

to different biotopes but also to the fact that many biotopes resemble each other in providing suitable environments. Most Macrolepidoptera hence fly in all of them. We may call those which provide similar conditions for the existence of Macrolepidoptera biotope groups.

The biotopes may be grouped as follows:

1. The whole alpine region. Characteristic of this biotope group are the Macrolepidopterous species that live only in the two biotopes of this group. Such Lepidoptera in Kevojoki area are *Clossiana polaris*, *C. chariclea*, *Entephria polata* and *Pygmaena fusca* (abundantly flying).

2. The biotope group rich in dwarf shrubs. The subalpine and coniferous heaths belong to this group. Characteristic species are *Callophrys rubi borealis* and *Zygaena exulans*.

3. The biotope group rich in grass. The Macrolepidopterous fauna of the meadow forests and meadows belonging to this group comprises *Clossiana selene*, *Syngrapha hochenwarthi lapponaris*, *Xanthorhoë munitata arcticaria*, *Lampropteryx suffumata defumata*, *Euphyia luctuata borealis*, *Epirrhoë alternata* and *Eupithecia palustraria*.

4. The wet biotope group of bogs and patches of willows. The only, but very characteristic species is *Clossiana eunomia montana*.

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THE PHALANGIDS AND PSEUDOSCORPIONIDS OF FINNISH LAPLAND

PEKKA T. LEHTINEN

Department of Zoology, University of Turku,
Turku, Finland

I. Introduction

In contrast to the numerous arctic and boreal species of spiders there are no true arctic species of Phalangids and Pseudoscorpionids. The total number of species is already small in boreal areas, as in southern Finland, and it decreases further towards and beyond the Arctic Circle. The absolute northern limit of the out-of-door distribution of Pseudoscorpionids is in Finnish Lapland, like that of the terrestrial Isopods and Diplopods (cf. PALMÉN 1946, 1949). Only one Phalangid species, *Mitopus morio*, has been found in true arctic regions in Greenland and Spitzbergen (STRAND 1906, HACKMAN 1956). Because of the scarcity of the representatives of these groups in subarctic areas and the lack of northern species, interest investigating them, at least in Finnish Lapland, has been rather slight.

Scattered records of two Phalangid species from Lapland have been published by HEINÄJOKI (1944), and KROGERUS (1960) lists some records of three species from Kuusamo.

There are several notes on the Phalangid fauna of Swedish (STRAND 1900 b, TULLGREN 1906, SCHENKEL 1931, HOLM 1951), Norwegian (THORELL 1876, SIMON 1887, ELLINGSEN 1900, STRAND 1900 a & c), and Russian (SIMON 1887, HEINÄJOKI 1944) Lapland. HASSELT (1884) also lists some records from Lapland of Phalangids without accurate zoogeographical data. In STRAND's summary (1906) there are no additional records.

In the summary of the distribution of Finnish Pseudoscorpionids KAISILA (1949) gives one record only of one species from Lapland, together with some of the cosmopolitan hemerophilous *Chelifer cancroides*. ELLINGSEN (1903) and REDIKORZEV (1928) each give one species of Pseudoscorpionids from Norwegian and Russian Lapland, while there are no records from Swedish Lapland TULLGREN (1899).

The Phalangids and Pseudoscorpionids are not mentioned in the zoogeographical analysis of holarctic animals by LINDROTH (1957), though in these groups, there are several holarctic representatives.

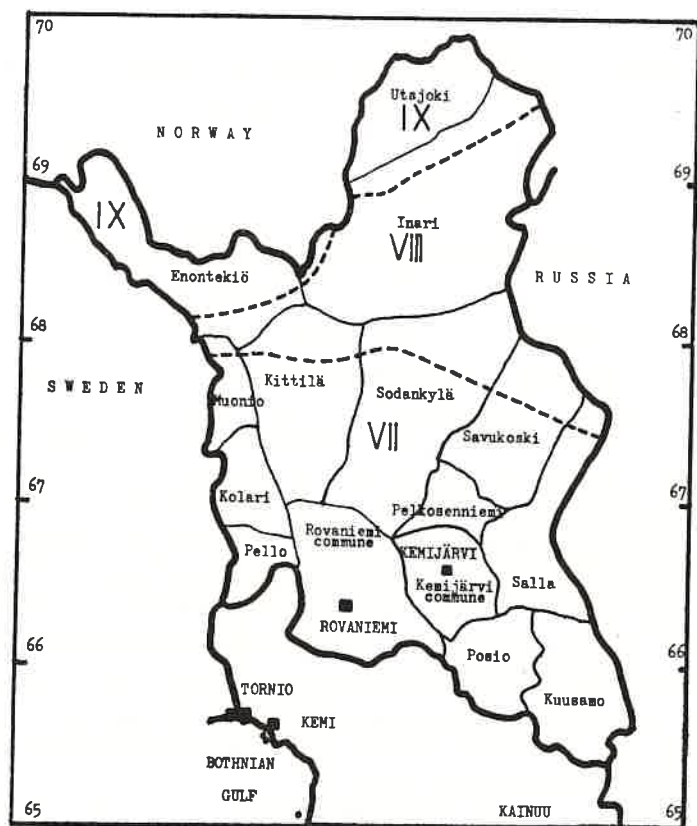


Fig. 1. Map of Finnish Lapland. VII: Far North, VIII: Forest Lapland, IX: Fjeld Lapland.

Between 1959 and 1963 terrestrial invertebrates have been extensively collected in all parts of Finnish Lapland by the author. In 1962, Phalangids were further collected in Utsjoki by Mrs. Varpu Välimäki, Miss Sirpa Similä, Mr. Ossi Lindqvist, and Mr. Erkki Leppäkoski, as well as in 1964 by Mr. Lasse J. Tuominen. Their material was kindly given me for identification and publication.

In this study, Finnish Lapland includes the regions VII to IX of the new zoogeographical division of Finland (VOIPIO 1956). For details, see the map in fig. 1. In Swedish, Norwegian & Russian Lapland the Arctic Circle is regarded as the approximate southern limit.

II. Phalangida

Nemastomidae

Nemastoma lugubre (Müller) 1779

Syn. *N. lugubre-bimaculatum* (Fabricius) 1793

VII (6 exx.). *Kuusamo*: Oulanka, Aventojoiki & Taivalköngäs; Rukatunturi; Toranginaho; Ala-ölky.

There are no previous records of the area, and only one published record for the area north of latitude 62° in Finland (HEINÄJOKI 1944: Oulu). According to unpublished observations of the author, however, this species is regularly found throughout Central and Eastern Finland as far as Kuusamo. On the Atlantic coast of Norway it is found at least as far as Nordland (STRAND 1900 a). According to STRAND (1906) and ROEWER (1923) the total distribution of this species is palearctic, including records of the subarctic parts of Russia.

As in southern Finland, this species is only found among the litter of forests. It is only slightly dependent on the various kinds of trees, or on the lower vegetation, but it avoids the acid soil of most Finnish bogs and fens (cf. the extensive Arthropod material of KROGERUS, 1960), and the dryness of some largely lichen-covered pine forests. In contrast to most southern species of terrestrial invertebrates, it does not become more stenotopic towards the northern limit of its range.

All the specimens of the present material represent the very much more common colouration type in Finland, with two silvery spots on the dorsal side (*bimaculatum* of most authors). In the opinion of the author, this is a characteristic of rather small taxonomic value, and comparable to the sympatric colour variants of the snails *Cepaea hortensis* and *Eulota fruticum*.

Phalangiidae

Mitopus morio (Fabricius) 1791

Syn. *Mitopus alpinus v. borealis* Thorell 1876

Oligolophus alpinus Simon 1882

O. kulczynskii Strand 1900

O. vagans Strand 1900

IX (142 exx.). *Enontekiö*: Siilasvuoma; Kilpisjärvi; Saana. — *Utsjoki*: Karigasniemi, Passijoki; Kevojoki, Linkkapahta, Kotkapahta; Raessijoki; Kevojärvi, Kevo Station, Tshieskulanpahta; Kenespahta; Ashkasjoki; Ailigas; Teno River (several records on the Finnish side from Kistuskaidi to Nuorgam); Anarashvaarri; Nuorgam village, Pajuniemenpahta, Gältijoki; several records between Nuorgam and Pulmankijärvi; N, E & W sides of Lake Pulmankijärvi; Kaldaushjoki.

VIII (3 exx.). *Inari*: Ukonjärvi; Nuottamajärvi; Repojoiki; Kaunispää.

VII (24 exx.). *Sodankylä*: Peurasuvanto; Petkula; Kirkonkylä. — *Rovaniemi commune*: Korkalo. — *Posio*: Maaninkavaara. — *Kuusamo*: Kuusamojärvi; Toranginaho; Oulanka, Aventojoiki & Taivalköngäs; Rukatunturi; Ala-ölky.

Found in Finnish Lapland also by HEINÄJOKI (1944) and KROGERUS (1960). Common also in other parts of Lapland (THORELL 1876, HASSELT 1884, SIMON 1887, ELLINGSEN 1900, STRAND 1900 a, b & c, TULLGREN 1906, SCHENKEL 1931, HEINÄJOKI 1944 & HOLM 1951). The total range of this species is very large, reaching from Kamtchatka and Saghalin to Eastern Canada, and from Greenland and Spitzbergen to Iran and North Africa (ROEWER 1923, SUZUKI 1949, HACKMAN 1956).

Mitopus morio is more or less eurytopic in Lapland as well as all over Finland. In northern areas, it is most numerous in the birch zone, occurring regularly both on rock-strewn ledges of variable slope and among the lower vegetation of birch forests, groves and fens. It has also been found indoors in all parts of Finland. In southern Lapland it is less numerous in spruce forests, though the relative numbers in the present material are misleading due to irregular collecting. As pointed out already by HEINÄJOKI (1944), *Oligolophus tridens* is the most abundant Phalangid species in the large forests of Central Finland, though by no means overwhelmingly so compared to *Mitopus morio*.

There are only a few Finnish species of terrestrial invertebrates that are commonly and more or less evenly distributed from the outermost rocky islets of the southwestern archipelago to the top of the highest fjelds. *Mitopus morio*, however, belongs to this group in common with *Lithobius curtipes* (Chilopoda), *Araneus cornutus* (Araneae), and *Dendrobaena octaedra* (Oligochaeta). Several species of spiders and terrestrial gastropods are further distributed from the outer archipelago to the alpine region of the fjelds, but being less eurytopic, they may be rare in large intervening areas (cf. also LEHTINEN, 1964).

The present material is rather useful for determining the maturity period of this species in Lapland, precisely because extensive collecting has been carried out annually in the month of July. The first records of adult specimens derive from 22th to 25th July, except in 1960, when several adult specimens were found from July 15th onwards, both in Enontekiö and Utsjoki. No observations were made in the late autumn and early spring, but most probably the adult specimens do not hibernate.

The specimens from the alpine region deviate morphologically, but the characteristics change gradually, affording a good instance of a morphologically distinct ecotype. It has relatively shorter legs, darker and more distinct folium, and stronger thorns on the legs than the specimens from lower altitudes. This question has also been discussed by THORELL (1876), STRAND (1906), ROEWER (1923), HEINÄJOKI (1944), and HOLM (1951) with varying opinions with regard to the taxonomic value of the deviating characteristics.

Oligolophus tridens (C. L. Koch) 1871

VIII (HEINÄJOKI 1944, p. 15)

VII (6 exx.). *Sodankylä*: Peurasuvanto; Kirkonkylä. — *Pelkosenniemi*: Kairala. — *Rovaniemi commune*: Korkalo. — *Kuusamo*: Toranginaho.

On the Atlantic coast of Norway it is found at least as far as Nordland (STRAND 1900 a). Total range includes Central and Eastern Europe (ROEWER 1923), but immature specimens probably belonging to this species have also been found in Newfoundland (HACKMAN 1956).

Most of the Lapland records of this species are from habitats slightly influenced by man, and it seems to change its main habitat towards the northern limit of its range. In southern and central Finland it is most common in the litter of groves and several other types of forest with moist soil.

In conformity with the results of HEINÄJOKI (1944) and KÄSTNER (1928), adult specimens are found only from August onwards, the first in this case being found on August 15th.

The present material agrees morphologically with that from more southern areas. Among other things the male and female genitalia have been compared with detailed figures in LOHMANDER (1945).

Phalangium opilio Linné 1767

Syn. *P. cornutum* Linné 1776

Opilio cornutus Herbst 1802 et seq.

VII (KROGERUS 1960, p. 93)

No records in the present material. Total distribution holarctic, but certainly distributed over large areas by human activities.

KROGERUS (1960) also found this species in peat-bogs far from human habitations proving that it is in Finland rather eurytopic and independent of habitats built over by man, though it is clearly favoured by such conditions, and it is most abundant in them.

Euphalangium nordenskiöldi (L. Koch) 1879

Syn. *E. nordenskiöldi-kolense* Strand 1906

Not found inside the boundaries of Finland in spite of intensive searching in Eastern Utsjoki and Kuusamo. This continental boreo-subarctic species is the only palearctic species of Phalangids with a mainly northern range, occurring also in the Kola Peninsula as far as Kandalaksha in the west (SIMON 1887, HEINÄJOKI 1944). For details of taxonomy and distribution, see STRAND (1906) and ROEWER (1923).

Platybunus triangularis Herbst 1804

Syn. *P. corniger* (Hermann) 1836

VII (5 exx.). *Rovaniemi commune*: Hirvas. — *Kuusamo*: Kirkonkylä, near the church, Toranginjärvi, Toranginaho.

Already recorded as being found in Kuusamo by KROGERUS (1960). HEINÄJOKI (1944) lists records of this species only as far as Kuopio in the North, but on the map attached to her paper there are also records of it being found in Kittilä, Salla, and Kuusamo, in the two last-mentioned cases they were found on what is now the Russian side. It has also been found in the southern parts of Swedish (STRAND 1900 b) and Norwegian Lapland (STRAND 1900 a) as well as in the Kola Peninsula (SIMON 1887). Total distribution is European.

All the specimens in the present material were found among bush and tree vegetation, the main habitat of this species at least in Finland.

All specimens are adult ones, taken throughout July and August. Adult specimens could almost certainly be found throughout the year, as in southern Finland. Representatives of the genus *Platybunus* are the only Finnish species of Phalangidae that can be found as adult specimens in May and June.

III. *Pseudoscorpionida*

Neobisiidae

Neobisium carcinoides (Hermann) 1804

Syn. *N. muscorum* (Leach) 1817 et seq.

Not found in the Finnish Lapland, though distributed in Norway up to Nordland and Lofoten (ELLINGSEN 1903). It is also the most common species of southern Finland at least as far north as latitude 62°, and also found sparsely as far north as Oulu (KAISILA 1949).

Microbisium brevifemorum (Ellingsen) 1903

VII (1 ex.). *Kuusamo*: Juuma, Hautaniitynuoma.

There are no previous records of this species for any part of Lapland or other subarctic areas. According to KAISILA (1949), it is found only as far north as latitude 62°, but unpublished material in the collections of the Zoological Museum in Helsinki (KAISILA, pers. comm.) as well as the unpublished observations of the author prove that the distribution of this species is more or less continuous.

Total distribution Central and Northern Europe with slightly continental character (BEIER 1963).

The only specimen in the present material was found by sifting the moss and litter stratum of a calcareous swamp together with many rare species of invertebrates, such as *Pirata insularis*, *Gnaphosa nigerrima*, *Bolyphantis crucifer*, *Centromerus laevitarsis*, *Microneta lugubris*, *Evansia merens*, and *Walckenaera nodosa* (Araneae) as well as *Vertigo genesii* and *Succinea sarsi* (Gastropoda). Evidently it is more stenotopic at the northern limit of its range than in Central and southern Finland, where it is regularly found in the moss and litter stratum of various types of bogs and fens (cf. also KAISILA 1949).

Chernetidae

Chernes cimicoides (Fabricius) 1793

VII (KAISILA 1949, p. 85)

No records in the present study, and evidently rare already from latitude 64° northwards. The commonest corticolous Pseudoscorpionid in southern Finland.

Cheliferidae

Chelifer cancroides (Linné) 1758

VII (KAISILA 1949, p. 86)

All records for the subarctic area refer to indoor occurrence (see also REDIKORZEV 1928), and as such this species is cosmopolitan (BEIER 1963). Found also out-of-doors in southern Finland according to NORDBERG (1936), KAISILA (1949) and the unpublished observations of the author.

Altogether five Phalangid and three Pseudoscorpionid species have been found in Finnish Lapland, one of them indoors only. *Mitopus morio* is common in the whole area treated, including all zones in Fjeld Lapland.

In Kuusamo numerous southern species of terrestrial invertebrates reach the northern limit of their abundant and regular occurrence, in many cases even the absolute one. This is mainly due to the great variability of favourable habitats available in this area (for details, see LEHTINEN 1964). The distribution of some Phalangid and Pseudoscorpionid species also seems to support the proposal that Kuusamo commune should constitute a strongly deviating subregion of the *Far North* (VIIth region in the new zoogeographical division of Finland).

As in spiders (LEHTINEN 1964), some species in the treated groups change their habitats close to the northern limit of their range, or at least become

more stenotopic. Instances are *Oligolophus tridens*, *Microbisium brevifemuratum*, and *Chelifer cancroides*.

Further investigations may lead to detailed changes in the limits of the ranges of the species treated, and single records of a few possible species (*Lacinius ephippiatus*, *Euphalangium nordenskiöldi*, *Neobisium carcinoides*, and *Dendrochernes cyrneus*) may be added, but the main features of the composition of the Phalangid and Pseudoscorpionid fauna of Lapland are already known.

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