

Finland (compare LUTHER 1901 and SILVOLA 1957). *Vertigo alpestris* has been found only once in northernmost Finnish Lapland, in Kuoppaniva (LUTHER 1901).

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OCURRENCE OF MACROLEPIDOPTERA IN THE BIOTOPES
OF THE KEVOJOKI AREA IN INARI LAPLAND
(FINLAND)

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I. INTRODUCTION

Material for this study was mainly collected in the Kevojoki River area in the summer of 1956 (Fig. 1). Spring came early that year. *Trollius europaeus* and *Geranium silvaticum* were in bloom and the birches in full leaf all the time I was in the area (30. VI.—20. VII.). The weather was excellent; it rained only on the first two days, and the sun shone almost the whole time. The north wind brought cold weather in the last few days, and Lepidoptera did not fly. Some observations made in 1959 and 1961 are included. For previous studies in Inari Lapland, see EURANTO & al. (1957) and JUSSILA (1957, 1963).

The frequency in every biotope is estimated according to the following scale:

- fqq = very common; the species was found in almost every observation area
fq = common; species found in more than 50 % of the observation areas
stfq = fairly common; in 36—50 %
p = local (passim); in 21—35 %
str = rather rare; in 11—20 %
r = rare; in 5—10 %
rr = very rare; in less than 5 %

The abundance of Macrolepidoptera species in different biotopes is estimated according to the following scale:

- epp = very abundant; more than 50 specimens in an observation area of 50—100 m²
ep = abundant; 21—50 specimens
step = fairly abundant; 11—20 specimens
sp = occasional; 8—10 specimens
stpc = rather scarce; 5—7 specimens
pc = scarce; 2—4 specimens
pec = very scarce; 1 specimen

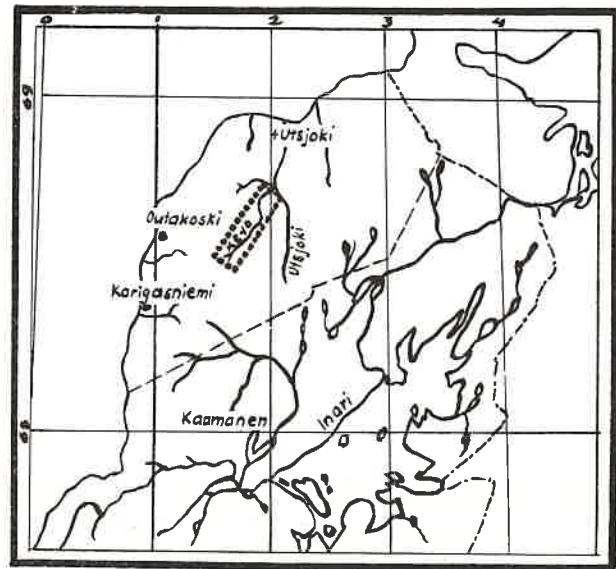


Fig. 1. The northern part of Inari Lapland. Kevojoki River area is enclosed by dotted lines.

II. BIOTOPES

The lack or the presence of the host plant of the larva in a biotope or its nearest surroundings has a decisive effect on the Lepidoptera in the biotope. The Lepidoptera oviposit where the larvae have abundant food. The imagos fly in biotopes where the host plant lives. Some species are very particular about their food; in the area studied, *Epirrhoe alternata* Müll. lives only on *Galium uliginosum*, *Perizoma blandiata dilacerata* Zett. on *Euphrasia frigida* and *Eupithecia bilunulata* Zett. on *Pinus silvestris*. Most larvae are however polyphagous (e.g. many *Noctuae*) or they live in plants common almost everywhere (e.g. *Oporinia autumnata* Bkh. on birch). In such cases, in addition to the adaptation of the species to the food available and so to the conditions presented by the flora of a biotope, the demands of the imagos on the biotope are important.

1. Alpine region

In the area studied, the alpine region is confined to the higher SW part, where *Cetraria nivalis* — *Carex bigelowii* heaths predominate (Fig. 2).

A. Dry heaths

This biotope is found only on the summits of the fjelds. *Cladonia* lichens constitute the ground cover in addition to *Empetrum hermaphroditum* and

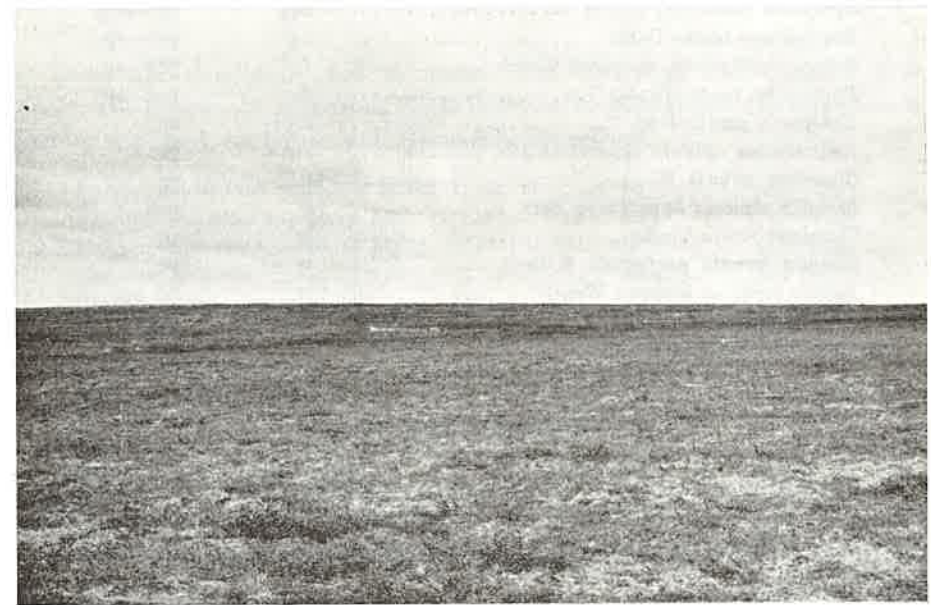


Fig. 2. Alpine region of the Poddusroadja mountain. — Photo R. J.

Vaccinium vitis-idaea. *Betula nana* is abundant. Other typical plants are *Arctostaphylos alpina*, *Loiseleuria procumbens*, *Diapensia lapponica* and *Salix herbacea*.

The following Macrolepidoptera fly in this biotope:

<i>Pygmaena fusca</i> Thnbg	fq	cp—cpp
<i>Entephria polata</i> Dup.	fq	step
<i>Clossiana polaris</i> B.	p	sp
<i>Psodos coracina lappona</i> Wehrli	str	step
<i>Polyommatus optilete cyparissus</i> Hb.	str	pcc
<i>Euphydryas iduna</i> Dalm.	r	pc
<i>Oenis bore</i> Sehn.	rr	pcc
<i>Clossiana chariclea</i> Sehn.	rr	pcc

B. Moist heaths

Moist heaths are found mainly on lower levels of the alpine region. Lichens do not predominate, but bryophytes. Typical plants are *Vaccinium myrtillus* and *Phyllodoce coerulea*. *Empetrum hermaphroditum* and *Betula nana* grow bigger than on the dry heaths.

The number of species is greater than on the dry heaths:

<i>Sympistis melaleuca</i> Thnbg	fqq	pe—step
<i>Euphydryas iduna</i> Dalm.	fq	pec—sp
<i>Eulype subhastata moestata</i> Nolck	fq	pec—sp
<i>Pygmaena fusca</i> Thnbg	fq	pec—sp
<i>Entephria polata</i> Dup.	stfq	sp
<i>Polymmatius optilete cyparissus</i> Hb.	str	pec
<i>Clossiana polaris</i> B.	r	sp
<i>Episilia alpicola hyperborea</i> Zett.	r	pec
<i>Clossiana freija</i> Thnbg	rr	pc
<i>Scopula ternata perfumata</i> E. Reut.	rr	pc
<i>Psodos coracina lappona</i> Wehrli	rr	pc
<i>Anarta melanopa</i> Thnbg	rr	pec
<i>Clossiana chariclea</i> Schn.	rr	pec

2. Subalpine birch region

The subalpine region is the prevalent vegetation zone in the Kevojoiki area. The most characteristic feature of this region is the fjeld birch (*Betula "tortuosa"*), which is low and bushy at higher levels, but forms woods at lower altitudes.

A. Dry birch heaths

These occur everywhere on poor, gravelly ground at the bottoms of valleys, on and above river banks. They contain sparse short trees and resemble apple orchards. Typical plants are *Cladonia* spp., *Empetrum hermaphroditum*, *Vaccinium vitis-idaea*, *V. myrtillus* and *Betula nana*.

The following species fly in the dry birch heaths:

<i>Eulype subhastata moestata</i> Nolck	fq	pe—cpp
<i>Episilia alpicola hyperborea</i> Zett.	fq	pec—cpp
<i>Colias palaeno lapponica</i> B. Pet	p	pec—pe
<i>Diarsia festiva borealis</i> Zett.	p	pec—pe
<i>Zygaena exulans</i> Hochenw.	p	pec
<i>Polyommatus optilete cyparissus</i> Hb.	str	pec—cpp
<i>Melitaea athalia scandinavica</i> Stgr	str	step
<i>Sympistis melaleuca</i> Thnbg	str	step
<i>Scopula ternata perfumata</i> E. Reut.	str	pec—sp
<i>Erebia pandrose lappona</i> Thnbg	str	pec
<i>Anarta melanopa</i> Thnbg	str	pec
<i>Xanthorhoë annotinata</i> Zett.	str	pec
<i>Pygmaena fusca</i> Thnbg	str	pec
<i>Erebia medusa polaris</i> Stgr	r	pec
<i>Phacosia gnoma frigida</i> Zett.	rr	pec
<i>Anomogyna lactabilis</i> Zett.	rr	pec
<i>Entephria caesiata annosata</i> Zett.	rr	pec
<i>Isturgia carbonaria</i> Cl.	rr	pec

B. Moist birch heaths

These are woodlands rich in mosses and dwarf shrubs. Characteristic species are *Vaccinium myrtillus*, *Empetrum hermaphroditum*, *Cornus suecica*, *Lastrea* spp. and, on better soil, *Geranium silvaticum*.

<i>Eulype subhastata moestata</i> Nolck	fq	pec—cpp
<i>Episilia alpicola hyperborea</i> Zett.	stfq	pec—step
<i>Entephria caesiata annosata</i> Zett.	stfq	pec—step
<i>Gnophos sordaria</i> Thnbg	stfq	pec—sp
<i>Diarsia festiva borealis</i> Zett.	p	pec—stpe
<i>Eupithecia satyrata</i> Hb.	p	pec—pe
<i>Pygmaena fusca</i> Thnbg	p	pec
<i>Zygaena exulans</i> Hochenw.	p	pec
<i>Sympistis melaleuca</i> Thnbg	str	pec—step
<i>Polyommatus optilete cyparissus</i> Hb.	str	pec—ep
<i>Erebia medusa polaris</i> Stgr	str	pec
<i>Scopula ternata perfumata</i> E. Reut.	str	pec
<i>Xanthorhoë annotinata</i> Zett.	str	pec
<i>Eupithecia gelidata hyperborea</i> Stgr	str	pec
<i>Anomogyna gelida</i> Sp. Schn.	rr	pec
<i>Sympistis funerbris</i> Hb.	rr	pec
<i>Psodos coracina lappona</i> Wehrli	rr	pec

C. Meadow forests

Mosses and dwarf shrubs are absent as a rule. *Trollius europaeus*, *Geranium silvaticum*, *Saussurea alpina*, *Viola biflora*, *Equisetum* spp. and ferns are typical plants.

The macrolepidopterous fauna is rich:

<i>Colias palaeno lapponica</i> B. Pet.	fq	pe—cp
<i>Scopula ternata perfumata</i> E. Reut.	fq	pec—cp
<i>Epirrhoë alternata</i> Müll.	fq	pec—cp
<i>Hydriomena ruberata</i> Fr.	fq	pec—cp
<i>Melitaea athalia scandinavica</i> Stgr	fq	pe—sp
<i>Lampropteryx suffumata defumata</i> Stich.	stfq	pe—step
<i>Clossiana thore scandinavica</i> Rygge	stfq	pec—step
<i>Eupithecia virgaureata attenaria</i> Stgr.	stfq	pec—pe
<i>Syngrapha hochcnwarthi lapponaris</i> Schulte	p	cp
<i>Clossiana euphrosyne</i> L.	p	pec—step
<i>Polyommatus optilete cyparissus</i> Hb.	p	pec—step
<i>Gnophos sordaria</i> Thnbg	p	pec—stpe
<i>Entephria caesiata annosata</i> Zett.	str	pec—cp
<i>Diarsia festiva borealis</i> Zett.	str	pe—step
<i>Clossiana selene hela</i> Stgr	str	pec—step
<i>Xanthorhoë munitata arcticaria</i> Germ.	str	pec—step

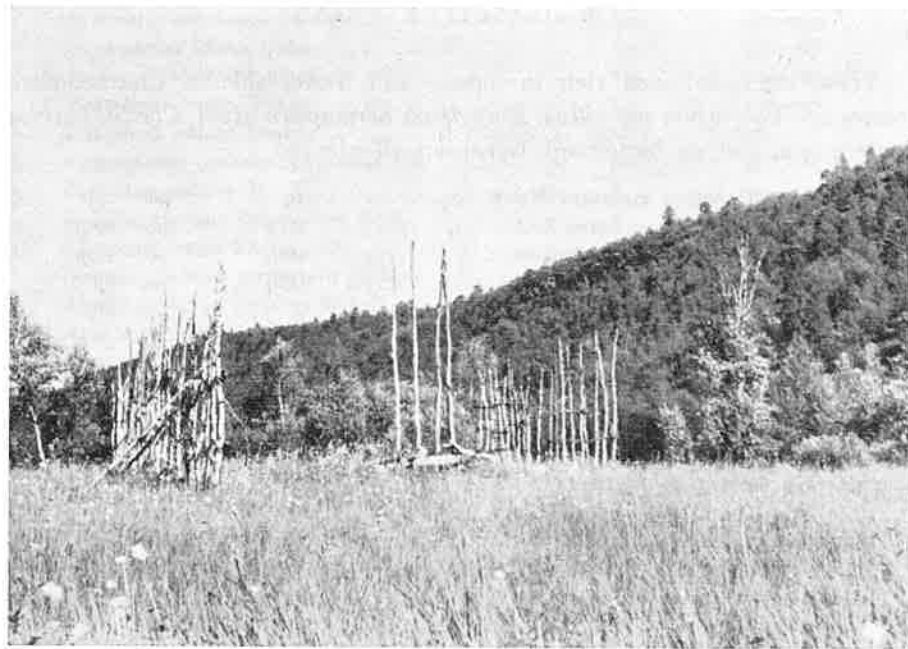


Fig. 3. Meadow in the canyon of Kevojoki near the mouth of the Madjoki River. —
Photo R. J.

<i>Erebia medusa polaris</i> Stgr	str	pec—pc
<i>Eupithecia palustraria</i> Dbl.	str	pec—pc
<i>Episilia alpicola hyperborea</i> Zett.	str	pec
<i>Anomogyna lactabilis</i> Zett.	r	pec
<i>Pieris napi bicolorata</i> B. Pet.	rr	pec
<i>Clossiana freija</i> Thnbg	rr	pec
<i>Pachnobia tecta</i> Hb.	rr	pec
<i>Xanthorhoë annotinata</i> Zett.	rr	pec
<i>Colostygia turbata fuscolimbata</i> Tgstr.	rr	pec
<i>Euphyia luctuata borealis</i> W. Pet.	rr	pec
<i>Perizoma blandiata dilacerata</i> Zett.	rr	pec
<i>Eupithecia intricata arceuthata</i> Frr	rr	pec
<i>Eupithecia gelidata hyperborea</i> Stgr	rr	pec
<i>Selenia bilunaria alpestris</i> Prt	rr	pec

D. Meadows

The meadows rich in *Trollius* represent semi-cultivated fields ("kenttä" in Finnish) typical of Lapland (Fig. 3). In the autumns the Lapps mow hay there, and so the meadows are prevented from becoming wooded.

<i>Colias palaeno lapponica</i> B. Pet.	fq	stpc—step
<i>Polyommatus optilete cyparissus</i> Hb.	fq	stpc—step
<i>Syngrapha hochenwarthi lapponaris</i> Schulte	stfq	pc—cp
<i>Xanthorhoë munitata arcticaria</i> Germ.	stfq	pec—cp
<i>Lampropteryx suffumata defumata</i> Stieh.	stfq	pec—cp
<i>Epirrhoë alternata</i> Müll.	p	sp—cpp
<i>Erebia medusa polaris</i> Stgr	p	pec—step
<i>Clossiana selene hela</i> Stgr	str	stpc—cp
<i>Perizoma albulata</i> Schiff.	str	stpc—cp
<i>Scopula ternata perfumata</i> E. Reut.	str	pec—cp
<i>Melitaea athalia scandinavica</i> Rygge	str	pec—stpc
<i>Hydriomena ruberata</i> Frr	str	pc
<i>Clossiana thore scandinavica</i> Rygge	str	pec
<i>Eupithecia palustraria</i> Dbl.	str	pec
<i>Eupithecia satyrata</i> Hb.	str	pec
<i>Clossiana freija</i> Thnbg	r	pec
<i>Diarsia festiva borealis</i> Zett.	r	pec
<i>Colostygia turbata fuscolimbata</i> Tgstr.	rr	pec—pc
<i>Lycaena helle lapponica</i> Backh.	rr	pec
<i>Syngrapha parilis</i> Hb.	rr	pec

E. Patches of willows

Patches of willows are found on the lower banks of the Kevojoki canyon where they form thickets on damp ground. The plant species include as a rule *Salix glauca*, *S. hastata*, *S. lapponum* and less frequently *S. lanata*. *Betula nana* is also abundant.

<i>Colias palaeno lapponica</i> B. Pet.	fq	step—cp
<i>Scopula ternata perfumata</i> E. Reut.	stfq	step—cp
<i>Eulype subhastata moestata</i> Nolek	stfq	pec—step
<i>Polyomaatus optilete cyparissus</i> Hb.	p	pc—cp
<i>Sympistis melaleuca</i> Thnbg	p	pec—cp
<i>Clossiana euphrosyne</i> L.	str	pec—step
<i>Gnophos sordaria</i> Thnbg	str	pec—step
<i>Clossiana eunomia montana</i> B. Pet.	r	pec—step
<i>Episilia alpicola hyperborea</i> Zett.	rr	pc
<i>Pieris napi bicolorata</i> B. Pet.	rr	pec
<i>Diarsia festiva borealis</i> Zett.	rr	pec
<i>Hydriomena ruberata</i> Frr	rr	pec

F. Bogs

Bogs occur both in the canyon and in the birch forests above it ("skaidi"). The plant species are *Betula nana*, *Salix myrsinites*, *S. phylicifolia*, *Rubus chamaemorus*, *Carex* spp. and many mosses.

<i>Polyommatus optilete cuparissus</i> Hb.	fqq	step—cpp
<i>Melitaea athalia scandinavica</i> Stgr	fqq	step—cp
<i>Clossiana euphrosyne</i> L.	fqq	sp—cp
<i>Colias palaeno lapponica</i> B. Pet.	fq	step—cp
<i>Clossiana freija</i> Thnbg	fq	pec
<i>Xanthorhoë abrasaria</i> H.S.	stfq	pec—stpe
<i>Euphydryas iduna</i> Dalm.	p	pec—pe
<i>Clossiana euonomia montana</i> B. Pet.	p	pec—pe
<i>Sympistis melaleuca</i> Thnbg	str	pec—stpe
<i>Scopula ternata perfumata</i> E. Reut.	str	pec—stpe
<i>Eulype subhastata moestata</i> Nolek	str	pec—stpe
<i>Erebia pandros lappona</i> Thnbg	r	pec
<i>Zygnaea exulans</i> Hoehenw.	r	pec
<i>Pyrgus centaureae griseus</i> Lghl.	rr	pec
<i>Clossiana frigga</i> Thnbg	rr	pec
<i>Syngrapha parilis</i> Hb.	rr	pec
<i>Hyphoraia lapponica</i> Thnbg.	rr	pec

3. Coniferous region

In the canyon of the Kevojoki River, the subalpine region is interspersed with small groves of Scotch pine (*Pinus silvestris*) (Fig. 4). The pine grows on slopes and hills on dry ground covered with esker gravel. The pine woods are thus nearest to the meagre *Vaccinium* — *Empetrum* — *Cladonia* type (KUJALA 1929). A typical species is *Arctostaphylos uva-ursi*.

The macrolepidopterous fauna is not very rich:

<i>Eulype subhastata moestata</i> Nolek	fqq	pe—cpp
<i>Scopula ternata perfumata</i> E. Reut.	fq	pe—cpp
<i>Colias palaeno lapponica</i> B. Pet.	stfq	pec—step
<i>Sympistis melaleuca</i> Thnbg	stfq	pec—step
<i>Melitaea athalia scandinavica</i> Stgr	stfq	pec—pe
<i>Eupithecia satyrata</i> Hb.	p	pec—pe
<i>Polyommatus optilete cyparissus</i> Hb.	str	pe—step
<i>Episilia alpicola hyperborea</i> Zett.	str	pec—sp
<i>Erebia medusa polaris</i> Stgr	str	pec
<i>Diarsia festiva borealis</i> Zett.	str	pec
<i>Gnophos sordaria</i> Thnbg	str	pec
<i>Pygmaena fusca</i> Thnbg	r	pec
<i>Entephria caesiata annosata</i> Zett.	rr	step
<i>Sympistis funerbris</i> Hb.	rr	pe
<i>Callophrys rubi borealis</i> Krul.	rr	pec
<i>Anomogyna lactabilis</i> Zett.	rr	pec
<i>Xanthorhoë annotinata</i> Zett.	rr	pec
<i>Xanthorhoë montanata lapponica</i> Stgr	rr	pec
<i>Euphyia luctuata borealis</i> W. Pet.	rr	pec
<i>Eupithecia gelidata hyperboreata</i> Stgr	rr	pec
<i>Eupithecia bilunulata</i> Zett. (Euranto & al. 1957)		pec



Fig. 4. Pine heath north of the Njaggaljärvet lakes. — Photo R. J.

III. SUMMARY

As the above lists show, the commonest species (above all *Colias palaeno lapponica*, *Melitaea athalia scandinavica*, *Polyommatus optilete cyparissus*, *Episilia alpicola hyperborea*, *Sympistis melaleuca*, *Scopula ternata perfumata* and *Eulype subhastata moestata*) are not confined to one biotope but live in different habitats. Hence rare species which live exclusively or mainly in one biotope characterise the biotope.

The following species can be regarded characteristic species of the biotopes in the Kevojoki area:

Dry heaths in the alpine region: *Oeniscus bore*

Moist heaths in the alpine region: no characteristic species

Dry birch heaths: no characteristic species

Moist birch heaths: *Anomogyna gelida*

Meadow forests: *Clossiana thore scandinavica* and *Euphyia luctuata borealis*

Meadows: *Perizoma albulata*

Patches of willows: no characteristic species

Bogs: *Clossiana frigga*, *Pyrgus centaureae griseus* and *Xanthorhoë abrasaria*

Coniferous groves: *Eupithecia bilunulata*.

As this list shows, the number of characteristic Macrolepidopterous species in every biotope is very small or no characteristic species occur at all. This may be due not only to the ability of Lepidoptera to adapt themselves

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

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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.