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Revision of the Norwegian material of the genus *Dasyphora* Robineau-Desvoidy (Diptera, Muscidae) with new records of species and localities

KNUT ROGNES

Rognes, K. 1979. Revision of the Norwegian material of the genus *Dasyphora* Robineau-Desvoidy (Diptera, Muscidae) with new records of species and localities. *Fauna norv. Ser. B, 26,* 49—58.

Material of the genera *Dasyphora* Robineau-Desvoidy and *Pyrellia* Robineau-Desvoidy in the collections of Tromsø Museum, Tromsø; Museum of Zoology, Bergen; Museum of Zoology, Oslo (Siebke's collection); and the author have been examined and revised. *Dasyphora cyanella* (Meigen) is reported from Norway for the first time, records indicating a pronounced atlantic distribution, remarks on its biology given, and the cercal plate figured. Specimens collected in Troms, Northern Norway, determined as *D. cyanella* by Ringdahl, are shown to belong to *D. zimini* Hennig. Records of *D. zimini, D. cyanella* and *D. cyanicolor* (Zetterstedt) from Norway are listed and reliable finds mapped. Some notes on *Pyrellia ignita* Robineau-Desvoidy and *P. cadaverina* (L.) are given. Morphological differences between *D. zimini* and *D. cyanella* are discussed. Some aberrations in the chaetotaxy of the middle tibia are described. The amount and extent of dusting on the mentum usually separate *D. cyanella* and *D. zimini.* A key to Norwegian species of *Dasyphora* is given.

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INTRODUCTION

In the lastest revision of the palearctic Muscidae to appear (Hennig 1955—64) a new species, *Dasyphora zimini* Hennig, 1964, was described. It is almost identical to its closest relative, *Dasyphora cyanella* (Meigen, 1826), from which earlier authors did not distinguish, it but differs in certain characters of the head and middle tibiae and in its geographical range. *D. zimini* is reported mostly from Northern and Middle Europe, while *D. cyanella* is present in Western and Southern Europe. From Scandinavia Hennig had, of these two species, seen *D. zimini* only and was inclined to believe that all published records of *D. cyanella* from Scandinavia belonged to *D. zimini.* He cites a number of publications of Ringdahl concerning Norwegian and Swedish records, and one of Tiensuu concerning Finnish records (Hennig 1964: 961—962). Hennig however, apparently did not examine specimens determined by Ringdahl or Tiensuu as *D. cyanella.* A more distant relative, *Dasyphora cyanicolor* (Zetterstedt, 1845) also is present in Scandinavia.

Recently, Pont (1971) confirmed *D. zimini* as a Swedish species by collecting a female specimen in Småland, Southern Sweden. Michelsen (1977) recorded *D. cyanella* from Denmark. Neither *D. zimini* nor *D. cyanicolor,* however, are reported from Denmark.

D. zimini and *D. cyanicolor* only are previously known from Norway (Ringdahl 1952, Hennig 1955—64). During the last three years, however, a large number of a green metallic muscid fly have been collected by the author in the district around Stavanger, Norway, all belonging to *D. cyanella.* Thus all three species occur in Norway.

A revision of the Norwegian material of the genus *Dasyphora* Robineau-Desvoidy, 1830 seems desirable in order to confirm Hennig's assumptions about published records of *D. cyanella,* and in order to obtain basic knowledge of its Scandinavian distribution.

MATERIAL AND METHODS

The following museum material of the genera *Dasyphora* and *Pyrellia* Robineau-Desvoidy, 1830 were revised: 24 specimens in Tromsø Museum, Tromsø (mostly previously published by Ringdahl, 1928, 1944a), 6 specimens in Museum of Zoology, Bergen (previously unpublished), and 18 specimens in Museum of Zoology,

Oslo (mostly collected and previously published by Siebke, 1877).

In addition 156 specimens collected by me (2 deposited at Museum of Zoology, Copenhagen, the rest in the author's collection) were examined.

Identifications follow Ringdahl (1954), Hennig (1955—64) and Fonseca (1968).

All published records are dealt with. Only some unverified records have been regarded as reliable and are recorded on the maps.

In all lists of Norwegian localities Løken's (1973) modification of Strand's (1943) system has been used. A question-mark before a locality name means it has been added by the present author, a question-mark after the number of a year that the interpretation of the handwriting on a label is uncertain. All lists give the EIS square number for the locality in question, and the maps of Norway show the 189 EIS-squares for the country (cfr. Økland 1977).

The abbreviations for the museum or collection where specimens are deposited are as follows: TM = Tromsø Museum, ZMB = Museum of Zoology, Bergen, ZMC = Museum of Zoology, Copenhagen, ZMO = Museum of Zoology, Oslo, KR = author's private collection.

The terminalia of one completely dried male specimen were macerated, dissected and mounted in Euparal under coverglass.

The figures have been prepared by means of a WILD M 8 drawing tube.

DASYPHORA ZIMINI **Hennig, 1964**

Revised records

AKERSHUS:AK: Oslo, Tøyen 1 ♂ ?date, H. Siebke, EIS 28, ZMO no. 5938, (Siebke, 1877: 97 as *Pyrellia serena* Meigen). (This may well be the specimen from July 1850 mentioned by Siebke, *loc.cit.*, bottom line).

OPPLAND: Os: Ringebu, ?loc., 1 ♂, 25 July 1850?, H. Siebke, EIS 63, ZMO no. 5943, (Siebke, 1877: 98 as *P. cyanicolor* Zetterstedt). On: Dovre, Hjerkinn, 1 ♂, 27 July 1852?, H. Siebke, EIS 71, ZMO no. 5949, (Siebke, 1877: 98 as *P. eriophthalma* Macquart).

BUSKERUD: Bø: Ringerike, Hønefoss, 1 ♀, ? date, H. Siebke, EIS 36, ZMO no. 5951, (Siebke, 1877: 98 as *P. eriophthalma).*

SØR-TRØNDELAG: STi: Oppdal, ?Kongsvoll, 1 ♂, ?date, H. Siebke, EIS 79, ZMO no 5950, (Siebke, 1877: 98 as *P. eriophthalma).* (The specimen is labelled «Dovre» only, but the locality is certainly right, since of the three localities mentioned by Siebke — «...ad Hønefos et in alpe Dovre ad Jerkin et Kongsvold legi...» *(loc.cit.*, line 8 and 9 from above) — the names of the first two ones have been found on the labels of the remaining two specimens placed in the collection under *Dasyphora* (sic) *eriophthalma,* both identified above.); ?Trondheim, 1 ♂, ?date, H. Siebke, EIS 92, ZMO no. 5934, (Siebke, 1877:97 as *P. cadaverina* L.). (The specimen carries a small square white label with a printed (?) capital letter T. This must mean «Throndhjem» since only two localities are mentioned by Siebke — «Ad Løsset in par. Aamodt 4 August 1870 et ad Throndhjem mihi obvia.» *(loc.cit.*, line 4 and 5 from below) — and the only other specimen placed in the collection under *P. cadaverina* is labelled «Aamot» and identified below (ZMO no. 5935)).

TROMS: TRy: Lenvik, Finnsnes, 2 ♂♂, 20 Sept. 1935, T. Soot-Ryen, EIS 154, TM, (Ringdahl, 1944a: 12 as *P. cyanella* Meigen); 1 ♀, 20 Sept. 1935, T. Soot-Ryen, EIS 154, TM, (Ringdahl, 1944a: 12 as *P. cyanicolor* Zetterstedt). (The latter is a misidentification. The right anterior spiracle is soiled and looks black, the left is yellow as normal but hidden by front leg.); Tromsø, Ramfjord, 10 ♀♀, 28 May 1924, T. Soot-Ryen, EIS 162, TM (Ringdahl, 1928: 8 as *P. cyanella);* Tromsdal, 2 ♀♀, ?date, O. Bidenkap, EIS 162, TM, (Bidenkap, 1901: 60 as *P. cyanicolor,* Ringdahl, 1928: 8 as *P. cyanella);*TRi: Balsfjord, Skjåvikør, 1 ♀, 28 May 1943, T. Soot-Ryen, EIS 162, TM, (Ringdahl, 1944a: 12 as *P. cyanella);* Malangen, 1 ♀, 11 April 1941, T. Soot-Ryen, EIS 154, TM, (Ringdahl, 1944a: 12 as *P. cyanella).*

These revised records from Troms, Northern Norway, favour the view that *D. zimini* equals *P. cyanella* as used by Ringdahl, and confirm Hennig's assumptions.

New records

AKERSHUS: AK: Oslo, Tøyen, 2 ♂♂, 14 April 1852, H. Siebke, EIS 28, ZMO nos. 5936, 5937. (These specimens are placed under *P. serena* in Siebke's collection, but the date indicates that they have never been published (cfr. Siebke 1877: 97, bottom line)).

HEDMARK: HEn: Tynset, Tyldal, 1 ♀, 24 July 1848, H. Siebke, EIS 72, ZMO no. 5946; 1 ♀, ? date, H. Siebke, EIS 72, ZMO no. 5947. (Both specimens are placed under *P. cyanicolor* in Siebke's collection, but the locality is not mentioned by Siebke, 1877: 97—98).

UNKNOWN PROVINCE: ?loc., 1 ♂, ?date, H. Siebke, ZMO no. 5948. (The specimen is the only one placed under *Dasyphora* (sic) *lasiophthalma* Macquart in Siebke's collection, and it is labelled «var: coloroviridacuprio» in very small handwriting. Siebke (1877: 98, under the name *P. lasiophthalma* Meigen (sic)) mentions no own catches, the only statement is: «Ad Thynæs in par. Skogn a prof. Zetterstedt observata.». The specimen carries the ordinary label «Siebke» (in print), however, identifying the collector.)

Reliable published records

AKERSHUS: AK: Oslo, EIS 28.
HEDMARK: HEs: Eidskog, Eidskog?, EIS 38? (Hennig 1964: 962).
SØR-TRØNDELAG: ?STi, 3 ♂♂, 11 ♀♀, V. Storm, (Ringdahl 1944b, 1944c: 83 as *P. cyanella).* — I have in vain searched for these specimens. They are not present in Trondheim, Lund, or Stockholm. On the maps (Figs. 1 A, 2) they are recorded for EIS 92 and STi, respectively.

Unverified published record

VESTFOLD: VE: ?1oc., ♂ ♀, 1891, O. Bidenkap, (Bidenkap, 1892: 239 as *P. lasiophthalma* Macquart). The specimen is probably lost and the record is not presented on the maps.

DASYPHORA CYANELLA **(Meigen, 1826)**

New records

ROGALAND: Ry: Hetland (?Sandnes), Dale, 1 ♀, 21 April 1968, T. Nielsen, EIS 7, ZMB; Stavanger: Aukland, Byhaugen, Gosen, Krossberg, Kvernevikskogen, Lærerskolen, Sunde, Tasta, Ullandhaug; Time, Njåskogen; Randaberg, Hålandsvatn, 38 ♂♂, 102 ♀♀, 7 April — 15 Oct. 1977—1979, K. Rognes, EIS 7, KR. Stavanger, Sunde, 1 ♂, 8 Oct. 1978, K. Rognes, EIS 7, ZMC; Krossberg, 1 ♀, 1 May 1977, K. Rognes, EIS 7, ZMC.
HORDALAND: HOy: Fana, Dolvik, 1 ♀, 12 Sept. 1937, N. Knaben, EIS 30, ZMB; Bergen, Muséhagen, 1 ♀, 28 Sept. 1936, N. Knaben, EIS 39, ZMB; Åsane, Steinestø, 1 ♂, 8 May 1966, A. Løken, EIS 39, ZMB.
These are the first records from Norway.

Note

In ZMB is a damaged specimen (SFi: Sogndal, Åberget, 1 ♀, 29 May 1948, A. Løken, EIS 50) determined by O. Ringdahl as *P. cyanella* Meig. belonging either to *D. zimini* or to *D. cyanella.*

DASYPHORA CYANICOLOR **(Zetterstedt, 1845)**

Revised records

HEDMARK: HEn: Åmot, ?Løset, 1 ♂, ?date, H. Siebke, EIS 64, ZMO no. 5935, (Siebke, 1877: 97 as *P. cadaverina).* (This must be the specimen from 4 Aug. 1870 since the only other specimen placed under *P. cadaverina* in the collection is a *D. zimini* from Trondheim (ZMO no. 5934), see above.); 1 ♂, 27 July 1848, H. Siebke, EIS 64, ZMO no. 5942 (Siebke, 1877: 98 as *P. cyanicolor).*
OPPLAND: On: Fron, ?1oc., 1 ♂, H. Siebke, EIS 62?, ZMO no. 5945, (Siebke, 1877: 98 as *P. cyanicolor).* (The specimen from Hønefoss (Siebke 1877: 98 line 2 from above) is not in the collection. The specimen from Vang (On:Vang) *(1oc.cit.)* is a misidentified female specimen of *Orthellia caesarion* (Meigen, 1826) (ZMO no. 5944)).
NORDLAND: Nsi: Rana, Krokstrand, 1 ♂, 18 Aug. 1926, A. Grønlie, EIS 124, TM, (Ringdahl 1944a: 12 as *P. cyanicolor).*
TROMS: TRi: Målselv, Bjerkeng, 3 ♀♀, 13 June 1897, O. Bidenkap, EIS 154?, TM, (Bidenkap, 1901: 60 as *P. serena* Meigen. In this publication the date and sex are wrong. Ringdahl, 1928: 8 as *P. serena);* Frihetsli, 1 ♂, 29 July 1922, T. Soot-Ryen, EIS 147, TM, (Ringdahl, 1928: 8 as *P. serena).* (The female specimen from Finnsnes (Ringdahl 1944a: 12 — *P. cyanicolor)* is a misidentified *D. zimini,* see above).

New records

AKERSHUS: AK: Oslo, Tøyen, 1 ♀, 23 April 1848, H. Siebke, EIS 28, TM.
HEDMARK: HEn: Åmot, ?Løset, 1 ♂, ?date, H. Siebke, EIS 64, TM.
OPPLAND: On: Fron, ?1oc., 1 ♀, H. Siebke, EIS 62?, ZMO no. 5939. (This specimen is placed in the collection under the name *P. serena.)*
BUSKERUD: Bø: Flesberg, Belgen, 1 ♂, 27 July 1979, K. Rognes, EIS 27, KR; Hvila, 27 July 1979, 2 ♂♂, K. Rognes, EIS 27, KR; Kongsberg, Hvittingsfoss, 1 ♂, 1 ♀, 6 Aug. 1979, K. Rognes, EIS 19, KR; Ringerike, Løvlia, 1 ♀, 31 July 1977, K. Rognes, EIS 36, KR.
VESTFOLD: VE: Hof, Thorrud, 3 ♂♂, 3 ♀♀, 28 July 1979, K. Rognes, EIS 28, KR.
TELEMARK: TEy: Drangedal, Tørnes, 1 ♀, 28 June 1978, K. Rognes, EIS 18, KR.
AUST-AGDER: AAy: Tvedestrand, Fiane, 1 ♀, 27 June 1979, Ø. Rognes, EIS 6, KR.
HORDALAND: HOy: Tysnes, Ånuglo, 1 ♂, 13 May 1970, Museum of Zoology, Excursion, EIS 23, ZMB.

Reliable published records

SØR-TRØNDELAG: ?STi, 1 ♂, 1 ♀, V. Storm, (Ringdahl, 1944c: 83 as *P. cyanicolor).* I have in vain searched for these specimens, see above under *D. zimini.* On the maps (Figs. 1 C, 3) I have recorded them for EIS 92 and STi, respectively.
NORDLAND: Nnø: Tysfjord, ?1oc., ?sex, ?date, E. Strand, (Strand, 1903: 7 as *P. cyanicolor,* E. Girschner det., Ringdahl, 1928: 8 as *P. serena).* On the maps (Figs. 1 C, 3) I have recorded this specimen for EIS 139? and Nnø, respectively. I do not know where, if anywhere, the specimen is deposited.

Unverified published records

BUSKERUD: Bv: Ål, ?1oc., ?sex, ?date, E. Strand, (Strand, 1900: 70 as *P. serena).* Not recorded on the maps.
VESTFOLD: VE: ?1oc., ♂ ♀, 1891, O. Bidenkap, (Bidenkap, 1892: 239 as *P. cyanicolor).* This is an unreliable record (cfr. Bidenkap's determination

of the two female specimens of *D. zimini* from Tromsdal, see above), and not recorded on the maps. These specimens probably are lost.

PYRELLIA IGNITA **Robineau-Desvoidy, 1830**

In Siebke's collection there are one male and one female specimen of *Pyrellia ignita* (ZMO nos. 5940, 5941, respectively) each carrying a small square black label in addition to the label with the museum number. They are placed in the collection under the name *P. aenea* Zetterstedt. No other information is supplied, neither collector, locality nor date. Siebke (1877) does not refer to them. They have probably not been found in Norway.

Hennig (1963: 942) records *P. ignita* from Norway, referring to it the following way: «...Norwegen (Tysfjord u.a.: Ringdahl 1928)...». But in Ringdahl's paper this locality is mentioned with explicit reference to Strand under the name «*P. serena* (Meig.) Stein» which is a synonym to *D. cyanicolor*. In Strand's own paper (Strand 1903: 7) the locality is mentioned under the name «*P. cyanicolor* Zett.» and the species, like all the other ones published in that paper, has been identified by E. Girschner. Hennig's record is probably due to some misunderstanding. Ringdahl (1952) does not record the species from Norway. Strand's record is placed among the reliable published records of *D. cyanicolor* (see above).

PYRELLIA CADAVERINA **(L.)**

Unverified published record

TROMS: TRi: Målselv, Maukstad, 1 ♀, 16 June 1897, O. Bidenkap, EIS 154, (Bidenkap, 1901: 60 as *P. aenea* Zetterstedt, Ringdahl, 1928: 8 as *P. cadaverina).* Ringdahl says: «Eine ♀ Ex. das wahrscheinlich dieser Art zugehörig ist, ist von Bidenkap bei Maukstad gefunden.». The specimen is not present in TM, ZMO or ZMB. This somewhat doubtful record is the only Norwegian one. In Denmark the species has not been collected since 1911 (Michelsen 1977). It is not on the British list (Pont 1975). In Sweden, Ringdahl (1952) records it from Skåne and Gotland. The species in all probability does not occur in Norway at present.

GEOGRAPHICAL DISTRIBUTION

D. zimini (Figs. 1A, 2) seems to avoid the westernmost part of Scandinavia. Outside that region it has been reported from mountainous regions in Central Europe: Germany (with terra typica), Czechoslovakia, Austria, Switzerland, The French Alps, Yugoslavia, USSR (Hennig 1964: 962).

D. cyanella (Figs. 1B, 2) in this very northernmost part of its range has a pronounced atlantic preference. Outside Scandinavia it has been reported from Scotland, England, Netherlands, France, Spain, Portugal (including the Azores), Hungary, from several localities in the Mediterranean region (Italy, Yugoslavia, Greece, Israel), and even from Iran, but not from Germany (Hennig 1963: 951 f). An immigration to Norway from the British Isles, where it is very common (Fonseca 1968), seems plausible. Michelsen (1977) suggests that it has been expanding its range northwards relatively recently, having reached the southern parts of Denmark during the last decades, since all Danish records date from the 1970's. The Norwegian records from 1936 and 1937 seem to indicate that this has occurred earlier, if recently at all.

D. cyanicolor (Figs. 1C, 3) is widespread in Scandinavia. It is reported to be common in the north of Great Britain, but to become uncommon and local towards the south (Fonseca 1968). The lack of records from Denmark is surprising, especially since it has been recorded from Germany and France. It also occurs in North America (Hennig 1963).

REMARKS ON THE BIOLOGY OF *D.CYANELLA* IN THE STAVANGER AREA

All the localities where the species has been caught by the author lie within about 500 m from a field where cattle graze for parts of the year. The larvae develop in cow droppings (Hennig 1964).

The imago survives the winter (Hennig 1964) which explains its early occurrence in the spring and late occurrence in the autumn. I have only one find from June and one from July, but at present I think this reflects a rather low collecting activity in the suitable areas at that time of the year. Outdoors the fly has been captured on walls, tree trunks, leaves and flowers. 24 May 1979 I observed and caught numerous females on newly laid cow droppings, but I could not ascertain whether they were ovipositing. Thomson (1937) says that it is very occasionally that two females are seen ovipositing on the same dungcake. Nearby some females were caught on male *Salix* catkins in full bloom.

On two occasions *D. cyanella* has been taken indoors: a female 8 April 1977 and a male 6 Oct. 1978, the first one probably having just escaped from its winter quarters, the second one looking for one. Both Graham-Smith (1918) and Thomson (1937) report to have seen *D. cyanella* overwintering in houses.

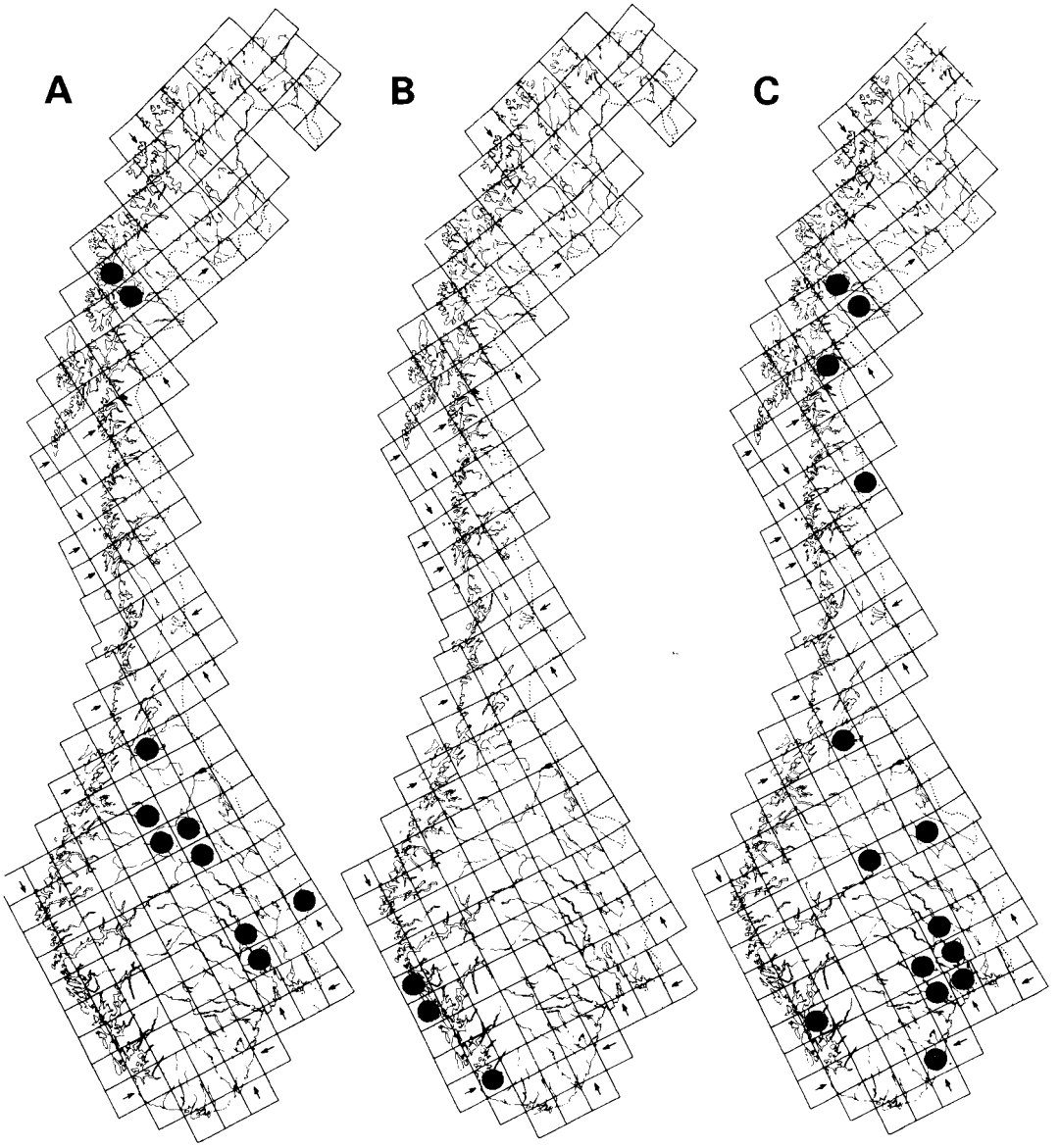

Fig. 1. Records of *Dasyphora* Robineau-Desvoidy from Norway. — A) *D. zimini* Hennig, B) *D. cyanella* (Meigen), C) *D. cyanicolor* (Zetterstedt).

MORPHOLOGICAL DIFFERENCES BETWEEN *D. ZIMINI* AND *D. CYANELLA*

Morphological differences mainly relate to the width of frons (Hennig 1964) (Fig. 4), the chaetotaxy of the middle tibia, and certain characteristics of the mouthparts. The latter two points will be considered in some detail.

The middle tibia of both sexes of *D. zimini* carries, according to Hennig (1964), one or two shorter setae above and in line with the comparatively large anterodorsal seta, while in *D. cyanella* no such smaller setae are present. This is the case with most specimens in the material seen by the author (Figs. 5A, where even three

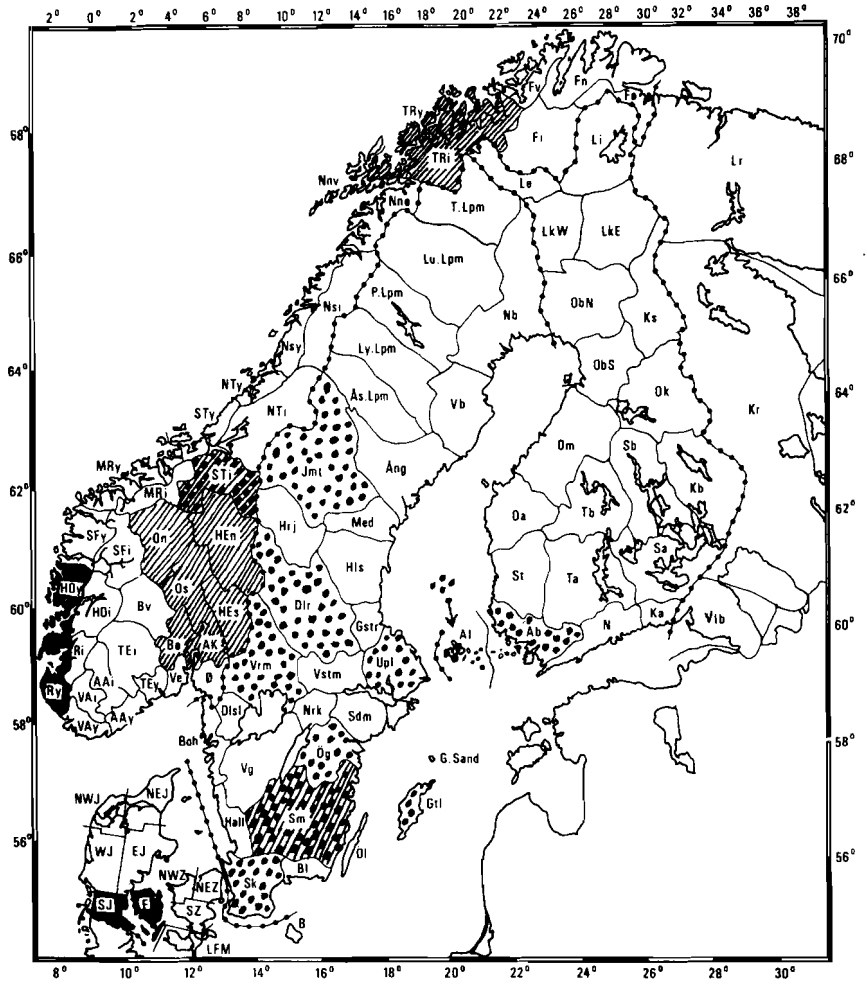

Fig. 2. Provincial records of *D. cyanella* (Meigen) and *D. zimini* Hennig from Fennoscandia and Denmark. Black areas: *D. cyanella*, new records (Norway) and records from Michelsen (1977) (Denmark). Hatched areas: *D. zimini*, revised and new records (Norway), records from Hennig (1964) (Norway) and Pont (1971) (Sweden). Dotted areas: *D. zimini* (as *D. cyanella*), records from Ringdahl (1944c, 1952) (Norway, Sweden) and Tiensuu (1935) (Finland). See also Note on p. 51.

smaller setae are evident, 5B). However, some aberrations do occur. One specimen of *D. zimini* (ZMO no. 5948) has no small seta above the large anterodorsal seta on the left middle tibia. The right middle tibia unfortunately is lost. The width of the frons and the dusting of the mentum (see below) indicate, however, that the specimen belongs to *D. zimini*. Another specimen (ZMO no. 5943) shows one small seta above the large anterodorsal seta on the left middle tibia, but no such seta on the right one. Even though the specimen is very immature, the width of the frons points to *D. zimini*.

In *D. cyanella* only one examined specimen of each sex is aberrant with regard to the chaetotaxy of the middle tibia (i.e. a frequency of less than 2%). The male specimen has a small additional seta on the right tibia and two such ones on the left (Fig. 5C). The specimen, however, clearly is a *D. cyanella* as shown by the narrow frons (Fig. 4C), the fact that it was captured together with 22 quite normal male specimens,

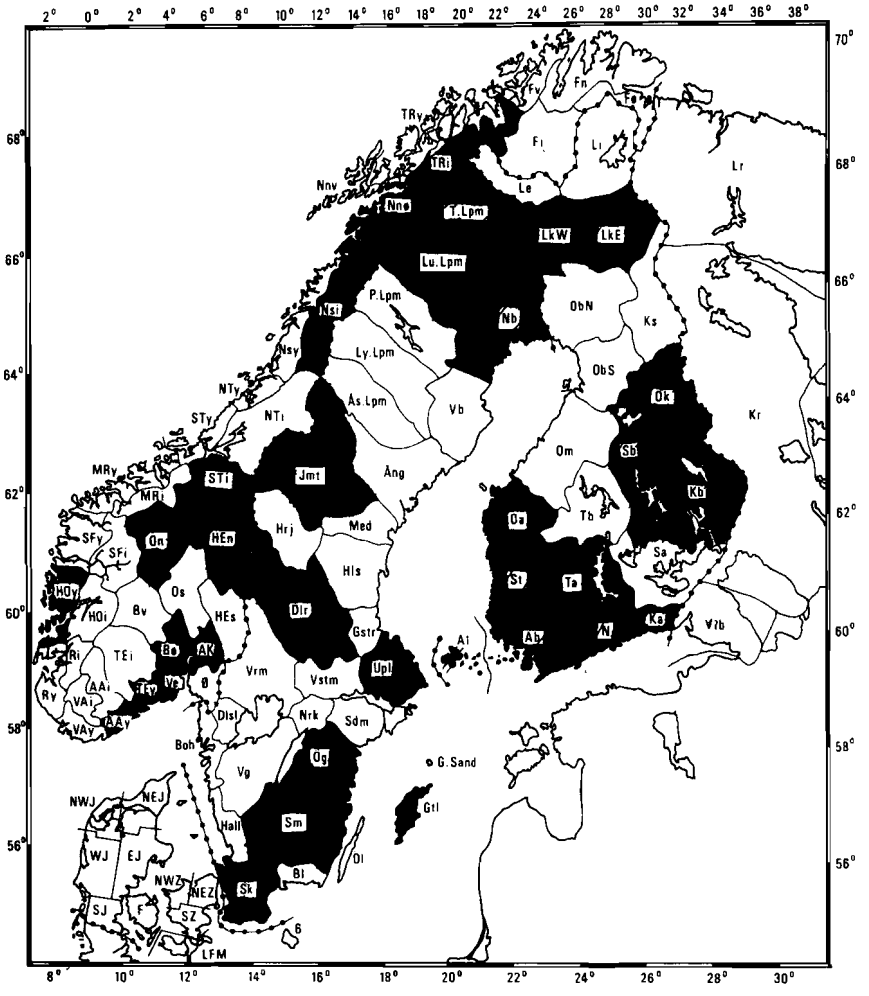

Fig. 3. Provincial records of *D. cyanicolor* (Zetterstedt) from Fennoscandia and Denmark. Revised, new and reliable published records (Norway), records from Ringdahl (1952) (Sweden) and Tiensuu (1935) (Finland).

and the lack of dusting on the mentum. The female specimen has a small seta above the anterodorsal main seta on the left middle tibia, the corresponding right leg being normal. It is clearly a *D. cyanella* since it was caught together with four quite normal females and lacks dusting on the mentum. The female specimen from «Ardennes, Les Hautes Buttés» (France) mentioned by Hennig (*op.cit.*: 951, 962) has a similar aberration in the chaetotaxy of the legs.

The chaetotaxy of the middle tibia thus cannot always be used with confidence for separating the two species. Species identification in all cases, however, are obtained when in addition certain characteristics of the mouthparts are taken into consideration. In all examined specimens of *D. zimini* the haustellum is rather strong and the mentum covered with greyish dust all over except for the hind third or fourth (Fig. 6 A). In *D. cyanella* the haustellum is more slender and the mentum shining brownish black, with a slight dark greenish sheen, and normally almost undusted or with some greyish dust below in the middle (Fig. 6 B). However, in 14% of the examined specimens of *D. cyanella* the weakly dusted area is more extensive and approaches or

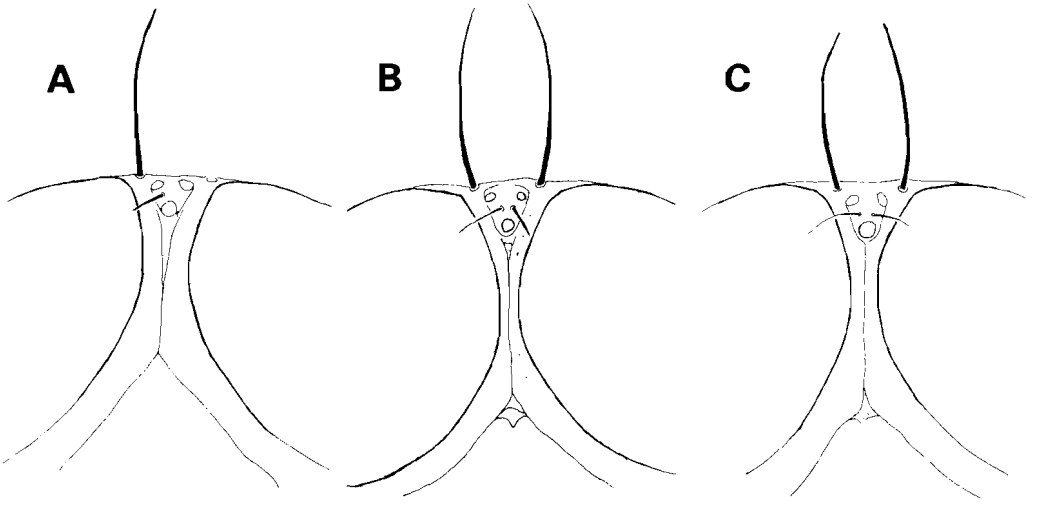

Fig. 4. Frons, frontal view. — A) *D. zimini* Hennig (male, TRy: Lenvik, Finnsnes 20 Sept. 1935), B) *D. cyanella* (Meigen) (male, Ry: Stavanger, Ullandhaug 8 Aug. 1978), C) *D. cyanella* (same specimen as in Fig. 5 C).

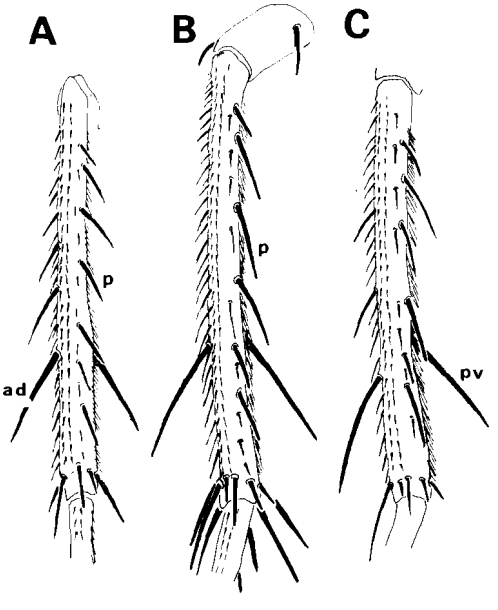

Fig. 5. Left middle tibia. — A) *D. zimini* Hennig (female, TRy: Tromsø, Ramfjord 28 May 1924), B) *D. cyanella* (Meigen) (male, Ry: Stavanger, Ullandhaug 8 Aug. 1978), C) *D. cyanella* (aberrant male, Ry: Stavanger, Krossberg 1 Oct. 1978). — ad = anterodorsal seta, pv = posteroventral seta, p = posterior setae.

actually touches the upper lateral margin of the mentum, thus making it very similar to that of *D. zimini*.

The terminalia of one male specimen of *D. cyanella* is shown in Fig. 7. They appear identical to the British specimen of *D. cyanella* illustrated by Patton & Gibbins (1934: 576—577). Hennig

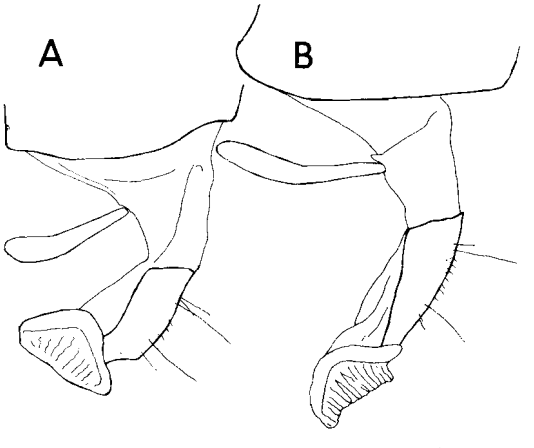

Fig. 6. Proboscis. — A) *D. zimini* Hennig (female, TRy: Tromsø, Ramfjord 28 May 1924), B) *D. cyanella* (Meigen) (female, Ry: Stavanger, Krossberg 1 Oct. 1978). Setae except on mentum omitted.

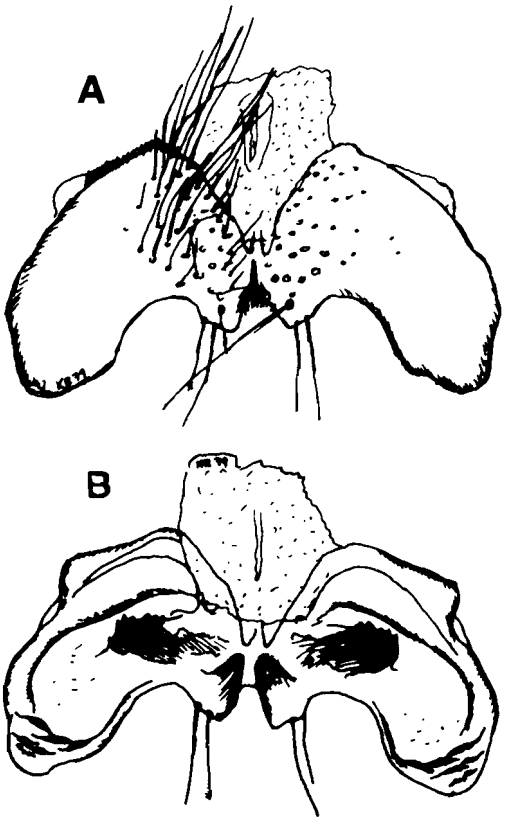

Fig. 7. Cercal plate of *D. cyanella* (Meigen). — A) Viewed from convex side (setae omitted on right side). B) Viewed from concave side. (Some distortion due to compression). (Male, Ry: Stavanger, Krossberg 1 Oct. 1978) (G.pr. 1).

(1964: 962) also finds agreement between the illustrations by Zimin of the genitalia («Mesolobus und Surstylus») of *D. zimini* and the figures by Patton & Gibbins. A renewed dissection of *D. zimini* may determine to what extent the two species have identical genitalia.

KEY TO NORWEGIAN SPECIES OF *DASYPHORA* ROBINEAU-DESVOIDY

1(2) Largest anterodorsal seta of middle tibia situated between posteroventral seta and apex of tibia, its base separated from base of posteroventral seta by at least width of tibia, anterodorsal seta about half as long as posteroventral seta; eyes almost naked; anterior spiracle brownish black; front of humerus strongly dusted; front of thorax with median broad band of strong white dusting, and lateral band of weaker dusting, about half as broad, visible in strong light when viewed tangentially, (front of thorax, apart from humeri, apparently with a single white band); thorax and abdomen shining dark blue-green; mentum greyish dusted . . . . . *D. cyanicolor* (Zetterstedt)

2(1) Largest anterodorsal seta of middle tibia situated at about same height on tibia as posteroventral seta and of approximately same length; eyes densely haired (less so in females); anterior spiracle orange; front of humerus strongly dusted; front of thorax with median broad band of strong white dusting, and lateral narrower band of equally strong dusting, (front of thorax, apart from humeri, apparently with three white bands); thorax and abdomen shining green.

3(4) Middle tibia without smaller setae above and in line with large anterodorsal seta; mentum shining brownish black with an almost imperceptible dark greenish sheen, normally practically undusted or with some dust medially below; male frons narrow, about 1.5 times wider than width of front ocellus, about half as broad as width of third antennal segment . . . . . *D. cyanella* (Meigen)

4(3) Middle tibia with one to three smaller setae above and in line with large anterodorsal seta; mentum greyish dusted all over except for a shining brown band at hind third or fourth; male frons relatively wide, about 3 times wider than width of front ocellus, about as broad as width of third antennal segment . . . . . *D. zimini* Hennig

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At last I want to express my gratitude to Verner Michelsen, Museum of Zoology, Copenhagen, for having verified my determinations of a large part of my own material of *D. cyanella* and *D. cyanicolor* and for pointing out important characteristics of the proboscis of *D. cyanella* and *D. zimini*.

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Terrestrial invertebrates of the Faroe Islands: I. Spiders (Araneae): Check-list, distribution, and habitats

SVEN-AXEL BENGTSON AND ERLING HAUGE

Bengtson, S.-A. & Hauge, E. 1979. Terrestrial invertebrates of the Faroe Islands: I. Spiders (Araneae): Check-list, distribution, and habitats. — *Fauna norv. ser. B, 26.* 59-83.

Field-work in the summers of 1978—1979 in 111 localities on 17 islands in the Faroe-group yielded 49 species of spiders, 7 of which (viz. *Oxyptila trux* (Blackwall), *Walckenaera nodosa* P.O.-Cambridge, *Centromerus dilutus* (O.P.-Cambridge), *Drepanotylus uncatus* (O.P.-Cambridge), *Porrhomma egeria* Simon, *Bathyphantes gracilis* (Blackwall), and *Lepthyphantes mengei* Kulczynski) had not previously been recorded. The Faroese check-list now comprises 67 species, of which 93% occur in Scotland, 69% in Shetland, 84% in Western Norway, and 63% in Iceland. Only a few species appear to be widely distributed and common within the Faroes; the majority being very local and rare. Comparisons with previously published information suggest a high rate of species turnover. Data on number, habitat distributions and distribution maps of the 49 species are presented.

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INTRODUCTION

The Faroe Islands are situated in the North Atlantic at about 62° N, 675 km W of Norway, 300 km NW of Shetland, and 450 km SE of Iceland. There are 18 islands in the group (Fig. 1) and they range in size from about 1 to 374 km $^{-2}$ (total area: ca. 1400 km^{-2}), all are very steep (highest peak: 882 m), and the vegetation cover is dominated by grass heaths. All islands but two of the smallest viz. Stóra Dímun and Litla Dímun, are permanently inhabited and the vegetation and landscape strongly influenced by sheep-grazing. The climate is typically oceanic; in Tórshavn the mean monthly temperatures of the coldest and warmest months are 4.1°C (February) and 11.1°C (August), respectively. The intensity of rainfall is high (in Tórshavn on average 260 d yr^{-1}), and, in some places, the annual precipitation exceeds 3,000 mm yr^{-1}.

The general faunal features (terrestrial, freshwater, and marine), and detailed information on several taxa, is known owing to the extensive field-work carried out by Danish expeditions in 1924—1928 and reported in «The Zoology of The Faroes» (printed 1928—1971). In July and early August 1978 and first half of August 1979 a Swedish-Norwegian team (S.-A. Bengtson, P.H. Enckell, and T. Solhøy) visited 17 of the islands in order to collect terrestrial invertebrates as part of an ecological project focused on modern theories of island biogeography and especially the influence of man on the Faroese biota. The field-work mainly aimed at collecting terrestrial molluscs, lumbricids, beetles, and spiders, but because of the methods employed, also various other taxa are represented in our material. This is the first in a series of papers, where we present faunistic results of our 1978—1979 field-work, dealing with taxa for which we are able to add significantly to previously published information. The present paper deals with the spiders (Araneae) and forthcoming papers will treat the terrestrial molluscs (Gastropoda), lumbricids (Lumbricidae), harvestmen (Opilionidae), beetles (Coleoptera), Isopoda & Myriapoda, and possibly a few more taxa. The ecological syntheses will appear in other contexts.

MATERIAL AND METHODS

The field-work was carried out 29 June — 8 August 1978 (Bengtson, Enckell, and Solhøy) and 3—16 August 1979 (Bengtson and Solhøy) and included 17 islands and a total of 111 localities (Fig. 2). Although the topography and vegetation of the islands show less heterogeneity than many other areas, we found it necessary to group the localities into 9 habitat types. A more fine-graded classification certainly would have been possible, but would have complicated and obscured the interpretation of the data. Since one of the major purposes of our project was to assess the influence of man on the biota the ha-

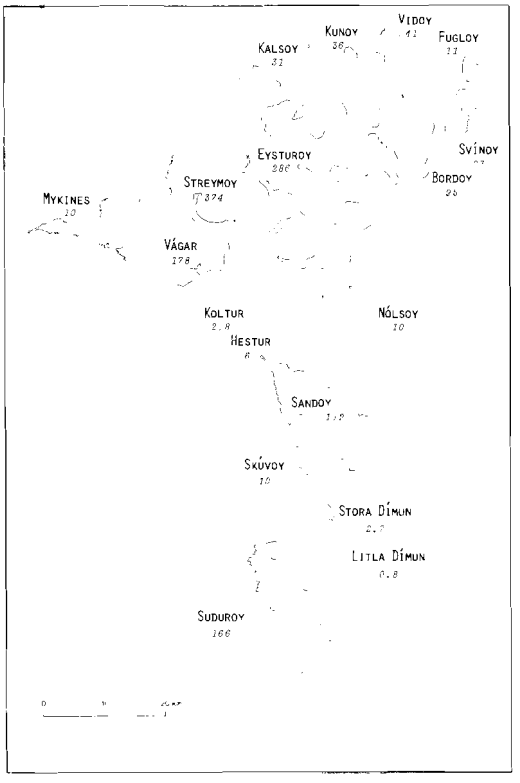

Fig. 1. Map of the Faroes with names of the islands and sizes in km^{-2}. The island group is situated approximately at 62°N and 7°W.

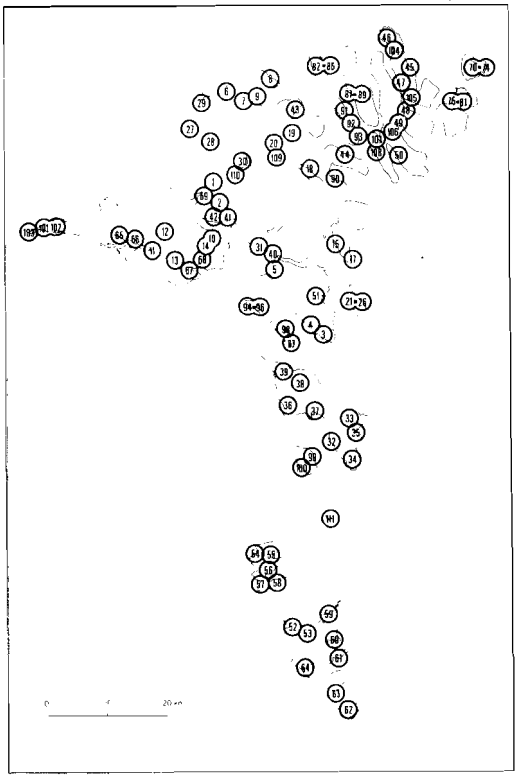

Fig. 2. Position of localities (field-numbers as in Appendix I) in the Faroes, where terrestrial invertebrates were collected in 1978—1979.

bitat classification was, in the first place, based on a distinction between «infields» and «outfields». Infields, or «homefields» (böur in Faroese), refer to areas within and around settlements (towns, villages, and farmsteads) which are usually surrounded by fences (stonewalls or barbedwire) to exclude sheep-grazing. The infields are used for growing crops and haymaking and constitute the cultivated land. We have made a somewhat arbitrary division between infield localities within the settlements (H) and those in the outskirts of the infields areas (G). There are no natural woods or higher shrubs in the Faroes, but some small plantations which are also protected from sheep-grazing. All other habitat types are «outfields» (hagi in Faroese), which are heavily grazed; except for type D (see below) which is inaccessible to sheep. The localities were further classified according to vegetation and topography: (A) mountain sites (> 250 m a.s.l.), (B) dwarf shrub heaths, (C) plantations, (D) cliffs, shelves, and crevices (hamrar and gjáir in Faroese), (E) lowland bogs, (F) grass heaths, (G) infields: the outskirts, (H) infields: within settlements, and (I) sand dunes. For more details about the habitat classification and localities see Appendix I. In selecting the localities we tried to spread them evenly over the islands and in numbers corresponding to the sizes of the islands. However, it was for practical reasons not to be avoided that the position of the localities to a large extent reflect the road-system and boat communications. Furthermore, some habitat types clearly are over-represented (e.g. H and G) and others under-represented (e.g.A, B, D, and E; habitats along sea-shores are practically not included at all).

On each locality we attempted to employ four basic collecting methods: (1) pitfall traps (with 4% formalin); mainly for beetles and spiders, (2) extraction of lumbricids by the formalin method (Raw 1959), (3) sieving and subsequent extraction in Tullgren funnels of foerna; mainly for spiders, beetles, and shell-bearing molluscs, and

(4) extensive collecting by hand which yielded especially slugs, lumbricids and the larger species of the other taxa. Time and weather conditions prevented us from carrying out the full program on each locality and therefore the number of «valid» localities varies for the four main taxa. Appendix I gives the pertinent collecting-data for each locality. A few series of pitfalls (locs 69, 74, and 111) could not be retrieved before the end of the field-work and were brought in later. One shortcoming of our field-work is that it only covers a relatively short period of time in contrast to the previous Danish investigations. Some species may have activity-peaks outside the July-August period and thus may therefore have been missed by us. This source of error probably only applies to the spiders among the four taxa that we worked on.

The spider material consists of 49 species and 3,678 individuals of which 1,591 (43,3%) were adults (identified by E.H.) and the nomenclature mainly follows Locket, Millidge & Merrett (1974). The collections are preserved at the Zoological Museum, University of Bergen.

SYNOPSIS OF THE SPECIES

Brændegaard's (1928) paper on the spiders of the Faroes was based on the Danish collections in 1924—1928 and lists 43 species. The most recent list of species is given by Ashmole (1979) who tabulates species found in the Shetland Islands and the neighbouring areas, including the Faroes. His informations about the Faroes is based on published records and an unpublished list provided by Dr. Å. Holm and the total number of species is 60. In 1978—1979 we found 49 species of which 7, viz. *Oxyptila trux* (Blackwall), *Walckenaera nodosa* O.P.-Cambridge, *Centromerus dilutus* (O.P.-Cambridge), *Drepanotylus uncatus* (O.P.-Cambridge), *Porrhomma egeria* Simon, *Bathyphantes gracilis* (Blackwall), and *Lephtyphantes mengei* Kulczynski, had not previously been recorded in Faroes: bringing the total up to 67. In the following all species known to have been collected in the Faroes will be listed. For each species is given the localities in which it is found in 1978—1979 with comments on habitat and other remarks. For species recorded by Brændegaard (Bdg 1928) only the number of localities will be given, and his original paper should be consulted for details. Ashmole (1979) lists only the presence of a species and no further information regarding the Faroes. For each species its presence in neighbouring areas is given: for Scotland (Sc) and Shetland (Sh) according to Ashmole (1979), for Iceland (I) according to Brændegaard (1958), Lindroth (1965), Lindroth et al. (1973), Bengtson et al. (1976 and unpubl.), and for Western Norway (WN), defined as the provinces of Rogaland, Hordaland, and Sogn og Fjordane, according to Cooke (1967), Hauge (1971, 1972, 1974, and unpubl.), Kauri (1966), Klausen (unpubl.), Kvamme (unpubl.), and Strand (1902a, 1902b, 1904a, and 1904b).

The total material of adult spiders collected in 1978—1979 is summarized in Tab. 1 (numbers of islands, localities, and individuals, sex-ratio, and habitat) and illustrated in the distribution maps in Appendix II.

Family Gnaphosidae

Haplodrassus signifer (C.L. Koch) Found in one locality among heather (1 ♀) on Vágar (loc. 13). Previously recorded from one locality on Eysturoy (Bgd 1928). Occurs in Sc, Sh, I, and WN.

Family Clubionidae

Clubiona trivialis C.L. Koch. Previously found in two localities on Streymoy (Bgd 1928). Occurs in Sc, Sh, and WN.

Family Thomisidae

Xysticus cristatus (Clerk) Found in 6 localities (locs 3, 13, 16, 36, 42, 57) on Suduroy, Sandoy, Vágar, Streymoy, and Eysturoy. Juvenile *Xysticus* sp. were found in locs 2, 4, 13, 16, 42, and 76; the latter on Svínoy. Previously found in 9 localities (Bgd 1928). Found in grass and dwarf shrub heaths and in open infield meadows. Occurs in Sc, Sh, I, and WN.

Oxyptila trux (Blackwall) Found in 6 localities (locs 24, 30, 36, 42, 56, 65) on Suduroy, Sandoy, Vágar, Streymoy, and Nólsoy. Juvenile *Oxyptila* sp. were found in locs 36, 45 (on Vidoy), and 56. Found in dwarf shrub and grass heaths and infield meadows. Occurs in Sc, Sh, and WN.

Family Lycosidae

Pardosa palustris (L.) Found in 9 localities (locs 1, 2, 4, 10, 13, 14, 16, 33, 36) on Sandoy, Vágar, Streymoy, and Eysturoy. Previously recorded from 6 localities including 4 on Suduroy, where the species «seems to be fairly common» (Bgd 1928:21). Juvenile *Pardosa* sp. found only at loc. 4. Found in grass and dwarf shrub heaths and open infield meadows. Occurs in Sc, Sh, I, and WN.

Pardosa sphagnicola (Dahl) Found in two localities on Vágar (loc. 12 on *Sphagnum* and loc. 13 among heather). Bgd's (1928:21) *Lycosa riparia (L. prativaga),* which was recorded in one locality on Streymoy, is according to Holm & Kronestedt

Species	Number of				Habitat (no. of locs)								
	islands	locs	inds	(♂♂/♀♀)	A	B	C	D	E	F	G	H	I
Haplodrassus signifer (C.L. Koch)	1	1	1	(0/1)	-	1	-	-	-	-	-	-	-
Xysticus cristatus (Clerk)	5	6	14	(12/2)	-	2	-	-	-	1	3	-	-
Oxyptila trux (Blackwall)	5	6	11	(10/1)	-	2	-	1	-	1	2	-	-
Pardosa palustris (L.)	4	9	26	(14/12)	-	3	-	-	-	3	3	-	-
P. sphagnicola (Dahl)	1	2	16	(7/9)	-	1	-	-	1	-	-	-	-
Trochosa (terricola ?) Thorell	3	3	3	juvs	-	1	-	-	-	-	-	2	-
Alopecosa pulverulenta (Clerk)	2	3	4	(1/3)	-	2	-	-	-	-	1	-	-
Pirata piraticus (Clerk)	4	9	26	(23/3)	-	1	-	-	2	3	2	1	-
Robertus lividus (Blackwall)	5	8	10	(1/9)	1	1	1	-	-	5	-	-	-
Meta merianae (Scopoli)	7	14	18	(7/11)	-	2	-	-	-	3	7	2	-
Ceratinella brevipes (Westring)	2	2	2	(1/1)	-	-	1	-	-	-	1	-	-
Walckenaera nudipalpis (Westring)	4	5	11	(0/11)	-	-	-	1	-	-	3	1	-
W. nodosa O.P.-Cambridge	1	2	2	(0/2)	-	-	-	-	-	1	1	-	-
W. clavicornis (Emerton)	5	6	13	(2/11)	1	-	-	1	-	4	-	-	-
W. cuspidata Blackwall	2	2	2	(0/2)	-	-	-	-	-	2	-	-	-
W. antica (Wider)	2	2	3	(0/3)	-	-	-	-	-	1	-	1	-
Gonatum rubens (Blackwall)	6	7	8	(2/6)	-	1	1	-	-	4	-	1	-
Tiso vagans (Blackwall)	6	9	36	(18/18)	-	2	-	-	-	2	5	-	-
Monochepalus fuscipes (Blackwall)	6	12	29	(0/29)	-	1	1	-	-	3	4	3	-
Gonylidiellum vivum (O.P.-Cambridge)	5	5	8	(6/2)	-	2	-	-	-	1	-	2	-
Savignya frontata (Blackwall)	10	22	49	(9/40)	-	1	1	-	-	1	15	4	-
Diplocephalus cristatus (Blackwall)	9	14	36	(14/22)	-	-	1	-	1	-	4	8	-
D. permixtus (O.P.-Cambridge)	7	12	21	(1/20)	-	2	3	-	-	3	2	2	-
Diplocentria bidentata (Emerton)	3	3	3	(1/2)	-	1	-	-	-	1	1	-	-
Latithorax faustus (O.P.-Cambridge)	1	1	1	(0/2)	-	-	1	-	-	-	-	-	-
Erigone promiscua (O.P.-Cambridge)	6	7	10	(6/4)	-	1	-	-	-	3	2	1	-
E. atra (Blackwall)	45	7	23	(11/12)	-	-	1	-	-	1	3	2	-
E. arctica (White)	6	7	175	(129/46)	-	-	-	-	-	1	1	4	1
E. tirolensis L. Koch	1	1	7	(5/2)	1	-	-	-	-	-	-	-	-
Rhaebothorax morulus (O.P.-Cambridge)	7	12	23	(11/12)	2	1	-	1	-	7	-	1	-
Leptorhoptrum robustum (Westring)	16	49	547	(420/127)	1	2	2	1	-	2	24	17	-
Drepanotylus uncatus (O.P.-Cambridge)	3	4	4	(0/4)	1	-	-	-	-	3	-	-	-
Hilaira frigida (Thorell)	6	12	44	(1/43)	1	-	-	2	1	7	-	1	-
Porrhomma convexum (Westring)	3	3	3	(0/3)	-	-	-	-	-	-	-	3	-
P. egeria Simon	1	1	1	(0/1)	-	1	-	-	-	-	-	-	-
Agyneta decora (O.P.-Cambridge)	7	21	41	(28/13)	-	2	-	1	1	8	7	2	-
Meioneta nigripes (Simon)	1	1	1	(0/1)	1	-	-	-	-	-	-	-	-
Centromerus arcanus (O.P.-Cambridge)	4	6	11	(0/11)	-	-	1	1	-	2	2	-	-
C. dilutus (O.P.-Cambridge)	1	1	1	(0/1)	-	1	-	-	-	-	-	-	-
Centromerita bicolor (Blackwall)	9	21	47	(13/34)	2	5	-	1	-	9	2	2	-
Oreonetides abnormis (Blackwall)	9	17	20	(8/12)	-	3	1	-	-	5	6	2	-
O. vaginatus (Thorell)	1	1	1	(0/1)	-	-	-	-	-	1	-	-	-
Bathyphantes gracilis (Blackwall)	1	1	1	(0/1)	-	-	-	-	-	-	-	1	-
Poeciloneta globosa (Wider)	3	4	4	(0/4)	-	-	-	1	-	1	2	-	-
Bolyphantes luteolus (Blackwall)	1	1	1	(0/1)	1	-	-	-	-	-	-	-	-
Lepthyphantes tenuis (Blackwall)	4	4	5	(1/4)	-	-	-	1	-	-	3	-	-
L. zimmermanni Bertkau	16	62	256	(129/127)	2	6	3	2	2	12	22	13	-
L. mengei Kulczynski	2	2	3	(0/3)	-	1	-	-	-	-	-	1	-
L. ericaeus (Blackwall)	6	11	12	(1/11)	-	2	1	1	1	2	3	1	-

Tab. 1. List of species of adult spiders (N = 49) collected in 1978-1979 in the Faroes. The table gives: number of islands (n = 17), number of localities (n = 111), total number of individuals and sex-ratio, and number of localities in different habitats. The abbreviations for habitats are: (A) mountain sites, (B) dwarf shrub heaths, (C) plantations, (D) cliffs, shelves, and crevices, (E) lowland bogs, (F) grass heaths, (G) infields: outskirts, (H) infields: settlements, and (I) sand dunes. For further information concerning the habitats (number of localities, vegetation etc) see Appendix I and the text.

(1970) identical with *P. sphagnicola*. Occurs in I and WN.

Pardosa eiseni (Thorell) One locality on Streymoy (Bgd 1928). Occurs in northern Scandinavia.

Trochosa terricola Thorell. Single juveniles of *Trochosa* sp. were found in three localities (locs 14, 45, 59) on Suduroy, Vágar, and Vidoy. *T. terricola* has previously been found in 4 localities; including on Streymoy and Eysturoy (Bgd 1928). Occurs in Sc, Sh, and WN.

Alopecosa pulverulenta (Clerk) Found in three localities (locs 13, 75, 76) on Vágar and Svínoy; only 3 ♀ ♀ among heather and in infield meadow. Listed by Ashmole (1979). Occurs in Sc, Sh, and WN.

Pirata piraticus (Clerk) Found in 9 localities (locs 2, 4, 5, 12, 20, 33, 38, 52, 60) on Suduroy, Sandoy, Vágar, Streymoy, and Eysturoy. Juvenile *Pirata* sp. found in loc. 13 on Vágar. Previously only 5 specimens known from Suduroy (Bgd 1928). Mostly found in wet habitats *(Sphagnum* and *Calluna)* but also in infield meadows. Occurs in Sc, Sh, I, and WN.

Family Agelenidae

Hahnia montana (Blackwall) Previously found in one locality on Suduroy (Bgd 1928). Occurs in Sc, Sh, and WN.

Tegenaria domestica (Clerk) *(= T. derhami* (Scopoli)) Previously found in two localities on Streymoy and Eysturoy (Bgd 1928). Occurs in Sc, Sh, I, and WN.

Family Theridiidae

Robertus lividus (Blackwall) Found in 8 localities (locs 4, 5, 10, 76, 78, 84, 85, 108) on Vágar, Streymoy, Kalsoy, Bordoy, and Svínoy. Previously found in 6 localities; including on Suduroy, Sandoy, and Vidoy (Bgd 1928). Juveniles *Robertus* sp were found in 8 localities (locs 5, 10, 14, 24, 28, 76, 78, 87) including on Nólsoy and Kunoy. Mostly found on grass heaths, but also in a mountain site, dwarf shrub heath, and a plantation. Occurs in Sc, Sh, and WN.

Robertus arundineti (O.P.-Cambridge) Previously found in one locality on Vágar (Bgd 1928). Occurs in Sc, Sh, I, and WN.

Family Tetragnathidae

Meta merianae (Scopoli) Found in 14 localities (locs 6, 17, 18, 28, 30, 43, 52, 59, 61, 62, 65, 92, 93, 105) on Suduroy, Vágar, Streymoy, Eysturoy, Kalsoy, and Vidoy. Juvenile *Meta* sp were found in 13 localities (locs 11, 18, 30, 32, 41, 44, 55, 59, 61, 66, 87, 94, 98); including on Sandoy, Koltur, Hestur, and Kunoy. Previously found in 16 localities; including on Bordoy (Bgd 1928). Mostly found in infield meadows but also in dwarf shrub and grass heaths as well as within settlements. Occurs in Sc, Sh, I, and WN. *M. merianae* var *celata* has once been recorded on Streymoy (Bgd 1928).

Family Linyphiidae, Subfamily Erigonidae

Ceratinella brevipes (Westring) Found in two localities on Kalsoy (loc. 85 in plantation) and Vidoy (loc. 46 in infield meadow). Previously found in one locality on Sandoy (Bgd 1928). Occur in Sc, Sh, I, and WN.

Caledonia evansi O.P.-Cambridge. Listed by Ashmole (1979). Occurs in Sc, Sh, I, and WN.

Collinsia holmgreni (Thorell). Previously found in two localities on Streymoy and Eysturoy (Bgd 1928; as *Coryphaeolana mendica* L. Koch). Occurs in Sc, I, and WN.

Walckenaera nudipalpis (Westring). Found in 5 localities (locs 6, 22, 43, 50, 94) on Koltur, Nólsoy, Eysturoy, and Bordoy. Previously found in one locality on Streymoy (Bgd 1928). Only females found mainly in infield meadows. Occurs in Sc, Sh, I, and WN.

Walckenaera nodosa O.P.-Cambridge. Found in two localities on Streymoy (loc. 5 in grass heath and loc. 69 in grass meadow below cliffs). Both specimens were females and found close to water in wet sites (cf. Palmgren 1976). Occurs in Sc, I, and WN.

Walckenaera clavicornis (Emerton). Found in 6 localities (locs 10, 22, 24, 34, 63, 102) on Suduroy, Sandoy, Mykines, Vágar, and Nólsoy. Mainly grass heaths but also mountain sites and cliffs and shelves. Listed by Ashmole (1979). Occurs in Sc, Sh, and I and in alpine habitats in Norway; though not in WN.

Walckenaere cuspidata Blackwall. Found in two localities (2 ♀ ♀) on Suduroy (loc. 53) and Eysturoy (loc. 9), both on grass heaths. Previously found on one locality on Streymoy (Bgd 1928). Listed by Ashmole (1979). Occurs in Sc, I, and WN.

Walckenaena antica (Wider) Found in two localities (♀ ♀) on Hestur (loc. 98, infield grass and herbs) and Kalsoy (loc. 92, grass heath). Listed by Ashmole (1979). Occurs in Sc, Sh, and WN.

Gonatium rubens (Blackwall) Found in 7 localities (locs 1, 16, 39, 47, 85, 92, 98) on Sandoy, Hestur, Streymoy, Eysturoy, Kalsoy, and Vidoy. Previously known from two localities on Suduroy and Streymoy (Bgd 1928). Mostly found in grass heaths, but also in richer vegetation and in one plantation. Occurs in Sc, Sh, I, and WN.

Tiso aestivus (C.L. Koch) Listed by Ashmole (1979). Occurs in Sc, I, and WN.

Tiso vagans (Blackwall) Found in 9 localities (locs 3, 13, 16, 28, 33, 36, 46, 47, 49) on Sandoy, Vágar, Streymoy, Eysturoy, Bordoy, and Vidoy. Previously known from one localities on Streymoy (Bgd 1928). Mostly found in infield meadows but also on grass and dwarf shrub heaths. Occurs in Sc, Sh, and WN.

Tmeticus affinis (Blackwall). Previously only one specimen from Streymoy (Bgd 1928).

Monocephalus fuscipes (Blackwall). Found in 12 localities (locs 17, 42, 45, 46, 47, 48, 83, 85, 87, 92, 93, 105) on Streymoy, Eysturoy, Kalsoy, Kunoy, Bordoy, and Vidoy. Mostly in infield habitats but also on heaths. All 29 specimens collected were females. Listed by Ashmole (1979). Occurs in Sc and is a W European species (Wiehle 1960).

Gongylidiellum vivum (O.P.-Cambridge). Found in 5 localities (locs 5, 45, 76, 93, 94) on Koltur, Streymoy, Kalsoy, Vidoy, and Svínoy. Found in infields within settlements and in grass heaths and dwarf shrub. Listed by Ashmole (1979). Occurs in Sc and WN.

Savignya frontata (Blackwall). Found in 22 localities (locs 3, 14, 16, 18, 26, 27, 29, 36, 42, 43, 46, 50, 52, 55, 59, 60, 66, 69, 58, 87, 102, 110) on Suduroy, Sandoy, Mykines, Vágar, Streymoy, Eysturoy, Kunoy, Bordoy, Nólsoy, and Vidoy. Previously known from 4 localities (Bgd 1928). Mostly found in richly vegetated infield localities and less frequent in heaths. Occurs in Sc, I, and WN.

Diplocephalus cristatus (Blackwall). Found in 14 localities (locs 12, 26, 41, 43, 44, 46, 55, 58, 59, 68, 73, 89, 94, 104) on Suduroy, Vágar, Koltur, Streymoy, Nólsoy, Eysturoy, Kunoy, Vidoy, and Fugloy. Previously known only from around Tórshavn (Bgd 1928). Mostly found in infields but also in a plantation. Occurs in Sc, Sh, I, and WN.

Diplocephalus permixtus (O.P.-Cambridge). Found in 12 localities (locs 2, 19, 21, 51, 53, 55, 65, 85, 90, 97, 98, 110) on Suduroy, Vágar, Hestur, Streymoy, Nólsoy, Eysturoy, and Kalsoy. No clear pattern with regard to habitat but found in both infield and heath localities. In other areas known to occur in places with a relatively high moisture (Locket & Millidge 1953, Wiehle 1960, Palmgren 1976). Listed by Ashmole (1979). Occurs in Sc, Sh, I, and WN.

Diplocentria bidentata (Emerton). Found in three localities on Nólsoy (loc. 24 in grass heath), Streymoy, (loc. 69 in rich grass) and on Bordoy (loc. 106 among *Calluna*). Listed by Ashmole (1979). Occurs in Sc and I.

Latithorax faustus (O.P.-Cambridge). Found in one locality (1 ♀) on Streymoy (loc. 51 in plantation). Listed by Ashmole (1979). Occurs in Sc, I, and WN.

Entelecara errata (O.P.-Cambridge). Listed by Ashmole (1979). Occurs in Sc, Sh, and WN.

Erigone promiscua (O.P.-Cambridge). Found in 7 localities (locs 3, 5, 10, 36, 64, 76, 99) on Suduroy, Skúvoy, Sandoy, Vágar, Streymoy, and Svínoy. Previously known from 5 localities including on Mykines (Bgd 1928). Found in a variety of habitats, mostly in grass heaths and infields. Occurs in Sc and Sh.

Erigone atra (Blackwall). Found in 7 localities (locs 11, 18, 41, 51, 58, 64, 111) on Suduroy, Stóra Dímun, Vágar, Streymoy, and Eysturoy. Previously known from 5 localities; including on Bordoy (Bgd 1928). Found on grass heaths meadows and in one plantation. Occurs in Sc, Sh, I, and WN.

Erigone arctica (White). Found in 7 localities (locs 6, 37, 41, 44, 98, 102, 104) on Sandoy, Mykines, Hestur, Streymoy, Eysturoy, and Vidoy. Previously known from 9 localities; including on Vágar (Bgd 1928). Found in meadows and rich vegetation near settlements, but 166 of the 175 specimens came from the sand dune locality (loc. 37) on Sandoy. Occurs in Sc, Sh, I, and WN.

Erigone tirolensis L. Koch. Found in one locality on Streymoy (loc. 31 at about 600 m a.s.l.). A typically high alpine species. Listed by Ashmole (1979). Occurs in Sc, I, and WN.

Erigone psychrophila Thorell. Previously found in 2 localities on Suduroy and Nólsoy (Bgd 1928). Occurs in Sc, I, and WN.

Trichopterna globipes L. Koch. Previously found in one locality (Bgd 1928). Occurs on the European continent.

Rhaebothorax morulus (O.P.-Cambridge). Found in 12 localities (locs 1, 7, 9, 10, 20, 21, 22, 24, 31, 63, 77, 98) on Suduroy, Vágar, Hestur, Nólsoy, Streymoy, Eysturoy, and Svínoy. Found mostly in mountain sites and open grass heaths but also occasionally in other habitats. Listed by Ashmole (1979). Occurs in Sc, Sh, I, and WN.

Subfamily Linyphiinae

Leptorhoptrum robustum (Westring). Found in 49 localities (locs 3, 6, 8, 14, 17, 26, 27, 29, 32, 33, 35, 41, 43, 44, 45, 46, 48, 49, 50, 51, 52, 55, 56, 58, 60, 61, 62, 66, 67, 68, 69, 73, 78, 79, 81, 82, 84, 87, 88, 90, 93, 94, 96, 97, 98, 99, 101, 107, 110), on all islands except on Stóra Dímun. Previously known from 28 localities (Bgd 1928). Together with *Lepthyphantes zimmermanni* Bertkau (see below) the most widely distributed and, possible also commonest spider in the Faroes. It is mostly found near habitations; i.e. infield habitats. Occurs in Sc, Sh, I, and WN.

Drepanotylus uncatus (O.P.-Cambridge). Found in 4 localities (locs 4, 5, 34, 53) on Suduroy, Sandoy, and Streymoy in grass heaths and in one mountain site. Only 4 ♀ ♀ found. A hygrophilous species (see Locket & Millidge, 1953, Braendegaard 1958). Occurs in Sc, Sh, I, and WN.

Hilaira frigida (Thorell). Found in 12 localities (locs 10, 12, 19, 22, 24, 39, 44, 53, 54, 71, 72, 77) on Suduroy, Sandoy, Vágar, Nólsoy, Eysturoy, Svínoy, and Fugloy. Previously known from 15 localities, including on Streymoy, and Bordoy, and considered «quite common» (Bgd 1928). Mostly found in placed with open and sparse vegetation such as grass heaths and on higher grounds (see also Bgd 1928). Occurs in Sc, Sh, I, and WN.

Hilaira nubigena Hull. Listed by Ashmole (1979). Occurs in Sc and Fennoscandia.

Porrhomma convexum (Westring). Found in three localities (locs 17, 41, 91) on Streymoy, Eysturoy, and Kalsoy. All finds in rich and moist sites. Previously known from one locality on Sandoy (Bgd 1928). Occurs in Sc and I.

Porrhomma egeria Simon. Found in one locality on Vidoy (loc. 45 among heather). The specimen is a female with reduced eyes and the epigyn is in agreement with Palmgren (1975, figs 17:12 and 17:11b) and Wiehle (1956, fig. 386). However, the specimen lacks one of the two prolateral spines on femur I which is said to be diagnostic for the species (Locket & Millidge 1953, Palmgren 1975). Occurs in Sc (rare outdoors) and Sh.

Agyneta decora (O.P.-Cambridge). Found in 21 localities (locs 2, 12, 14, 21, 22, 23, 28, 39, 41, 42, 46, 52, 53, 57, 63, 64, 65, 66, 67, 69, 98) on Suduroy, Sandoy, Hestur, Vágur, Streymoy, Nólsoy, and Vidoy. Thus, widely distributed and in a variety of habitats though mostly in grass heaths and meadows, but in small numbers. Listed by Ashmole (1979). Occurs in Sc, Sh, I, and WN.

Meioneta nigripes (Simon). Found in one locality on Svinoy (loc. 77; 1 ♀ at about 460 m a.s.l.). Previously known from two localities on Streymoy (Bgd 1928). Occurs in Sc, Sh, I, and WN.

Centromerus arcanus (O.P.-Cambridge). Found in 6 localities (locs 10, 14, 22, 28, 51, 83) on Vágar, Streymoy, Nólsoy, and Kalsoy. Only females found and in both grass heaths and meadows and in a plantation. Listed by Ashmole (1979). Occurs in Sc and WN.

Centromerus dilutus (O.P.-Cambridge). Found in one locality on Svinoy (loc. 76; 1 ♀ among heather). Occurs in Sc and WN.

Centromerita bicolor (Blackwall). Found in 21 localities (locs 2, 9, 10, 13, 16, 19, 21, 22, 23, 24, 30, 31, 34, 39, 48, 53, 57, 68, 69, 76, 94) on Suduroy, Sandoy, Koltur, Vágar, Streymoy, Nólsoy, Eysturoy, Bordoy, and Svinoy. Previously known from 26 localities including on Mykines and Vidoy (Bgd 1928). Thus, a widely distributed species which occurs in a variety of habitats but mostly in grass and dwarf shrub heaths, but apparently usually in relatively small numbers. Occurs in Sc, Sh, I, and WN.

Oreonetides abnormis (Blackwall). Found in 17 localities (locs 4, 6, 14, 27, 28, 30, 45, 51, 53, 69, 76, 79, 82, 84, 91, 92, 107) on Suduroy, Vágar, Streymoy, Eysturoy, Kalsoy, Bordoy, Vidoy, Svinoy, and (outside our ordinary sampling sites) on Sandoy. Previously known from 7 localities (Bgd 1928). Mostly in infield habitats but also in grass and dwarf shrub heaths. Occurs in Sc, Sh, I, and WN.

Oreonetides vaginatus (Thorell). Found in one locality on Eysturoy (loc. 9; 1 ♀ on barren grass heath). Previously found in one locality on high ground on Streymoy (Bgd 1928). Occurs in Sc, Sh, and WN.

Bathyphantes gracilis (Blackwall). Found in one locality on Kunoy (loc. 87: 1 ♀ in grass and herbage). Occurs in Sc, Sh, I, and WN.

Poeciloneta globosa (Wider). Found in 4 localities (only ♀ ♀) on Streymoy (loc. 5; grass heath near water, and loc. 51 in plantation), Nólsoy (loc. 22; ungrazed rock shelves) and Stóra Dímun (loc. 111, grass meadow). Previously known from 9 localities, including on Suduroy, Sandoy, and Mykines and «appears to be common» (Bgd 1928). Occurs in Sc, Sh, and WN.

Bolyphantes luteolus (Blackwall). Found in one locality on Svinoy (loc. 77; 1 ♀ at about 460 m a.s.l.) Previously known from 12 localities on Suduroy, Sandoy, Koltur, Vágar, Streymoy, and Eysturoy and «appears to be common but not occuring on the northern islands» (see above; Svinoy!) (Bgd 1928). We cannot suggest any explanation to why we found it only in one locality. Occurs in Sc, Sh, and WN.

Bolyphantes index (Thorell).Previously found once on Suduroy (Bgd 1928). Occurs in I and WN.

Lepthyphantes tenuis (Blackwall). Found in 4 localities (locs 6, 33, 58, 71) on Suduroy, Sandoy, Eysturoy, and Fugloy. Found in infield meadows. Previously known from one locality on Streymoy (Bgd 1928). Occurs in Sc, Sh, and WN.

Lepthyphantes complicatus (Emerton). Listed by Ashmole (1979). Occurs in Sc, I, and WN.

Lepthyphantes zimmermanni Bertkau. Found in 62 localities (locs 1, 3, 4, 5, 7, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 26, 28, 32, 34, 35, 36, 39, 42, 44, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 58, 59, 60, 62, 66, 68, 69, 73, 74, 76, 78, 79, 83, 87, 88, 89, 90, 91, 94, 97, 98, 101, 105, 106, 109, 110, 111) on all islands except Skúvoy. Previously known from 16 localities (Bgd 1928). Together with *Leptorhoptrum robustum* (see above) the most widely distributed species in the Faroes and apparently abundant. It was found in all sorts of habitats. Occurs in Sc, Sh, I, and WN.

Lepthyphantes mengei Kulczynski. Found in two localities on Kunoy (loc. 87; 2 ♀ ♀ in grass and herbage) and on Vidoy (loc. 45; 1 ♀ among heather. Occurs in Sc, Sh, I, and WN.

Lepthyphantes leprosus (Ohlert). Previously known from one locality on Streymoy (Bgd 1928). Occurs in Sc, Sh, and I.

Lepthyphantes ericaeus (Blackwall). Found in 11 localities (locs 2, 4, 7, 12, 14, 21, 22, 42, 51, 59, 94) on Suduroy, Koltur, Vágar, Streymoy, Nólsoy, and Eysturoy. Previously known from 3 localities on Streymoy (Bgd 1928). The finds are spread over a variety of habitats. Occurs in Sc, Sh, and WN.

DISCUSSION

With the appearence of Ashmole's (1979) and our lists the total number of spider species known to have been recorded in the Faroes amounts to 67. Although this means a considerable increase compared with the 43 species listed by Braendegaard (1928) it is still significantly less than the 90 species found in the Shetland Islands (Ashmole, 1979). This difference between Shetland and Faroes in species numbers is noteworthy since the two archipelagoes are of the

same size (ca. 1,400 km^{-2}), but presumable the Shetland Islands, apart from being situated much closer to Scotland, offer a greater diversity of habitats. Iceland, which is about 75 times the size of the Faroes, also shows a higher habitat diversity but there are only 90 species of spiders recorded (from Ashmole (1979) and our own unpubl. data). However, the improved list of species from the Faroes does not alter Braendegaard's (1928) conclusion that the spider fauna is distinctly West-European. Of the 67 Faroese species 62 (i.e. 93%) occur in Scotland, 46 (69%) in the Shetland Islands, 56 (84%) in Western Norway, and 42 (63%) in Iceland. For a zoogeographical discussion of the spider faunas (especially regarding the Shetland Islands) of North Atlantic islands it is referred to Ashmole (1979). His main conclucions are not significantly changed by the present addition of 7 species to the Faroese list.

A comparison of Braendegaard's list (1928) of 43 species, which was mainly based on the Danish collections from 1924—1928, and our list from 1978—1979 containing 49 species, reveals that they have only 28 species (i.e. 44% of the total species pool) in common. The majority of the species found in 1924—28 but not in 1978—79, and vice versa, can be denoted «rare» and only recorded in one or two localities. In 1978—79, 15 of 49 species (31%) were found only in one or two localities, compared with 26 of 43 (61%) on Braendegaard's list. On the basis of our field-data we consider 6 species to be widely distributed (i.e. they were found on $\geqslant$ 9 of the 17 islands) viz. *L. zimmermanni, L. robustum, S. frontata, D. cristatus, C. bicolor,* and *O. abnormis* (i.e. about 1/8 of the species) and another 16 to be relatively widely distributed (on 5—7 islands; see Tab. 1). Thirteen species were «common» in the sense that they were found in > 10 localities: *L. zimmermanni, L. robustum, S. frontata, C. bicolor, A. decora, O. abnormis, D. cristatus, M. merianae, M. fuscipes, R. morulus, H. frigida, D. permixtus,* and *L. ericaeus* (Tab. 1). Braendegaard (1928) lists 6 species as being of «common occurrence» and another 8 species as being «comparatively common» and of those 14 *B. luteolus, R. lividus, E. atra, E. arctica, E. promiscua, P. globosa. X. cristatus,* and *P. palustris* are not among our 20 widely distributed and/or common species. Most of the discrepancies are probably only a matter of opinion as to whether a species is common or not, or a consequence of the fact that some habitats were under-represented in our study (see above 2.) However, regarding *B. luteolus* and *P. globosa* we cannot give any explanations. Is it possible that these two species have decreased markedly, or do they show drastic annual variation in abundance?

The collections made in 1978—79 do not provide a reliable base for numerical analyses. It is, however, noteworthy that two species *(L. robustum* and *L. zimmermanni)* together constitute 51% of the total number of adult spiders included in this study. Thus, the vast majority of the spiders are rare also in terms of relative abundance. Whether they are also rare in absolute numbers cannot be decided without further quantitative sampling. Our subjective feelings, based on field experiences, are that there are many more low-density spiders in the Faroes than in Iceland. This would, in combination with the marked dissimiliarity of Braendegaard's and our species lists (see above), suggest a relatively high «turnover» of species, which is consistent with some of the current theories of colonization (see e.g. MacArthur & Wilson 1967). In agreement with Braendegaard (1928) and Ashmole (1979) we believe that many (possibly all) of the Faroese spiders colonized the islands in postglacial time, and that many probably reached the Faroes by «ballooning», which means that propagules recurrently arrive, get established or go extinct after some time. Only repeated and intensified field-work will reveal which of the rare species are permanent members of the fauna.

Because of the many rare species the assemblages of species varied considerably between different localities and habitats. The grass heaths contained the largest number of species (32 of the 49 species), closely followed by the dwarf shrub heaths (29 species) and the infields (outskirts: 27 species and settlements: 25 species). The grass heaths are affected by grazing which, in this case, increases species diversity, possible by reducing environmental stability. Although relatively few dwarf shrub heath localities were surveyed the number of species was high, which may be associated with a relatively high structural complexity of the vegetation and the fact that the *Callune* heaths are located on south and west facing slopes where climatic conditions are presumably favourable. The other habitats contained much fewer species (mountain sites: 11, plantations: 14, cliffs, shelves, and crevices: 13, lowland bogs: 7, and sand dunes: 1 species); although it should be noted that these habitats were under-represented in our material.

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APPENDIX 1

List of localities where terrestrial invertebrates were collected in 1978—1979 in the Faroe Islands. The data given are: field-number and name of the locality (cf. Fig. 2), name of island (cf. Fig. 1), type of habitat (see below), altitude, and methods of collecting (pit-fall-trapping, sieve sampling, formalin sampling, and hand collecting). The right-hand columne contains remarks on the sampling site (vegetation, topography, exposure etc.). Each locality is assigned to either of the following 8 habitat types (as indicated in the table a few localities include more than one habitat type):

A: Mountain sites, or fell-fields, which are situated > 250 m a.s.l. are characterized by a mosaic of bare ground (graval, stones, and boulders) and vegetation consisting of e.g. *Silene acaulis, Luzula spicata, Alchemilla alpina, Polygonum viviparum, Juncus trifidus, Koenigia islandica, Deschampsia alpina, Sibbaldia procumbens, Salix herbacea, Loiseleuria procumbens, Saxifraga* spp, and mosses of *Rhacomitrium* (for the nomenclature of plants and further information on the vegetation; see Hansen (1966). The material includes 4 localities of this type.

B: Dwarf shrub heaths which cover fairly large areas and may be found from near sea-level to 3—400 m a.s.l. They usually occur on S—W facing slopes and are dominated by *Calluna vulgaris, Empetrum nigrum, E. hermaphroditum, Erica cinerea, V. myrtillus, Nardus stricta, Galium saxatile, Potentilla erecta,* and many species of mosses. The material includes 10 localities of this type.

C: Plantations which are usually dominanted by various exotic species of spruce, pine and larch but also contain decidous trees *(Betula* and *Sorbus).* Most of the plantations are small (a few hectars), the trees reaching a hight of 4—6 meters, and with poorly developed undergrowth. They were planted mainly early in this century, in the 1920's, and 1950's. Plantations occur on several of the islands (Suduroy, Sandoy, Streymoy, Eysturoy, Bordoy, Kalsoy, and Kunoy. No natural post-glacial woods have ever occurred in the Faroes. Four plantations were surveyed.

D: Cliffs, shelves (hamrar in Faroese) and crevices (Gjáir) which, because of inaccessibility to sheep, often support a very luxuriant vegetation including e.g. *Luzula sylvatica, Geranium sylvaticum, Filipendula ulmaria, Epilobium montanum, Dryopteris filix-mas* and many others. The material includes 3 localities plus another 5 as parts of the other localities.

E: Lowland bogs, which are common in the larger islands (Streymoy, Eysturoy, Vágar, Suduroy, and Sandoy). Those included in this study were dominated by *Sphagnum* spp, *Eriophorum angustifolium, Juncus squarrosus, Scirpus caespitosa,* and various *Carex* spp. Only 3 localities of this type were investigated.

F: Grass heaths, which is by far the most common type of vegetation in.the Faroes, of a variety of types. The most dominant plant species are: *Anthoxanthum odoratum, Deschampsia flexuosa, Agrostis tenuis, Festuca rubra, F. viviparum, Luzula multiflora, Plantago lanceolata, Prunella vulgaris, Ranunculus repens, Cerastium holosteoides,* and *Leontodon autumnalis.* The grass heaths are usually intensively grazed by sheep. The material includes 31 localities.

G: Localities in the outskirts of the «infields» or «home-fields» (böur in Faroese). In the Faroes the cultivated land (used for various crops and haymaking) is usually found around the settlements (villages or farmsteads) and is surrounded by stonewalls or other types of fences in order to prevent sheep-grazing. In the outskirts of the infields the vegetation is usually characterized by rich grass and herb meadows including *A. odoratum, Holcus lanatus, Cardamine hirsuta, Rhinanthus minor, P vulgaris, Bellis perennis, Trifolium repens, Lychnies flos-cuculi, Orchis maculata* etc. The material includes 34 localities of this type.

H: Infield localities very close to, or within, settlements (gardens, around houses etc.) The vegetation is often very dense and luxurious and include *Angelica archangelica, Plantago major, Matricaria matricarioides, Poa annua, Capsella bursa-pastoris* and wasteland species such as *Rumex longifolius R. obtusifolius* and *R. crispus.* The material includes 21 localities of this type.

I: Sand dunes, which are only found on Sandoy (in a few other places, e.g. on Vágar, similar sites occur) and have a vegetation consisting of *Ammophila arenaria, Elymus arenarius,* and *Cakile maritima.* Only one sand dune locality was studied.

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[1] All series in 1978 and comprising 5 traps each, unless otherwise stated.

[2] Abbreviations refer to: sieve samples and subsequent extraction in Tullgren funnels (si); extration of lumbricids by using formalin (Fo; hand collecting (Hc) by searching among vegetation, debris, under stones etc.

[3] Only 3 traps were recovered.

[4] Only 4 traps were recovered.

[5] Includes also a large sample of slugs collected by school children of Skúvoy in September 1979.

[6] 10 traps.

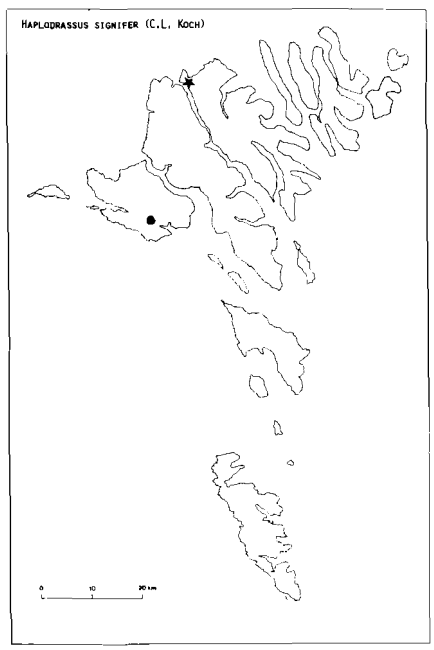
Locality	Island	Habitat	Altitude (m a.s.l.)	Pitfall trapping[1]	Other methods of collecting	Further description
1. Myrarna	Streymoy	F	200	1-23 July	Si, Fo	Rather wet grass heath; facing SW.
2. NW Kvívík	Streymoy	B	210	1-23 July	Si, Fo, Hc	Rather wet shrub heath; facing SW.
3. Kirkjuböur	Streymoy	G	40	7-25 July	Si, Hc	Cattle-grazed grassland; sloping W.
4. NW Kirkjuböur	Streymoy	F	80	-	Fo, Hc	Dry, stony grass heath; facing SW.
5. Nordradalur	Streymoy	F	70	4-21 July	Si, Fo, Hc	Grassland along small stream.
6. NE Eidi	Eysturoy	G	70	-	Si, Fo, Hc	Steep grass-herb meadow slope; facing SW; near road; plenty of stones and boulders.
7. Slættaratindur	Eysturoy	B	160	-	Si, Hc	Rather wet shrub heath; near road with plenty of stones and boulders.
8. Gjógv	Eysturoy	H	10	-	Si, Fo, Hc	Grass-herbs, wasteland; within village along stream; facing NE.
9. S Gjógv	Eysturoy	F	310	2-20 July	Si, Fo, Hc	Wet and patchy grass heath with plenty of stones; facing N.
10. Lidarurdsfelli	Vágar	F	200	3-23 July	Si, Fo, Hc	Rich grass heath sloping gently N; plenty of mosses.
11. Sörvágur	Vágar	H	5	3-23 July	Si, Fo, Hc	Grass- and wasteland on sand; within village near shore.
12. N Vatnasoyar	Vágar	E	60	3-23 July	Si, Hc	Bog with *Sphagnum*, *Eriophorum*, *Carex*, and some shrubs.
13. Sörvágsvatn	Vágar	B	40	3-23 July	Si, Fo, Hc	Slope with dense *Calluna*; facing SW; near lake.
14. N Sandavágur	Vágar	G	60	3-23 July	Si, Fo, Hc	Rich grassland near small deciduous plantation; stony ground along a small stream.
15. Nes	Eysturoy	G	20	-	Fo, Hc	Grass-herbage along grave-yard.
16. E Nes	Eysturoy	B	115	4-20 July	Si, Fo	Patchy shrub heath; dry; facing SW.
17. Æduvík	Eysturoy	H	5	4-20 July	Si, Fo, Hc	Rich herb and grass meadow in village, near shore; facing SE.
18. Skálafjördur	Eysturoy	G	30	4-20 July	Si, Fo, Hc	Heavily grazed grassland; steep slope facing S.
19. S Oyndarfjördur	Eysturoy	F	140	4-20 July	Si, Fo, Hc	Steep grassland slope; facing SW.
20. S Funningsfjördur	Eysturoy	F	100	4-20 July	Si, Fo	Wet, stony, patchy grass heath slope; facing W.
21. Nólsoy	Nólsoy	F	65	4 Jul-8 Aug	Si, Fo	Grassland facing NW; below low cliffs.
22. Nólsoy	Nólsoy	D	110	4 Jul-8 Aug	Si, Hc	Cliffs, shelves, and very stony slope; facing NW.
23. Nólsoy	Nólsoy	F	80	4 Jul-8 Aug		Very wet (boggy) grassland with ditches.
24. Nólsoy	Nólsoy	F	200	4 Jul-8 Aug	Si, Fo, Hc	Grass heath with plenty of *Nardus*; facing NW.
25. Nólsoy	Nólsoy	F	30	-	Hc	Stony grass heath facing W.
26. Nólsoy	Nólsoy	H	15	4 Jul-8 Aug		Grass meadow with *Rumex*; within the village.
27. Saksun	Streymoy	G	60	5-21 July	Si, Fo, Hc	Rich grass and herbage, near small stream and farm; also on dryer, stony grassland nearby; facing W.
28. Glyvursgjógv	Streymoy	(F(+D)	120	5-21 July	Si, Fo, Hc	Grazed stony grassland and adjacent cliffs with crevices; facing SE and NW.
29. Tjörnuvík	Streymoy	G(+H)	20	5-21 July	Si, Fo, Hc	Very steep grass-herb meadow slope; facing SE; also around church-yard.
30. NE Streymnes	Streymoy	B	60	5-24 July	Si, Fo, Hc	Shrub heath facing S; near road with plenty of stones and boulder.
31. Sandfelli	Streymoy	A	600	5-21 July	Si, Hc	Fell-fields with grasses, *Silene acaulis* and *Rhacomitrium*.
32. Skarvanes	Sandoy	H	10	6-22 July[3]	Si, Fo, Hc	Rich herb meadow along small stream within village; near the shore; facing W.
33. Skálavík	Sandoy	G	40	6-22 July	Si, Fo, Hc	Grass and herb meadows along ditches.
34. Skúvoyarfjall	Sandoy	A	260	6-22 July	Si, Fo, Hc	Wet fell-fields with *Nardus*, mosses and stones; facing N.
35. Húsavík	Sandoy	G	5	6-22 July	Si, Fo, Hc	Rich grass and herbs on sand; along ditches and stonewalls; close to the shore.

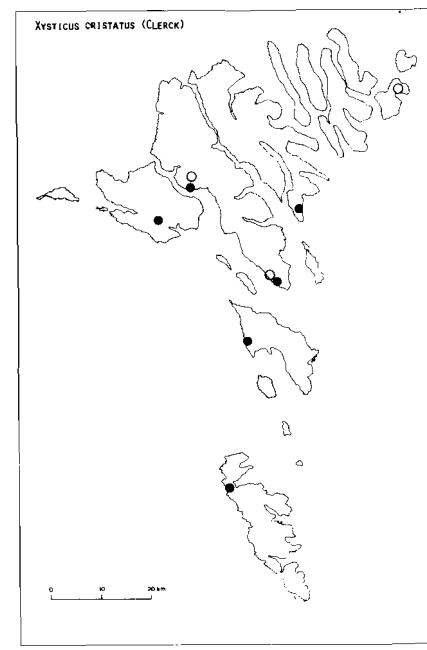
Locality	Island	Habitat	Altitude (m a.s.l.)	Pitfall trapping[1]	Other methods of collecting[2]	Further description
36. Söltuvik	Sandoy	G	25	6-22 July	Si, Fo, Hc	Slooping grass and herb meadow below low cliffs; facing W.
37. Sandur	Sandoy	I	5	6-22 July	Hc	Sand dunes with *Ammophila*, *Elymus* and *Cakile*.
38. Heimara Hálsavatn	Sandoy	E	115	6-22 July	Hc	Wetland along NW shore of lake.
39. W Skopun	Sandoy	F	80	6-22 July	Si, Fo, Hc	Steep, stony grass heath slope; facing NE.
40. Mörkradalur	Streymoy	F	400	-	Hc	Heavily grazed, steep grassfield; sloping E; near road.
41. Kvívík	Streymoy	H	10	8-23 July	Si, Fo, Hc	Rich herbage and wasteland along shore; within village; also in garden between bushes and trees.
42. W Kvívik	Streymoy	G	50	8-23 July	Si, Fo, Hc	Grass and herb meadow slope below low cliffs; facing S; along stream.
43. Oyndarfjördur	Eysturoy	G	5	9-24 July	Si, Fo, Hc	Rich grassland between boat houses along shore.
44. Leirvik	Eysturoy	H	5	5-13 Aug 79[4]	Si, Fo, Hc	Grass- and wastelands with ditches near boat-houses.
45. Dalá	Vidoy	B	40	9-24 July	Si, Fo, Hc	Undulating, patchy shrub heath along stream.
46. Vidareidi	Vidoy	G	70	9-24 July	Si, Fo, Hc	Stony grass meadow along small brook; facing S.
47. N Hvannasund	Vidoy	F	80	9-24 July	Si, Fi	Steep, stony grass heath; facing W.
48. Nordtoftir	Bordoy	G	10	9-24 July	Si, Fo, Hc	Heavily grazed grassfield around sheep-houses; facing NE.
49. Árnafjördur	Bordoy	G	30	9-24 July	Si, Fo	Grass-herb meadow along small stream; facing SE.
50. Nordoyri	Bordoy	G	20	9-24 July	Si, Fo, Hc	Stony grass meadow along brook; facing W.
51. Tórshavn	Streymoy	C	40	7-25 July+ 3-14 Aug 79	Si, Hc	Plantation; *Larix* with rich grass undergrowth; *Sorbus* with bare ground.
52. Fámjin	Suduroy	G	60	10-25 July	Si, Fo, Hc	Rich herb meadow and W facing grass slope near small stream.
53. E Fámjin	Suduroy	F	180	10-25 July	Si, Fo, Hc	Stony grass heath near brook; facing W.
54. Glyvraberg	Suduroy	F	140	-	Hc	Heavily grazed grass heath gently sloping W.
55. Sandvíi	Suduroy	H	10	10-25 July	Si, Fo, Hc	Grass and herbage around graveyard near shore.
56. N Hvalba	Suduroy	D	60	-	Si, Hc	Steep cliffs; shelves with rich herbage; near waterfall facing S.
57. Hvalbiareidi	Suduroy	F	40	11-25 July	Fo, Hc	Stony grass heath along brook; facing W.
58. Nes	Suduroy	G	10	11-25 July	Si, Fo, Hc	Patch of grass-herb on sand near shore.
59. E Frodba	Suduroy	G(+D)	50	11-25 July	Si, Fo, Hc	Rich grass meadow; also on nearby cliffs and shelves; facing S.
60. Hov	Suduroy	H	10	11-25 July	Si, Fo, Hc	Rich herbage around grave-yard, near shore.
61. Porkeri	Suduroy	G	10	11-25 July	Si, Fo, Hc	Flat, rich grass meadow near the shore.
62. Sumba	Suduroy	G	90	11-25 July	Si, Fo, Hc	Rich grass-herb meadow; gentle slope; facing W.
63. NW Sumba	Suduroy	F	350	11-25 July	Si, Fo, Hc	Steep grass heath slope; facing SW.
64. SW Vágur	Suduroy	F	50	11-25 July	Hc	Heavily grazed grassland; below low cliffs; facing N.
65. Akranes	Vágar	B	80	13 Jul-18 Aug	Si, Hc	Patchy shrub heath; facing S.
66. Böur	Vágar	G	30	13 Jul-18 Aug	Si, Hc	Grass and herbs along stonewall, facing SW.
67. Midvágur	Vágar	G	30	13 Jul-18 Aug	Si, Fo, Hc	Rich grass and herb meadows among boat-houses and old sheep-houses; facing N.
68. Sandavágur	Vágar	H	20	13 Jul-18 Aug	Si, Fo, Hc	Grass, herbs and wasteland along stream in village.
69. Vestmanna	Streymoy	G	35	13 Jul 78-Jan 79	Hc	Rich grassland near waterfall; below low cliffs; facing N.
70. N Hattarvík	Fugloy	F	120	-	Fo, Hc	Stony, heavily grazed grass heath near brook; facing S.

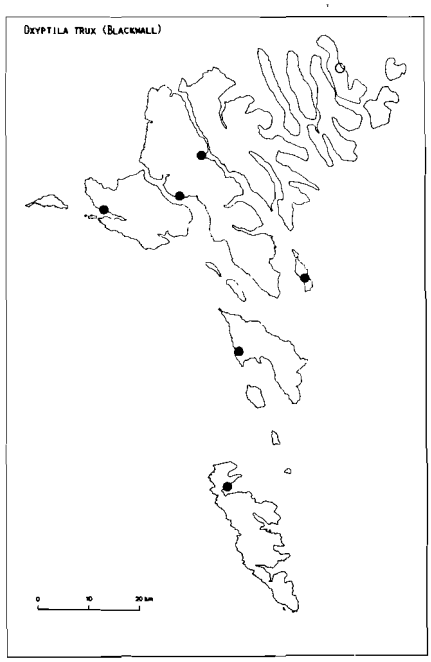
Locality	Island	Habitat	Altitude (m a.s.l.)	Pitfall trapping[2]	Other methods	Further description
71. S Skardsvík	Fugloy	D	300	-	Si, Hc	Steep cliffs and shelves; facing SW.
72. SW Hattarvík	Fugloy	F	170	-	Hc	Grass heath with dense moss; gently sloping S.
73. Hattarvík	Fugloy	H	15	14 Jul-11 Aug	Si, Hc	Grass, herbage, wasteland in village along shore; facing S.
74. Hattarvík	Fugloy	G	50	-	Si, Hc	Rich grassland along small stream.
75. N Svínoy	Svínoy	G	50	-	Si, Hc	Stony grassland along brook.
76. Keldufjall	Svínoy	B	150	-	Si, Hc	Tall *Calluna* heath on S slope of mountain.
77. Keldufjall	Svínoy	A	460	-	Si, Hc	Fell-fields with patches of grass and moss on summit.
78. Keldufjall	Svínoy	A	390	-	Si, Hc	Fell-fields with much *Nardus* on SW slope of mountain.
79. Svínoyareidi	Svínoy	A	15	-	Si, Hc	Grass meadow around boathouses and farm ruins.
80. E Svínoy	Svínoy	G	30	-	Si, Hc	Grass meadow along ditches.
81. Svínoy	Svínoy	H	10	14 Jul-11 Aug	Si, Hc	Grass and herbage within village; near shore; facing E.
82. Mikladalur	Kalsoy	G	40	14 Jul-12 Aug	Si, Hc	Grass-herb meadow; facing E.
83. Mikladalur	Kalsoy	G	50	-	Si, Hc	Grass meadow sloping E.
84. W Mikladalur	Kalsoy	F	120	-	Si, Hc	Grass heath gently sloping E.
85. Mikladalur	Kalsoy	C	110	-	Si, Hc	Small coniferous plantation.
86. W Mikladalur	Kalsoy	F	120	-	Si, Hc	Grass heath sloping E.
87. Kunoy	Kunoy	H	20	15 Jul-10 Aug	Si, Hc	Rich grass-herb meadow around church; sloping W.
88. E Kunoy	Kunoy	B	90	-	Si, Hc	Tall *Calluna* heath facing W.
89. E Kunoy	Kunoy	C	80	-	Si, Hc	Coniferous plantation.
90. Sydrugöta	Eysturoy	G	30	15 Jul-6 Aug	Si, Fo, Hc	Rich grass meadow along ditch; near shore; facing E.
91. Husar	Kalsoy	H	30	15 Jul-12 Aug	Si, Hc	Grass meadow sloping E.
92. S Husar	Kalsoy	F	40	-	Si, Hc	Grass heath sloping E.
93. Sydradalur	Kalsoy	H	40	15 Jul-12 Aug	Si, Fo,	Grass meadow sloping gently E.
94. Koltur	Koltur	H	20	17 Jul 78-15 Jan 79	Si, Fo, Hc	Rich grass and herbage around farm buildings; facing E.
95. NW Koltur	Koltur	F(+D)	100	-	Si, Hc	Steep grass heath sloping ES; also on cliffs and shelves.
96. SE Koltur	Koltur	G	20	-	Si, Hc	Rich herb meadow; facing S.
97. Hælur	Hestur	G	90	-	Si, Hc	Rich meadow, with some barley, around abandoned farm.
98. Hestur	Hestur	H	20	17 Jul-20 Aug	Si, Hc	Mixed grass and herbs around buildings within village.
99. Skúvoy	Skúvoy	H	40	-	Si, Hc[5]	Grass and herbs within village.
100. W Skúvoy	Skúvoy	F	130	-	Hc[5]	Grass heath; sloping E.
101. Mykines	Mykines	H	60	2-12 Aug	Si, Fo, Hc	Rich meadows within village; facing SW.
102. E Mykines	Mykines	F	140	3-12 Aug	Si, Fo, Hc	Grass heath; facing W.
103. Mykineshólmar	Mykines	F	90		Hc	Grass heath; facing S.
104. Vidareidi	Vidoy	H	20	5-12 Aug 79	Si, Fo, Hc	Rich grass meadows around churchyard; near shore and stream; facing NW.
105. S Hvannasund	Vidoy	F(+D)	40(+150)	5-12 Aug 79	Si, Fo, Hc	Grass heath facing S; also on cliffs and shelves above.
106. N Árnafjørdur	Bordoy	B(+D)	80(+110)	5-12 Aug 79	Si, Fo, Hc	Patchy shrub heath on slope facing SE; also on cliffs and shelves above.
107. Klaksvík	Bordoy	H	15	5-13 Aug 79	Si, Fo, Hc	Wet grass meadow along brook within town; facing E.
108. W Klaksvík	Bordoy	F	140	5-13 Aug 79	Si, Fo, Hc	Grass heath with pathces of *Calluna* along stream; facing E.
109. Vesturdalsá	Eysturoy	E(+F)	60(+90)	5-13 Aug 79	Hc	Bog with *Sphagnum* and *Carex*; also grass heath along road.
110. Hvalvík	Streymoy	C	15	8-13 Aug 79[6]	Si, Fo, Hc	Plantation; among *Larix* and *Betula*; rich undergrowth of grass.
111. Stóra Dímun	Stóra Dímun	G	100	11 Aug-7 Oct 79	Si, Fo, Hc	Rich grassland; along ditches and around house ruins.

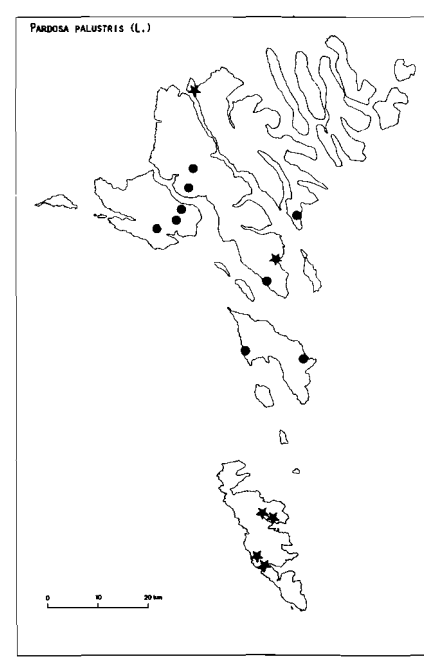
APPENDIX II

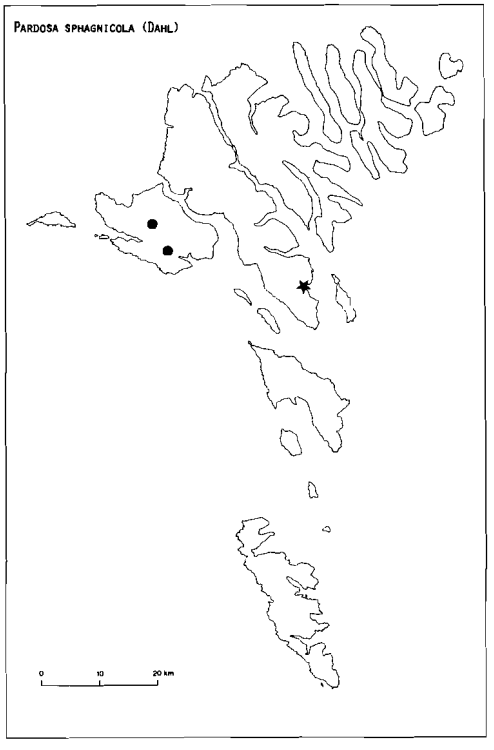
Maps showing the distribution of 49 species of spiders (Araneae) recorded in 1978—1979 in the Faroes. Black circles denote records of adult individuals and open circles refer to juvenile individuals identified to genus only but in all probability belonging to the species in question. Previous records from Brændegaard (1928) are shown (black stars for exact locality, and asterisks when only the name of the island is known) when they deviate considerably from, or markedly supplement, our data. Previous records of species which were considered common by Brændegaard and also found to be common in 1978—1979 have not been entered on the maps. For the exact data on localities it is referred is to Appendix I, and text. The distribution maps are presented in the same order as the species are listed in the synopsis in the text.

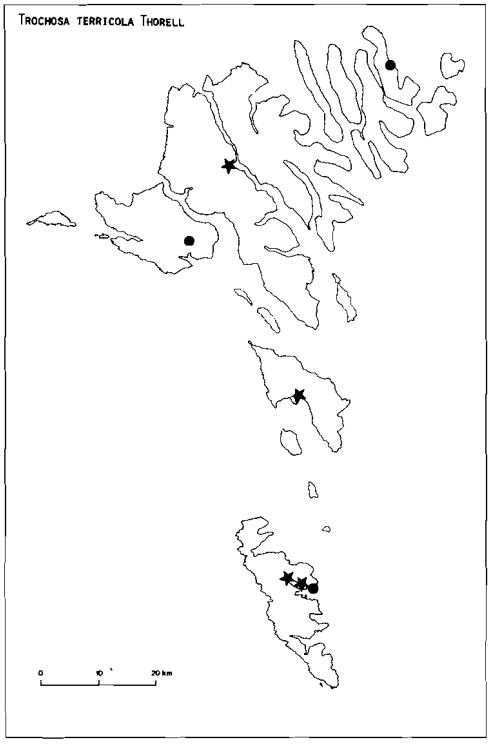


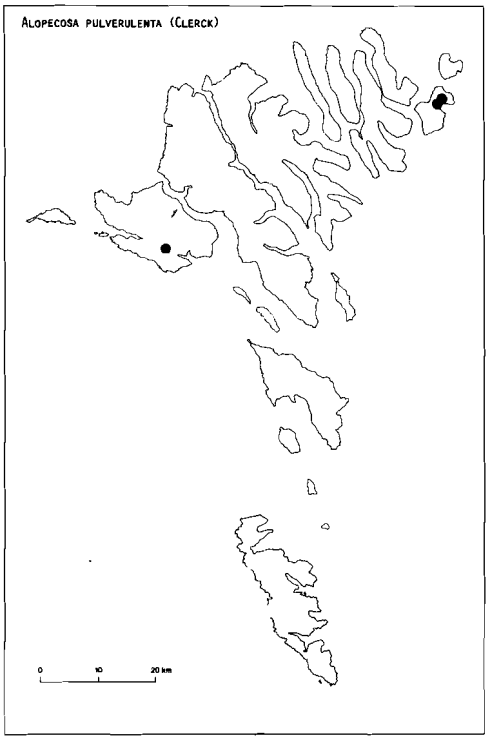







PARDOSA SPHAGNICOLA (DAHL)
0
10
20 km


TROCHOSA TERRICOLA THORELL
0
10
20 km


ALOPECOSA PULVERULENTA (CLERCK)
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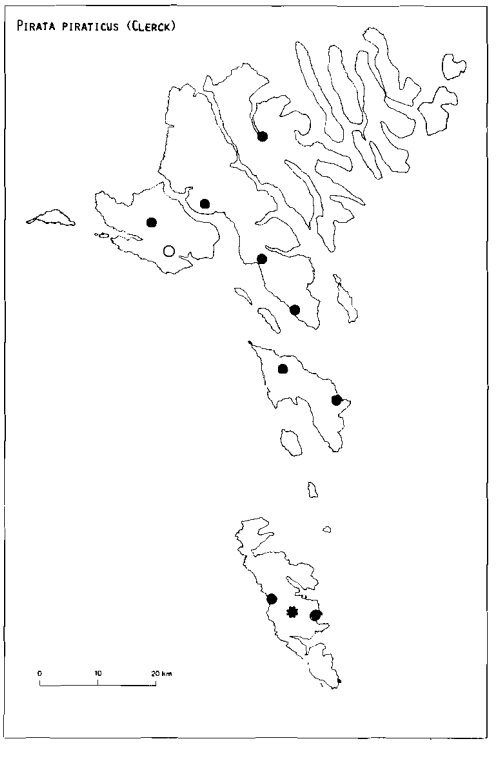
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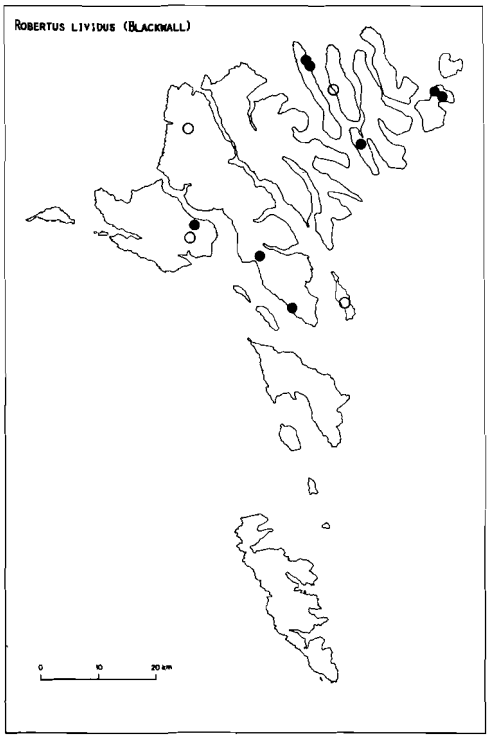
ROBERTUS LIVIDUS (BLACKWALL)
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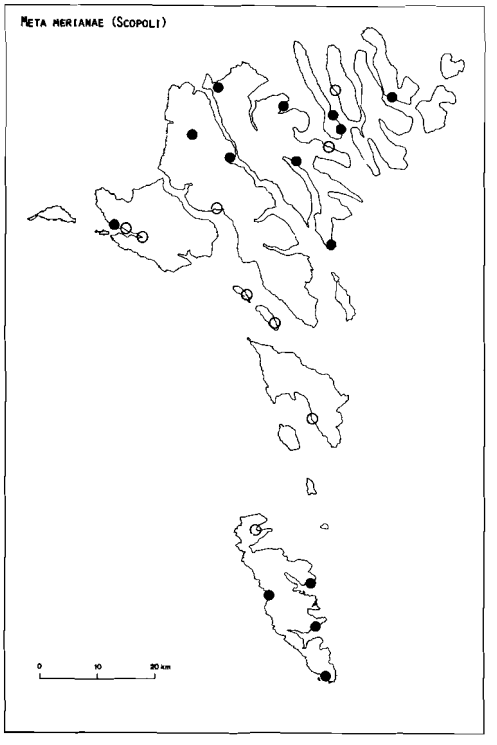
10
20 km


META MERIANAE (SCOPOLI)
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10
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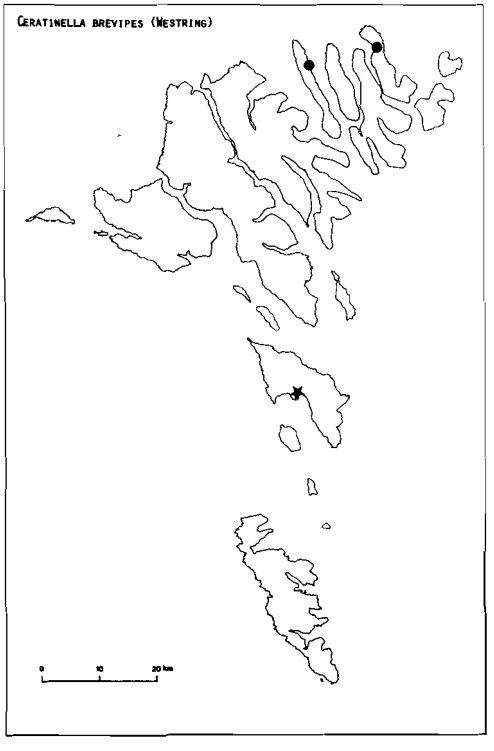
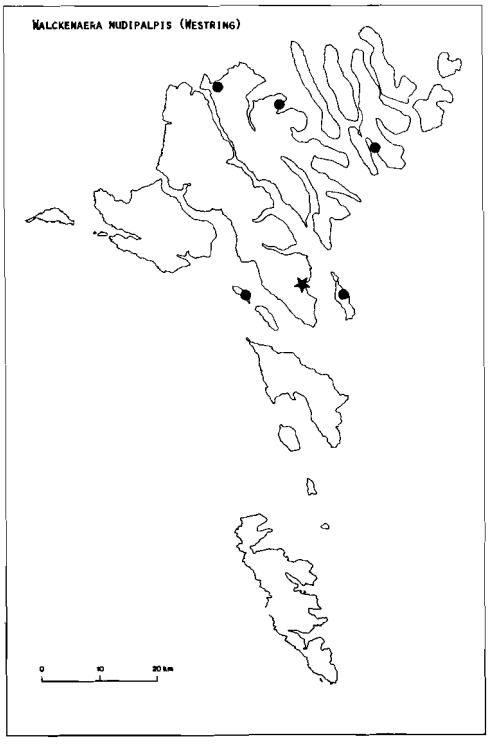

CERATINELLA BREVIPES (WESTRING)
0
10
20 km


WALCKENAERA NUDIPALPIS (WESTRING)
0
10
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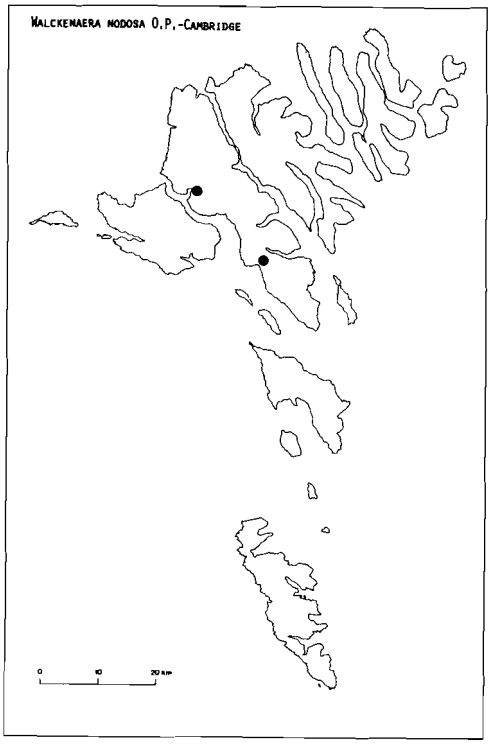
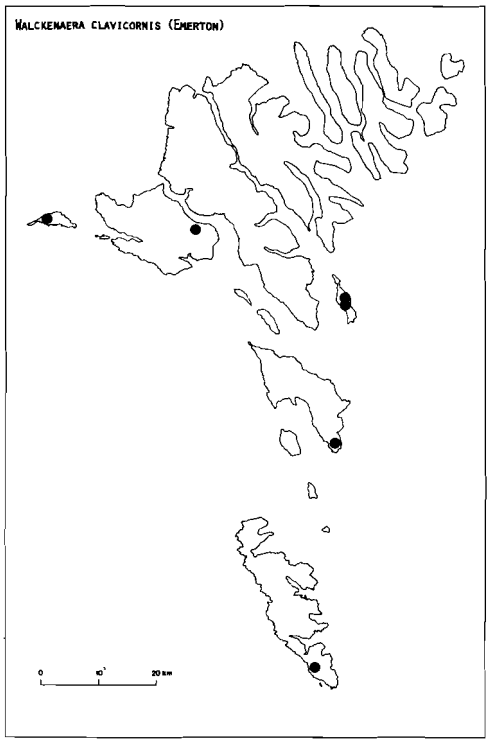
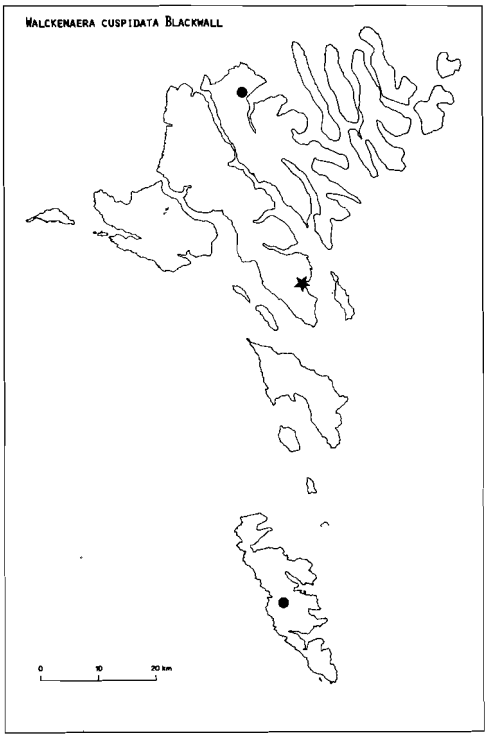
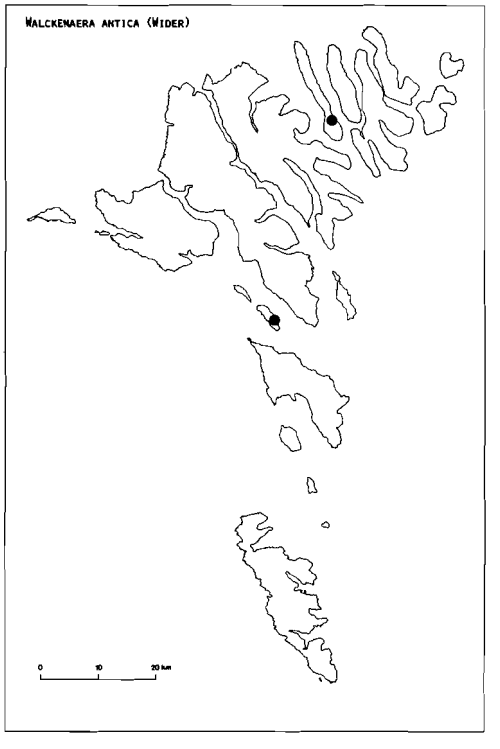

WALCKENAERA NODOSA O.P.-CAMBRIDGE
0
10
20 km


WALCKENAERA CLAVICORNIS (EMERTON)
0
10
20 km


WALCKENAERA CUSPIDATA BLACKWALL
0
10
20 km


WALCKENAERA ANTICA (WIDER)
0
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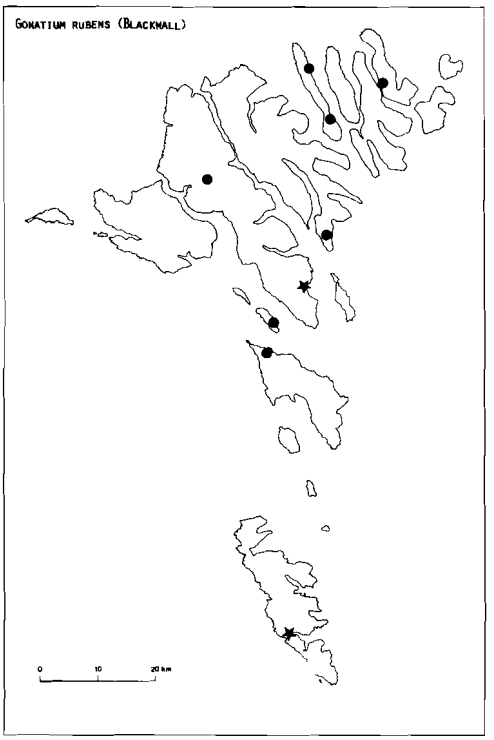
GONATIUM RUBENS (BLACKWALL)
0
10
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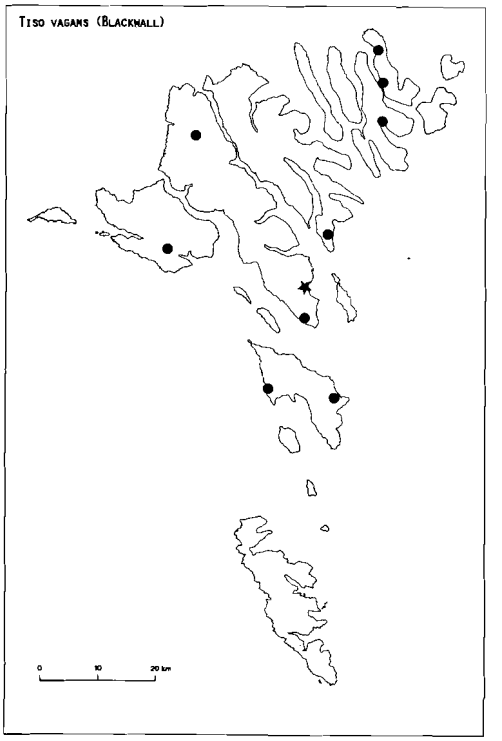
TISO VAGANS (BLACKWALL)
0
10
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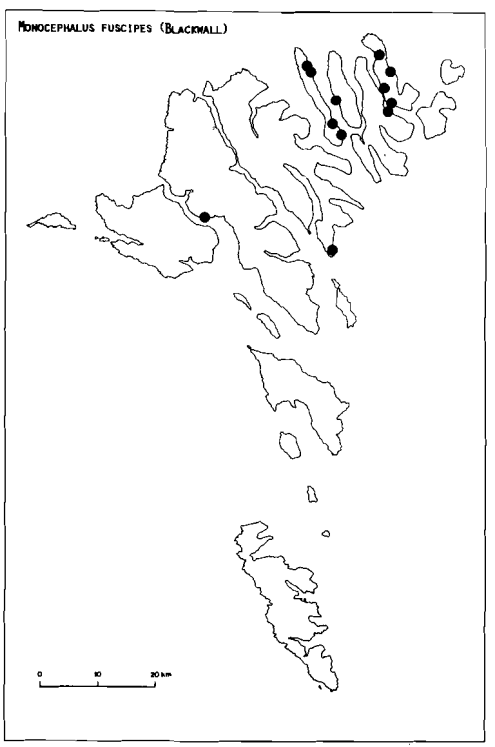
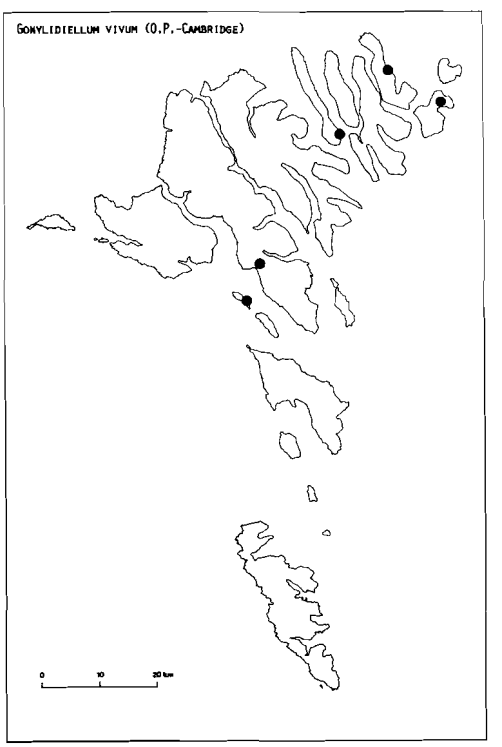
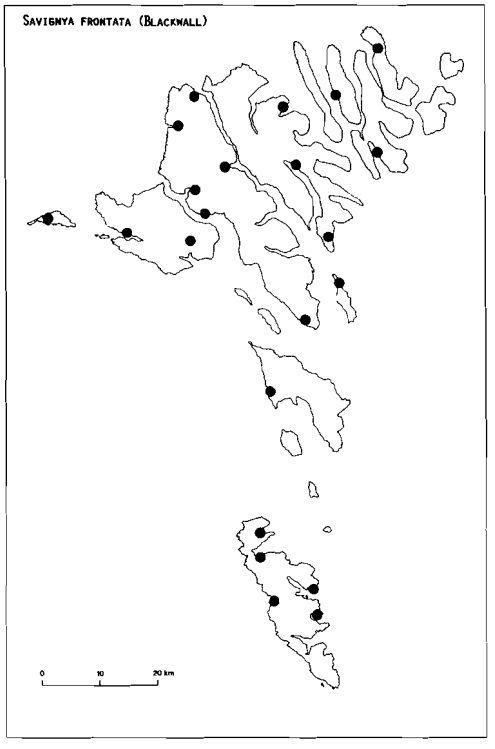
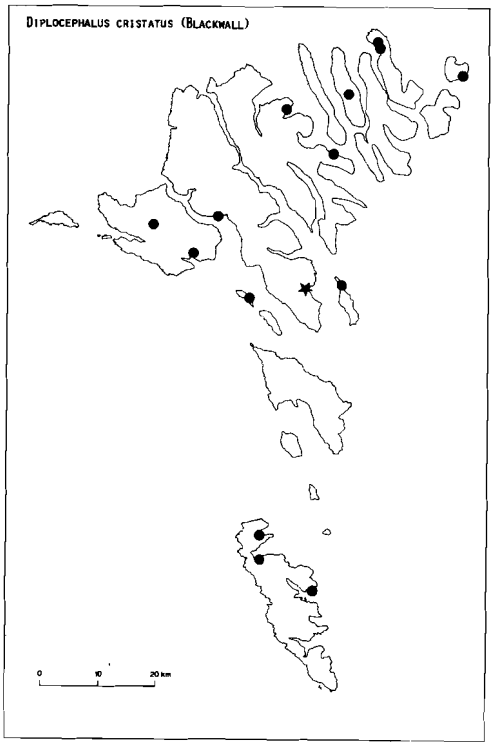
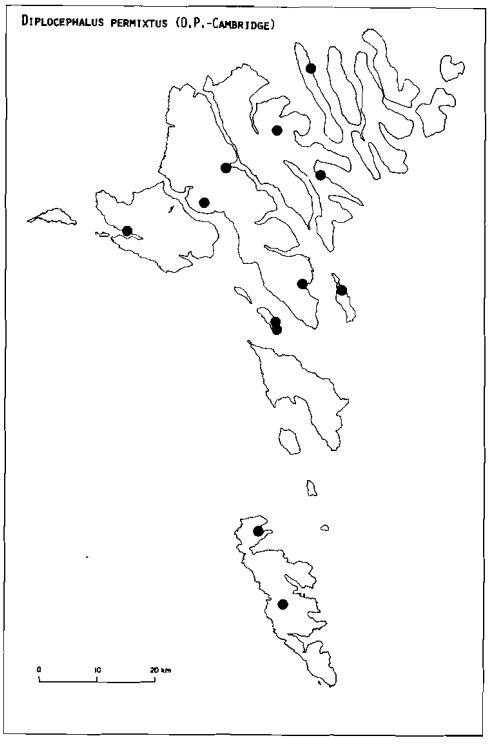
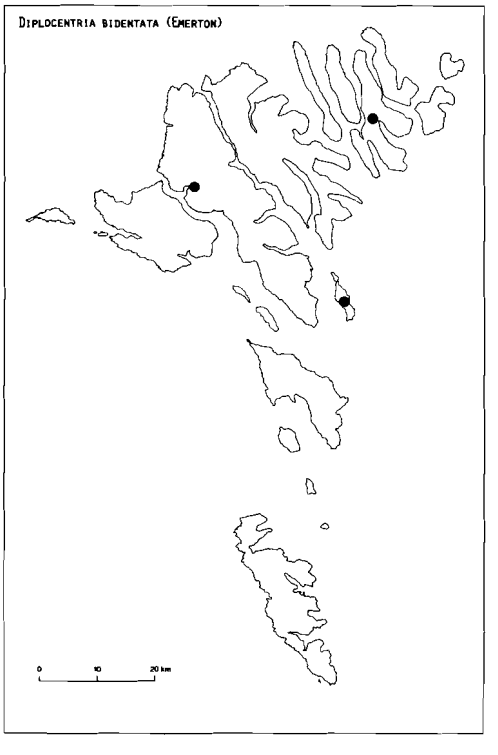

MONOCEPHALUS FUSCIPES (BLACKWALL)
0
10
20 km

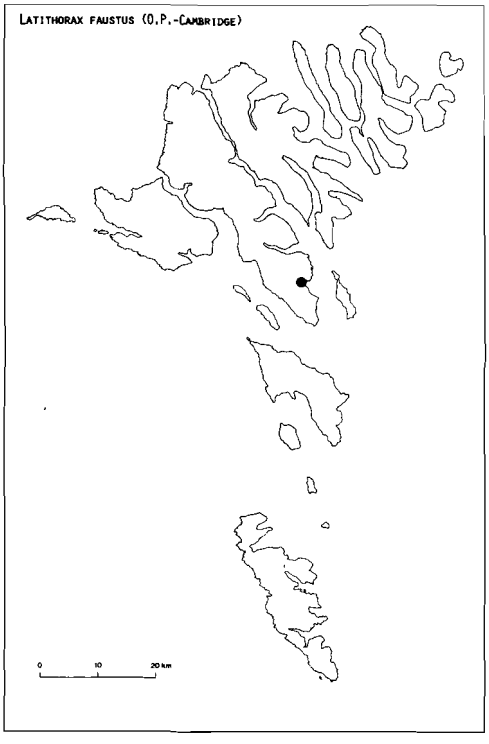

GONYLIDIELLUM VIVUM (O.P.-CAMBRIDGE)
0
10
20 km

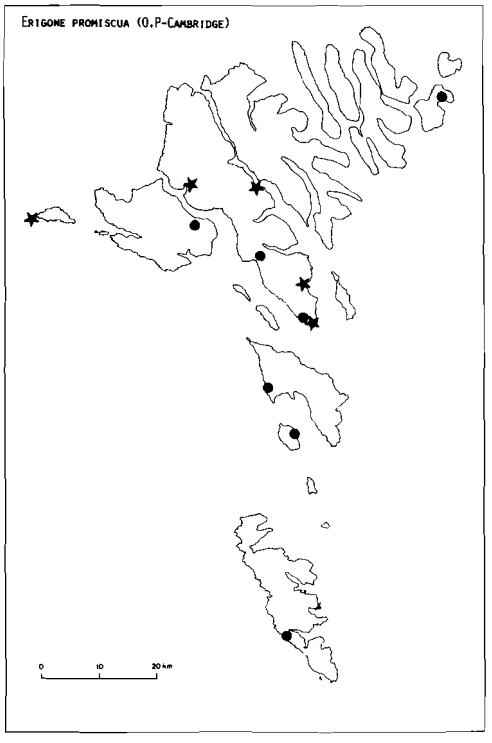

SAVIGNYA FRONTATA (BLACKWALL)
0
10
20 km

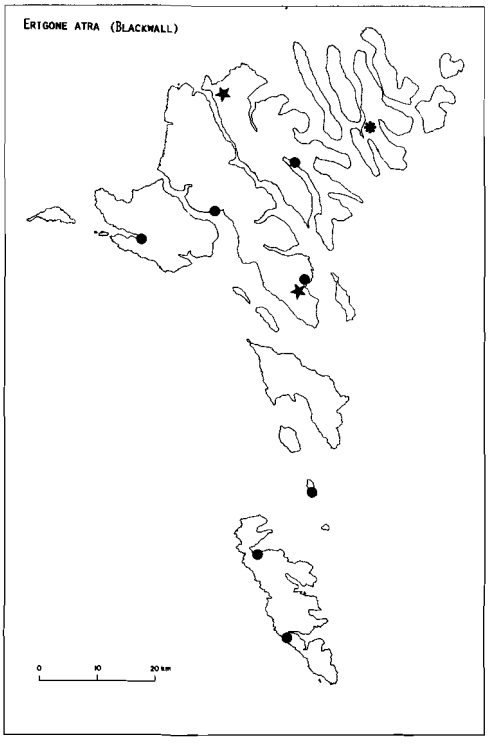

DIPLOCEPHALUS CRISTATUS (BLACKWALL)
0
10
20 km

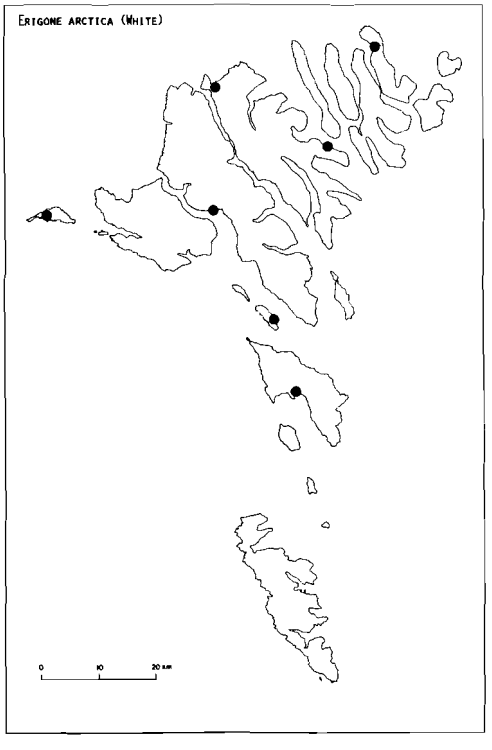

DIPLOCEPHALUS PERMIXTUS (O.P.-CAMBRIDGE)
0
10
20 km

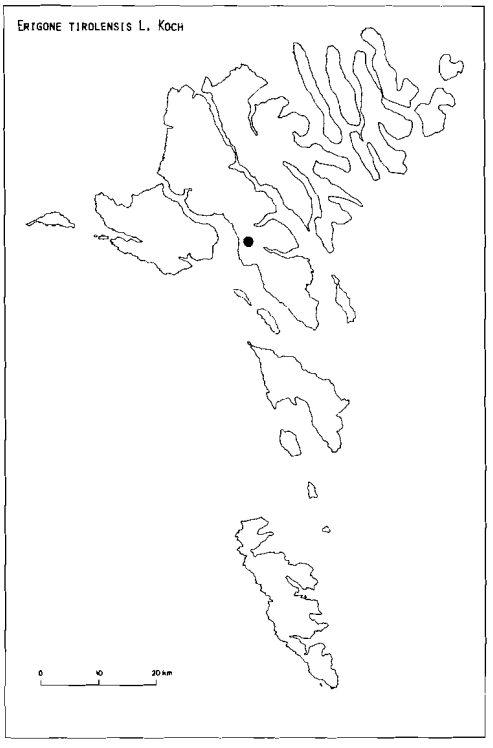

DIPLOCENTRIA BIDENTATA (EMERTON)
0
10
20 km

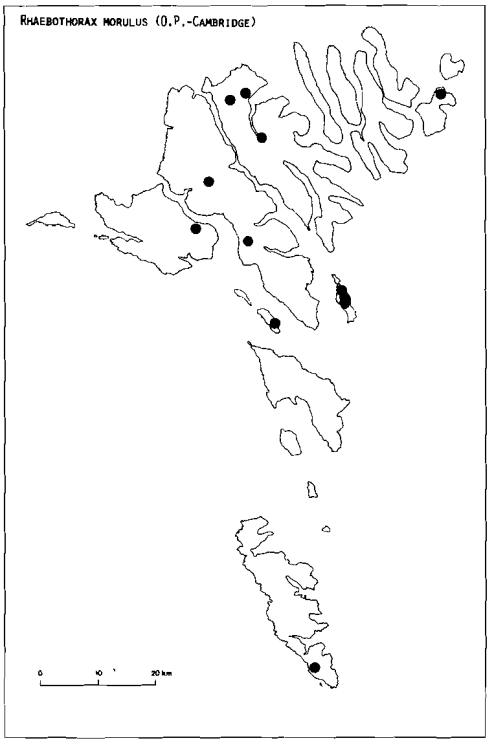

LATITHORAX FAUSTUS (O,P,-CAMBRIDGE)
0
10
20 km


ERIGONE PROMISCUA (O,P-CAMBRIDGE)
0
10
20 km

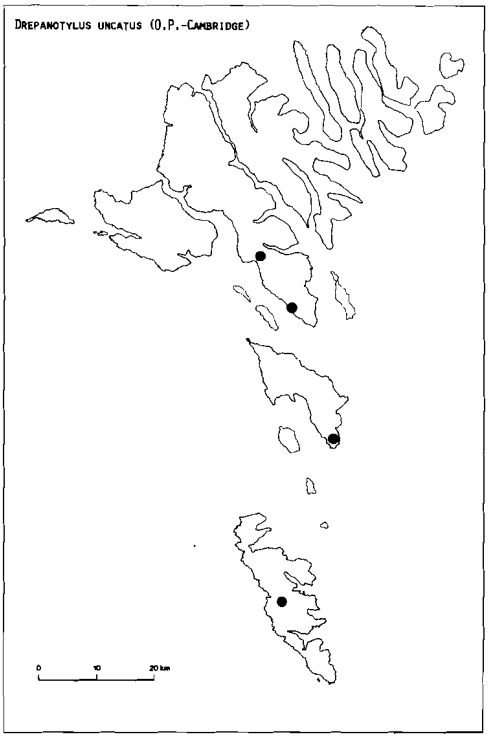

ERIGONE ATRA (BLACKWALL)
0
10
20 km

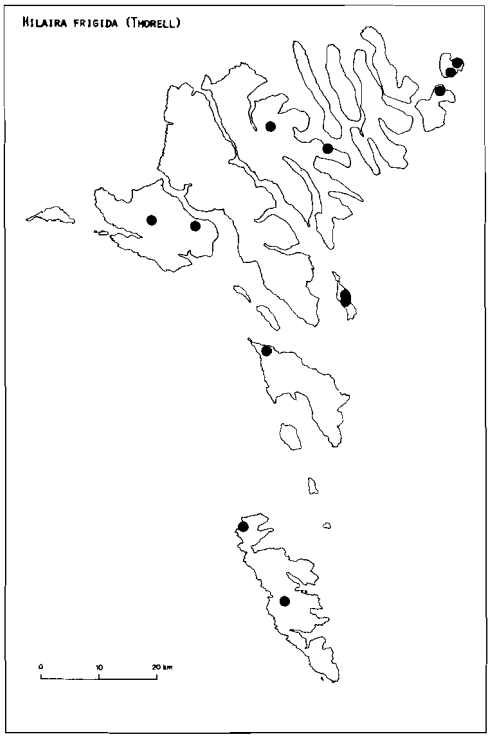

ERIGONE ARCTICA (WHITE)
0
10
20 km

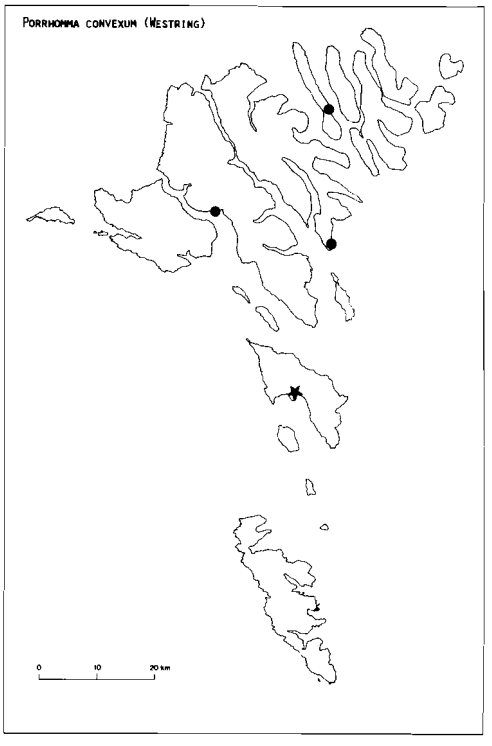

Erigone tirolensis L. Koch
0
10
20 km

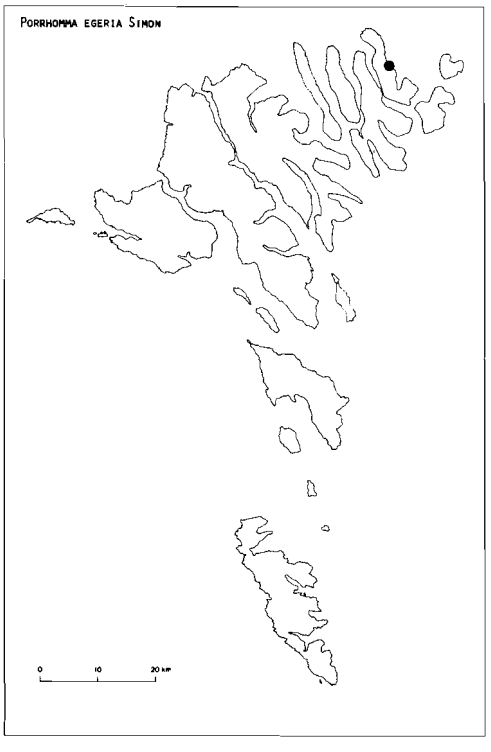

Rhaebothorax morulus (O.P.-Cambridge)
0
10
20 km

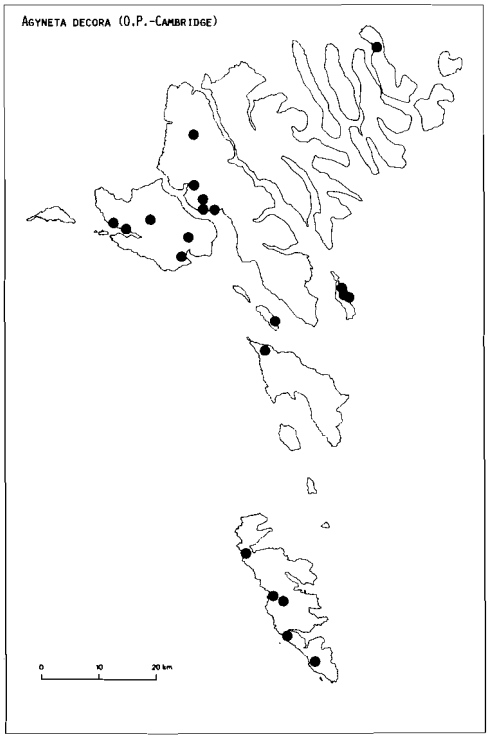

Leptorhoptrum robustum (Westring)
0
10
20 km

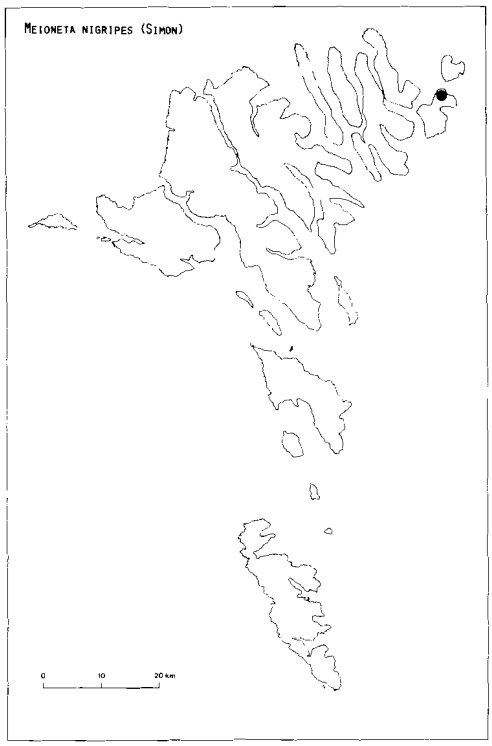

Drepanotylus uncatus (O.P.-Cambridge)
0
10
20 km

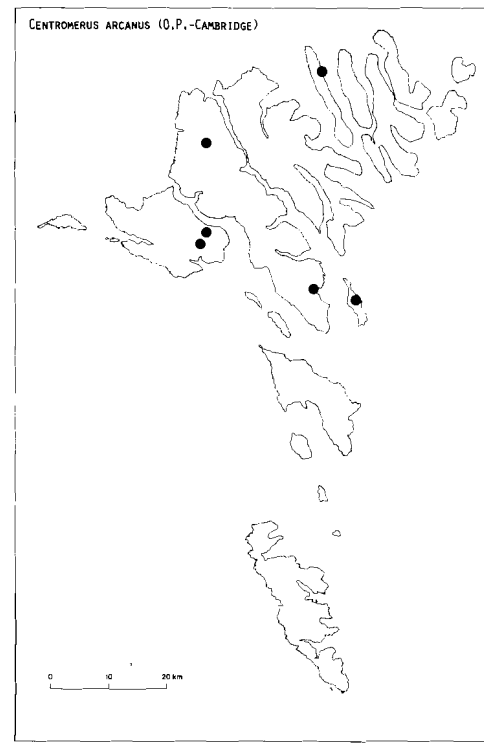

Hilaira frigida (Thorell)
0
10
20 km

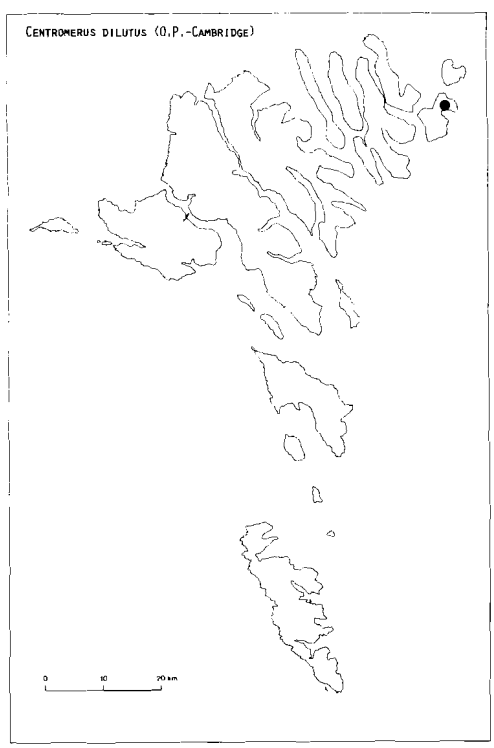

Porrhomma convexum (Westring)
0
10
20 km

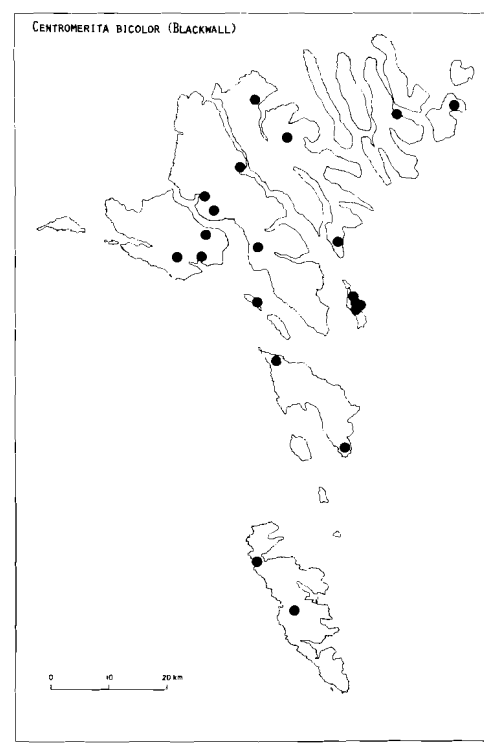

Porrhomma egeria Simon
0
10
20 km

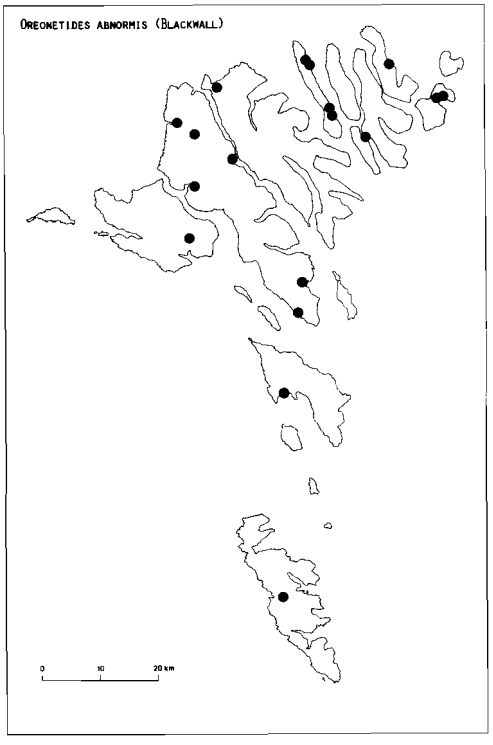

Agyneta decora (O.P.-Cambridge)
0
10
20 km

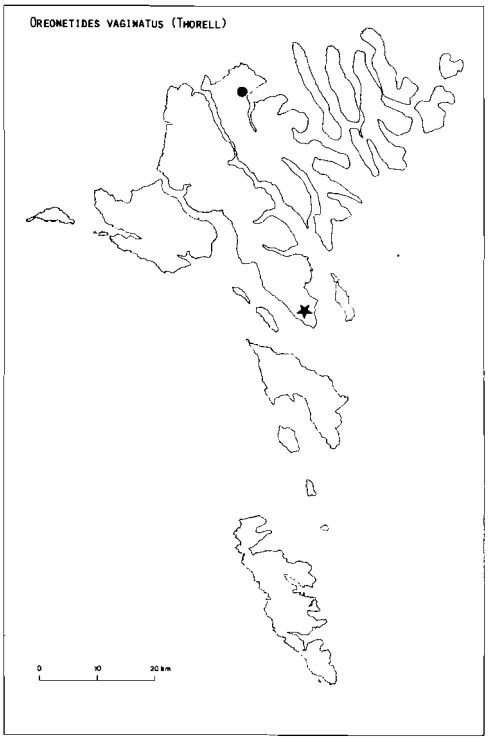

Meioneta nigripes (Simon)
0
10
20 km

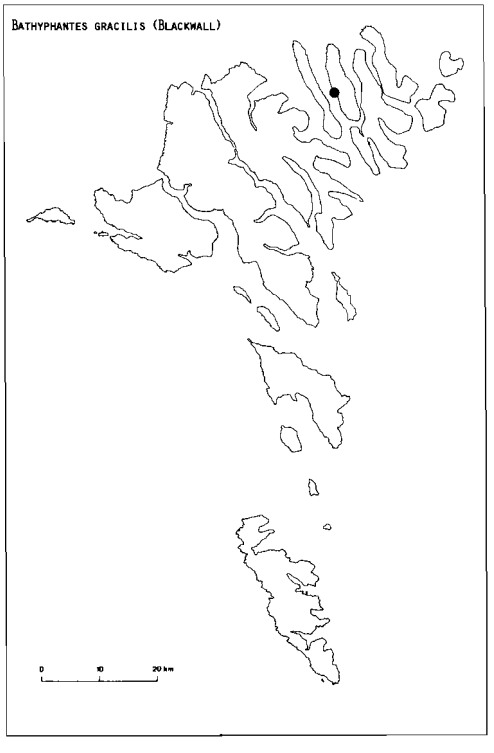

Centromerus arcanus (O.P.-Cambridge)
0
10
20 km

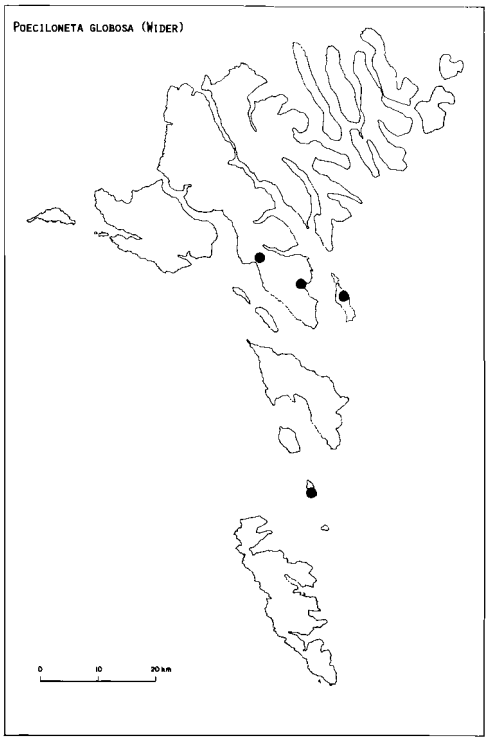

Centromerus dilutus (O.P.-Cambridge)
0
10
20 km

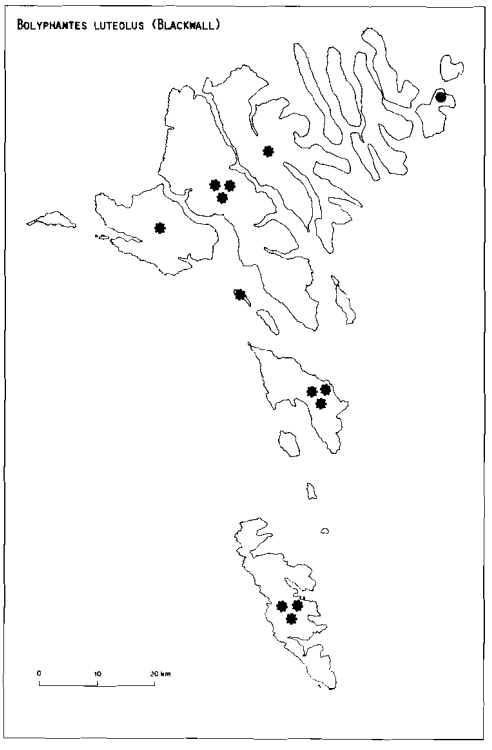

Centromerita bicolor (Blackwall)
0
10
20 km

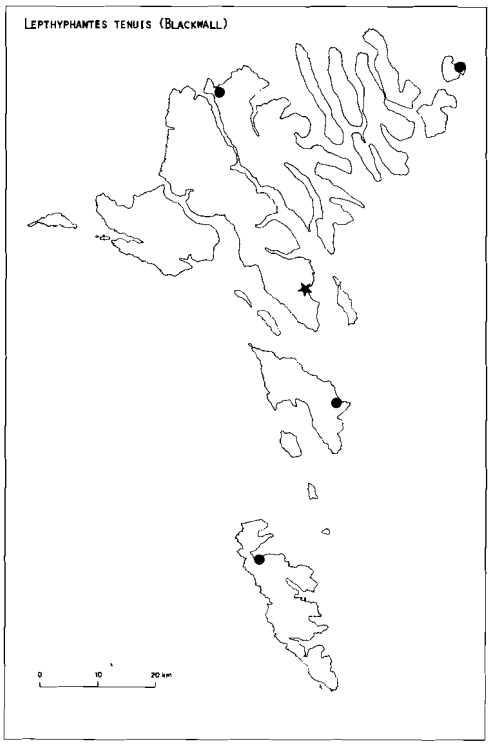

OREONETIDES ABNORMIS (BLACKWALL)
0
10
20 km


OREONETIDES VAGINATUS (THORELL)
0
10
20 km

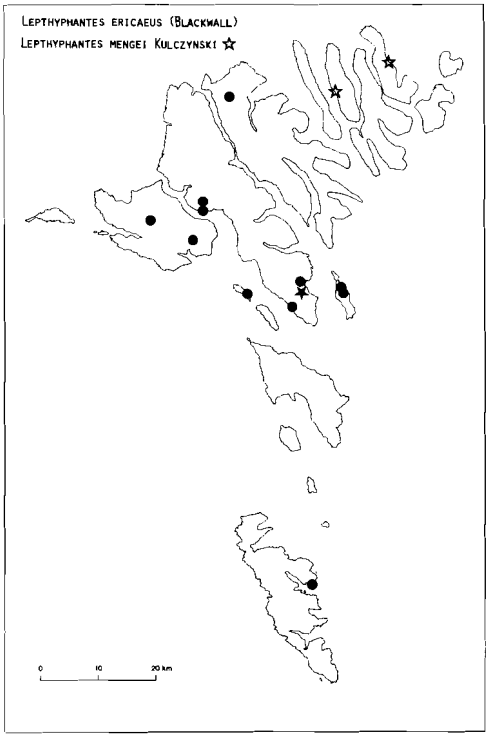

BATHYPHANTES GRACILIS (BLACKWALL)
0
10
20 km


POECILONETA GLOBOSA (WIDER)
0
10
20 km


Bolyphantes luteolus (Blackwall)
0
10
20 km


Lepthyphantes tenuis (Blackwall)
0
10
20 km


Lepthyphantes zimmermanni Bertkau
0
10
20 km


Lepthyphantes ericaeus (Blackwall)
Lepthyphantes mengei Kulczynski ☆
0
10
20 km

The spider fauna of 5 alpine and subalpine habitats in the Jotunheimen area, Southern Norway.

ERLING HAUGE AND DAGFINN REFSETH

Hauge, E & Refseth, D. 1979. The spider fauna of 5 alpine and subalpine habitats in the Jotunheimen area, Southern Norway. *Fauna norv. Ser. B 26,* 84-90.

Collections by means of pitfall traps were done in the years 1970—1973 in five different alpine and subalpine habitats in the Jotunheimen area, a central high alpine area in Southern Norway. Description of the plant communities of the five habitats are given. A total of 6702 spiders were caught, and among the adults 82 species identified. Six families are represented: Linyphiidae (54 species), Lycosidae (10 species), Gnaphosidae (10 species), Thomisidae (7 species) and Hahniidae (1 species). A brief discussion is given on the composition of the spider faunas in the five habitats, and a complete list of the species with notes on their seasonal activity periodes is presented. Three species, *Hypselistes jacksoni* (O.P.-Cambridge), *Macrargus boreus* Holm and *Gnaphosa orites* Chamberlin are reported for the first time in Norway.

E.Hauge, Museum of Zoology, Muséplass 3, N-5014 Bergen/Univ., Norway: D. Refseth, Zoologisk Institutt, Unit — NLHT, Rosenberg, N-7000 Trondheim, Norway.

INTRODUCTION

Apart from a relatively abundant material from the vicinity of Finse (Hauge et al. 1978), the knowledge of the spider fauna of the high mountain areas in central Southern Norway is scanty and is merely based on casual observations reported in a few, scattered papers. In order to procure information about the terrestrial invertebrate fauna in different alpine and subalpine habitats, an investigation was carried out during the years 1970—1973 in Sjodalen, Vågå (Oppland county), in management of the Norwegian IBP Section CT/Jotunheimen.

The present paper presents the spider material collected during these four years, and includes a complete species list with notes on habitat preference and seasonal activity patterns.

DESCRIPTIONS OF THE HABITATS

Sjodalen in Vågå community (Oppland) extends from Gjende (south) to Randsverk (north). The investigation took place in the upper part of the valley in the vicinity of Øvre and Nedre Sjodalsvatn (Fig. 1).

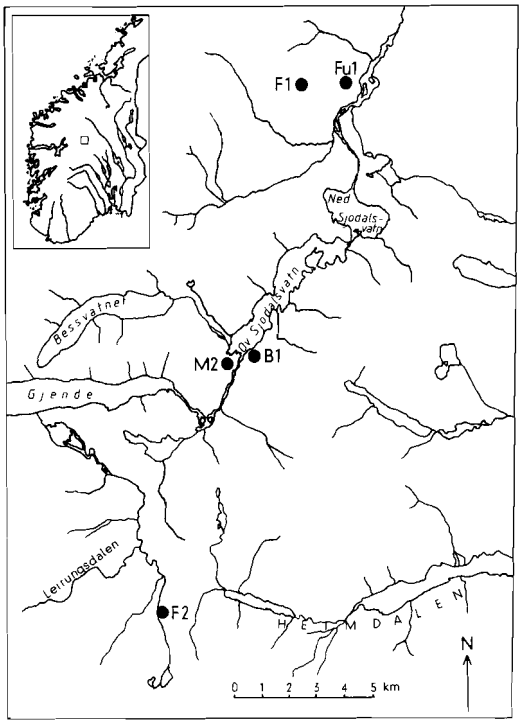
The area is situated on the eastern side of the Jotunheimen Mts. The climate is continental, with an oceanity index (Kotilainen 1933) of approximately 30 (Lindroth 1949). Mean yearly precipitation is about 600 mm, mean temperature in July normally about 12°C and in January about —10°C (according to informations from Norsk Meteorologisk Institutt).

The vegetation is varied and includes pine forest, subalpine birch forest and low-alpine dwarf-shrub heaths.

The collection was carried out in 5 selected sites which were thought to be representatives for the most important types of vegetation in the area. Descriptions of the sites are as follows:

Fu 1: A relatively dry pine forest situated in a south exposed slope, 920 m a.s.l. (UTM reference: 32VMP9629). The forest is rich in heather *(Barbilophozio-Pinetorum),* but contains some lichen dominated areas *(Cladonio-Pinetum).* The field layer consist mainly of *Empetrum hermaphroditum, Calluna vulgaris, Vaccinium myrtillus* and *V. vitis idae.* The ground layer is dominated by mosses, especially *Hylocomium splendens, Pleurozium schreberi,* and lichens *(Cladonia spp.).* The shrub layer is sparse, but there are some *Betula nana* and *Juniperus communis.*

B 1: A relatively humid part of a mountain birch forest situated on the eastern side of Øvre Sjodalsvann, 980 ma.s.l. (UTM 32VMP9219). The vegetation is mainly lichen-rich craw-berry-birch forest (*Betuletum-empetro-cladinosum* + *Betuletum-empetro-hylocomiosum)* with some high perennials, especially *Geranium silvaticum.* The shrub layer is well represented by *J. communis* and *Salix spp.,* the field layer is dominated by *E. hermaphroditum.* The ground layer mostly contains mosses and lichens, *Dicranum spp., H. splendens* and *Cladonia spp.*



Figur 1. The locality of the sampling areas in central, southern Norway.

M 2: This plot was chosen within one of the largest continuous lichen heaths in the area, south of Øvre Sjodalsvann, 955 m a.s.l. (UTM 32VMP9119). The habitat is very dry and botanically poor. The vegetation consists mainly of lichens *(Cladonia spp).* and some *Betula nana,* and is classified as a craw-berry-lichen heath *(Arctostaphylo-Cetrarion nivalis).*

F : An eutrophic low-alpine dwarf-shrub heath, situated 1120 m a.s.i. (UTM: 32VMP 9529). It consists mostly of chionophobous rich heath *(Kobresieto-Dryadion)* in a mosaic with rich alpine fen *(Caricion atrofuscae-saxatilis),* intermingeled with fragments of meadow snow-beds. In 1972 the collection was done in a dry, exposed area consisting of chionophobous crawberry-lichen heath, in 1973 the traps were moved to a more humid area with a mosaic of bilberry heath *(Phyllodoco-Vaccinium myrtilli),* and poor, chionophilous dwarf-shrub heath *(Loiseleuriet-Arctostaphylion + Juncion trifidi norwegicum)* and the above mentioned chionophobous rich heath and meadow snow-beds. Dominant plant species are *E. hermaphroditum, Arctostaphylos alpina, B.nana* and *J. communis.*

F 2: Also situated in the low-alpine region, but approximately 25 km further south, in the northern slope of Valdresflya, 1260 m a.s.l. (UTM: 32VMP 8909). This area is botanically poor, characterized as an oligotrophic low-alpine dwarf-shrub heath. Dominant types of vegetation are chionophilous bilberry heath *(Phyllodoco + Junction trifidi scandinavicum)* and poor, chionophilous dwarf-shrub heath. In more humid parts of the habitat some *B.nana, Salix lapponum* and *S. lanata* occur. The area contains great quantities of stones.

METHODS

Pitfall traps were used (in 1970 and 1971 consisting of jam yars (1/2 l.), but in 1972 and 1973 replaced by plastic cups, 9.5 cm deep with an upper diameter of 6.5 cm). As a shelter against rain each trap was provided with a roof made of huntonite plates. As preservative was used 4% formaldehyde. During the first two years the numbers of traps were 100 and 50, respectively, but in 1972 and 1973 the numbers were reduced to 20. The traps were arranged in two rows, the traps being 2—4 m apart. The greater part of the material was collected in 1972 and 1973, when collection was carried out throughout the whole summer. The traps were emptied several times during the sampling periods, in 1973 mostly every week, otherwise at irregular intervals.

Pitfall traps are known to be selective, for the benefit of the active epigeic invertebrate fauna, and as such only to some extent useful as a quantitative tool, and our results are discussed with this in mind.

RESULTS AND DISCUSSION

A total of 6702 specimens were trapped during the four years. Only adult specimens are identified to species, of which there are 82: Linyphiidae 54 species (65.9%), Lycosidae 10 species (12.2%), Gnaphosidae 10 species (12.2%), Thomisidae 7 species (8.5%), and Hahniidae 1 species (1.2%). Of Theridiidae only a few juveniles were caught.

Only six of the 82 species have been found in all five habitats: *Latithorax faustus* (O.P.-Cambridge), *Caledonia evansi* O.P.-Cambridge, *Oreonetides vaginatus* (Thorell), *Bolyphantes luteolus* (Blackwall), *Lepthyphantes angulatus* (O.P.-Cambridge), and *Oxyptila rauda* Simon.

The distribution on families and habitats is shown in Table 1. In all habitats except F2 there

Table 1. The spider families represented (%) in the total catches during four years of pitfall sampling in five areas in the Jotunheimen Mts.

	Family \ Locality	M2	B1	F1	F2	Fu 1
Adults	Linyphiidae	4.8	34.7	22.3	51.1	34.3
	Lycosidae	83.7	55.0	67.4	48.1	57.6
	Gnaphosidae	10.4	6.7	7.6	—	8.0
	Thomisidae	1.0	0.6	1.0	1.8	0.4
	Hahniidae	0.1	3.0	1.7	—	2.1
	N	722	1207	1314	597	959
Juveniles	Linyphiidae	3.7	29.2	10.9	49.6	30.2
	Lycosidae	78.0	51.4	79.7	48.0	55.9
	Gnaphosidae	16.0	17.5	9.2	0.4	11.6
	Thomisidae	2.3	1.3	0.2	2.0	2.4
	Hahniidae	—	0.3	—	—	—
	Theridiidae	—	0.3	—	—	—
	N	437	315	617	246	288

is a relatively great dominance of Lycosidae, mainly due to the effect of the trapping method. For the same reason the catches of Gnaphosidae are quite large. On the other hand, the share of Linyphiidae in the catches is lower than might be expected from their known dominance among spiders at or close to the ground in our part of the world.

Noticeable few Linyphiidae are caught at M2 (both adults and juveniles), which may reflect the dry conditions in the lichen heath, since Linyphiidae generally are sensible to low humidities. The two open alpine localities (F1 and F2) are more humid and have a considerably higher percentage of Linyphiidae, our figures being quite well in accordance with for instance those of Koponen (1975), although being slightly larger. However, compared with the percentages of Linyphiidae in catches from Finse (Hauge et al. 1978), our figures are quite low.

Sørensen's index of similarity (Sørensen 1948) is an index based only on «presence» or «absence» of species and does not take into account the quantitative relations between the species in an area. The use of that index on pitfall trap material should therefore to some extent be justified.

The similarity indices between habitats are shown in Table 2. Here the five localities are arranged downwards and to the right after their increasing position above sea level, a ranking also corresponding to the decreasing structural complexity of the vegetation. Thus, in the upper row and left column there is a tendency to decreasing values, which should imply that the altitude, as might be expected, has an important influence on the composition of the spider fauna in the various areas. Easily perceptible at least is the difference between the lowest situated area (Fu 1) and the low-alpine heath F2 (S = 28). This difference may have been caused by several factors: a) the altitude (as mentioned above) resulting in a lower species diversity at F2 because of more extreme conditions, b) the very different habitat types involved (forest vs. open ground), c) the more diverse field layer and vegetation as a whole at Fu 1 resulting in a more diverse spider fauna at this site compared to F2 (factors a—c are of course interacting, d) Fu 1 is south exposed, F2 is north exposed, e) Fu 1 is characterized as a *dry* habitat, while F 2 must be considered as more humid.

Furthermore, a relatively high degree of similarity between the habitats Fu 1 and B1 might be expected since both are forest habitats. To some extent this seem to be true (S = 54), but the similarity appears less than might be expected. As a matter of fact these are two different types of forest, a dry pine forest and a more humid mountainous birch forest. An interesting fact is that the latter (B1) obviously has more species in common with the two low alpine heaths M2 and F1 (S = 62 and S = 65 respectively), than with the pine forest. However, this is not surprising, since the scattered subalpine birch forest in the Nordic countries normally forms the transition zone between the lower forest zones and lower, open alpine areas. Thus, a high degree of faunal similarity between these habitat types must evolve.

The similarity value between F1 and M2 (S = 68) is also relatively high. Thus the three habitat types B1, M2 and F1 seem to form a group with relatively quite similar indices (S = 62, 65 and 68).

F2 has the highest similarity to F1 (S = 56), which seems quite reasonably since F1 and F2 both represent low-alpine dwarf-shrub heaths, although F1 botanically is the most diverse of the two. The latter is reflected in the *number* of

Table 2. Similarity indices from the 5 sampling areas. Based in Sørensen's index of similarity (Sørensen 1948).

	Fu 1	B1	M2	F1	F2
Fu 1	—	54	45	42	28
B1	54	—	62	65	47
M2	45	62	—	68	49
F1	42	65	68	—	56
F2	28	47	49	56	—

spider species caught (F1 : 41 species, F2 27 species).

M2, and especially F2, have a sparse vegetation and are very little differentiated as concerns the composition of the plant community. In these localities fewer species have been caught, and the catches reveal greater differences between dominant and subdominant species at these sites than at Fu 1, B1 and F1.

The species composition in the five localities may be summarized as follows:

M2 (The lichen heath), although being situated within the subalpine region, must be defined as belonging to the lower alpin region (probably corresponding to Holm's (1950) «*regio alpina inferior*»). It is characterized by a mixture of northern and/or alpine species. A characteristic species of open land, especially in the mountain areas, *Pardosa palustris* (L.), is dominant (46.1% of all adult specimens). Second dominant is another northern/alpine species, *P. hyperborea* (Thorell) (22.6%). Number three on the list is also a Lycosid species, *Alopecosa aculeata* (Clerck) (14.4%). This species in all likelihood normally reaches higher altitudes than *A.pulverulenta* (Clerck), which in our material occurs only in the pine forest (Fu 1). Altogether these three Lycosid species comprize 83.1% of the catches at M2, a results of the method used rather than of their real abundance in the area. Furthermore, the list consists of species which are common in alpine areas in Southern Norway: *Gnaphosa lapponum* (L.Koch), *G. leporina* (L.Koch), *Meioneta rurestris* (C.L.Koch), *Hilaira frigida* (Thorell), *H. pervicax* Hull, *Tiso aestivus* (C.L.Koch), *Trichopterna mengei* (Simon), *Caledonia evansi* O.P.-Cambridge, *Rhaebothorax morulus* O.P.-Cambridge, *Oxyptila rauda arctica* Kulczynski, *Oreonetides vaginatus* (Thorell), *Diplocentria bidentata* (Emerton), *Zornella cultrigera* (L.Koch), *Walckenaera cuspidata* (Blackwall).

The mountain birch forest locality (B1) is situated 20 m higher than the lichen heath, yet several alpine species mentioned above are absent or less dominant at B1, particularly *P.palustris* (0.7%), which primarily is affected by the more dense vegetation. A usually common species in mountain birch forest, *P.hyperborea,* is the dominant one (27.8%). It is followed by *P.lugubris* (Walckenear) (8.5%), also a common forest species. Additional species are the northern forest species *Lepthyphantes mengei* (Kulczynskii), *L. angulatus* (O.P.-Cambridge) *L. antroniensis* (Schenkel), *Macrargus boreus* Holm (new to Norway), *Hahnia ononidium* Simon, *Agyneta cauta* (O.P.-Cambridge) and *Maso sundevalli* (Westring). Compared to M2 (0.7%) *Zornella cultrigera* is relatively abundant at B1 (6.2%). This species, according to the litterature obtains its maximum abundance in the lower alpine zones and in *regio silvatica* (2.5% at Fu 1, but absent from F1 and F2). Some species usually found in alpine areas below the timber line also are present: *Rhaebothorax monticola* Holm, *Hilaira nubigena* Hull and *Bathyphantes gracilis* (Blackwall). *Walckenaera karpinskii* (O.P.-Cambridge) is otherwise found only at the other forest locality (Fu 1). This species reaches relatively high altitudes in Northern Scandinavia, 1700 m a.s.l. according to Holm (1950) In S. Norway it has been reported from about 1800 m a.s.l. (in the Jotunheimen area) (Holm 1960). *Gonatium rubens* (Blackwall) is an open land species and common in our alpine areas (4.4% at M2) and typically less abundant at B1 (0.2%).

The eutrophic. low-alpine, dwarf-shrub heath (F1) is characterized by open land species and alpine species. However, F1 contains some willow thicket occasionally providing some sort of a closed canopy probably causing the presence of some northern forest species ascending somewhat into the lower alpine areas. Compared to B1 *P. palustris* is more dominant (10.7%), which indicate a more open terrain, but this percentage is quite low compared to the corresponding values from M2 (46.1%) and F2 (41.0%). Thus the structure of the *Salix*-vegetation probably has some effect on this species. Moreover *P.palustris* has probably got a competitor at F1: *Pardosa atrata* Thorell (11.0% concentrated in a mass occurrence in 1972). *P. hyperborea* is still present (32.4%). Additional alpine species not present at M2 and B1 are: *Micaria alpina* Simon, *Rhaebothorax sphagnicola* Holm, *Conigerella borealis* (Jackson), *Leptorhoptrum robustum* (Westring) and *Oedothorax retusus* (Westring). The northern forest species *Lepthypantes antroniensis* is (in Northern Scandinavia) previously not found above the lower alpine zone (Palmgren 1965). Another northern forest species, *Hypselistes jacksoni* (O.P.-Cambridge), also is found at F1.

F2, the oligotroph low-alpine dwarf-shrub heath, contains fewer specimens (597 adults) and fewer species (27) than the other habitats. As might be expected *P.palustris* is the most dominant species in the catches (41.0%). *P. hyperborea,* one of the most common species in the other habitats, has not been found at F2. According to Holm (1950, Table 2) and Palmgren (1965, Table IX) *palustris* reaches higher altitu-

des than do *hyperborea*. Holm (1950) also states that the abundance of *hyperborea* in the alpine areas is small. Otherwise the list from F2 contains mostly nordic and alpine species. High alpine species not present at the other localities are *Erigone atra* (Blackwall), *E. psychrophila* (Thorell) and *Tricca alpigena* (Doleschal). Several *Oedothorax retusus* (11.4%) are found. This species as well as *Leptorhoptrum robustum* (Westring) (6.1%) and *Latithorax faustus* (O.P.-Cambridge) (6.4%) locally are very numerous in our high alpine areas.

In the pine forest, Fu 1, most of the typical alpine species are lacking. Instead some more typical forest species occur, several of which are not present at the other four localities: *Lepthyphantes complicatus* (Emerton), *Pocadicnemis pumila* (Blackwall), *Porrhomma pallidum* Jackson, *Pardosa sphagnicola* (Dahl), *Gnaphosa intermedia* Holm, *G.orites* Chamberline, *Micaria aenea* Thorell, *Thanatus formicinus* (Clerck) and *Alopecosa pulverulenta* (Clerck).

ANNOTATED LIST OF SPECIES

Ceratinella brevipes (Westring). 3 ♀♀, June: M2, F1, F2. Common in the high mountain areas in S.Norway, but seldom abundant.

Walckenaera capito (Westring). 1 ♂, 25 Sept.—17 Oct. 1973, M2. In Norway previously known from Skarmodalen (Strand 1902) and Hemsedal (Strand 1899). In southern Europe probably an alpine species rarely found at altitudes below 1000 m a.s.l. (Lockett & Millidge 1953, Wiehle 1960). Holm (1959) found in near Torneträsk at about 700 m a.s.l. Palmgren (1972) reckons it to be a northern species, and found it in N. Finnland (Palmgren 1965 b) above the timber line, and in birch forest (Palmgren 1965 a).

W. nudipalpis (Westring). 1 ♀, June 1971; 3 ♀♀, Sept.—Dec. 1973; B1, Fu 1.

W.cuspidata (Blackwall). 13 ♂♂, ultimo Aug.—Nov.; 20 ♀♀, June—Dec.; all localities, except Fu 1. The sexual activity periods of this species are not certain, but (Braun & Rabeler 1979) and Palmgren (1965 a) suggest an activity period in the autumn, which is in accordance with our material and with results from the Finse area (Hauge et al. 1978). Palmgren (1972), however, indicates an increasing activity of males from spring to autumn (Type X), and Merrett (1969) caught males from February to July.

W.karpinskii (O.P.-Cambridge). 9 ♀♀, June/July and ultimo Aug.—Sept.; B1, Fu 1. Thus it has been found only in our forest localities. It is otherwise reckoned as an alpine (Brændegård 1958) and northern species (Koponen 1972), but Brændegård's specimens from Iceland are probably not *karpinskii*, but *clavicornis*.

Pocadicnemis pumila (Blackwall). 1 ♂, 4 ♀♀, July, Fu 1.

Gonatium rubens (Blackwall). 10 ♂♂, end July—Sept.; 45 ♀♀, July—Oct.; all localities, except F2.

Hypomma bituberculatum (Wider). 5 ♀♀, end of the June to middle of August; B1, F1, F2.

Hypselistes jacksoni (O.P.-Cambridge). 2 ♀♀, 10 June— 10 July 1971; F1. A northern species (Palmgren 1976), but in the north found only below the timber line (Holm 1950, Palmgren 1965 a). A pronounced hygrophilous species (Palmgren 1965 a). The species is new to Norway.

Maso sundevalli (Westring). 41 ♂♂, end June—Sept. (max. in July); 5 ♀♀, end Apr.—July; B1 (2.5%), F1 (1.2%).

Metopobactrus prominulus (O.P.-Cambridge). 2 ♀♀, June/July, M2.

Oedothorax retusus (Westring). 41 ♂♂, 32 ♀♀, July/Aug., F1 (0.2%), F2 (11.4%). Both Wiehle (1960) and Palmgren (1976) give a much longer period of sexual activity for both sexes: May-October.

Trichopterna mengei (Simon). 116 ♂♂, 67 ♀♀, June. Oct.; absent from Fu 1, relatively numerous at B1 (10.0%), less dominant at F2 (3.8%), B1 (1.9%) and M2 (0.4%). The males show a marked dominance in the population in spring (early June 1973) (55%). This percentage decreases via 14 and 16 during the following two weeks to 0 in the second of half June. From then the percentage increases again within a week to 25% and in the following sampling periodes via 56%—67%—50%—67%—86% to 87—100% at the end of September. Thus there seem to be marked spring and autumn peeks in the activity of the males, as opposed to the results from Finse (Hauge et al. 1978), where only an autumn peek was found.

Cnephalocotes obscurus (Blackwall). 7 ♂♂, June, 1 ♂, Aug.; 11 ♀♀, June—July; all localities, except F2 (most specimens at Fu 1)

Tiso aestivus (C.L.Koch). 4 ♂♂, June; 2 ♀♀, June-July; all localities, except Fu 1.

Zornella cultrigera (L.Koch). 15 ♂♂, end Aug.—medio Oct., 1 ♂, hand collected on snow, Apr.; 88 ♀♀, June—Oct.; M2 (0.7%), B1 (6.2%) and Fu 1 (2.5%). In Norway previously known only from N. Norway.

Diplocentria bidentata Emerton. 22 ♂♂, June (max.)—July, 1 ♂, September; 7 ♀♀, June—July; absent from F1 and F2, most specimens caught at B1 (24).

D. replicata Holm. Total 5 ♂♂ + 4 ♀♀, 9—13 July 1970, B1. Previously known from Northern Norway only. Holm (1950) found the type specimens in *regio subalpina*.

Typhocrestus tenuis (Holm). 1 ♂, 19 July—13 Aug. 1972, Fu 1. Previously known only from the Skjomen fjord, Nordland, in a birch forest approximately 300 m a.s.l., 5 Aug. 1966 (Hauge 1977).

Erigone atra (Blackwall). 39 ♂♂ + 12 ♀♀, July—Aug., F2.

E. psychrophila (Thorell). 1 ♀, 7—12 July 1971, F2.

Latithorax faustus (O.P.-Cambridge). Total 19 ♂♂ + 36 ♀♀ June early Aug.; all localities, but most numerous at F2 (40).

L. latus (Holm). 7 ♂♂, June and July, B1, F2, and Fu 1.

Caledonia evansi O.P.-Cambridge. 1 ♂, June; 39 ♂♂, Sept.—Nov.; 1 ♀ June, ♀ Sept.—Nov.; all localities, but most common at Fu 1 (25 specimens). Typical for this species most specimens are concentrated in late autumn, but two specimens caught in June indicate hibernating specimens.

Rhaebothorax morulus (O.P.-Cambridge). 7 ♂♂, June—middle of July, Sept. 11 ♀♀, June—middle of Aug.; M2, F1 and F2. Obviously more euryoecious than the following two *Rhaebothorax* species.

R. sphagnicola Holm. 6 ♂♂, 3 ♀♀, June to August, F1.

R.monticola Holm. 9 ♂♂, July—Nov., B1.

Conigerella borealis (Jackson). 1 ♂, July; 4 ♀♀, June—July; F1 and F2. A typical alpine species.

Agyneta cauta (O.P.-Cambridge). 16 ♂♂, 18 ♀♀, June—July, B1.

A.decora O.P.-Cambridge. 6 ♂♂, 4 ♀♀, June — July; F2 (9 specimens), Fu 1.

A.subtilis (O.P.-Cambridge). 2 ♂♂, June—July, Fu 1.

Meioneta rurestris (C.L.Koch). 2 ♂♂, 13 ♀♀, June—July; M2, F1.

Maro sublestus Falconer. 1 ♂, June; 1 ♀, Oct./Nov.; B1. A northern forest species which rarely reaches the lower alpine areas (Palmgren 1975), or regio subalpina (Holm 1950).

Poeciloneta globosa (Wider). 1 ♂, June; 2 ♀♀, June—Aug.; Fu 1.

Leptorhoptrum robustum (Westring). 39 ♂♂, July—Sept. (max. in July); 6 ♀♀, July—early Oct.; F1 (7 specimens), F2 (38 specimens).

Oreonetides vaginatus (Thorell). 18 ♂♂, 14 ♀♀, June to September; all localities.

Hilaira frigida (Thorell). ♂♂, June/July; 19 ♂♂, Sept.—Nov.; 3 ♀♀, June and Sept.—Oct.; all localities except Fu 1. A peak in sexual activity in autumn and a small one in early spring was also indicated by Hauge et al. (1978).

H.nubigena Hull. 5 ♂♂, Aug.—Oct.; B1, F2, Fu 1.

H.pervicax Hull. 5 ♂♂, 2 ♀♀, end of Sept.—Oct.; M2, B1, F1.

Macrargus carpenteri (O.P.-Cambridge). 2 ♂♂, April/May; 21 ♂♂, end of Sept.—Nov.; 39 ♀♀, June/July, end of Sept.—Nov. (max.); all localities, except F2. Probably a winteractive species with a peak of activety in late autumn and a small one in early spring.

M.boreus Holm. 2 ♂♂, Apr.—June; 11 ♂♂, middle Aug.—Nov.; 29 ♀♀, May—June and middle of Aug.—Nov. (max.); 11 ♂♂, hand collected on snow 18—22 Apr., 1973; B1. The species is new to Norway.

Porrhomma pallidum Jackson. 2 ♂♂, June, Fu 1.

P.campbelli (O.P.-Cambridge). 1 ♀, 29 Sept.—16 Oct. 1973, F1.

Centromerus arcanus (O.P.-Cambridge). 9 ♂♂, June, 1 ♂, July; F1, Fu 1 (8 specimens).

Bathyphantes gracilis (Blackwall). 2 ♂♂, Sept.; 3 ♀♀, June—July; B1, F2.

Bolyphantes luteolus (Blackwall). Total 40 ♂♂ + 15 ♀♀, middle June—end Nov.; all localities.

B. index (Thorell). 1 ♂, trapped between 16 Oct.—26 Nov. 1973; Fu 1.

Lepthyphantes alacris (Blackwall). 5 ♀♀, July—Nov.; B1, Fu 1.

L.angulatus (O.P.-Cambridge). 29 ♂♂, June—July (max.); 2 ♂♂, Sept.—Oct.; 45 ♀♀, June—Aug. (max.), Sept.—Nov.; all localities.

L.oscurus (Blackwall). 1 ♂, 12—18 1973; M2.

L. complicatus (Emerton). 7 ♂♂, June—July (max.) and Aug.; 4 ♀♀, June and Sept.; Fu 1.

L.antroniensis Schenkel. 13 ♂♂, June (max.), July, and Sept.—Nov.; 9 ♀♀, June—July and Sept.—Nov.; B1, F1.

L.expunctus (O.P.-Cambridge). 2 ♀♀, trapped between 17 Sept. and 16 Oct. 1973, Fu 1.

L.mengei Kulczynski. 42 ♂♂, Aug.—Oct.; 55 ♀♀, July—Nov.; B1, (4.0%), F1 (0.9%), Fu 1 (3.2%).

Alopecosa pulverulenta (Clerck). 37 ♂♂, May—June; 19 ♀♀, May—Aug.; Fu 1.

A.aculeata (Clerck). 453 ♂♂, May—June (max.) and July; 150 ♀♀, May—June (max.), July-Sept.; all localities, except F2, and with dominance values from 13.2% to 17.6%.

Pardosa palustris (L.). 376 ♂♂, May—early July (max.) and Aug./Sept.; 364 ♀♀, May-Sept.; all localities, except Fu 1.

P hyperborea (Thorell). 729 ♂♂, May—June (max.), July; 366 ♀♀, May—Oct.; all localities, except F2, and with dominance values varying from 19.3% (Fu 1) to 32.4% (F1).

P.lugubris (Walckenaer). 88 ♂♂, June—July; 32 ♀♀, June—Aug.; all localities, except F1, most common at B1 (103 specimens).

P.riparia C.L.Koch. 112 ♂♂, June—July; 77 ♀♀, June—Sept.; Fu 1.

P.sphagnicola (Dahl). 2 ♂♂, June/July, Fu 1.

P.atrata Thorell. 75 ♂♂, 75 ♀♀, June—Aug. B1 (0.4%), F1 (11.0%), F2 (0.6%).

P.amentata (Clerck). 2 ♂♂, 4 ♀♀, June—July, F1, F2.

Tricca alpigena (Doleschal). 14 ♂♂, June (12 ♂♂)—July; 13 ♀♀, June (12 ♀♀)—Aug., F2.

Gnaphosa intermedia Holm. 3 ♂♂, Apr.—June; 1 ♀, May/June; B1, Fu 1. First find in Southern Norway.

G.orites Chamberlin. 2 ♂♂, trapped between 14 Aug. and 17 Sept.; Fu 1. The species is new to Norway.

G.muscorum (L.Koch). 14 ♂♂, June—Aug. M2, B1 and F1.

G.lapponum (L.Koch). 101 ♂♂, June—Oct.; 31 ♀♀, May—Oct.; M2 (8.5%), B1 (1.6%), F1 (3.8%).

G.leporina (L.Koch). 93 ♂♂, medio June—ultimo July; 14 ♀♀, June—Oct.; all localities, except F2, most common at Fu 1 (5.7%).

Drassodes pubescens Thorell. 3 ♂♂, 4 ♀♀, June—July, B1, Fu 1.

Haplodrassus signifer (C.L.Koch). 10 ♂♂, 12 ♀♀, June—July; M2, F1, Fu 1.

Micaria alpina Simon. 20 ♂♂, June—July and end of Aug.—Sept.; 3 ♀♀, July; F1 (22 specimens), Fu 1.

M.pulicaria (Sundevall). 4 ♂♂, June to July, 2 ♀♀, Apr.—Aug.; B1.

M.aenea Thorell. 4 ♀♀, June-July, Fu 1. In Norway previously known only from Vefsn, Nordland (Strand 1900).

Xysticus luctuosus (Blackwall). 1 ♀, 15—23 June 1971, Fu 1.

X.obscurus Collett. 2 ♂♂, 3 ♀♀, July; B1, F1.

X. cristatus (Clerck). 1 ♀, July, F1.

X.bifasciatus C.L.Koch. 1 ♂, June B1.

Oxyptila rauda arctica Kulczynski. 21 ♂♂, June (max.) and end July—Sept.; 7 ♀♀, June—Oct.; all localities.

Thanatus formicinus (Clerck). 2 ♀♀, trapped 15—23 June 1973, Fu 1.

*T.*sp. *(articus* Thorell?). 2 ♀♀, epigyne very similar to the one drawn by Hauge (1976), July and Sept./Oct., M2.

Hahnia ononidium Simon. 71 ♂♂, 8 ♀♀, June—July; M2 (1 specimen), B1 (36 specimens), F1 (22 specimens), Fu 1 (20 specimens).

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Oribatids (Acari) from an oligotrophic bog in western Norway.

TORSTEIN SOLHØY

Solhøy, T. 1979. Oribatids (Acari) from an oligotrophic bog in western Norway. *Fauna norv. Ser. B. 26,* 91-94.

About 27 species of oribatid mites were found in an oligotrophic bog at Uksetjern, Gulen, Sogn & Fjordane, western Norway. The abundance of adults were about 60 000/m^2 with a corresponding biomass of 490 mg dw/m^2. 36% of the specimens were found in the upper layer (0—5 cm), 34% in the middle (5—10 cm) and 23% in the lower (10—17 cm). Corresponding biomass values were 30%, 57%, and 13% respectively. The dominant species found were *Malaconothrus* sp., *Nanhermannia coronata* Berlese and *Parachipteria willmanni* v.d. Hammen. Vertical distribution in relation to feeding requirements is discussed.

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INTRODUCTION

Oribatid mites apparently form an important faunal element in the decomposition of plant remains and fungal hyphae in bogs (Tarras—Wahlberg 1961; Block 1965; 1966; Rajski 1961; Strenzke 1952; Popp 1962, a, b; Dalenius 1960). It is therefore of considerable interest to study the species composition, abundance, vertical distribution and nutritional requirements of the mites in a variety of such habitats. No data is, however, available from Norway on the last aspect (but see Schuster 1956, Luxton 1972, Schatz 1979 for general information). Also of the firstmentioned aspects the informations available from Norway are sparse, (Willmann 1929; Solhøy 1975; Solhøy & Øvstedal 1979).

SAMPLE SITE AND METHODS

The samples were taken from an oligotrophic bog at Uksetjern, Fivelsdal near Brandangersundet, Gulen Sogn & Fjordane, March 11. 1974. The most common plant species were *Eriophorum vaginatum, Calluna vulgaris, Myrica gale* and *Sphagnum* species.

A sample of 100 cm^2 was cut out from the peat down to 17 cm below moss surface. The sample was then separated into three strata: 0—5 cm, 5—10 cm, 10—17 cm, and secured in plastic bags.

The mites were extracted in a conventional Tullgren/Berlese apparatus one day after the sampling. The extraction lasted for six days.

RESULTS

About 27 species of oribatid mites with a total of 614 adult specimens were found (Tab. 1.) This gives about 61 000 adults per m. sq. Poor or lacking descriptions of most of the immature stages prevented determination of this part of the material.

Of the species identified, only *Eniochthonius minutissimus* (Berlese) has not previously been recorded from western Norway. Thor (1937, as *Hypochtoniella pallidula* C.L. Koch) states that it is a rare species in southeastern Norway.

The most common identified species were *Malaconothrus* sp., *Nanhermannia coronata* Berlese, *Parachipteria willmanni* v.d. Hammen, *Tectocepheus velatus* (Michael) and *Hypochtonius rufulus* (C.L. Koch) accounting for 66% of the specimens. As much as 9 species were rare with less than 5 specimens found (Tab. 1.)

About 36% of the specimens were found in the upper layer, 43% in the middle, and 23% in the lower layer. Corresponding biomass values (total 494 mg dw/m^2) were 30%, 57% and 13% respectively. Most abundant or exclusively present in the upper layer were among the common taxa Brachychthoniidae and *Parachipteria willmanni,* and among the rare taxa *Cepheus cepheiformis* (Nicolet), *Camisia* n.sp., *Eupelops* sp., and *Rhysotritia duplicata* Grandjean. Primarily or exclusively present in the middle layer were among the more common taxa *Oppia* spp., *Nothrus pratensis* Sellnick, *Ceratoppia bipilis* (Hermann) and *Phthiracarus* sp., and among the rare taxa *Eniochthonius minutissimus, Platynot-*

Table 1. Density and biomass of the oribatid taxa found in the bog at Uksetjern. The percentage composition is also given. Area of the layers: 100 cm^2. Asterisk means values less than 1 (percentage or biomass).

Table 1.	Number								Biomass ug dw							
Layer (cm)	0–5		5–10		10–17		Total		0–5		5–10		10–17		Total	
Taxon	N	%	N	%	N	%	N	%	W	%	W	%	W	%	W	%
Malaconothrus sp.	43	19	75	28	40	31	158	26	86	6	150	5	80	12	316	6
Nanhermannia coronata Berlese	23	11	39	15	30	23	92	15	207	14	351	12	270	41	828	17
Brachychthoniidae (3 species)	60	27	4	2	2	2	66	11	6	*	*	*	*	*	7	*
Parachipteria willmanni v.d. Hammen	52	24	10	4	3	2	65	11	936	64	180	6	54	8	1170	24
Tectocepheus velatus (Michael)	17	8	15	6	24	18	56	9	29	2	25	*	41	6	95	2
Oppia spp. (3 species)	9	4	35	13	11	8	55	9	6	*	25	*	8	1	39	*
Hypochthonius rufulus (C.L. Koch)	—	—	29	11	—	—	29	5	—	—	319	11	—	—	319	6
Suctobelba spp. (2 species)	3	1	10	4	6	5	19	3	2	*	5	*	3*	10	*	
Phthiracarus sp	1	*	14	5	3	2	18	3	30	2	420	15	90	14	540	11
Steganacarus striculus (C.L. Koch)	5	2	9	3	3	2	17	3	40	3	72	3	24	4	136	3
Nothrus pratensis Sellnick	—	—	13	5	—	—	13	2	—	—	1040	37	—	—	1040	21
Ceratoppia bipilis (Hermann)	1	*	6	2	—	—	7	1	20	1	120	4	—	—	140	3
Eulomannia ribagai (Berlese)	—	—	1	*	5	4	6	1	—	—	6	*	30	5	36	*
Galumna sp.	—	—	3	1	1	*	4	*	—	—	75	3	25	4	100	2
Cepheus cepheiformis (Nicolet)	2	*	—	—	—	—	2	*	40	3	—	—	—	—	40	*
Chamobates sp.	—	—	—	—	1	*	1	*	—	—	—	—	6	*	6	*
Camisia n. sp.	1	*	—	—	—	—	1	*	21	1	—	—	—	—	21	*
Eniochthonius minutissimus (Berlese)	—	—	1	*	—	—	1	*	—	—	2	*	—	—	2	*
Eupelops sp.	1	*	—	—	—	—	1	*	20	1	—	—	—	—	20	*
Fuscozetes fuscipes (C.L. Koch)	—	—	—	—	1	*	1	*	—	—	—	—	22	3	22	*
Platynothrus peltifer C.L. Koch	—	—	1	*	—	—	1	*	—	—	35	1	—	—	35	*
Rhysotritia duplicata Grandjean	1	*	—	—	—	—	1	*	20	1	—	—	—	—	20	*
Total	219		265		130		614		1463		2825		653		4942	

hrus pelitifer (C.L. Koch) and *Galumna* sp. Primarily confined to the lower layer were the rare species *Eulohmanni ribagai* (Berlese), *Chamobates* sp., and *Fuscozetes fuscipes* (C.L. Koch). No special pattern in vertical distribution were found for the common taxa *Malaconothrus* sp., *Nanhermannia coronata, Tectocepheus velatus* and *Steganacarus strictulus* (C.L. Koch). In summary 6 taxa showed a preference for the upper layer, 9 taxa for the middle layer, 3 taxa for the lower layer, while 4 taxa showed no special preference in vertical distribution.

Looking at the size distribution of the species (expressed in weights), 15 of the species are less than 10 ug. dw accounting for 77 % of the specimens found, but only 30 % of the biomass (Tab. 2). In the next size class (10–19.9 ug. dw) only 2 species are found with a relative abundance of 15 %, but with as much as 30 % of the biomass. Combining the next two size classes we find 9 species constituing 6 % of the specimens and 19 % of the biomass. The only big species, *Nothrus pratensis* (80 ug dw), shows a relative abundance of 2 %, but accounts for 21 % of the biomass.

DISCUSSION

It appears well documented that there exist a certain similarity between the fauna of bog oribatids from different areas of northern Europe (Willmann 1929, 1933, 1942; Strenzke 1952; Knülle 1957; Dalenius 1960; Rajski 1961; Popp 1962 a, b, Block 1965, 1966). Most of the more abundant taxa found in the bog at Uksetjern also are reported common by serveral of these authors.

In *Sphagnum fuscum* hummocks of a central Swedish bog Tarras — Wahlberg (1961) found the following 6 taxa to be the most abundant ones: *Malaconothrus gracilis* v.d. Hammen, *Nanhermannia coronata* (synonymous with *Nanhermannia nana* (Nicolet) sensu Willmann 1931), *Nothrus pratensis, Tectocepheus velatus, Hypochthonius rufulus* and the group *Oppia/Suctobelba*. This bear a striking resemblance to the list from Uksetjern (Tab. 1.) In northern Germany Knülle (1957) grouped oribatids according to habitat preference. The group IX (species with optimum in «feuchten und nassen Bodenauflagen der *Sphagnum*-torfböden von

Table 2. Weight (ug dw.) distribution of the specimens found in the bog at Uksetjern.

Weight class (ug)	Number found	%	Weight (ug)	%	Number of species
0.1— 9.9	471	77	1475	30	15
10.0—19.9	94	15	1489	30	2
20.0—29.9	17	3	363	7	7
30.0—39.9	19	3	575	12	2
80.0—89.9	13	2	1040	21	1

Hochmooren» etc.) consist of species of which seven or eight were found at Uksetjern. Block (1965) investigated four types of habitats at Moor House in England where the *Juncus squarrosus* site apparently show the closest resemblance to the bog at Uksetjern, at least with regard to soil humidity. Of the 39 species found, only three species were common. Viz. *Nanhermannia coronata, Tectocepheus velatus* and *Platynothrus peltifer*. The resemblance with more arctic and alpine bogs in the nordic countries (Tuxen 1943, Dalenius 1960, Solhøy 1975) is not so strong, but characteristic taxa in common are *Malaconothrus* sp., *Tectocepheus velatus* and to a certain extent *Platynothrus peltifer*.

The genera *Limnozetes* Hull, *Hydrozetes* Berlese, and *Trimalaconothrus* Berlese often reported abundant in various wet habitats, were not found in the samples from Uksetjern. The main reason is probably that the habitat is not wet enough. All three genera are more or less confined to constant wet or even for long periods, submerged habitats.

The number of species at Uksetjern is in fairly good accordance with several other studies. Solhøy (1975) found 18 species, Willmann (1929) 22 species, Knülle (1957) 25 species, Karppinen (1962) 27 species, Tarras-Wahlberg (1961) 31 species and Tuxen (1943) 33 species. But some studies also report considerable more species. Rajski (1961) found about 60 in a Polish bog site, Dalenius (1960) found about 50 in northern Sweden, and Block (1965) about 45 in England. In analysing these species rich lists, it is evident that they must represent quite varied habitats with rather dry and mesic microhabitats as well as the wet ones. This is probably the main reason for this high diversity. In more uniform wet habitats it seem to be reasonable to conclude that the species number of oribatids lies between 20 and 35.

Most studies on the vertical distribution of oribatids report that most of the specimens are restricted to the upper few cm of the litter and soil. Solhøy (1972) found that about 80% of total Acari (mostly oribatids) during the summer occurred in the stratum 0—3 cm of an eutrophic sedge bog on Hardangervidda, Norway. Schatz (1979) found about 90% of the specimens to be confined to the upper 2 cm of the soil in several alpine sites near Innsbruck, Tyrol. He could not find any great differences throughout the year. Lebrun (1971, p.69) rewieving some of the literature, found that most studies report more than 60% of the specimens in the litter and upper 5 cm of the soil.

However, Rajski (1961) reports from a *Sphagnum* bog in Poland that when 88—98% of the oribatids were found in the upper 5 cm during the summer, the situation was reverse in the winter with only 16% in this layer. Persson & Lohm (1977) found that more than 70% of the total number of Acari were found in the litter and top 5 cm of peat soil of a grassland in Sweden during May to October. But the proportion was 60% in November and only 40% in winter. This is close to the value of 36% found in the present study, in which the samples must be regarded as winter samples. In the loose peat it is easy for the animals to move downwards to escape from the frost at the surface. However, it can not be excluded that the oribatids in such a loose peat as that found at Uksetjern will have a similar distribution throughout the year, due to better pore space in the lower layers compared to ordinary soils.

If this distribution is kept also during the summer, it is tempting to try to explain the differences in vertical distribution with some differences in the feeding requirements. According to Schuster (1956), Lebrun (1971) and Luxton (1972) the oribatids can be grouped into three broad categories as macrophytophages (feeding strictly on higher plant material), microphytophages (feeding strictly on the microflora) and panphytophages (combining the two types). Macrophytophages in the present study are *Cepheus cepheiformis, Phthiracarus* sp., *Steganacarus striculus* and *Rhysotritia duplicata* accounting for 15% of the biomass and to a certain extent confined to the middle layer of peat. Classified as microphytophages are *Hypochthonius rufulus, Ceratoppia bipilis, Oppia* spp., *Tectocepheus velatus, Suctobelba* ssp., and *Eulohmannia ribagai* accounting for 19% of the biomass. *Hypochthonius rufulus, Ceratoppia bipilis* and *Oppia* spp., have a clear preference for the middle layer, *Eulohmannia ribagai* for the lower layer, while *Suctobelba* spp. and *Tectocepheus velatus*

to a certain extent are indifferent. Brachychtoniidae are most abundant in the upper layer. As much as 66% of the oribatid biomass can be referred to the panphytophagous species. They are *Parachipteria willmanni, Platynothrus peltifer, Chamobates* sp., *Fuscozetes fuscipes, Galumna* sp., *Camisia* n.sp., *Nanhermannia coronata, Nothrus pratensis* and *Eupelops* sp. Of the more common species *Parachipteria willmanni* is mostly confined to the upper layer, *Nothrus pratensis* to the middle layer while *Nanhermannia coronata* is indifferent in vertical distribution.

It must be admitted that the division of the layers in the present study is quite arbitrary and may in fact obscure any narrow niche divisions. The vertical movements during the year must also be better known. However, the results from the present study seem to indicate that the macrophytophages and microphytophages occur most abundant lower than 5 cm down in the bog. The panphytophagous group of oribatids is clearly the largest group with 66% of the biomass and as should be expected they are not confined to any special layer if we regard them as one group. But within the group there is noticeable differences.

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Short communications

DINOCRAS CEPHALOTES (CURTIS, 1827) (PLEC.,PERLIDAE) IN WESTERN NORWAY.

TERJE HERMANSEN

A total of 58 nymphs of *Dinocras cephalotes* (Curtis, 1827) were collected in the river Etneelva in southern Hordaland. The species probably spend three years as nymphs in the river.

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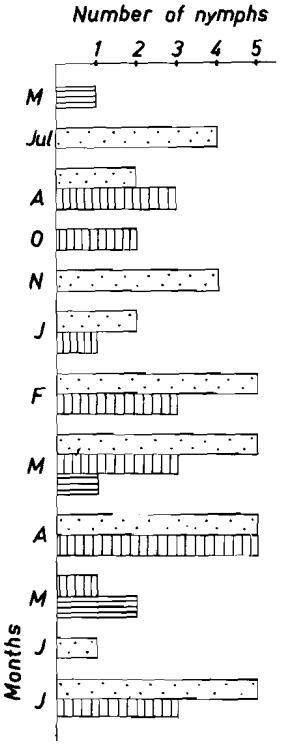

Fig. 1 Number of nymphs in each sizeclass from May 1977 to July 1978. Sizeclasses: I: 0—2,2 mm, II: 2,2—3,2 mm, III: 3,2— mm, between the eyes.

According to Lillehammer (1974) *Dinocras cephalotes* (Curtis, 1827) is found scattered in eastern and northern Norway. Most of the records are from the central mountain areas in southern Norway, where it is taken in small and medium sized streams, largely in the Boreal pine forest zone. In western Norway the only previous records are two from Rogaland. The species prefers rivers with stony, stable substratum and is reported to live three years as nymphs (Hynes 1941, Brinck 1949).

During my investigation on the food preference of young salmon (*Salmo salar* L.) in Etneelva, HOi: Etne, in 1977 and 1978 I caught 58 nymphs of *D. cephalotes*, one of which were found in the stomach of a young salmon. The locality (UTM:32VLM303183) is situated 22 m a.s.l. about 3 km upstreams. The current speed is rather slow as the locality is situated above a threshold. The substratum is dominated by large and medium sized stones overgrown with mosses. During the investigation the acidity in the water varied between pH 5.96 and pH 6.34 and the watertemperature between 1.7°C and 18.2°C. Monthly samples were taken and the collecting method used was the kicking technique (Frost et al. 1971).

The width between the eyes is used to separate the nymphs into sizeclasses. In fig. 1 the number of nymphs in each sizeclass are plotted against the sampling time. Nothing contradicts that the nymphs spend three years in the river.

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A CONTRIBUTION TO THE KNOWLEDGE OF THE NORWEGIAN SPIDER FAUNA

ERLING HAUGE

New records in Norway are given for the soecies *Araniella displicata* (Hentz), *Liocranum rupicola* (Walckenaer, *Philodromus laevipes* L., *Xysticus erraticus* (Blackwall) and *Lepthyphantes angulipalpis* (Westring)

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Araniella displicata (Hentz). In Norway this species has been reported only once: At Røyken near the Oslo fjord, Eastern Norway (Collett 1976). The new record is from Western Norway: HOi: Voss, Gjerksvoll, SE of Bavallen. One females with a cocoon was found 24 June 1978 by a student group (leg. O. Thune and B.E. Waage). Habitat: On *Juniperus communis* in an open area within a south exposed alder thicket.

Liocranum rupicola (Walckenaer). Previously the species has been reported from Son (Akershus) and from the Hvaler islands (Östfold) (Waaler 1967). The new record is from Telemark: TEy:Bamble, Rörholt. One female was found on a house wall 31 July 1975 (Torfinn Andersen leg.). It is a rather rare, southern species, according to Lockett & Millidge (1951), and does not seem to occur north of Östergötland in Sweden (Tullgren 1946).

Philodromus laevipes L. Storm (1898) reports the species from Mostadmarken near Trondheim (as *P. elegans* (Blackwall)). Further it is reported «up to Nordland» (Collett 1876, Strand 1899). The new record is the first from Western Norway: HOi: Varaldsöy, Vardheiane, one female on the trunk of a pine, 12 May 1974. The colours of the specimen are almost identical to those given by Tullgren (1944, Fig. 40B).

Xysticus erraticus (Blackwall). The species has previously been found near Bergen (Collett 1876, Strand 1899), Hol in Hallingdal (Strand 1899) and in Son (Akershus) (Waaler 1967). New records: HOy: Kvinnherad, Gjermundshamn, 1 male, 30 Aug. 1968 (B.Berland leg.), Aay: Hövåg, Indre Årsnes, 1 female, 30 May 1971 (K. Syvertsen leg.) and 1 female, in a meadow, HOi: Voss 29 June 1978.

Lepthyphantes angulipalpis (Westring). Previously reported from Hallingdal (Strand 1899) and from Ringsaker (Waaler 1971) New records: VE:Tjöme, Mostranda, 60 males and 7 females, 10 April — 20 May 1975 (Trond Andersen leg.); VE: Nötteröy, 1 female, 14 May 1975 (T. Andersen leg.).

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Book:

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

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