology (Fig. 7D):

L. silvarum seems to be a southern species in Norway as all known records are south of 60°N. In Sweden it is known northwards to Uppland (about 60°N) (Ringdahl 1952), and in Finland northwards to Ostrobotnia borealis (65°N) (Nuorteva 1959a). According to Nuorteva (1963) *L. silvarum* is clearly asynanthropic in the southern part of Finland. In the northern part, however, it is only recorded from cities, viz. Oulu (?), judging from map in Nuorteva (1959a: 8), and Kajaani (Nuorteva 1963). This might indicate that *L. silvarum* will be found further to the north in Norway.

6. *Lucilia bufonivora* Moniez, 1876

Total material examined: 2 ♂ ♂.

Notes on taxonomy:

Both specimens have only two postsutural acrostichal setae. This is exceptionally also the case with some specimens of *L. silvarum* (above; Spence 1954: 30—31). However, a number of other characters all mentioned in the above key, distinguish the two specimens from the specimens of *L. silvarum* examined by me.

The terminalia have not been examined.

New and revised records:

OPPLAND: On: Fron,? loc., EIS 62?, 1 ♂ ?date, H. Siebke, ZMO no. 6118 (positioned as *L. cornicina);* 1 ♂ 26 July 1850, H. Siebke, ZMO no. 6148 (Siebke 1877: 97, as *L. illustris* (Meigen), which is his only record of this species). Siebke gives the locality as «...horto botanico ad Christianiam...» (AK: Oslo, Tøyen), but this is obviously wrong as Siebke at the date given in fact was collecting insects in the valley of Gudbrandsdalen far north of Oslo (cf. Siebke 1853: 254) which is in accordance with the label which reads «Fron».
These are the first records from Norway.

Distribution and ecology (Fig. 7E):

In Sweden *L. bufonivora* is reported from Skåne and Öland (Ringdahl 1952), and in Finland from the southern part of the country north to about 64°N according to the map published by Nuorteva (1959a: 8). The species is asynanthropic in Finland which is quite natural in view of its biology (Nuorteva 1959a, 1963).

Remarks on biology:

L. bufonivora parasitizes anurans (Lundbeck 1927, Schumann 1971) and apparently also urodelans (Zumpt 1956: 45). According to the distribution maps of Norwegian amphibians given by Dolmen (1978), the host of the specimens found at Fron, in the valley of Gudbrandsdalen, may have been *Rana temporaria* or *Triturus vulgaris*.

7. *Lucilia caesar* (L.)

Total material examined: 74 ♂ ♂ and 33 ♀ ♀.

Notes on taxonomy:

The female of *L. caesar* is defined in this paper according to the distribution of the hairiness at the margin of the innermost segment of the postabdomen (sixth tergite). The quite naked section on each side is characteristic, as pointed out by Spence (1954) (Fig. 6D, and key). The short hairs at the middorsal line are sometimes longer and more numerous than shown in the figure. The middorsal edge viewed in profile is normally convex, though quite straight in one of the specimens. The numbers of hairs on the underside of the arista cannot be used to distinguish the females of *L. caesar* from those of *L. illustris*, as the number varies from 10 to 18 with a mean of 13.5. Spence (1954) and Emden (1954) give the range as 13—17 with a mean of 15, and Nuorteva (1959a) as 12—18.

New and revised records:

AKERSHUS: AK: Frogn, Sønderstøa — Degerud, EIS 28, 1 ♂ 8 Aug., 2 ♂ ♂ 9 Aug. 1935, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. caesar);* Asker, ? loc., EIS 28, 1 ♀ ?date, W.M.(?) Schøyen, ZMO no. 6110 (positioned as *L. caesar);* Bærum, Høvik, EIS 28, 1 ♂ 18 June, 1 ♂ 16 Aug. 1935, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. caesar);* Nordby gård, EIS 28, 1 ♂ 22 June 1979; ?loc., 1 ♀ ?date, W.M(?) Schøyen, ZMO no. 6108.

BUSKERUD: Bø: Ringerike, Løvlia, EIS 36, 1 ♂ 31 July 1977; Lier, Lahell, EIS 28, 2 ♂ ♂ 2 Aug. 1979; Øvre Eiker, Burud, EIS 27, 1 ♂ 1 ♀ 1 Aug. 1979; Kongsberg, Efteløt, EIS 27, 1 ♂ 1 ♀ 6 Aug. 1979; Gran, EIS 18, 1 ♂ 6 Aug., 1979; Hvittingfoss, EIS 19, 4 ♂ ♂ 1 ♀ 6 Aug. 1979; Komnes, EIS 19, 1 ♂ 6 Aug. 1979.

VESTFOLD: VE: Hof, Thorrud, EIS 28, 1 ♂ 28 July 1979.

TELEMARK: TEi: Bø, Øvrebø, EIS 18, 1 ♂ 25 July 1979; Seljord, Ulvenes, EIS 17, 3 ♂ ♂ 3 ♀ ♀ 25 July 1979; Kviteseid, Heggtveit, EIS 17, 1 ♂ 24 July 1979.

AUST-AGDER: AAy: Fjære, Fjære kirke, EIS 6, 1 ♂ 2 ♀ ♀ 27 June 1979, A. & K. Rognes; Landvik, Skiftenes, EIS 6, 2 ♂ ♂ 29 June, 1 ♂ 1 ♀ 30 June, 1 ♂ 1 ♀ 5 July 1971, E. Oug, ZMB.

VEST-AGDER: VAy: Kristiansand, Stangenes, EIS 2, 1 ♀ 24 Aug. 1975, 2 ♂ ♂ 23 June 1979, S. Svendsen; Mandal, Valand, EIS 2, 1 ♂ 5 July 1979; Lindesnes, Jørgenstad, EIS 1, 1 ♀ 21 July 1977, T. Nielsen. VAi: Kvinesdal, Gjemlestad, EIS 4, 1 ♂ 10 July 1945, N. Knaben, ZMB.

ROGALAND: Ry: Klepp, Frøyland bridge, EIS 7, 1 ♀ 20 Aug. 1978; Øksnevad, EIS 7, 1 ♀ 15 June 1978, 1 ♂ 1 Aug. 1979, T. Nielsen; Sandnes, Melsheia, EIS 7, 1 ♀ 14 June 1978; Stavanger, Byhaugen, EIS 7, 1 ♂ 9 June 1979; Forus, EIS 7, 1 ♀ 14 June 1978; Gosen, EIS 7, 1 ♂ 23 June 1977; Krossberg, EIS 7, 1 ♂ 23 June, 3 ♂ ♂ 11 July 1977, 3 ♂ ♂ 9 Aug. 1978, 2 ♂ ♂ 2 Sept. 1979; 4 ♂ ♂ 3 ♀ ♀ 4 July 1979, Ø. & K. Rognes; Sunde, EIS 7, 1 ♂ 1—15 Aug. 1979; Tjensvoll, EIS 7, 1 ♂ 5 July 1977; Ullandhaug, EIS 7, 2 ♂ ♂ 10 Aug. 1978, 1 ♂ 4 July, 1 ♂ 26 Aug. 1979. Ri: Suldal, Nesflaten, EIS 24, 1 ♀ 28 June 1935, T. Soot-Ryen, TM.

HORDALAND: HOy: Samnanger, Høyseter, EIS 40, 1 ♂ 19 July 1950, A. Tjønneland, ZMB; Bergen, Bellevue, EIS 39, 1 ♀ 15 Sept. 1936, N. Knaben, ZMB; Svartediket, EIS 39?, 1 ♂ 23 July 1950, A. Løken, ZMB; Askøy, Herdla, EIS 39, 1 ♂ 15 June, 1 ♂ 16 June 1936, 1 ♂ 1 ♀ 15 July 1937, N. Knaben, ZMB; 1 ♂ 4—7 June 1938, A. Brinkmann, ZMB; Åsane, Åstveit — Golfbanen, EIS 39, 1 ♂ 17 July 1966, A. Løken, ZMB; Åstveit, EIS 39, 1 ♂ 1 ♀ 12 July 1972, L. Greve, ZMB. HOi: Kvinnherad, Rosendal, EIS 31, 1 ♀ 1 June 1957, Museum of Zoology, Bergen, Excursion, ZMB; Skeie-Seimsfoss, EIS 31, 2 ♂ ♂ 20 Aug.

1944, H. Tambs-Lyche, ZMB; Kvam, Berge-Bergsberget, EIS 31, 1 ♂ 1 July, 1 ♀ 19 July, 1 ♂ 20 July 1971, H.R. Skjoldal, ZMB; Granvin, Eide, EIS 41, 1 ♂ 24 June, 1 ♂ 25 June 1935, T. Soot-Ryen, TM. (Ringdahl 1944b:6, as *L. caesar).*

SOGN OG FJORDANE: SFi: Luster, Sande, EIS 60, 3 ♂ ♂ 31 July 1945, N. Knaben, ZMB; Stryn, Innvik, EIS 68, 1 ♂ 1 ♀ 30 July 1978.

MØRE og ROMSDAL: MRi: Ørsta, Viddal, EIS 68, 1 ♀ Juli 1946, ?leg., ZMB; Rauma, Lerheim, EIS 77, 1 ♂ 2 ♀ ♀ 29 July 1978.

NORD-TRØNDELAG: NTi: Steinkjer, Gulbergaunet, EIS 101, 1 ♂ 2 ♀ ♀ 26 July 1978 (64°01'N).

Unverified records:

The records by Siebke (1877) are unreliable, as none of the specimens collected and indentified by him as *L.caesar* belong to that species. The specimen recorded as *L. splendida* (Meigen) (= *L. caesar* (L.) teste Aubertin 1933) belongs to *L. fuscipalpis* (see above). The records by Bidenkap from Vestfold (VE) and Tromsø (TRy: Tromsø «a single female specimen») (Bidenkap 1892, 1901, respectively) cannot be accepted, as a confusion with *L. illustris* is possible, and highly probable in the latter case. Bidenkap (1892) also reports *L. ruficeps* (Meigen) (= *L. caesar* (L.) teste Lundbeck 1927) from Vestfold. Bidenkap's own specimens are probably lost, but in ZMO is a specimen (ZMO no. 6117, L.M. (?) Esmark leg.) determined as *L. ruficeps* (by Bidenkap?, cf. Bidenkap 1892: 238, where he reports to have examined Siebke's and Esmark's specimens) which belongs to *L. illustris* (see below). Strand's (1900) record from «Aal» (Bv: Ål, Ål) also is unacceptable as are the records by Storm (1891:13, 1895: 232 and 1907: 4), (all *Lucilia* specimens in what remains of Storm's collection in DKNVS belong to *L. illustris* (Ringdahl 1944a, and below)). Natvig (1950: 171, 1959: 174) reports *L. caesar* from Norway without specifying localities.

Brinkmann (1973, 1976a, 1976b), who has studied the problem of blow-fly myiasis of sheep in Norway, bred *L. caesar* from larvae collected from sheep from the following localities: HOy: Fusa, Eikelandsosen (Koldal), EIS 31; Holdhus (Bjørndal), EIS 31; HOi: Kvinnherad, Rosendal, EIS 31; Varaldsøy (Midtstølen), EIS 31; Voss, Høyland n. of Lønavatn, EIS 41 (Brinkmann 1976b).

Remarks on the localities:

Gulbergaunet is a camp site almost in the centre of the city of Steinkjer.

Distribution and ecology (Fig. 8B):

The northernmost record from Norway (Gulbergaunet, 64°01'N) roughly corresponds to the northern limit in Finland (64°N) (Nuorteva 1959a). In Sweden *L. caesar* is reported northwards to Uppland (about 60°N) (Ringdahl 1952). According to Nuorteva (1963) *L. caesar* is more synanthropic than *L. illustris* in the southern part of Finland, probably because of its greater proximity to the northern limit of its range. The record from Gulbergaunet fits well with the trend of increasing synanthropy towards the northern limit of their range shown also by other *Lucilia* species (Nuorteva 1963, Nuorteva & Laurikainen 1964).

Remarks on biology:

Acccording to Brinkmann (1976a, 1976b) only *L. caesar* acts as primary striker in sheep myiasis in Norway. In a series of ten breeding experiments giving rise to *Lucilia* species, this species was bred alone from larvae collected from sheep in four cases. In five cases it was bred together with *L. illustris*. Only in one case was *L. illustris* reared alone. Unfortunately Brinkmann does not state the number of emerged flies in each rearing experiment. His arguments for ruling out the latter case, which may indicate that also *L. illustris* acts as primary striker, is discussed below.

Blow-fly myiasis of sheep is mainly known from the western part of Norway (Rogaland, Hordaland, Sogn og Fjordane and Møre) (Brinkmann 1976a). As is evident from Fig. 8B, *L. caesar* is more widely distributed than the disease.

8. *Lucilia illustris* (Meigen, 1826)

Total material examined: 80 ♂ ♂ and 76 ♀ ♀.

Notes on taxonomy:

The female of *L. illustris* is defined in this paper according to the distribution of the marginal setae of the innermost segment of the postabdomen (sixth tergite) (Fig. 6H, and key) (cf. also Spence 1954). In the majority of cases the number of hairs on the underside of the arista cannot be used to distinguish females of this species from those of *L. caesar*. In the material examined it varies from 7 to 18 (mean 11). Spence (1954) and Emden (1954) give the range as 9—12 (mean 11), Nuorteva (1959a) as 9—13.

New and revised records:

AKERSHUS: AK: Frogn, Sønderstøa-Degerud, EIS 28, 1 ♂ 8 Aug., 2 ♂ ♂ 9 Aug. 1935, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. illustris* Meigen); Oslo, Sognsvatn, EIS 28, 1 ♂ 31 July 1935, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. illustris);* Tøyen EIS 28, 1 ♀ 22 July 1846, H. Siebke, ZMO no. 6149 (determined by Siebke as *L. sericata* Meigen according to Brinkmann 1976a: 327) (J.P. Dear det.); 1 ♂ 10 Aug. 1846, H. Siebke, TM (Ringdahl 1944b: 6, as *L. illustris);* 1 ♂ 10 Aug. 1846, H. Siebke, ZMO no. 6106 (positioned as *L. caesar* L.); 1 ♂ ?date, H. Siebke, TM (Ringdahl 1944b: 6, as *L. illustris);* ?loc., EIS 28, 1 ♂ ?date,

L.M. Esmark, ZMO no. 6117 (positioned as *L. ruficeps* Meigen); ?loc., EIS 28, 1 ♀ 14 July 1936, F.C. Bishopp No. 26 497, ZMO no. 6213 (determined as *L. sericata* by D.G. Hall, misidentification).

HEDMARK: HEs: Elverum, Grundset, EIS 55, 1 ♀ ?date, H. Siebke, ZMB (determined as *L. caesar*, by Siebke?); 1 ♀ ?date, H. Siebke, ZMO no. 6109 (positioned as *L. caesar).*

BUSKERUD: Bø: Røyken, Slemmestad, EIS 28, 1 ♂ 2 June 1935, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. illustris);* 1 ♀ 19 Aug. 1935, T. Soot-Ryen, TM; Modum, ?loc., EIS 28, 1 ♀ ?date, W.M. Schøyen, ZMO no. 6107 (positioned as *L. caesar);* Øvre Eiker, Burud, EIS 27, 1 ♀ 1 Aug. 1979; Kongsberg, Efteløt, EIS 27, 1 ♂ 6 Aug. 1979; Kongsberg, EIS 27, 2 ♂ ♂ 1 ♀ 27 July 1979; Meheia, EIS 27, 1 ♀ 26 July 1979.

TELEMARK: TEi: Bø, Bø, EIS 18, 1 ♂ 1 ♀ 25 July 1979; Øvrebø, EIS 18, 3 ♂ ♂ 1 ♀ 25 July 1979; Seljord, Ulvenes, EIS 17, 1 ♀ 25 July 1979.

AUST-AGDER: AAy: Hisøy, Ramsø, EIS 6, 1 ♂ 19 July 1935, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. illustris);* 1 ♀ 19 July 1935, T. Soot-Ryen, TM.

VEST-AGDER: VAy: Mandal, Kvisla-Mandal, EIS 2, 1 ♂ 12 July 1935, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. caesar,* misidentification); 1 ♂ 2 ♀ ♀ 12 July 1935, T. Soot-Ryen, TM; Rona-Mandal, EIS 2, 1 ♂ 9 July 1935, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. illustris);* Farsund, Lista, EIS 1, 1 ♂ 28 June 1978, J. Nystrøm.

ROGALAND: Ry: Hå, Ogna, EIS 3, 1 ♂ 29 July 1962, T. Nielsen; Klepp, Gjeishaug, EIS 7, 1 ♀ 4 Aug. 1963, A. Løken, ZMB; Vik, EIS 7, 1 ♂ 4 Aug. 1963, T. Nielsen, ZMB; Øksnevad, EIS 7, 1 ♂ 1 ♀ 23 July 1965, T. Nielsen, ZMB; 2 ♂ ♂ 5 ♀ ♀ 1 Aug. 1979, T. Nielsen; ?loc., EIS 7, 2 ♀ ♀ 21 July 1962, T, Nielsen, ZMB; Gjesdal, Kydland, EIS 7, 1 ♀ 10 July 1977; Sandnes, Lura, EIS 7, 3 ♂ ♂ 1 ♀ 19 July 1979; Sola, Gimra, EIS 7, 1 ♀ 29 Aug. 1963, T. Nielsen, ZMB; 3 ♂ ♂ 19 July 1979; Ølberg, EIS 7, 1 ♂ 16 July 1961, A. Løken, ZMB; Stavanger, Byhaugen, EIS 7, 1 ♂ 9 June 1979; Krossberg, EIS 7, 1 ♂ 11 July 1977; 1 ♀ 9 Aug. 1978; 2 ♀ ♀ 4 July 1979, Ø. & K. Rognes; Sunde, EIS 7, 1 ♂ 25 June, 1 ♀ 30 June, 1 ♀ 2 July, 1 ♂ 7 July 1977; 1 ♀ 29 May, 1 ♀ 9 Aug. 1978; 2 ♂ ♂ 1—15 Aug., 3 ♂ ♂ 24 Aug. 1979; Tjensvoll, EIS 7, 3 ♂ ♂ 2 ♀ ♀ 5 July, 1 ♀ 13 July, 1 ♂ 1 ♀ 11 Aug. 1977; Ullandhaug, EIS 7, 1 ♀ 29 May 1977; 2 ♂ ♂ 4 ♀ ♀ 10 Aug. 1978; 1 ♀ 10 June, 2 ♀ ♀ 4 July 1979.

HORDALAND: HOy: Fana, Milde, EIS 30, 1 ♀ 28 July 1966, L. Greve, ZMB; Askøy, Herdla, EIS 39, 1 ♂ 29 July 1935, N. Knaben, ZMB; 1 ♂ 17 June 1936, N. Knaben, ZMB; 1 ♂ 2 ♀ ♀ July 1936, A. Brinkmann, ZMB; 1 ♀ 10 July, 1 ♂ 15 July 1937, N. Knaben, ZMB; 1 ♂ 23 July 1937, A. Brinkmann, ZMB; Lindås, Fosse EIS 39, 1 ♂ 6 June 1965, A. Løken, ZMB. HOi: Kvinnherad, Berget, EIS 31, 1 ♀ 3 Sept. 1966, Museum of Zoology, Bergen, Excursion, ZMB; Ljosmyr, EIS 31, 1 ♀ 3 Sept. 1965, Museum of Zoology, Bergen, Excursion, ZMB.

SOGN OG FJORDANE: SFy: Gloppen, Sandane, EIS 68, 2 ♂ ♂ 2 ♀ ♀ 31 July 1978. SFi: Luster, Sande, EIS 60, 1 ♀ 31 July 1945, N. Knaben, ZMB.

MØRE OG ROMSDAL: MRi: Rauma, ?loc., EIS 77, 1 ♀ ?date, H. Siebke, ZMO no. 6111 (positioned as *L. caesar).*

SØR-TRØNDELAG: STi?: ?loc., EIS 92?, 12 ♂ ♂ 6 ♀ ♀, V. Storm, DKNVS (Ringdahl 1944a: 80, as *L. illustris).*

NORD-TRØNDELAG: NTy: Namsos, Namsos, EIS 106, 1 ♀ 16 July 1946, T. Soot-Ryen, TM. NTi: Levanger, Hammer, EIS 98, 1 ♀ 3 July 1978; Steinkjer, Gulbergaunet, EIS 101, 1 ♂ 1 ♀ 26 July 1978.

NORDLAND: Nsy: Brønnøy, Brønnøysund, EIS 114, 1 ♂ 2 ♀ ♀ 25 June 1946, T. Soot-Ryen, TM; Hommelstø, EIS 114, 1 ♀ 28 June 1946, T. Soot-Ryen, TM. Nsi: Grane, Trofors, EIS 115, 1 ♀ 25 July 1946, T. Soot-Ryen, TM. Nnv: Røst Skomvær, EIS 129, 1 ♂ 8 July 1936, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. illustris);* Andøy, Andenes, EIS 152, 1 ♂ 23 July 1941, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. illustris).*

TROMS: TRy: Karlsøy, Torsvåg, EIS 171, 1 ♀ 16 July 1925, T. Soot-Ryen, TM. TRi: Balsfjord, Skjåvikør, EIS 162, 1 ♂ 19 June 1943, T. Soot-Ryen, TM; Storfjord, Oteren, EIS 155, 1 ♂ 10 July 1979, I. & T. Nielsen; Nordreisa, Andsjøen-Storslett, EIS 164, 4 ♂ ♂ 3 ♀ ♀ 8 July 1979, I. & T. Nielsen; Storslett, EIS 164, 1 ♀ 9 July 1979, T. Nielsen.

FINNMARK: Fv: Nordkapp, Repvåg, EIS 182, 1 ♂ 3 Aug. 1924, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. illustris).* Fi: Alta, Jotkajavre, EIS 165, 1 ♀ 25 July 1924, T. Soot-Ryen, TM (Ringdahl 1944b: 6, as *L. illustris);* Kautokeino, Kautokeino, EIS 157, 1 ♂ 3—4 July 1979, I. & T. Nielsen. Fn: Porsanger, Russenes, EIS 181, 1 ♀ 28 June 1979, T. Nielsen.

Unverified records:

Zetterstedt (1845: 1317) reports *L. illustris* from Oslo (Dahlbom). According to Ringdahl (1952: 185) Zetterstedt was not able to segregate the species of the genus *Lucilia,* and the record is consequently unreliable. Siebke's only record («In horto botanico ad Christianiam 26 Juli 1850 a me reperta.» Siebke 1877: 97) belongs to *L. bufonivora* (the locality is obviously wrong, see ZMO no. 6148 above). Ringdahl (1944b: 6) reports *L. illustris* from Ry: Sandnes, Hana, EIS 7 (F. Jensen leg.). Brinkmann (1976b) has bred *L. illustris* from larvae collected from sheep from the following localities: HOy: Fusa, Eikelandsosen (Koldal), EIS 31; Holdhus (Bjørndal), EIS 31; HOi: Kvinnherad, Rosendal, EIS 31; Voss, Høyland n. of Lønavatn, EIS 41. S. Andersen, Copenhagen,

(in litt.) reports to have caught 4 specimens of this species at «Breivegen Bru, Hundorp» (On: Fron, EIS 63).

Distribution and ecology (Fig. 8C):

L. illustris is distributed all over the country, the northernmost record being from Repvåg (70°45'N). The species also occurs all over Finland and Sweden (Ringdahl 1952, Nuorteva 1959a, 1963, 1964, Nuorteva & Vesikari 1966). In the northern parts of Finland it is strongly synanthropic whereas it is almost independent of conditions created by man in the south (Nuorteva 1963).

Remarks on biology:

In the breeding experiments cited above, *L. illustris* emerged together with *L. caesar* in five of ten cases. In one case it was reared alone (Brinkmann 1976a, 1976b). This may indicate that *L. illustris,* in addition to *L. caesar* (see above), may act as primary striker in sheep myiasis in Norway. MacLeod (1943a: 78) also reports a few cases of *L. illustris* acting alone from Great Britain. Brinkmann (1976a, 1976b), however, rules out this case completely, for two reasons. Firstly, because it was an isolated case. Secondly because the species «is abundant all over the country, i.e. also in eastern and northern Norway from which parts sheep strike is unknown.» (Brinkmann 1976a: 326). The strength of the first argument cannot be evaluated as Brinkmann does not give the number of adult flies which emerged in the breeding experiments. The second argument has no force since, following the logic behind it, one would have to rule out even *L. caesar,* which also is abundant in areas where sheep strike has not been recorded, e.g. Finland (Brinkmann 1976a: 327). *L. sericata* would have to be rejected as primary cause of sheep myiasis in Europe, for the same reason (Cragg 1950). None of the above mentioned *Lucilia* species are obligatory parasites of sheep. The fact that each of them has an area of distribution exceeding the area of occurrence of the disease does not in itself constitute an argument against any species being its primary cause.

Note

6 females in TM, 3 in ZMB and 5 in ZMO (nos. 6112, 6113, 6114, 6116, 6192) remain unidentified. They belong to *L. caesar* or *L. illustris.*

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Spiders (Araneae) from five damp localities on Osterøy, Western Norway

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Andersen, T., Bakke, B. & Klausen, F. E. 1980. Spiders (Araneae) from five damp localities on Osterøy, Western Norway. *Fauna norv. Ser. B. 27,* 53—59.

A total of 3015 specimens belonging to 85 species of Araneae were caught in five light traps operated on the Island of Osterøy, Western Norway, during, 1972 and 1973. All traps were placed in damp habitats near freshwater. Different types of vegetation influenced the composition of the spider fauna, both in numbers and diversity.

Two species, *Erigone promiscua* (O.P.-Cambridge, 1872) and *Floronia bucculenta* (Clerck, 1757), are new to Norway and three species *Trochosa spinipalpis* (F.O.P.-Cambridge, 1895), *Walckenaera nodosa* O.P.-Cambridge, 1873 and *Lophomma punctatum* (Blackwall, 1841) have previously not been recorded from Western Norway. Additional records of these species from Hordaland are included, as well as comments on habitat preference and geographical distribution.

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INTRODUCTION

The present paper deals with a collection of spiders taken in light traps on the Island of Osterøy in outer Hordaland, during 1972 and 1973. In 1972 light traps were operated from early June to late November in five localities: Valestrandsfossen, Revheim, Lono, Holo, and Herland. In 1973 only the traps at Valestrandsfossen, Revheim, and Lono were run, and the collecting period this year was April to November.

All five traps were placed close to stagnant or running waters. The vegetation differed considerably, but all localities were more or less damp.

LOCALITIES

At Revheim (UTM:32VLN085131) the light trap was placed on a small floating island grown with *Sphagnum* sp., and with a brim of vegetation consisting of *Myrica gale* on the inside and *Carex vesicaria, Cicuta virosa* and *Menyanthes trifoliata* along the water. The locality was permanently soaked. At Lono (UTM: 32VLN093135) the vegetation on the trapping site was dominated by small grassfields extending down to a stream, merely interrupted by a few trees (*Alnus glutinosa)* along the stream. The grassland was moist. A moss carpet of *Rhytidiadelphus squarrosus* and *Hylocomium splendens* made up the ground layer. At Valestrandsfossen (UTM: 32VLN041134) the vegetation was more complex. In addition to the field layer, which was mainly made up of *Calamagrostis purpurea,* there was a dense scrub layer consisting of a belt of *Salix* spp. and *Spiraea salicifolia* along the water. The area is often flooded in the spring, and was during the sampling periode more or less permanently waterlogged. At Herland (UTM:32VLN105216) the trap was situated in a meadow extending down to a small river. The locality had a dense field layer of grass and herbs, and scattered trees, mainly *Populus tremula, Corylus avellana,* and *Betula pubescens,* were found close to the trapping site. At Holo (UTM:32VLN075202) the light trap was placed near a small, rather swift stream running through a mixed forest with *Picea abies, B. pubescens, A. glutinosa,* and *Prunus padus.* The locality was very shady and damp, and the field layer was made up of ferns, and *Rubus idaeus.*

METHOD

The light traps used were of a modified Robinson type, fitted with mercury vapour bulbs (Philips HPL 125 W). In 1972 the traps were placed upon the ground, the vertical sides rising about 15 cm above ground level. In 1973 the traps were dug into the ground with the top almost even with ground level. This modification made access for ground living species more easy. Ac-

Table 1. Araneae taken in the light traps on Osterøy in 1972 and 1973.

Species	Valestrandsfossen						Revheim						Lono						Herland			Holo		
	1972			1973			1972			1973			1972			1973			1972			1972		
	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.
DYSDERIDAE																								
Segestria senoculata (L., 1758)	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–
GNAPHOSIDAE																								
Haplodrassus signifer (C.L. Koch, 1839)	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–
Gnaphosidae indet.	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	5	–	–	–	–	–	–
CLUBIONDAE																								
Clubiona reclusa O.P.-Cambridge, 1863	8	8	–	18	9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
C. trivialis C.L. Koch, 1841	–	–	–	–	–	–	–	–	–	1	1	1	–	–	–	–	–	–	1	–	–	–	–	–
C. frutetorum L. Koch, 1866	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–
Cheiracanthium erraticum (Walckenaer, 1802)	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Agroeca proxima (O.P.-Cambridge, 1871)	–	–	–	–	–	–	–	–	–	7	–	–	–	–	–	9	–	–	–	–	–	–	–	–
Clubionidae indet.	–	–	44	–	–	171	–	–	–	–	–	2	–	–	2	–	–	3	–	–	6	–	–	–
THOMISIDAE																								
Xysticus cristatus (Clerck, 1757)	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
X. luctuosus (Blackwall, 1836)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Philodromus aureolus (Clerck, 1757)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Thomisidae indet.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
LYCOSIDAE																								
Pardosa pullata (Clerck, 1757)	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
P. amentata (Clerck, 1757)	2	1	–	58	12	–	–	–	–	1	5	–	1	–	–	10	5	–	1	–	–	–	–	–
Alopecosa cuneata (Clerck, 1757)	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Trochosa terricola Thorell, 1856	–	–	–	10	12	–	–	–	–	1	2	–	–	–	–	90	108	–	–	–	–	–	–	–
T. spinipalpis (F.O.P.-Cambridge, 1895)	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Pirata piraticus (Clerck, 1757)	–	–	–	3	3	10	–	3	–	43	180	150	–	–	–	–	–	5	–	–	–	–	–	–
P. hygrophilus Thorell, 1872	–	–	–	–	1	–	–	2	–	6	340	46	–	–	–	–	–	–	–	1	–	–	–	–
Lycosidae indet.	–	–	7	–	–	68	–	–	–	–	–	32	–	–	2	–	–	24	–	–	1	–	–	–
PISAURIDAE																								
Pisaura mirabilis (Clerck, 1757)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Dolomedes fimbriatus (Clerck, 1757)	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
AGELENIDAE																								
Cryphoeca silvicola (C.L. Koch, 1834)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Antistea elegans (Blackwall, 1841)	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
MIMETIDAE																								
Ero furcata (Villers, 1789)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–

THERIDIIDAE																							
Steatoda bipunctata (L., 1758)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—
Robertus lividus (Blackwall, 1836)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—
R. arundineti (O.P.-Cambridge, 1871)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—
R. scoticus Jackson, 1914	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TETRAGNATHIDAE																								
Tetragnatha extensa (L., 1758)	8	3	—	10	6	1	2	—	—	—	1	—	1	—	—	—	—	—	2	—	—	—	—	—
T. montana Simon, 1874	32	1	—	9	4	—	1	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—
Pachygnatha clercki Sundevall, 1830	14	9	—	17	28	1	—	—	—	8	13	—	—	—	—	—	—	—	—	1	—	—	—	—
P. degeeri Sundevall, 1830	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	11	5	—	—	3	—	—	2	—
Tetragnathidae indet.	—	—	1	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	2	—	—	—
ARGIOPIDAE																								
Meta segmentata (Clerck, 1757)	6	2	—	2	5	—	—	—	—	—	—	—	1	2	—	8	3	—	—	—	—	1	—	—
M. merianae (Scopoli, 1763)	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Araneus diadematus Clerck, 1757	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—
A. patagiatus Clerck, 1757	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
A. cucurbitinus Clerck, 1757	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
Argiopidae indet.	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	2
LINYPHIIDAE																								
Ceratinella brevis (Wider, 1834)	—	—	—	—	—	—	—	—	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—
Walckenaera nodosa O.P.-Cambridge, 1873	—	—	—	1	—	—	—	—	—	2	—	—	—	—	—	2	1	—	—	—	—	—	—	—
Cornicularia cuspidata (Blackwall, 1833)	—	—	—	10	20	3	—	—	—	1	2	—	—	—	—	2	—	—	—	—	—	—	1	—
Dicymbium tibiale (Blackwall, 1836)	—	1	—	9	7	—	—	—	—	—	—	—	—	—	—	7	5	—	—	—	—	—	—	—
Dismodicus bifrons (Blackwall, 1841)	—	1	—	27	15	—	—	—	—	—	—	—	1	1	—	3	—	—	—	—	—	—	—	—
Metopobactrus prominulus (O.P.-Cambridge, 1872)	—	—	—	—	—	—	—	—	—	19	—	4	—	—	—	—	—	—	—	—	—	—	—	—
Gonatium rubens (Blackwall, 1833)	—	—	—	4	3	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—
G. rubellum (Blackwall, 1841)	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
Oedothorax fuscus (Blackwall, 1834)	—	—	—	1	3	—	—	—	—	—	1	—	4	3	—	194	114	—	—	—	—	—	—	—
Silometopus elegans (O.P.-Cambridge, 1872)	—	—	—	1	—	—	—	—	—	1	2	—	1	—	—	1	—	—	—	—	—	—	—	—
Lophomma punctatum (Blackwall, 1841)	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gongylidiellum vivum (O.P.-Cambridge, 1875)	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Micrargus herbigradus (Blackwall, 1854)	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Erigonella hiemalis (Blackwall, 1841)	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—
Savignia frontata Blackwall, 1833	—	—	—	6	—	—	—	—	—	—	—	—	—	—	—	2	6	—	—	—	—	—	—	—
Diplocephalus permixtus (O.P.-Cambridge, 1871)	—	—	—	4	—	—	—	—	—	1	2	—	—	—	—	—	1	—	—	—	—	—	—	—
D. latifrons (O.P.-Cambridge, 1863)	—	—	—	1	4	—	—	—	—	—	1	—	—	—	—	14	12	—	—	—	—	—	—	—

Species	Valestrandsfossen						Revheim						Lono						Herland			Holo		
	1972			1973			1972			1973			1972			1973			1972			1972		
	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.	♂	♀	juv.
Asthenargus paganus (Simon, 1884)	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Typhocrestus digitatus (O.P.-Cambridge, 1872)	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Erigone dentipalpis (Wider, 1834)	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	2	4	—	—	—	—	—	—	—
E. atra (Blackwall, 1841)	—	—	—	1	1	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—	—	—	1	—
E. promiscua (O.P.-Cambridge, 1872)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—
Leptorhoptrum robustum (Westring, 1851)	—	—	—	7	1	—	—	—	—	—	—	—	1	1	—	10	—	2	—	—	—	—	—	—
Drepanotylus uncatus (O.P.-Cambridge, 1873)	—	—	—	7	6	—	—	—	—	—	3	—	—	—	—	2	1	—	—	—	—	1	—	—
Porrhomma pallidum Jackson, 1913	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
Meioneta saxatilis (Blackwall, 1844)	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—
Centromerus sylvaticus (Blackwall, 1841)	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—
C. arcanus (O.P.-Cambridge, 1873)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Tallusia experta (O.P.-Cambridge, 1871)	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Centromerita bicolor (Blackwall, 1833)	—	—	—	—	1	—	—	—	—	6	—	—	—	—	—	7	12	—	2	2	—	—	—	—
C. concinna (Thorell, 1875)	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	3	—	—	—	—	—	—	—	—
Oreonetides abnormis (Blackwall, 1841)	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	2	—	—	—	—	—	—	—	—
Macrargus rufus (Wider, 1834)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—
Diplostyla concolor (Wider, 1834)	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bathyphantes gracilis (Blackwall, 1841)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Tapinopa longidens (Wider, 1834)	—	—	—	2	—	—	—	—	—	1	—	—	—	—	—	4	—	—	1	—	—	—	—	—
Floronia bucculenta (Clerck, 1757)	1	1	—	6	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Labulla thoracica (Wider, 1834)	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bolyphantes luteolus (Blackwall, 1833)	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	4	—	—	—	—	—	—	—	—
B. alticeps (Sundevall, 1832)	77	14	—	18	1	—	1	—	—	7	—	—	18	4	—	15	1	—	3	—	—	3	—	—
Lepthyphantes alacris (Blackwall, 1853)	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
L. zimmermanni Bertkau, 1890	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
L. cristatus (Menge, 1866)	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
L. mengei Kulczynski, 1887	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	3	—	—	—	—	—	—	—	—
L. angulatus (O.P.-Cambridge, 1879—81)	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Helophora insignis (Blackwall, 1841)	10	8	—	2	1	—	—	—	—	—	—	—	4	1	—	2	—	—	—	1	—	11	—	1
Linyphia triangularis (Clerck, 1757)	7	47	—	13	20	—	—	—	—	4	1	—	21	6	—	10	6	1	2	2	—	2	2	—
L. clathrata Sundevall, 1829	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Microlinyphia pusilla Sundevall, 1829	—	—	—	2	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Allomengea scopigera (Grube, 1859)	5	10	—	52	15	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—
Linyphiidae indet.	—	—	1	—	—	43	—	—	—	—	—	11	—	—	2	—	—	11	—	—	—	—	—	5

cordingly the catches were greater in 1973. We have therefore confined our discussion on the abundance of the species to the results from 1973.

In 1972 the catches were killed with trichloroethylene and later preserved in alcohol. The second year the catches were conserved directly in a container filled with ethyleneglycol and later transferred to alcohol. The traps were emptied regularly, every fifth day in 1972 and every tenth day in 1973.

RESULTS

The species

A total of 3015 specimens belonging to 85 species were caught in the light traps, Tab. 1. Most of the species are well known and common, but two are new to Norway and three previously have not been recorded from Western Norway.

Trochosa spinipalpis (F.O.P.-Cambirdge, 1895) previously is recorded from Nordland, Møre and Romsdal, Sør-Trøndelag and Oppland (Hauge 1976, Hauge & Wiger 1980, Tambs — Lyche 1942). We have two additional records from Western Norway: Kalandseid, Bergen (UTM: 32VLM022873) 24 Apr.1973 1 ♂ 1 ♀ in a waterlogged area with *Sphagnum* sp. and sedge tussocks; Nordvikvann, Bergen (UTM: 32VKM990838) 17 Apr.—19 May 1973 4 ♂ 1 ♀ in a *Sphagnum*-bog.

Walckenaera nodosa O.P.-Cambridge, 1873 previously is recorded from central and eastern Norway (Hauge & Wiger 1980, Waaler 1972). We have two additional records from Western Norway: Halhjem, Os (UTM: 32VLM024733) 19 May and 18 Nov. 1975 1 ♂ 2 ♀ in a *Sphagnum*-bog; Måksteinen, Austevoll (UTM: 32VKM778636) 20 Oct. 1975 1 ♂ in a grassfield.

Lophomma punctatum (Blackwall, 1841) previously is recorded twice from eastern Norway (Strand 1903, Waaler 1972). We have three additional records from Western Norway: Fana Kirke, Bergen (UTM:32VKM983865) 16 Apr.—28 July 1973 2 ♂ on the bank of a stream in a decidious forest; Møkster, Austevoll (UTM:32VKM825648) 23 June 1973 2 ♂ 6 ♀ taken immediately above the surface of a small well, with nets suspended between shoots of *Scorpidium scorpidoides;* Kalandseid, Bergen (UTM:32VLM022873) 7 Nov. 1975 1 ♂ in a waterlogged area with *Sphagnum* sp. and sedge tussocks.

Erigone promiscua (O.P.-Cambridge, 1872) previously has not been recorded from Norway. We have one additional record: Møkster, Austevoll (UTM: 32VKM821652) 21 May 1972 2 ♂ 6 ♀ in small crevices on a rocky shore. The species is recorded from Marocco, Spain, Portugal, France, The British Isles and The Faroe Isles (Bonnet 1956).

Floronia bucculenta (Clerck, 1757) previously has not been recorded from Norway. We have one additional record: Halhjem, Os (UTM: 32VLM024733) 25 Aug. 1972 1 ♀ in a *Sphagnum*-bog. According to Locket and Millidge (1953) and Wiehle (1956) the species seems to have a preference for moist habitats. The species is widespread in Europe (Bonnet 1956).

Abundance

At Revheim *Pirata hygrophilus* Thorell, 1872 and *P. piraticus* (Clerck, 1757) were the most abundant species, making up 51 % and 40 % of the catches, respectively, Fig. 1. Both species are common in moist habitats and are characteristic for *Sphagnum*-bogs.

At Lono the dominant position were taken over by *Oedothorax fuscus* (Blackwall, 1834) (43 %) and *Trochosa terricola* Thorell, 1856 (27 %), Fig. 2. Both species are typical for open land habitats, such as moist grassland, but can also be found in other situations. The same apply to several of the other species, particularly

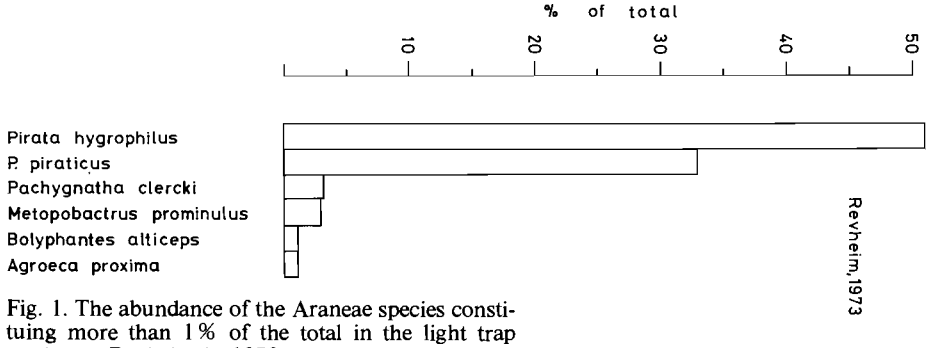

Fig. 1. The abundance of the Araneae species constituing more than 1 % of the total in the light trap catches at Revheim in 1973.

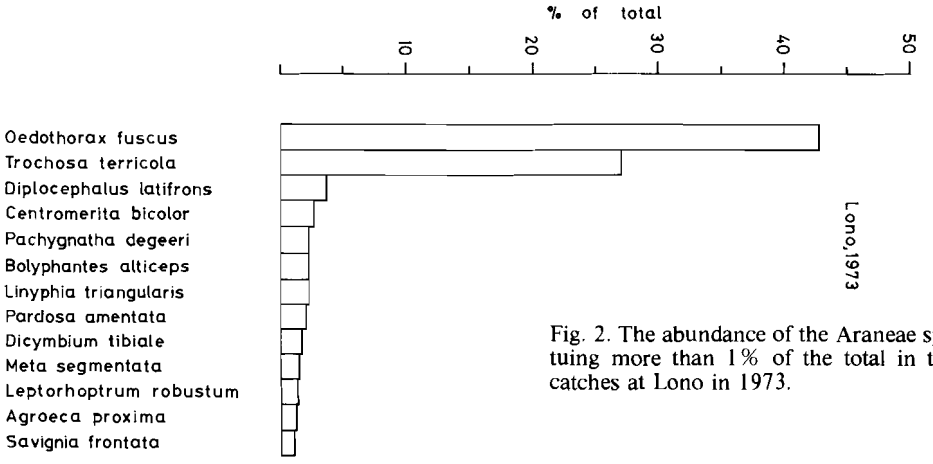

Fig. 2. The abundance of the Araneae species constituing more than 1% of the total in the light trap catches at Lono in 1973.

Centromerita bicolor (Blackwall, 1833, *Pachygnatha degeeri* Sundevall, 1830, *Pardosa amentata* (Clerck, 1757) and *Savignia frontata* Blackwall, 1833.

The most abundant species at Valestrandsfossen were *Pardosa amentata* (14%) and *Allomengea scopigera* (Grube, 1859) (13%), Fig. 3. *P. amentata* is a common species in moist grass fields and meadows. *A. scopigera* prefers the field and shrub layer, and is recorded from damp situations, often in connection with salt marshes (Locket and Millidge 1953, Heydemann 1961, Wiehle 1956). The list from Valestrandsfossen comprises species with more diverging demands. Species like *Trochosa terricola* and *Savignia frontata,* are groundliving species often encountered in open land habitats. Others, like *Allomengea scopigera, Clubiona reclusa* O.P.-Cambridge, 1863 and *Tetragnatha montana* Simon, 1874, are associated with the more shady conditions in shrubs and thickets. *Cornicularia cuspidata* (Blackwall, 1833) is more often connected with *Sphagnum*-bogs. Almost all of the species share the common preference for damp localities. Among the more pronounced in this respect is *Drepanotylus uncatus* (O.P.-Cambridge, 1873).

Pachygnatha clercki Sundevall, 1830 was fo-

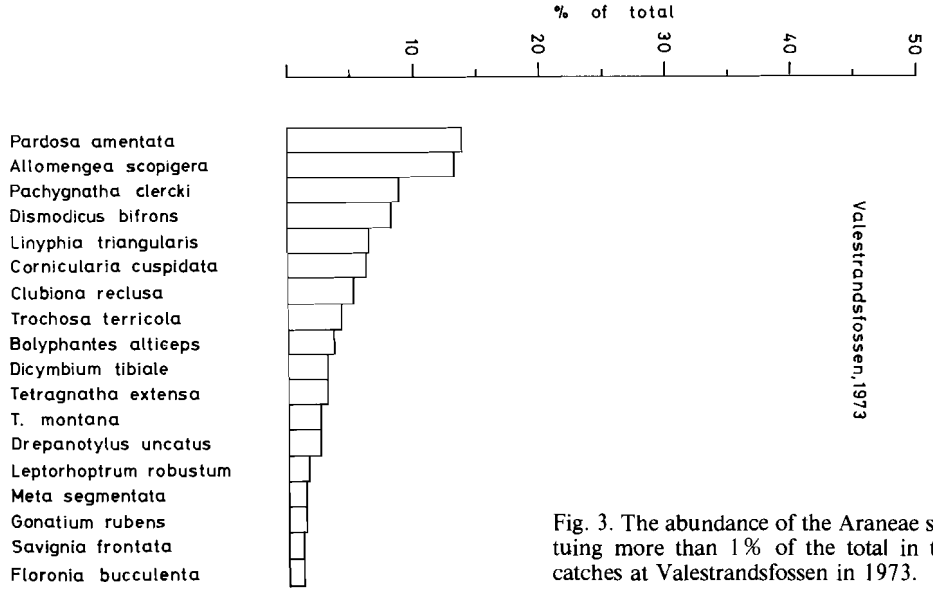

Fig. 3. The abundance of the Araneae species constituing more than 1% of the total in the light trap catches at Valestrandsfossen in 1973.

und in comparatively high numbers at Valestrandsfossen, it was present at Revheim, while it at Lono was replaced by *P. degeeri*. The latter has a greater tolerance to light and humidity, and is a characteristic species in open field habitats.

DISCUSSION

The vicinity of water to the localities studied is reflected in their spider faunas by the high number of species with affinity to damp habitats. Furthermore, the different structures of the vegetation in the localities obviously have an influence both on the species composition and on the species diversity. At Revheim the number of species is low, with few species taking up a very dominant position. At Valestrandsfossen, with its more complex and varied vegetation, there is a fairly large diversity with no markedly dominant species. The conditions at Lono show an intermediate position.

We have made no methodical attempt to compare trapping with UV-light to other trapping methods. It is possible that there is some quality connected with the light traps which attracts spiders, either the UV-light itself or the increased insect activity near the traps. That spiders can respond and adapt themselves to such activity has been shown by Riechert (1974).

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The spider fauna (Araneae) from 12 habitats in the Vassfaret region, south-eastern Norway

ERLING HAUGE AND RICHARD WIGER

Hauge, E. and Wiger, R. 1980. The spider fauna (Araneae) from 12 habitats in the Vassfaret region, south-eastern Norway. *Fauna norv. Ser. B 27,* 60—67.

During 1970—1973, 120 species of spiders were collected in pitfall traps in the Vassfaret region. Ten species are first records for Norway. Descriptions of 12 different plant associations in the area and complete lists of the spider catches are given. The composition of the spider faunas from the 12 habitats is discussed. The use of Renkonen's method indicates that pitfall trapping provides a spider fauna which seems to reflect a relationship to the vegetation in which they live.

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INTRODUCTION

Descriptive analyses of plant sociological patterns were a major part of the Conservation Section of the International Biological Programme (IBP-CT). Vegetation maps of plant communities in the Vassfaret region also were the basis for the IBP-CT Project Silva (Aune 1978). However, the plant associations are only part of an ecosystem. The present investigation was undertaken in order to study the relationships between the spider fauna and the plant associations. During 1970 to 1973 the terrestrial invertebrates were sampled extensively. The spider fauna of 12 localities are presented here. The Vassfaret Valley contains all of the main forest communities of the «pre-montane» region of eastern Norway (Aune 1978). Since the spider fauna is relatively unknown in this part of Norway, Vassfaret here forms a representative type area for nature conservation purposes.

DESCRIPTION OF THE STUDY AREA AND THE TRAPPING STATIONS

The Vassfaret region is a coniferous forest area typical of the eastern part of southern Norway (Fig. 1a). For this reason it was chosen as a representative type in the International Biological Programme. The main valley in Vassfaret is located about 600 m a.s.l. and consists of a chain of several lakes connected by rivers. The forest ranges to an altitude of around 900 m a.s.l. where it meets the subalpine zone of a limited mountain plateau. This coniferous forest is dominated by spruce, *Picea abies,* and extends up to the subalpine birch, *Betula pubescens,* zone. There are some limited areas of pine, *Pinus sylvestris,* forest throughout the region. A plant sociological analysis of Vassfaret has been published by Aune (1978).

The macroclimate of the Vassfaret region is characterized as continental according to Norwegian conditions (Aune 1978). The annual precipitation is approximately 600 mm, and winter generally lasts from five to seven months.

The locality of the 12 stations are shown in Fig. 1b.

Station 1. A pine wood *(Pinus sylvestris)* with a lichen ground cover, at an altitude of 585 m a.s.l. This *Cladonia-Pinetum* association has a field layer which is dominated by *Calluna vulgaris.* The are also scattered *Vaccinium vitis-idae* and *V. myrtillus.* The bottom layer is dominated by the lichens *Cladonia rangifera* and *C. sylvatica. Pleurozium schreberi* is the dominating moss. Dead remnants of *Pinus* are scattered about. 5 traps.

Station 2. A pine-mixed forest due north of station 1, with a NNW exposition, approximately 580 m a.s.l. This *Vaccinio Pinetum* association is dominated by *P. sylvestris,* but also contains a number of *Picea abies,* some *Populus sp.* and a few standing, dead birch, *Betula pubescens.* The field layer is dominated by *Vaccinium myrtillus,* but also contains *V. vitis-idae, Deschampsia flexuosa* and *Melampyrum pratense.* In addition to these some *Empetrum hermaphroditum, Linnea borealis* and *P. abies* are present. The bottom layer is dominated by the moss *P. schreberi,* but also contains *Dicranum scoparium* and *Ptilidium cristacastrensis, Hylocomium splendens* and *Sphagnum quinquefarium.* Small patches of *Clado-*

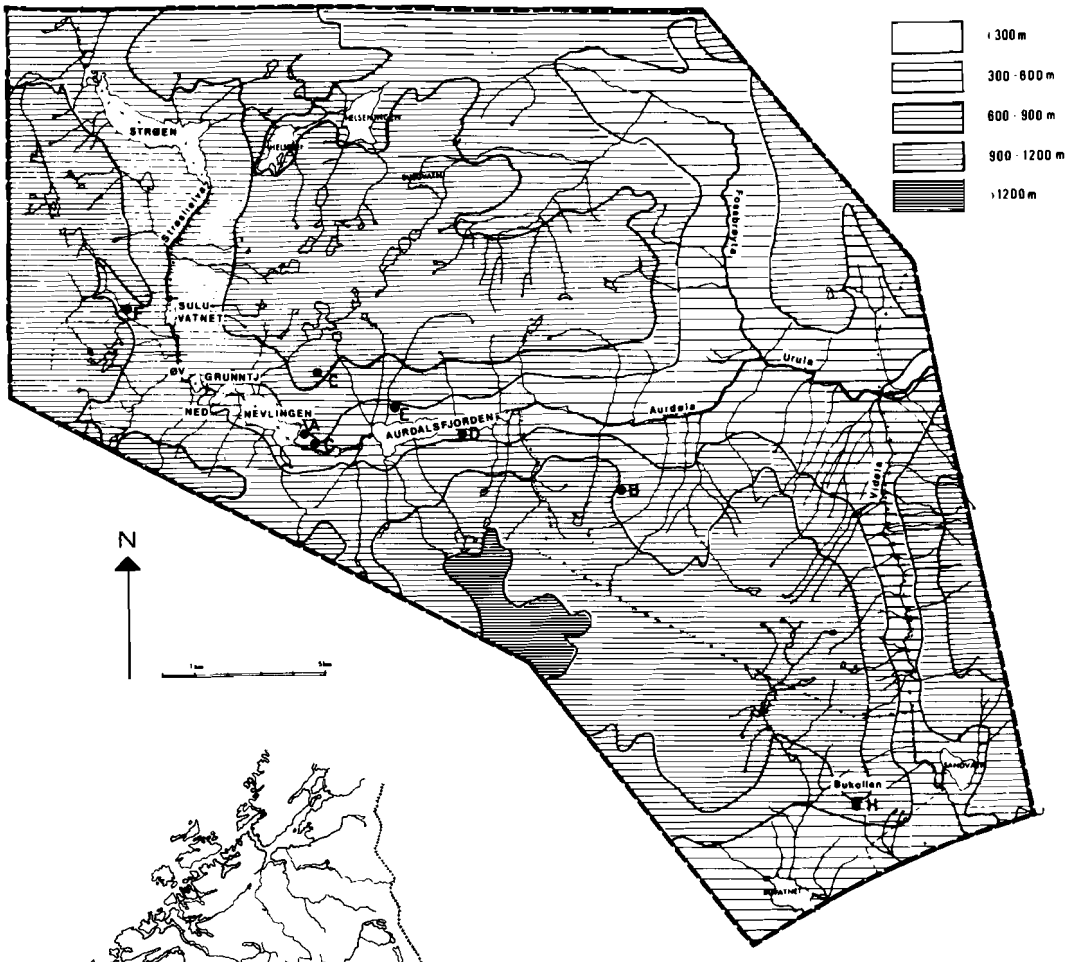


Fig. 1b. A topographical map of the Vassfaret region indicating the locations of the 12 sampling stations. The letters on the map correspond to the following stations (stations in parentheses): A(1,2), B(3,4,5), C(6,7), D(8), E(9), F(10), G(11) and H(12).

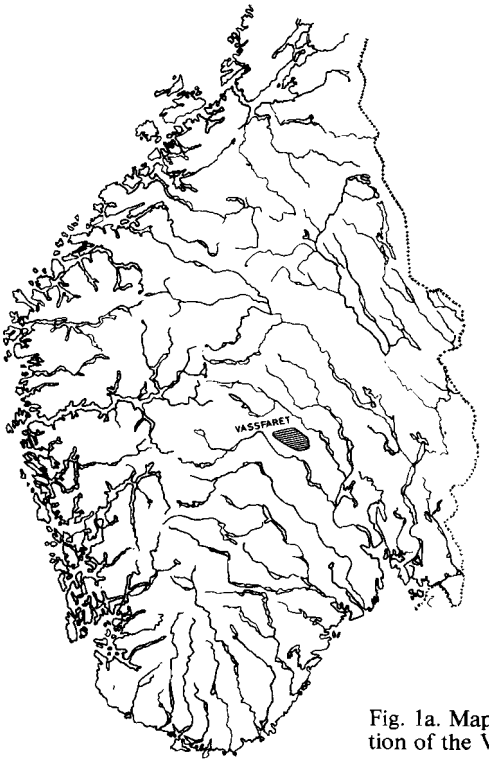


Fig. 1a. Map of southern Norway showing the location of the Vassfaret region.

nia rangifera and *C. sylvatica* also occur. Some small remnants of *Pinus, Picea* and *Populus* are scattered about. 5 traps.

Station 3. Situated in a thick subalpine birch wood, *B. pubescens,* 895 m a.s.l. This plot has a NW exposition. The field layer is dominated by *V. myrtillus,* but also contains *V. uliginosum, D. flexuosa* and *M. pratense.* The bottom layer is dominated by the following mosses: *Barbilophozia lycopodioides, P. schreberi, D. scoparium* and *D. majus.* Dead parts of birch are strewn about. 3 traps.

Station 4. Located 4 meters from station 3. The traps lie to each side of a birch thicket at the edge of a bog. Small birch shrubs are present, but sparse. The following grasses, sedges and shrubs are common: *Andromeda polifolia, Carex vaginata, Eriophorum vaginatum, E. angustifolium, Molinia caerula, Nardus stricta, Trichophorum caespitosum* and *Vaccinium microcarpum.* The bottom layer is dominated by *Sphagnum russowii* and *S. papillosum.* A few dead parts of birch are scattered about 2 traps.

Station 5. Situated in a subalpine form of *Eu-Piceetum* association, 925 m a.s.l., having a NNW exposition. A dense growth of *B. pubescens* accounts for both the tree and shrub layers. The field layer is characterized by *V. myrtillus* and also contains the following species: *Gymnocarpium dryopterus, C. vaginata, Geranium sylvaticum, Potentilla erecta, Listera cordata, M. pratense* and *Rubus saxatilis.* In addition there occurs *Trientalis europaea, D. flexuosa* and *Solidago virgaurea.* The bottom layer is dominated by *Sphagnum girgensohnii, Polytrichum formosum,* but also contains *B. lycopodiodes* and *Lophozia ventricosa.* Lots of dead parts of birch are scattered about. 5 traps.

Station 6. Together with station 7 and 12, of the *Cicerbition alpinea*-type plant association. These isolated plant societies, which are characterized by the great number of tall perennial herbs and grasses, all are located more of less at the base of cliffs or almost vertical mountain walls. Because of the southern exposition, these localities are snow-free relatively early in the spring. The steep slopes and cliffs which lie above these stations make them very susceptible to flooding. During heavy rains nearly all of the traps were flooded. The traps at station 6 have a SE exposition in a steep slope (40°) at an altitude of 780 m a.s.l. The field layer is very tall, approximately 125 cm, and countains 29 species. The vegetation is very dense and the bottom layer, which contains only five species of mosses, is quite dark. A good deal of rotting vegetation and bare soil are present here and at stations 7 and 12. 5 traps.

Station 7. Situated 780 m a.s.l. approximately 100 m below station 6 being separated by a spruce forest. The angle of the slope is 35°. The field layer is 125 cm high and contains 28 species. There are 8 species in the bottom layer. 5 traps.

Station 8. N exposition, located in rather dense small fern-spruce forest *(Eu-Piceetum)* 590 m a.s.l. The tree layer is dominated by spruce, *P. abies.* The shrub layer contains a number of *Sorbus aucuparia.* The dominant species in the field layer are *V. myrtillus* and the small ferns *Gymnocarpium dryopteris* and *Thelypteris phegopteris.* This small forest type is relatively moist and the bottom layer contains several hygrophilic species among which the most important quantitatively are *Ptilium cristacastrensis* and *S. girgensohnii.* 10 traps.

Station 9. Mixed forest, *Vaccinio-Pinetum,* containing *P. sylvestris, P. abies* and *B. pubescens,* and contiguous to richer spruce woods *(Eu-Piceetum* and *Melico-Piceetum).* The station is located on a hillside 650 m a.s.l. with a SSE exposure. The shrub layer contains *Alnus incana* and *P. abies.* The field layer is dominated by *V. myrtillus* and *V. vitis-idae.* Also present is *Linnea borealis, Melampyrum sylvaticum, Luzula pilosa, A. incana,* some *Calluna vulgaris* and *Deschampsia flexuosa,* and very few *Empetrum hermaphroditum.* The bottom layer is rich in mosses and dominated by *Hylocomium splendens* and *Pleurozium schreberi.* Pine and spruce needles, leaves and twings etc. are scattered about. 10 traps.

Station 10. Located in a spruce forest characterized as a poorly developed blueberry-spruce forest, *Eu-Piceetum myrtillosum,* with tendencies towards a slightly moist elevated *Vaccinio-Pinetum* type. The tree and shrub layers are dominated by spruce with a marked number of birch. The field layer is dominated by *V. myrtillus,* but also contains a strong element of *V. vitis-idae.* Also present in the shrub layer are *D. flexuosa, Empetrum hermaphroditum* and *L. borealis.* The bottom layer is rich in moss species, especially *B. lycopdioides, D. scoparium, Hylocomium splendens,* and *P. schreberi.* A few examples of *Cladonia sp.* are also present. Dead leaves, spruce needles and twigs are scattered about. 10 traps.

Station 11. Situated in a bog, an ombrotrophic complex with scattered pines at an altitude of 580 m a.s.l. The shrub layer is sparse and consists of *Betula nana, A. incana* and *Salix aurita.* The field layer is dominated by *Andromeda polifolia, C. vulgaris, Carex pauciflira, C. vaginata, V. myrtillus, V. uliginosum, Eriophorum vaginatum* and *Trichophorum caespitosum.* The bottom layer is dominated by the following mosses: *Polytrichum juniperum var. gracilis, Sphagnum fallax var. angustifolium* and *S. fuscum.* This station is subject to flooding during the spring thaw and heavy rains. 10 traps.

Station 12. Located 20 km from stations 6 and 7 and situated on a steep slope (35°) with a SW exposition. The altitude is 810 m a.s.l. This *Cicerbition alpinae* association covers a much greater area than either stations 6 or 7, and has a total of 37 species in the field layer, which is 150 cm tall. There were no species in the bottom layer. 9 traps.

METHODS AND MATERIALS

The spiders in the present study were collected in pitfall traps. These were plastic cups 92 mm tall with an inside upper diameter of 66 mm and lower diameter of 55 mm. They were dug into

Table 1. Relative abundances of species in the total captures at stations 1—12.

Species \ Station no.	1	2	3	4	5	6	7	8	9	10	11	12
Ceratinella brevis (Wid.)	0.1								0.1		0.6	0.2
C. brevipes (Westr.)					0.1				0.2	0.1		
Walckenaera cuspidata Blw.		0.8	1.1	1.1	0.6	0.5		0.7	0.7	10.1	0.8	
W. antica (Wid.)	1.2									0.1	1.3	
W. cucullata (C.L. Koch)	2.3	1.7				0.5		0.1	1.4	2.0		0.4
W. nudipalpis (Westr.)	2.9	7.5	5.3		3.4		1.1	1.4	0.3	1.8	2.9	
Gonatium rubens (Blw.)	0.1		0.1								1.2	0.6
G. rubellum (Blw.)			1.5		2.1		3.0		0.1			2.0
Tapinocyba pallens (O.P.-Cbr.)	3.2	0.5	0.6	6.9	0.1		0.6	0.6	1.2	5.8	0.2	2.2
Minyriolus pusillus (Wid.)	4.8	3.0							0.3	0.1		
Diplocephalus latifrons (Cbr.)					12.1	10.0	29.6	2.1	6.3	4.6		2.4
Dicymbium tibiale (Blw.)			0.5	2.1	7.8		6.6	1.6				7.9
Dismodicus bifrons (Blw.)			4.3	0.5	0.4							0.4
Zornella cultrigera (L. Koch)		0.2										
Cnephalocotes obscurus (Blw.)	0.4		0.1								0.5	
Asthenargus paganus (Simon)						1.5		1.2				0.2
Trichopterna mengei (Simon)		0.5	15.1	3.7	6.5	1.0	0.8	0.1		0.2		
Diplocentria bidentata (Em.)		0.8	2.2		5.1			3.2	2.6	4.6		
Microcentria pusilla (Schnkl.)											0.1	
Pocadicnemis pumila (Blw.)			0.4	10.6	0.4					0.2	3.0	
Micrargus herbigradus (Blw.)	0.1					4.0		1.3	0.8	1.2	1.3	
Pelecopsis radicicola (L. Koch)						2.0						1.8
Abacoproeces saltuum (L. Koch)												0.2
Maso sundevalli (Westr.)										0.1		0.2
Gongylidiellum latebricola (Cbr.)											0.2	
Thyreosthenius biovatus (Cbr.)	0.1											
Notioscopus sarcinatus (Cbr.)								0.1	0.2		4.9	
Minicia marginella (Wid.)											0.1	
Sisicus apertus (Holm)	0.9	0.2							0.1		0.1	
Caledonia evansi Cbr.								0.1	0.1	1.4	0.3	
Typhochrestus digitatus (Cbr.)						0.5						
Latithorax faustus (Cbr.)			0.1				0.3	0.3				
Hilaira excisa (Cbr.)			0.7		0.1		0.3					
Leptorhoptrum robustum (Westr.)			2.5	5.3	7.4							
Stemonyphantes lineatus (L.)												0.2
Labulla thoracica (Wid.)												0.2
Drapetisca socialis (Sundev.)	0.4	0.2									0.1	
Phaulothrix hardyi (Blw).	0.1											
Oreonetides vaginatus (Thor.)		0.2	4.2	1.1	7.0	0.5	4.7	12.3	3.5	10.7	0.5	
O. abnormis (Blw.)												0.4
Macrargus rufus (Wid.)	2.5	6.0				2.0		4.4	7.6	2.3		0.6
M. carpenteri (Cbr.)	8.6											
M. boreus Holm										0.2		
Microneta viaria (Blw.)								0.1		0.2		
Agyneta cauta (Cbr.)	5.0	2.1						0.1		0.1	2.4	
A. conigera (Cbr.)	0.1	0.2						0.1				0.2
A. decora (Cbr.)											0.1	
A. subtilis (Cbr.)	1.6	2.2					0.1	0.5	0.9	1.7	0.1	
A. ramosa Jackson		1.7						0.3	0.1			
A. suecica Holm	3.0	0.2								0.1		0.2
Meioneta rurestris (C.L. Koch)			0.1									
M. beata (Cbr.)											0.5	0.2
Centromerus arcanus (Cbr.)	3.7	17.9	5.3	15.3	17.6	1.0	17.2	31.4	21.9	4.6	1.7	0.6
C. incilium (L. Koch)	1.2											0.2
C. sylvaticus (Blw.)			18.0	11.6	0.7							
Porrhomma pallidum Jackson	1.9	7.1	1.2		4.7	0.5	4.2	7.7	9.0	16.4		1.8

Species \ Station no.	1	2	3	4	5	6	7	8	9	10	11	12
Helophora insignis (Blw.)	1.5	1.9									0.2	0.2
Lepthyphantes alacris (Blw.)	1.2	8.4			3.3	5.5	2.5	13.2	18.9	19.5	0.7	2.2
L. pallidus (Cbr.)	5.3	1.3	2.6	2.1	1.3	11.5	11.9	1.3	1.1	1.2	0.9	2.8
L. antroniensis Schenkel	2.2	3.7						0.3	2.6	1.9		
L. mengei Kulcz.	6.0		0.2	1.1		6.0					0.3	23.8
L. cristatus (Menge)											0.5	
L. obscurus (Blw.)										0.2		
L. expunctus (Cbr.)								0.1	0.1	0.3		
L. tenebricola (Wid.)	0.1	4.4	3.1	1.1	6.5	37.5	12.5	0.3	6.1	2.7		8.5
L. angulatus (Cbr.)			1.7	1.6	1.8					0.1	0.1	
L. zimmermanni Bertkau												0.2
Bolyphantes alticeps (Sund.)			1.0	0.5	0.2		1.1				0.2	2.2
B. luteolus (Blw.)			0.6		0.7	0.5				0.3		
B. index (Thor.)	0.1									0.1	0.2	
Robertus scoticus Jackson	0.4	1.1		0.5	0.2	6.5	0.6		0.5	0.3	0.1	1.6
R. arundineti (Cbr.)		0.2									2.6	
R. lividus (Blw.)									1.5			0.6
R. lyrifer Holm											0.4	
Alopecosa aculeata (Clerck)	8.6	4.0	1.3	2.1	0.5	0.5	0.6	0.1	0.3	0.5	0.7	1.0
A. pulverulenta (Clerck)	3.2	1.3	0.1	3.7	0.4			0.2	0.9		4.5	0.4
Pardosa lugubris (Walck.)	9.3	14.6	17.9	11.6	2.1	3.0	1.9	0.1	1.3	9.0	2.8	12.4
P. hyperborea Thor.	3.2	0.3								0.6	1.9	
P. sphagnicola (Dahl)		0.2	0.4					0.1			17.2	
P. amentata (Clerck)				5.3	0.4				0.1			
P. riparia (C.L. Koch)			6.7	8.5	6.5				0.2	0.3		5.7
Trochosa spinipalpis (F. Cbr.)											9.5	
T. terricola Thor.		02.					0.3	1.0	0.2		2.4	1.6
Pirata piccolo (Dahl)								0.1			4.1	
Tricca alpigena (Doleschal)											0.8	
Zora nemoralis (Blw.)	0.9										0.7	
Agroeca proxima (Cbr.)	2.8	0.5								0.7	0.3	0.2
A. brunnea (Blw.)	0.9	0.5								0.3	0.3	0.6
Scotina gracilipes (Blw.)	0.1										0.1	
S. palliardi (L. Koch)											0.2	
Clubiona subsultans Thor.		0.2						0.1				
C. reclusa Cbr.					0.1							0.4
Micaria publicaria (Sund.)			0.1									1.8
M. aenea Thor.	3.9		0.1	0.5								1.2
Haplodrassus signifer (C.L. Koch)	2.2	0.6	0.1	0.5	0.1				0.1	0.1	0.1	0.6
H. soerenseni (Strand)	0.1											
Drassodes pubescens (Thor.)	0.1										0.1	0.2
Gnaphosa orites Cbr.											3.6	
G. montana (L. Koch)											0.1	
G. muscorum (L. Koch)	0.3											
G. leporina (L. Koch)	1.5											
G. bicolor (Hahn)				1.1								
Zelotes clivicolus (L. Koch)	0.1		0.2									1.8
Z. subterraneus (C.L. Koch)						2.5			0.1			0.4
Z. latreillei (Simon)											0.1	
Xysticus cristatus (Clerck)										0.1		
X. lineatus (Westr.)												0.2
Oxyptilla atomaria (Panzer)												2.2
O. trux (Blw.)												3.5
Cryphoeca silvicola (C.L. Koch)	0.3	1.6						6.3	8.7	1.8		
Hahnia ononidium Simon	0.1									0.1	0.1	
H. pusilla C.L. Koch	0.3										2.1	
Antistea elegans (Blw.)		0.2	0.4	1.6				0.7			17.7	

Species \ Station no.	1	2	3	4	5	6	7	8	9	10	11	12
Ero furcata (Villers)						0.1			0.1			
Neon reticulatus (Blw.)	0.1							0.1			0.4	
Evarcha falcata (Clerck)	0.1	0.2	0.1									0.2
Amaurobius fenestralis (Strøm)						0.1			0.1			1.0
Cyclosa conica (Pallas)								0.1				
Meta mengei (Blw.)		0.2										
Numbers of specimens	684	630	834	189	829	200	361	1823	1057	937	953	509
Numbers of species	50	40	37	25	31	23	20	38	38	43	57	51
Diversity indices (Shannon-Weaver)	3.03	5.87	3.79	4.92	5.75	7.24	6.17	2.05	4.16	3.56	4.12	7.30

the earth in the 12 different plant associations described above. The traps were approximately a half centimeter below the surface of the bottom layer. Care was taken to minimize disturbance to the vegetation surrounding the traps. The traps were covered by masonite plates 16 x 16 cm which were supported by wire braces at a subjective height above the bottom layer of vegetation. The traps were placed in straight lines with a distance of 4 m between each of them. In the bottom of the traps were 3 cm of a solution consisting of 4% formalin to which was added a couple of drops of a liquid detergent. During the summer these traps were collected every 10 to 20 days. Several of the traps were liable to flooding depending upon the amount and intensity of rainfall. Originally there were either 5 or 10 traps in each study area but subsequent plant sociological analyses revealed a greater heterogeneity than was first supposed. As a consequence, some of the study sites subdivided into natural units according to plant analyses.

RESULTS AND DISCUSSION

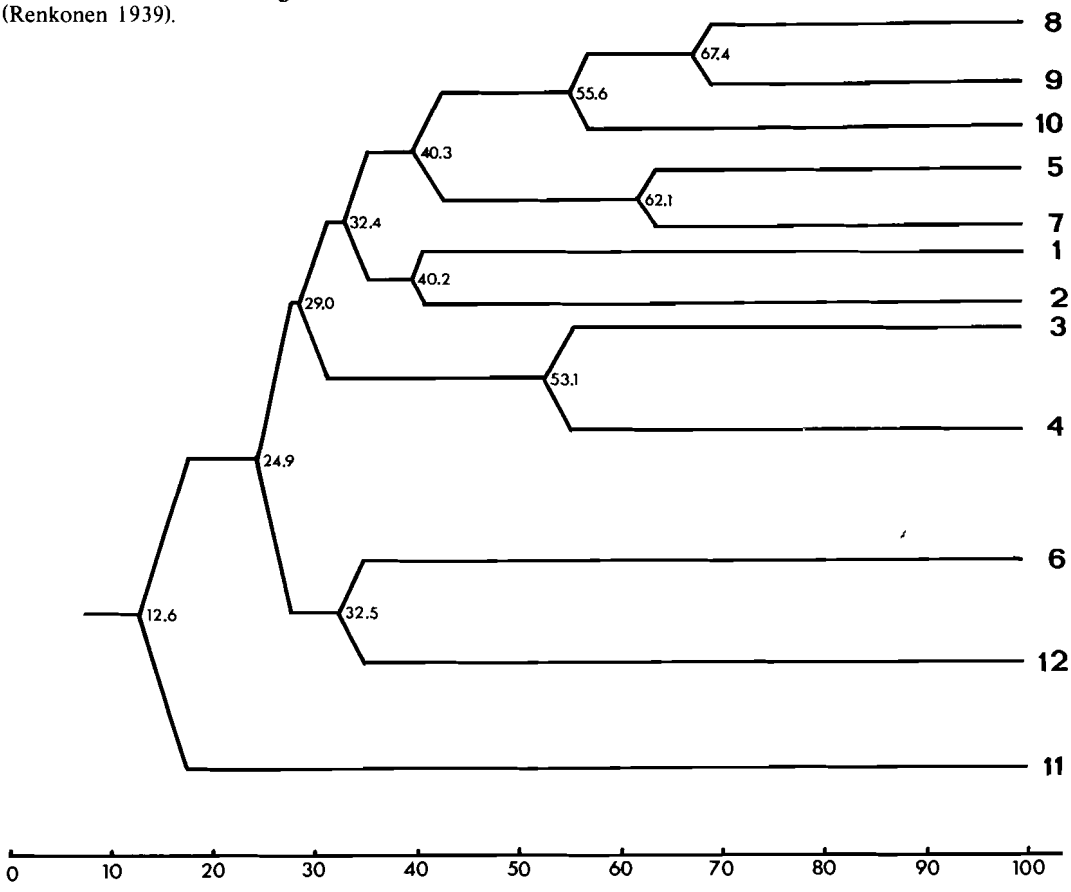
A total of 8,905 sexually mature individuals captured during 1970 to 1973 were classified to species. Seventy two of the 120 species belonged to the family Linyphiidae (as defined by Locket and Millidge 1953). The number of species at each locality varied between 20 (station 7) and 57 (station 11) (Table 1). Furthermore, 35 of the species occurred at a single station only whereas four species were present at all sites. Table 1 reveals that there are, at times, large variations in the dominance and the faunistic composition of the spiders of the various localities. In order to analyse some of the variations in the pitfall-trapped spider fauna (with the awareness of the selectivety of this method), we have applied Renkonen's method (or index) (Renkonen 1938). The results can be seen in the dendrogram in Figure 2 where the localities can be divided into four main groups, with group I containing three sub-groups:

Group I: Stations 1,2,5,7,8,9,10. — Subgroup I_a: 8,9,10. — Sub-group: I_b: 5,7. — Subgroup: I_c: 1,2. — Group II: Stations 3,4. — Group III: 6,12, — Group IV: Station 11.

Group I includes the localities which are more or less dominated by either *Pinus* or *Picea* associations. Station 5 is dominated in the tree layer by *B. pubescens*, but the ground layer is of the *Eu-Piceetum* association type. Station 7, the tall perennial herbs and grasses association, is the only locality which according to the description, should not fall into this group. However, this station is small and surrounded by spruce, and is consequently under a strong influence from the adjacent biotopes. The localities in the spruce woods (8,9,10) appear to form a subgroup of their own. Stations 5 and 7 with less pure *Picea* associations constitute the sub-group I_b with a relatively low association with subgroup I_a (40.3) (Fig. 2). From these two sub-groups dominated by spruce, the third subgroup (1 and 2) dominated by pine has a relatively low association index, 32.4.

The two localities in group II (3 and 4) are either characterized by pure subalpine birch woods or, in the case of station 4, its close proximity to station 3. These two localities have a relatively high degree of similarity (53.1). As these two stations formerly were associated with a subalpine form of an *Eu-Piceetum* association the as-

Fig. 2. Dendrogram showing species relations between the stations. According to Renkonens method (Renkonen 1939).



sociation index (29.0) reveals a closer relationship to the forest biotopes in group I than to the other two localities in group III.

Group III consisting of stations 6 and 12 is characterized by luxurious dense growths of tall perennial herbs and grasses. It appears to have a closer relationship to the forest biotopes of groups I and II than to group IV.

Station 11 is an open bog forming its own category (Group IV) with a low degree of association with the other biotopes (12.6).

Based on Fig. 2 pitfall trapping apparently catches a spider fauna reflecting a relationship to the vegetation despite the selectivity associated.

The diversity indices based on Shannon-Weaver's index of similarity are presented in Table 1. The indices are somewhat variable but generally high especially when compared to similar indices from alpine studies from Finse, Norway (Hauge et al. 1978). Of special interest are the three tall perennial associations with their high indices. The two lowest values were obtained from stations 1 and 8. The index from station 1 appears to be especially low when considering the index from station 2 situated about 20 m north from 1. However, from a plant sociological viewpoint station 2 is situated in a pine wood considerably richer than 1 which is dominated by *Calluna vulgaris*, an oligotrophic species.

COMMENTS ON THE SPECIES COMPOSITION

Station 11 is unique in having a number of dominant species either absent or scarce in the other localities (Table 1). Among these are a number of hygrophilid species: *Antistea elegans* (Blackwall), *Pardosa sphagnicola* (Dahl), *Trochosa terricola* (Thorell), *Notioscopus sarcinatus*

(O.P.-Cambridge), *Pirata piccolo* (Dahl). These species account for 53% of all of the adult individuals here captured. In additional the supposedly hygrophilic species, *Robertus arundineti* (O.P.-Cambridge) is common (2.6%).

Among the low localities in pine woods station 1 is the more edaphic with fewer mosses and more lichens than station 2. *Centromerus arcanus,* a species associated with relative moist forest biotopes (Palmgren 1975), partly as a result dominates at station 2 (17.9%) whereas it accounts for only 3.7% at station 1. *Macrargus rufus* (Wider) is relatively common at station 2 (6.0%), but is somewhat displaced at station 1 by *M. carpenteri* (O.P.-Cambridge) whose moisture requirements are less rigid than those of *M. rufus.* The presence of the hygrophilic *Antistea elegans, Robertus arundineti, Pardosa sphagnicola,* and a solid representation of *Walckenaera nudipalpis* (Westring) at station 2 provides further evidence for the higher moisture level of station 2 compared to station 1 where none of these species occurred.

Station 3 and 4 in the subalpine birch woods are moist and have strong elements of *Centromerus arcanus* (5.3 and 15.3%) and *C. sylvaticus* (Blackwall) (18.0 and 11.6%). *Trichopterna mengei* (Simon), which according to Palmgren (1976) are associated with moist birch woods, were plentiful at station 3 (15.1%) and relatively common at station 4 (3.7%). *W. nudipalpis* is common at station 3 (5.3%), but is lacking at station 4. Very few individuals of *Antistea elegans* were captured at both localities.

The remaining five localities in the coniferous woods, with the exception of 9, contained considerable numbers of *Centromerus arcanus. Diplocephalus latifrons* (O.P.-Cambridge) are abundant in these localities, especially at station 5 and 7. Furthermore, these 5 localities were characterized by a number of forest species common in Scandinavia. Among the most numerous is the samples were *Porrhomma pallidum* Jackson, *Lepthyphantes alacris* (Blackwall), *L. tenebricola* and *Oreonetides vaginatus* (Thorell). In general these 5 localities have much in common both with respect to the spider species present and dominant species.

The entire spider fauna wich was captured at Vassfaret is presented in Table 1. The following are reported for the first time in Norway: *Pelecopsis radicicola* (L. Koch), *Thyreosthenius biovatus* (O.P.-Cambridge), *Sisicus apertus* Holm, *Macrargus boreus* Holm, *Agyneta suecica* Holm, *A. ramosa* Jackson, *Pirata piccolo* (Dahl), *Scotina palliardi* (L. Koch), *Gnaphosa orites* (O.P.-Cambridge) and *Xysticus lineatus* (Westring).

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A contribution to the knowledge of the spider fauna (Araneae) of Norway

ERLING HAUGE

E. Hauge, 1980. A contribution to the spider fauna (Araneae) of Norway. *Fauna norv. Ser. B 27,* 68—71.

A list containing 25 little known spider species in Norway is presented. Six of these species, *Silometopus elegans* (O.P.-Cambridge), *Peponocranium ludicrum* (O.P.-Cambridge, *Gongylidiellum vivum* (O.P.-Cambridge), *Jacksonella falconeri* (Jackson), *Maro lehtineni* Saaristo and *Lepthyphantes flavipes* (Blackwall), are reported for the first time for Norway. Data on their distribution in Norway and on their ecology are given and to some extent discussed.

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INTRODUCTION

Most spider species in Norway, many of them not particularly rare, are poorly known concerning their Norwegian distribution. In all likelihood there still remain several species hitherto not recorded from Norway as indicated by more or less occasional collecting activities. In the present paper 25 species from such collections are presented and data on their ecology and distribution given.

I here acknowledge the different collectors for their permission to publish these data.

LIST OF SPECIES

Linyphiidae

Silometopus elegans (O.P.-Cambridge). — HOy: Lindås north of Bergen, in a *Calluna* heath, 1 ♀ in pitfall trap 3—5 June 1971, 1 ♂ 5 May, 1 ♂ 18 May, 1 ♀ 28 May 1972, 2 ♂ ♂ + 1 ♀ 9 Febr., 2 ♂ ♂ 12 March, 1 ♀ 8 May, 2 ♀ ♀ 4 June 1973, and 1 ♀ in a pitfall trap 4—25 June 1973. All specimens, except two, were collcted in pure *Sphagnum spp.* According to Lockett & Millidge (1953) mature specimens are found in spring and summer, see also Palmgren (1976, Fig. 37), some of my specimens as early as in February.

The species is new to Norway.

Araeoncus crassiceps (Westring). — HOy: Lindås, *Calluna heath,* 2 ♀ ♀ + 1 ♂ in pitfall traps 3—6 June 1971, 1 ♂ in pitfall trap 3—28 Aug. 1973; HOy: Kvinnherad, Rosendal, 22 May 1970, 1 ♀. According to Bristowe (1939) it is known from Norway, but more exact locality cannot be given.

Peponocranium ludicrum (O.P.-Cambridge). — HOy: Lindås, *Calluna* heath. A total of 45 ♂ ♂ and 73 ♀ ♀. All, except 2 ♂ ♂ from pure *Sphagnum spp.,* were found in *Hylocomium* dominated moss cover. Adult specimens were present almost throughout the whole year (Fig. 1) with maximum abundance in spring and early summer, i.e. in accordance with Lockett & Millidge (1953) and Merrett (1969). Simultanous pitfall trapping showed a very short male activity period: 3 May— 7 June 1972 and 8 May—25 June 1973.

The species is new to Norway.

Gongylidium rufipes (Sundevall). — VE: Tjøme, Mostranda, 1 ♀ in pitfall trap 10 Apr.—20 May 1975 (Trond Andersen leg.).

Previously reported from Norway (Bristowe 1939) and from Møre & Romsdal and Trøndelag (Hauge 1972).

Gongylidiellum vivum (O.P.-Cambridge). — HOy: Stord, Sagvåg, Limbuviki, small S exposed decidous forest near sea level, dominated by *Fraxinus excelsior* and *Corylus avellana,* 23 Sept. 1974, 1 ♀; HOy: Bømlo, Langevåg, *Calluna* heath, 24 Sept. 1974, 1 ♀; during 1972 and 1973 at HOy: Lindås, *Calluna* heath: 69 ♂ + 24 ♀ ♀, most specimens in *Hylocomium* dominated samples (only 12 ♂ ♂ + 7 ♀ ♀ in pure *Sphagnum* samples). Of the total catch only 4 ♂ ♂ from the last mentioned locality were taken in pitfall traps in spite of pitfall trapping continuously throughout the two years. Additional data from Lindås in 1971: Five males trapped 3—6 June, 3 males trapped 27 Oct.—27 Nov., 1 female 4—20 Oct. The pitfall trap data indicate two periods of sexual activity (spring and autumn), i.e. more or less in accordance with several authors (Tretzel 1954, Lockett & Millidge 1953, Wiehle 1960, Merrett 1969). Schaefer (1971) trapped the species almost the whole year with a peak of male activity in June. In my quantitative samples from Lindås both sexes are present in the area throughout the whole year (also in the winter). No definite peak

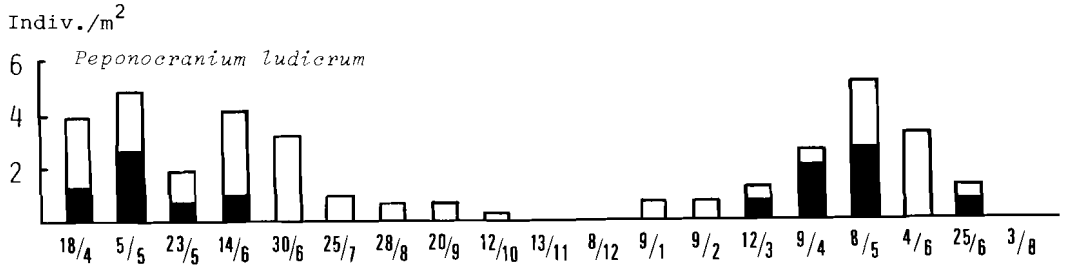

Fig. 1. *Peponocranium ludicrum* (O.P.-Cambridge). Abundances 1972—73. Black ♂♂, white ♀♀.

in the precentage of males in the population can be observed.

It is interesting that *G. latebricola* (O.P.-Cambridge)also occurs in this *Calluna* heath. Fourty ♂♂ + 222 ♀♀ were caught during 1971—1973, very few specimens in pitfall traps and very few specimens in pure *Sphagnum* samples. Thus it resembles *G. vivum* ecologically and the two species were often taken in the same samples. In contrast to *G. vivum* the few specimens of *G. latebricola* trapped in pitfalls were taken in a relatively long period (Apr./May—Sept./Oct.) indicating that adult specimens are present in the summer half year only, i.e. as reported by other authors. My quantitative samples in 1972—1973 show, however, that adults of *G. latebricola* are present in the area throughout the whole year although adult males seem to be scarce from June to August. *G. latebricola* seems to prefer somewhat more humid parts of the *Calluna* heath area than do *G. vivum*, but both species are relatively scarce in the most humid areas *(Sphagnum spp.). G. latebricola*, probably a more typical forest species, and *G. vivum*, an open land species and probably also a characteristic species for *Calluna* heaths, thus seems to coexcist in this area with great ecological overlap.

G. vivum is new to Norway.

Metopobactrus prominulus (O.P.-Cambridge). — HOy: Lindås, *Calluna* heath, in pitfall trap May/June 1972, 1 ♀, Aug. 1972, 1 ♀; HOy: Kvinnherad, Varaldsøy, 12 May 1974, 3 ♂♂.

In Norway previously known from high mountain areas (Finse, Jotunheimen).

Pelecopsis elongata (Wider). — HOy: Kvinnherad, Varaldsøy, 30 June 1968, 1 ♀ (T. Solhøy leg.); HOy: Austerheim, Rebnor, sweep net catches on *Juniperus communis* and *Sslix sp.*, 22 Apr. 1977, 1 ♀ (T. Solhøy leg.); HOi: Voss, Dalsleitet, dense old spruce forest in steep E exposed slope, ground flora dominated by *Vaccinium myrtillus, Hylocomium splendens, Sphagnum spp.*, 26 June 1974, 1 ♂.

Previously known from Nordland (Strand 1902a) and probably also from Troms (Jackson 1932).

Jacksonella falconeri (Jackson). — HOy: Lindås, *Calluna* heath, ground dominated by *Hylocomiun*, 1972—1973, 29 ♂♂ + 10 ♀♀. Pitfall catches show a short period of male activity in April/May, while more quantitative methods show that males are present in Aug., Oct., Jan., March, and May, and that adult females are present Oct.—Jan.

The species is new to Norway.

Panamomops mengei Simon. — HOi: Strandebarm, Eidesvann, SE exposed steep mountain side with dense forest dominated by *Fraxinus excelsior* and *Corylus avellana*, large blocks and partly great accumulations of dead leaves etc., 19 June 1974; 1 ♂; Ry: Nedstrand, Leiranger, S exposed oak forest, 31 July 1974, 1 ♀.

Previously known only from Nordland.

Collinsia spetsbergensis (Thorell). — On: Lom, Leirhø, in moss on blocks, 2320 m a.s.l., 3 July 1975, 1 ♀ (A. Fjellberg leg.).

Occurs in the Scandinavian high mountains, according to Holm (1960).

Erigonella hiemalis (Blackwall). — HOy: Lindås, north of Bergen, 1972—1973, 161 ♂♂ + 131 ♀♀. Most specimens taken in *Hylocomium* dominated areas, very few (2 ♂♂ + 9 ♀♀) in pure *Sphagnum* samples. Adults were present throughout the whole year, though especially males were scarce in mid-summer.

Previously reported from a very few localities in Norway (Hauge 1974), but has proved to be relatively abundant in West Norwegian *Calluna* heaths.

Maro lehtineni Saaristo. — VE: Tjøme, Mostranda, in pitfall traps 10 Apr.—20 May 1975, 1 ♀ (Trond Andersen leg.,); HOy: Lindås, *Hylocomium* dominated *Calluna* heath, Sept. 1972 (2 ♂♂ + 2 ♀♀), March 1973 (1 ♀), Apr. 1973 (♂ + 3 ♀♀).

The species is new to Norway. Previously known from Finland (Saaristo 1971) and from Iceland (Lindroth et al. 1973).

Taranuncnus setosus (O.P.-Cambridge). — HOy: Bergen, Fyllingsdalen, Storevann, in pitfall trap on bank of a water reservoir, 28 July—1 Aug. 1976, 1 ♀ (Christian Otto leg.)

Previously a single record from E. Norway (Waaler 1971).

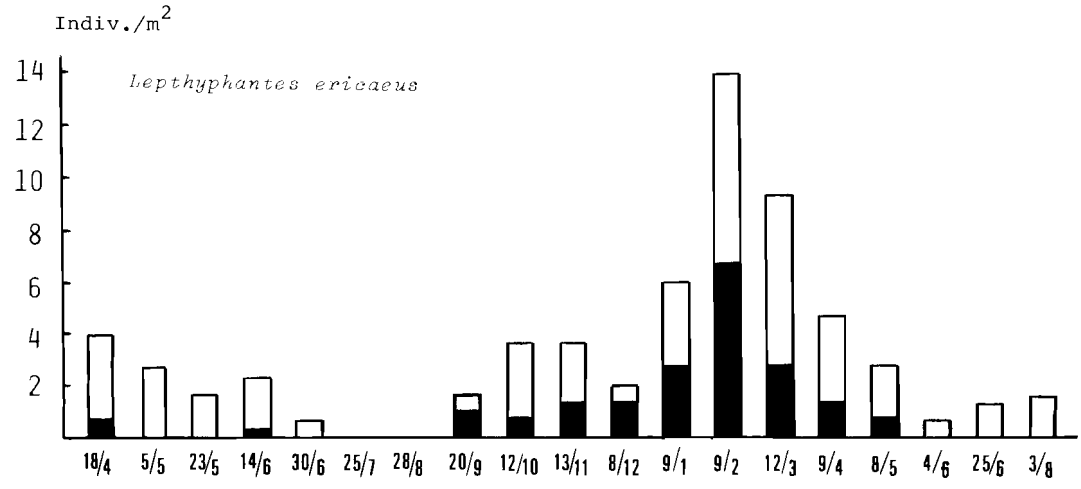

Fig. 2. *Lepthyphantes ericaeus* Blackwall. Abundances 1972—73. Black ♂♂, white ♀♀.

Tapinopa longidens (Wider). — VE: Ramnes, Langvann, pine forest, pitfall trap Apr./May 1975, 1 ♀ (Trond Andersen leg.).

Previously in Norway known as 1 subadult ♀, Hol, Hallingdal (Strand 1899).

Centromerus aequalis (Westring). — HOy: Strandebarm, Eidesvann (together with *P. mengei*), 19 June 1974, 1 ♀.

C. dilutus (O.P.-Cambridge). — HOy: Stord, Leirvik, Mjelkeviki, SE exposed slope with blocks, mixed forest of *Fraxinus, Corylus* and *Prunus*, 23 Oct. 1974, 1 ♂; HOi: Samnanger, Rolvsvåg, steep W exposed slope, light mixed forest of *Quercus, Pinus* and *Betula*, 22 June 1974, 14 ♀♀; HOy: Bømlo, Langevåg, Andal, hazel thicket, 24 Oct. 1974, 6 ♀♀; Hoy: Bømlo, Kvilesund, Sakseidet, 24 Oct. 1974, 1 ♀.

The first Norwegian record from Hordaland (Hauge 1974) thus was not accidental.

Lepthyphantes ericaeus (Blackwall). — VE: Tjøme, Mostranda, on pitfall traps 10 Apr.—20 May 1975, 1 ♀ (Trond Andersen leg.); HOy: Kvinnherad, Varaldsøy, Dalen, 12 May 1971, 1 ♀; HOy: Lindås, north of Bergen, *Calluna* heath, 1972—1973, 122 ♂♂ + 234 ♀♀, most specimens i *Hylocomium* dominated areas, only 1 ♂ + 2 ♀♀ in pure *Sphagnum* samples. In Lindås adult specimens were present throughout the whole year. Males were absent from about medio June to Aug. Females were also scarce in the same period with maximum abundance in midwinter (Fig. 2). A long activity period for males perhaps culminating about Nov.—Jan. when the largest percentage of males appeared was estimated by pitfall trapping from Oct./Nov. to May/June.

Recently reported from Lofoten (Ashmole & Plantrose 1979).

L. flavipes (Blackwall). — HOi: Strandebarm, Ljonesvåg, S exposed slope with an open small forest dominated by scattered *Quercus rubus* intermingled by some *Sorbus aucuparia, Betula pubescens* and *Juniperus communis*, ground with stones overgrown with *Hylocomium splendens*, field layer *Vaccinium myrtillus, V. vitis-idae* and *Calluna vulgaris*, 15 June 1974, 1 ♂ + 2 ♀♀; HOi: Strandebarm, Eidesvann, SE exposed dense forest dominated by *Fraxinus excelsior and Corylus avellana*, 19 June 1974, 2 ♀♀.

The species is new to Norway.

Tetragnathidae.

The three *Pachygnatha* species in Norway probably are all quite common, but relatively few localities have been published previously.

Pachygnatha clercki Sundevall. — HOy: Bergen, Fana, on the littoral vegetation of Myravann, 26 May 1970, 1 ♂; Ry: Klepp, Øksnevad, 19 Aug. 1972, 1 ♂ + 1 ♀ (Thore Nielsen leg.).

Previously known from Aker (Strand 1904), Asker og Fana (Tambs-Lyche 1942) and from Trøndelag (Solem & Hauge 1973).

P. listeri Sundevall. — VAi: Hægeland, Bringsværd, 24 Apr. 1975, 1 ♂ (Eldar Wrånes leg.); HOi: Kvinnherad, Varaldsøy, 12 May 1974, 1 ♀.

Previously reported from Trøndelag (Storm 1898) (rev. Tambs-Lyche 1942: *Pachygnatha sp.* (indeterminable)).

P. degeeri Sundevall. — HOi: Bergen, Fana, near Myravann, 20 Sept. 1969, 2 ♂♂: HOy: Lindås, *Calluna* heath, almost all specimens in pitfall

traps, 1972—1973, 107 ♂♂ + 275 ♀♀, females present almost the whole year, males were scarce or absent from Nov. to March.

Theridiidae

Pholcomma gibbum (Westring). — HOi: Kvinnherad, Ænesdal, SW exposed steep slope with mixed forest of *Prunus, Fraxinus, Ulmus, Quercus, Corylus* in the upper part, further down forest is dominated by *Pinus*, 25 May 1974, 1 ♀; Hoi: Strandebarm, Berge, mixed light forest of *Pinus silvestris* and *Quercus robur*, ground layer dominated by mosses, *Vaccinium myrtillus* and *Carex sp.*, 19 June 1974, 1 ♀: Hoi: Samnanger, Rolvsvåg, steep E exposed slope, light mixed forest dominated by *Quercus, Pinus* and *Betula*, 22 June 1974, 2 ♀♀; Hoy: Bømlo, Langevåg, Andal, SE exposed small hazel thicket near sea level, 24 Oct. 1974, 1 ♀.

Previously known only from Sørlandet.

Robertus neglectus O.P.-Cambridge. — HOi: Strandebarm, Fosse, steep S exposed slope dominated by *Fraxinus excelsior* intermingled with *Quercus robur* and *Corylus avellana*, rich foerna layer, 15 June, 1 ♂; Ry: Tysvær, Brekke, S exposed rich oak forest, 25 July 1974, 3 ♂♂; Ry: Nedstrand, Leiranger, partly S exposed deciduous dominated by tall oaks, 31 July 1974, 1 ♂; Hoy: Stord, Sagvåg, Limbuviki, small S exposed deciduous forest dominated by *Fraxinus and Corylus*, 23 Oct. 1974, 1 ♂.

Previously known from Nordland (Strand 1902 b), Sør-Trøndelag and Møre & Romsdal (Hauge 1972).

Salticidae

Heliophanus ritteri (Scopoli). — HOi: Lindås, *Calluna* heath, *Oct. 1972, 1* ♀.

Otherwise known only from the vicinity of Oslo (Collett 1875).

Oonopidae.

Oonops pulcher Templeton. — HOi: Strandebarm, Eidesvann (together with *Panamomops mengei*), 19 June 1974, 1 ♀; HOi: Strandebarm, Berge (together with *Pholcomma gibbum*), *19 June 1974, 4* ♀♀.

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Received 15 Dec. 1979.

Terrestrial invertebrates of the Faroe Islands: II. Harvest-spiders (Opiliones)

HANS KAURI

Kauri, H. 1980. Terrestrial invertebrates of the Faroe Islands: II. Harvest-spiders (Opiliones), *Fauna norv. Ser. B. 27*, 72—75.

A collection of Opiliones from the Faroe Islands brought home by a Norwegian-Swedish expedition (1978—79) comprised 4544 individuals representing 5 species: *Nemastoma bimaculatum* (Fabricius), *Mitopus morio* (Fabricius), *Oligolophus meadii* (Cambridge), *Lacinius ephippiatus* (C.L. Koch) and *Megabunus diadema* (Fabricius). *O. meadii* was recorded for the first time in the Faroe Islands, whereas the previously reported *Rilaena triangularis* (Herbst) and *Mitostoma chrysomelas* (Hermann) were not found.

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A Swedish-Norwegian team, S.-A. Bengtson (University of Bergen). P.H. Enckell (University of Lund) and T. Solhøy (University of Bergen) carried out zoological investigations in the Faroe Islands in July and early August 1978, and during the first half of August 1979[1]. They visited 17 of the islands (Fig. 1) and collecting methods were pitfall traps (with 4% formalin), sieving of foerna, moss etc. and subsequent extraction in Tullgren funnels, and extensive collecting by hand. The field work yielded large collectiones, therein 4544 opiliones, representing 5 species (Table 1).

Previously also *Rilaena triangularis* (Herbst) and *Mitostoma chrysomelas* (Hermann) have been recorded from the Faroes (Roewer 1923, Henriksen 1929) but were not found by this expedition. The adults of *R. triangularis* occur earlier in the season and had possibly disappeared before the field work was started. However, no juveniles were caught either. *M. chrysomelas* seems to be an uncommon species with a low abundance and may therefore have been missed by the collectors.

According to Meinertz (1962) *L. ephippiatus* occurs everywhere on the Faroes, but was in the present investigation found only once in one locality. Possibly this species is declining on the Faroe Islands. It should, however, be mentioned that the netcatching methods was not used which may explain a possible overlooking of the species in some of the localities. *O. meadii* is new to the Faroes Islands and the northernmost occurrence of the species.

The localities in the Faroes have been classified into 9 habitat types:

A. Mountain sites (> 250 m a.s.l.)
B. Dvarf shrub heaths.
C. Plantations (mostly clusters of pine and spruce, not far from the villages.
D. Cliffs, shelves, and crevices.
E. Lowland bogs.
F. Grass heaths.
G. Infields: The outskirts (newer parts on the farmland).
H. Infields: Within settlements.

Table 1.

	Number of individuals	% of tot.	Number of localities	%of tot
Nemastoma bimaculatum (Fabricius)	615	13.6	76	68.5
Mitopus morio (Fabricius)	3841	84.5	104	93.7
Oligolophus meadii (Cambridge)	68	1.5	26	23.4
Lacinius ephippiatus (C.L. Koch)	14	0.3	1	0.9
Megabunus diadema (Fabricius)	6	0.1	6	5.4

1) The field work was financed by grants from the Norwegian Research Council for Science and Humanities (to S.-A. Bengtson) and the Nordic Council for Ecology (to T. Solhøy).

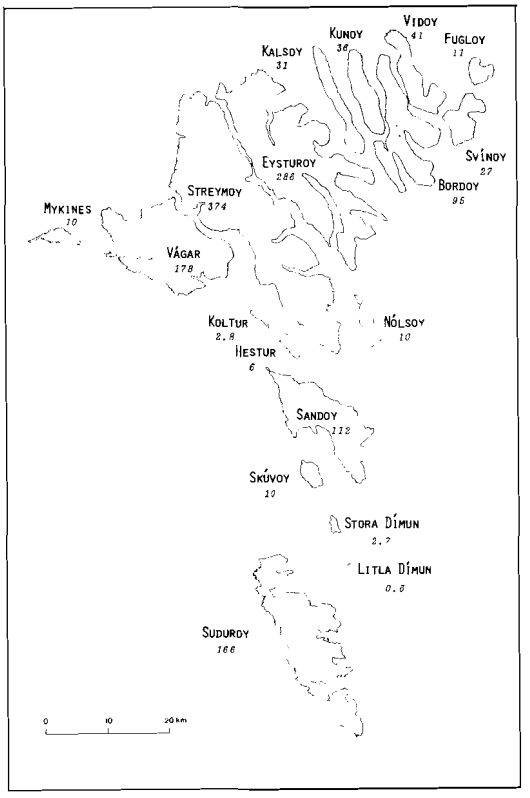

Fig. 1

I. Sand dunes.

For more details see Bengtson & Hauge (1979).

The infields (G and H) are usually surrounded by fences and thereby protected against sheep-grazing, whereás the other types of habitats (outfields) are heavily grazed. Only the habitat of cliffs, shelves and crevices (D) along with the plantations (C) are either inaccessible to or protected from sheep, and thus from grazing. In the collections some of these habitats are underrepresented e.g. A,C,D, and E.

NEMASTOMA BIMACULATUM (Fabricius)

Distributed in all the investigated islands with the exception of Skuvoy (Fig. 2). The major part of the finds are made within the infields (G = 28 localities and H = 13 localities), characterized by rich grass and herb vegetation. However, the ecological environment of this species is more differentiated. Within the outfields *N. bimaculatum* occur in considerable numbers (20 localities) in grass heaths, which is the most common type of habitat in the Faroes (Bengtson & Hauge 1979). It is found in dwarf shrub heaths, in cliffs, shelves and crevices, and sparsely in other habitats. The only habitat where *N. bimaculatum* was not found were the sand dunes. But this habitat is rare and poorly investigated. The frequency (per cent) of the distribution, and the abundance (mean catch) of *N. bimaculatum* in respective habitats is shown in Table 2. The habitats are arranged after decreasing frequency (% of localities with *N. bimaculatum).*

Unfortunately the frequencies, as well as the abundances for the habitats of A,C,D, and E cannot be regarded as significant. Nevertheless, the 100% frequency for D (cliffs and crevices), and the large number of catched individuals indicate a dense abundance and high frequency for this habitat. Also for B (dwarf shrub heaths) the frequency is high, but the number of catched animals per site is very low. This habitat is subject to heavy grazing pressure which may contribute to the low abundance.

Thus the habitats D,G,H, and F seem to be most favourable for this species.

MITOPUS MORIO (Fabricius)

Mitopus morio is the most abundant and frequent harvest spider in the Faroe Islands. It is widely distributed and occurs in all the islands, and

Table 1. The distribution of *Nemastoma bimaculatum* in different habitats.

Sign Habitat	Number of loc's invest.	N of loc's *with N. bim.*	% of loc's with *N. bim.*	Abundance (mean catch)
D Cliffs a. crevices	3	3	100	27.5
B Dwarf shrub heaths	10	9	90.0	4.1
G Infields: The outskirts	34	28	82.4	8.2
H Infields: Within settlements	21	13	61.9	6.0
F Grass heaths	31	20	64.5	4.6
C Plantations	4	2	50.0	8.0
E Lowland bogs	3	1	33.3	6.0
A Mountain sites	4	1	25.0	4.0
I Sand dunes	1	—	—	—

Fig. 2

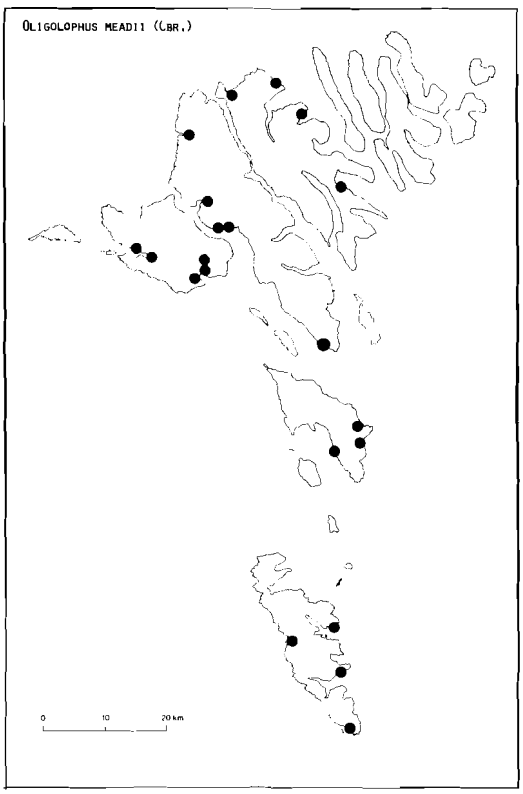

Fig. 3

in all the habitats. As the greatest part of the collecting work was carried out early in the summer, July and in the beginning of August, the juveniles and females predominate in the collections. The differences between females and males, especially concerning body size and colour pattern, are small and consequently the sexual dimorphism not very pronounced. However, in a small collection from Stora Dimun island brought home in October, those differences appeared with greater clarity.

The previous published informations concerning the Opiliones from Faroe Islands are reported by Henriksen (1929).

OLIGOLOPHUS MEADII (Cambridge)

The occurrence of *O. meadii*, (61 juv., 6 ♀ ♀, 1 ♂) in the Faroe Islands (Fig. 3) is the northernmost for the species. It is known neither from Iceland nor from Norway. According to Sankey & Savory (1974) it is distributed in England from Cornwall to Cumberland and was found in Guernsey in 1955. Martens (1978) have found the species in Spain in Cordillera Cantabrica, Sierra de Aralar. This is the only record from the Continent.

On the Faroe Islands it is found in five of the greatest islands: Streymoy (localities 3,27,41,42, and 69), Eysturoy (loc's 6,8,43, and 90), Vagar (loc's 11,14,66,67,68), Sandoy (loc's 32,33,35) and Suduroy (loc's 52,59,61, and 62). All the localities where *O. meadii* was found are situated in infields (G = 15 localities and H = 5 localities). The habitats par preference are grass and/or herb meadows, predominantly the rich ones. It is probably that the species is introduced to the Faroe Islands by man. The occurrence, attached only to cultivated land and to settlements, supports this assumption.

LACINIUS EPHIPPIATUS (C.L. Koch)

Lacinius ephippiatus (11 juv. 3 ♀) was collected only once, in Suduroy island in an infield locality (58), a sandy habitat with patches of grass-herb vegetation, close to shore.

According to Meinertz (1962), as mentioned

Fig. 4

above, *L. ephippiatus* was occurring «everywhere» in the Faroe Islands. However, no information concerning to localities is given. *L. ephippiatus* is not mentioned by Henriksen (1929). If Meinertz is right, the decline of this species in the Faroe is obvious.

MEGABUNUS DIADEMA (Fabricius)

Megabunus diadema (6 ♀ ♀) is found in 5 localities: Eysturoy (localities 6 and 43), Kunoy (loc. 87), Streymoy (loc. 27) and Svinoy (loc. 76). (Fig. 4). Most of the localities are classified as infield-habitats of rich grass-herb vegetation. Only one locality (loc. 76) is situated in outfield — a tall *Calluna* heath on the S slope of a mountain, 150 m a.s.l.

M. diadema is previously found by Dampf, according to Roewer (1923), in the Faroe Islands, and by Heriksen (1929): one specimen in Streymoy, N. of Thorshavn.

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Received 28 March 1980.

Short communications

PHRYGANOPHILUS RUFICOLLIS FABRICIUS (COL., MELANDRYIDAE) NY ART FOR NORGE

KARL ERIK ZACHARIASSEN

The Melandryid Bark Beetle *Phryganophilus ruficollis* Fabricius is reported found in Norway for the first time. Two specimens were found in Lierne, Nord-Trøndelag county, in 1979 on 22 and 24 June, respectively.

Karl Erik Zachariassen, Zoologisk Institutt, Universitetet i Trondheim NLHT, Rosenborg, N-7000 Trondheim, Norway.

Billen *Phryganophilus ruficollis* Fabricius (Fig. 1) er sjelden i Fennoskandia. Den har en utpreget østlig utbredelse, idet den er funnet i de sydligste deler av Finnland, ved den midt-svenske Østersjøkysten (Uppland, Gästrikland og Ångermanland) og i Jämtland (Lindroth, 1960). Artens levevis i Skandinavia er ufullstendig kjent. I Uppland er den funnet under bark og i morken ved av eik, men som påpekt av Landin (1970), indikerer dens forekomst i Jämtland at den også er knyttet til andre tresorter.

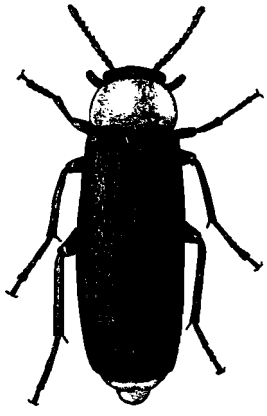

Fig. 1. *Phryganophilus ruficollis* er 12—16 mm lang og er sort med skarpt rød-gult pronotum og bakkropp.

22. juni 1979 fant forfatteren ett eksamplar av *P. ruficollis* ved Holand i Lierne i Nord-Trøndelag. Funnbiotopen var en lang østvendt li, der nåletrærne var hugget ut, mens et stort antall tørre kjukebevokste bjerkestammer sto igjen. Billen ble funnet ved solnedgang, sittende på undersiden av en tørr knivkjuke (*Polyporus betulinus*) som satt ca. halvannen meter oppe på en tørr, stående bjerkestamme. Ytterligere, ett eksemplar av arten ble tatt 24. juni, denne gang ca. 10 kilometer nærmere grenseovergangen ved Gäddede. Dette eksemplaret ble funnet i solskinn midt på dagen, mens dyret krøp over en nyhugget granstubbe ved en opplagsplass for tømmer.

Den relativt lange avstanden mellom funnstedene tyder på at det ikke dreier seg om tilfeldig innførte individer og at arten virkelig er etablert i området. Dette gir ytterligere bekreftelse på at arten har etablert seg på andre treslag enn eik.

Innvandringen av østlige arter til Norge begrenses av fjellkjedene som strekker seg mellom Norge og Sverige fra Hedmark og nordover, og som synes å være en utbredelsesbarriere for en rekke arter som har utviklingsstadier knyttet til trær. Lierne i Nord-Trøndelag er det eneste området i Norge som ligger på østsiden av denne fjellkjeden, og det er grunn til å vente at dette området inneholder en rekke østlige faunaelementer som mangler eller er sjeldne i resten av landet. Faunaen i Lierne er lite undersøkt, og mer omfattende faunistiske undersøkelser i området vil trolig gi interessante informasjoner om østlige arters spredningsforhold innen Skandinavia.

Jeg takker amanuensis Sigmund Sivertsen, DKNVS Museet, Trondheim, for bestemmelsen av knivkjuken.

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Received 15 Jan. 1980.

A RECORD OF GYNANDROMORPHISM IN *BASALYS* WESTWOOD (HYMENOPTERA, DIAPRIIDAE) FROM NORWAY

PER SVEUM

A gynandromorphic specimen of *Basalys* Westwood is reported from Norway. The gynandromorphism is visibly expressed through bilateral antennal differences. The antennae are figured.

Per Sveum, Saupstadringen 65b, N-7078 Saupstad, Norway.

Only few records of gynandromorphism within the Proctotrupoidea have been reported untill now (Bin 1972, Huggert 1977). Therefore some notes concerning this subject is given below.

A single gynandromorphic specimen of *Basalys* Westwood was swept from *Salix nigricans* Sm. at STi: Oppdal, Kongsvoll in the regio subalpina 900 m elevation (UTM 32VNQ315089) 8 Aug. 1979 (P. Sveum leg. & det., coll. Sveum). The specimen is mounted on a pinned card. Right wings and antenna are mounted on a microslide which is on the pin.

The taxonomy of *Basalys* is still unsuffiently known and I have not been able to asign the specimen to any species. However, it seem to be related to *B. antennatus* Jurine, as described by Hellèn (1963), the only described species of *Basalys* known to me with a four segmented clava.

As only one gynandromorphic specimen was available no dissection was carried out to state the potential presence of male and/or female genitalia. No differences in external body structure was found between the gynandromorphic specimen and a conspecific male from the same locality (29 Aug. 1979, P. Sveum leg. & det., coll. Sveum). The gynandromorphism is, however, indicated by the bilateral antennal differences (Fig. 1 & 2):

Left antenna: Twelve segments, clavate. Clava black, four segmented with the three subterminal segments fused. Last funicular segment coloured as clava, slightly dwarfed. Antenna otherwise brown, of normal female type. (Fig. 1).

Right antenna: Fourteen segments, black, filiform, some of the funicular segments dwarfed: segment 2 enlarged, irregular and fused, but not completely with segment 3. Segments 4 and 5 fused, irregular and enlarged. Segment 10 angularly bent. Antenna otherwise of normal male type. (Fig. 2).

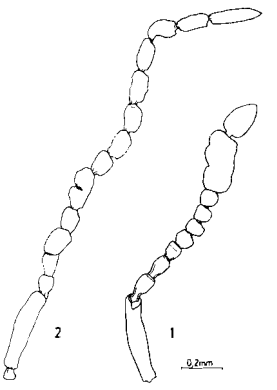

Fig. 1-2. Bilateral antennal differences in gynandromorphic *Basalys* Westwood. 1. Left, female antenna; 2. Right, Male antenna.

Judged from previous papers (Bin 1972, Huggert 1977) antennal dwarfism seem to be closely connected with gynandromorphism.

Normal male Hymenoptera are arrhenotochous, while females are diploid and origins sexually (Crozier 1977). This makes gynandromorphism even more interesting in Hymenoptera than in other animals. Considering the still unsolved problem of sex determination in Hymenoptera (Crozier 1977), it would certainly be great value to know whether gynandromorphic specimens are haploid or diploid.

ACKNOWLEDGEMENTS

Thanks are due to Dr. Lars Huggert, Umeå for comments on the specimen, and to Senior Curator John O. Solem for critical reading of the manuscript.

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Received 14 Apr. 1980.

NEW RECORDS OF *APAMEA MAILLARDI* (GEYER, 1832) (LEP., NOCTUIDAE) IN ADVENTDALEN, SPITSBERGEN

EINAR ALENDAL, TROND ANDERSEN AND ARILD FJELDSÅ

Two females of *Apamea maillardi* (Geyer, 1832) were taken in Adventdalen, Spitsbergen, in 1978 and 1979. These are the only confirmed records from the Svalbard Archipelago since a single male was caught in the same valley in 1924.

Einar Alendal, Trond Andersen & Arild Fjeldså, Museum of Zoology, N-5014 Bergen-Univ., Norway.

Although Kaisila (1973) correctly suggested *Apamea maillardi* (Geyer, 1832) (as *A. exulis* Lef.) to be a permanent species on Spitsbergen there only is one confirmed previous record. On 5 Aug. 1924 the botanist J. Lid caught a flying male of *A. maillardi* in the valley Adventdalen (precise locality not given) (Rebel 1925: as *Crymodes exulis cervini* Germ.). However, observations of flying noctuids in the western fjord areas, i.e. Dixon Land (Elton 1925), Kongsfjorden (Kaisila 1973), Brøggerhalvøya Aug. 1973 (A. Fjellberg pers.com.) and Ossian Sarsfjellet July 1977 (E. Alendal), probably all concerns this species.

The present records of *A. maillardi* also are from the valley Adventdalen: WNW of Janssonhaugen (UTM:33XWG2979) 150 m a.s.l. 29 July 1978 1 ♀, I. Brattbakk leg.; and between Arnicadalen and Brentskardet (UTM: 33XWG390811) 75 m a.s.l. 25 July 1979 1 ♀, E. Alendal leg. Both specimens were found resting among the vegetation.

The first locality was on a rather boggy plain about 14.5 km up the valley. The vegetation on the plain consist of *Poa arctica, Alopecurus alpinus, Calamagrostis neglecta, Dupontia pelligera, Eriophorum schleuchzeri,* and *Luzula arctica,* and on the surrounding bog heaps mainly of *Cassiope tetragona.* The second locality was at the bottom of one of the southfaced ravines between Arnicadalen and Brentskardet, about 23 km up the valley. Dry barren ridges or hillsides with only a partial vegetation cover surrounds the ravines which, however, have a rich vegetation due to the humidity from melting snowbeds and small brooks. The vegetation at the bottom of the ravines consist of *Ranunculus pygmaeus — Equisetum arvense —* associations with *Poa alpigena* and *Trisetum spicatum* in variable frequency.

The range of *A. maillardi* in the Svalbard Archipelago possibly includes only the fjord districts of western Spitsbergen with an optimal climate compared to other parts of the archipelago. In arctic environments the larvae of *A. maillardi* probably exclusively feeds on tussock-forming Gramineae.

ACKNOWLEDGEMENTS

We are indebted to Ingvar Brattbakk for allowing us to include his material.

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Received 10 Febr. 1980.

NOTES ON THE DISTRIBUTION OF SOME NORWEGIAN STRATIOMYIDAE (DIPTERA) SPECIES

LITA GREVE

New distributional records for six species of Stratiomyidae (Diptera) are given. *Nemotelus uliginosus* (L.) occurs further north in Scandinavia than previously recorded.

Lita Greve, Museum of Zoology, University of Bergen, N-5014 Bergen-Univ. Norway.

In Rozkošnýs (1973) survey of the *Stratiomyidae* of Fennoscandia and Denmark note is made of the fact that relatively little information is available on the distribution of Norwegian species. Judged from the catalogue the material from Norway is small compared to that from Sweden and Finland.

The material listed below represents mostly specimens collected by the author, otherwise the collector is mentioned. Only records representing provinces where the species has not been

recorded previously, are included. Where UTM is not used the geographical divisions follow Strand (1943).

Beris chalybeata (Forst.) TEi: Kviteseid, Morgedal 27 June 75 1 ♀. *B. chalybeata* has been recorded from both southern and northern Norway, but from few localities.

Beris clavipes (L.) TEi: Kviteseid, Morgedal 27 June 75 1 ♂ 1 ♀. *B.clavipes* has been recorded north to Nordland. Probably the most common species of the genus.

Beris fuscipes Meigen Fi: Alta, Gargia (UTM 34WEC from 955483 to 958432) 28 June 1979 1 ♂. Previously known from two places in Nordland and Troms (Andersson, H., 1971).

Microchrysa cyaneiventris (Zetterstedt) SFy: Eide, Gulen 27 June—29 July 1973 1 ♀ leg. T. Andersen. This is the second record from Norway. One male previously has been taken in HOy. This locality is in Rozkošný (1973) listed as Bland Skoy. The correct locality is Bruvik, Eidslandet 15 June 1965. (Bland Skoy is a misinterpretation of the Norwegian word «bland.skog» meaning forest of mixed coniferous and deciduous trees).

Microchrysa polita (L.) On: Dovre, Rudiløkken (UTM 32 VND 166667) 21 July 1979 1 ♀ NSi: Rana, Straumen 1—3 July 1972 1 ♀ leg. Per Straumfors (Rana Museum). TRy: Tranøy, Senja 7 July 1962 1 ♀ leg. R. Mehl (priv. coll.) Common and widely distributed.

Nemotelus uliginosus (L.) Nnø: Hamarøy, Buvåg 25 July 1979 5 ♂ ♂ 3 ♀ ♀. Previously known from three provinces in Norway viz. Ak, VE and NTi. This record is the northernmost for Scandinavia. The species was found in abundance on a part of grassland near a shallow inlet from the Vestfjorden. According to Rozkosný (1973) larvae of this species are often found near the sea shore. The flight of the flies was very fast, and the flies flew immediately over the low grass.

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Received 5 Febr. 1980.

CHEILOSIA ANGUSTIGENA BECKER, 1894 (DIPT., SYRPHIDAE) FOUND IN NORWAY

TORE R. NIELSEN

Cheilosia angustigena is reported new to Norway. Four females were collected at Geilo and Hovet, Bv: Hol (EIS 43) 13 and 14 June 1973. The species has up till now only been known from Finland and the northwestern and central parts of the European USSR. The present paper gives some morphological characters of the species.

Tore R. Nielsen, Juvélveien 19 D, N-4300 Sandnes, Norway.

Only a few of the Fennoscandian *Cheilosia* species belong to group B of Sack (1932) with hairy eyes and hairy face. One of them, *Ch. angustigena* Becker, was described on basis of a female specimen from Lapland, probably northern Finland (Becker 1894 p. 393), later on it has been reported from the northwestern and central parts of the European USSR (Stackelberg 1970).

A find of this species at Geilo (EIS 43) in central parts of South Norway indicates that it also has a more western distribution. The specimens, four females, were collected by the author on flowering *Anemone nemorosa* L. in scattered mountainous birch forest: Geilo, Bv: Hol 13 June 1973 (2 ♀ ♀) and Hovet, Bv: Hol 14 June 1973 (2 ♀ ♀). Both localities are about 700 m a.s.l.

As very little has been published about this species, a few comments about its morphology should be added. The specimens have some superficial resemblance to females of *Ch. longula* (Zett.), but the abdomen is broader. Body glittering black; pilose mainly white, but there are some short, adpressed black hairs along median line of the tergites, and mesonotum with a mix-

Fig. 1. *Cheilosia angustigena* Becker, female (from Geilo), head in lateral view.

ture of short black and white hairs. The hairs of face are white. 3rd antennal joint varying from light (in 3 specimens) to dark reddish brown, and upper margin of the joint more or less distinctly darkened. Arista short pubescent. The eyes are bare, profile of face (Fig. 1) rather «nosy». Legs black and yellow; all femorae and tibiae narrowly yellow at their tips, front and middle tibiae also broadly yellow at base. Tarsi darkened. Wings with the veins brown, becoming yellowish-brown towards base. Halters light yellowish-brown, squamulae whitish-yellow. Body length 6,5—7,5 mm.

Two of the specimens have been compared with the type specimen in coll. Univ. Zool. Mus., Helsinki.

ACKNOWLEDGEMENT

I am greatly indebted to Professor, dr. Walter Hackman, Helsinki for the opportunity to examine the type specimen of *Ch. angustigena*.

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Received 18 Apr. 1980.

Bokanmeldelser

Capdeville, P. 1979. Les Races Geographiques de *Parnassius apollo*/Die Geographischen Rassen von *Parnassius apollo.* Part. 4. Ed. Sci. Nat., 25 pp., 4 figs., 4 col.pls. Price: F.F. 55:— (Can be obtained from Edition Sciences Nat, 2 rue André Mellenne, Venette, F-60200 Compiegne, France).

This part belongs to a work of six volumes which will deal with the geographical races and subspecies of *Parnassius apollo* L. in Europe. The text is bilingual with equality in French and German.

The text of this part deals with the following geographical areas: the Swiss' Alps, the Dinaria, Bohemia & Morova, the South Tyrols, the North Tyrols and the Eastern Alps. First a map is included showing the different populations in a particular geographical area. Synonyms of the names are included together with references to their publications. The text deals with data on habits of the adults, where they live and so on.

This part contains four colour plates showing 32 specimens in natural size, males and females of 16 different races. They belong to the following geographical areas: South Tyrols, North Tyrols, the Eastern Alps and the Dinaria-Greece mountains.

The price may seem to be sligthly high for the small number of pages, but it can be explained by the excellent colour plates. Furthermore, with the text in French and German the book can be understood and read by a large number of people. I believe that this book will be of value for people interested in the beautiful butterfly *Parnassius apollo.*

Ulf Carlberg

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

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

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

Examples:

Journal:

Løken,A. 1962. Social wasps in Norway (Hymenoptera, Vespidae). *Norsk ent. Tidsskr. 12,* 191 - 218.

Book:

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

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

Chapter:

Whitman,L. 1951. The arthropod vectors of yellow fever.- In: Strode,K. (ed.), *Yellow Fever.* Mc. Graw - Hill, New York & London, pp 229 - 298.

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Content