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A QUANTITATIVE INVESTIGATION OF THE MICROFAUNA COMMUNITIES OF THE SOIL IN EAST GREENLAND
(PRELIMINARY REPORT)

BY

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INTRODUCTION

During the Danish Three-Year Expedition to East Greenland in 1931—34 M. sc. G. THORSON, in the spring and summer of 1932, made a number of collections by means of Berlese funnels of the animals living in the soil on Ella Island and the neighbouring tracts of land. This investigation of the microfauna of the soil was continued in the spring of 1933 by stud. mag. HOLGER MADSEN, who collected a great many samples of soil on Clavering Island and Ella Island, and in the summer of 1933 by Mr. G. THORSON, who brought back from Scoresby Sound a considerable material. So far the collections have been made exclusively in the spring and summer, but they will now be supplemented by the collections made by stud. mag. F. SØGAARD-ANDERSEN on Ella Island in the winter of 1933—34. Finally, on Dr. KNUD RASMUSSEN's 7th Thule Expedition in 1933, similar investigations on the microfauna of the soil were made at Angmagssalik and by Mikis Fjord.

Since the working up of the material hitherto collected will take several years, it will be convenient to publish a preliminary report on the results so far arrived at. The present work is based exclusively on investigations made on Ella Island and the surrounding land areas.

I am greatly indebted to Dr. LAUGE KOCH for having entrusted me with the working up of the material. I also wish to thank the zoologists who made the collections, viz. M. sc. G. THORSON, cand. mag. J. BRÆNDEGAARD, and stud. mag. H. MADSEN. In the determination of several of the animal groups I have received much valuable assistance. Thus Mr. J. BRÆNDEGAARD has worked up the material of Araneida, Mr. F. SØGAARD-ANDERSEN has determined the Diptera, and Dr. K. HENRIKSEN the Coccidae. During my study of the Collembola and Acarina M. sc. S. L. TUXEN and M. sc. H. THAMDRUP have been of great help to me and kindly placed their collections of the particular animals at my disposal. I beg all the specialists mentioned here to accept my most cordial thanks for their excellent help. To Mr. THORSON and Dr. R. SPÄRCK I am indebted for good advice and the interest shown me during my work. Finally I have to thank M. sc. TH. SØRENSEN for the copious information concerning the vegetation of Ella Island, without which I should have been unable to publish this preliminary report at the present time.

A General View of the Material.

The present paper is meant to give a preliminary account of some microanimal communities living in the soil of Ella Island, the Franz Joseph Fjord area, East Greenland. In addition a number of samples are at hand from the surrounding districts, but these samples are few in number and hence only suited for a comparison with the results arrived at from the main station on Ella Island.

The material on which the work is based was for the most part collected by G. THORSON during his wintering on Ella Island in 1931—32. The collections were made in the period from the middle of May to the end of August, so that the samples are fairly equally distributed over the whole summer. Further, J. BRÆNDEGAARD collected some samples in July-August, 1932. The investigation is based on a total of 94 samples of soil, each of an area of $^1/_{100}$ sq. m and about 5 cm thick. The reason why such small samples were taken is that the best results are obtained by working with small samples. In all about 130 samples were taken, but so far only 94 have been worked out. Of these 63 are from Ella Island, 11 from Mineral Bay in Suess Land, 9 from Traill Island near the Scott-Keltie Islands, 7 from the Nordfjord, and 4 from Scoresby Sound. About half of the 130 samples were treated at the Ella Island station in the usual way (BORNEBUSCH 1930, pp. 11 and 163) in Berlese funnels adapted for the purpose, being kept either one or two days in warm water funnels or three or four days in cardboard funnels without heating. The other half, which was secured so late in the summer that the animals could not be collected by means of Berlese funnels, were taken in tight tins to the Zoological Museum in Copenhagen to be treated in funnels there. When the animals were collected from these samples, which were treated for a period of about two weeks without heating, *Acarina* and *Collembola* were so abundant that some samples of $^1/_{100}$ sq. m contained more than 2000 individuals, while samples treated in Greenland rarely yielded more than 250 animals per $^1/_{100}$ sq. m, in most cases less, generally from 50 to 100.

Quantitatively the latter samples can hardly be considered quite

reliable. It must be assumed that during the long voyage to Copenhagen the temperature and moisture in the tins in which they were conveyed were too favourable. Usually it may be taken for granted that a large number of ova and quite young individuals succumb to the unfavourable conditions to which they are exposed in nature. It looks as if an enormous development has taken place in the tins, and this seems a natural explanation of the abundance of animals. However, very propably these samples, which were collected rather late in the summer, that is, in the latter half of August, even if they had been collected in Greenland by means of Berlese funnels would have shown a somewhat higher figure as regards the number of animals than earlier in the year, since hatching seems to reach its maximum in August, as far as can be judged from some earlier samples, which showed a fairly great increase in the number of young towards the end of the summer. As already stated, the samples which have been treated in funnels at the museum can hardly be relied upon, at any rate quantitatively; nor can they be relied upon qualitatively, there being a possibility that some young have developed from ova that have been carried, for instance by the wind, from another plant community than that from which the sample was taken, and which might perhaps not have developed in this place in nature. Qualitatively, however, they seem in certain respects to give a better result than the samples treated in Greenland. Thus they often contain species which have not been found in rapidly treated samples; in samples kept 24 hours in warm water funnels such species have most likely dried up before getting through the funnel, and in samples treated for a few days without heating, the desiccation must have been insufficient to force them out of the soil.

The reason why so far only 94 samples have been treated, is in great part to be sought in the essential difference in the number of animals between the early and the late samples, and whenever both kinds of samples are mentioned together in this work, they are separated by a heavy line in order to avoid mistakes.

In the investigation of the animal communities that may be contained in the soil, it will not do, as for instance in investigations of animal communities of the sea bottom, to make random shots and erect an animal community on the basis of the results thus arrived at. In the soil, where a large number of factors exert their influence, such a mode of procedure would be impracticable, while in the sea, where conditions are more uniform, it may be successfully employed. In order to have something to go upon, one avails oneself of existing conditions, and samples are taken, as has been done previously, e. g. by Bornebusch, in connection with the plant communities in order to find out whether the latter and the factors that condition them, viz. the nature of the soil, the pH value,

etc., have any influence on the distribution of the animals, and whether they cause the various animal communities to come into existence in correlation to the plant communities. If not, other factors may possibly be of importance for the distribution of the animals, and other possibilities must be looked into.

The botanist TH. SØRENSEN has done careful quantitative investigations of the various plant communities, determined the pH value, etc., and in connection with these investigations, the samples of soil in which the animal life was to be investigated were taken within the twelve plant communities occurring on Ella Island, viz.: 1) "Fjældmark" (fellfield), 2) *Carex-rupestris*-herb-vegetation, 3) dry *Elyna*-vegetation, 4) damp *Elyna*-vegetation, 5) birch-scrub (*Betula nana*), 6) birch-"stripes" (*Betula nana*), 7) birch-grass-vegetation, 8) *Dryas*-heath, 9) mixed dwarf-shrub-vegetation (mixed chamaephyte-vegetation), 10) *Cassiope*-snow-patch (*Cassiope*-heath), 11) bog (tufted bog), and 12) banks of lakes, besides a very few outside these communities.

The more detailed characterisation of each plant community will be given under the special treatment of the samples from the individual communities.

The 94 samples that form the basis of this work contain upwards of 28,000 animals, about 19,000 of which are *Acarina*, about 8,000 *Collembola*, and about 1,000 distributed among *Coccidae*, *Diptera*, and *Araneida*. In addition there occurred a single *Coleoptera* larva, a couple of *Lepidoptera* larvæ, *Hymenoptera*, *Physopoda*, and some few *Enchytraeidae* and *Nematoda*. All the latter small animal groups will not be closely discussed in this paper, since they cannot be collected quantitatively by means of Berlese funnels and accordingly nothing can be inferred from their casual presence in this connection. The only groups here mentioned where a collection with Berlese funnels is certain to yield a fairly satisfactory result, are *Collembola*, *Coccidae*, *Acarina*, *Diptera* larvæ, and in part *Araneida*. As regards the latter, there is often a risk of their escaping from the top of the funnels.

The facility with which this immense material has been collected by using Berlese funnels, is a further proof of the great progress which the employment of Berlese funnels means for the investigation of the microfauna of the soil, and not only quantitatively, but qualitatively also good results are arrived at by this method. As regards the *Oribatidae*, it may be mentioned that in 99 samples, collected in East Greenland by G. SEIDENFADEN, GRAVERSEN (1931) only found three species by employing the earlier method, viz. picking up the animals by means of a pincet, while in the 94 samples here investigated 18 species were found by employing Berlese funnels. GRAVERSEN further writes that in the 18 "Fjældmark" samples he found no *Acarina* at all. All the "Fjæld-

mark'' samples here investigated contained several species, and of the 94 samples only one contained no *Acarina*. In all 40 species of *Acarina* were found, nineteen of which are new to Greenland, and some few more new to East Greenland. Only 13 species of *Collembola* were found, two of which were new to Greenland.

For the sake of clarity I shall here give a list of the *Collembola* and *Acarina* so far known from East Greenland. *Acarina* that have no direct association with the soil, as for instance *Hydrachnidae*, *Sarcoptidae*, etc., are not included in the list.

List of the *Collembola* and *Acarina* so far known from East Greenland.

(The species marked with a + have been found in this investigation, those marked with an asterisk are species new to Greenland).

Collembola.

Hypogastrura armata Nic.
— *viatica* Tullb.
— *manubrialis* Tullb.
\+ — *purpurascens* Lubb.
\+ — *longispina* Tullb.
— (*Schoettella*) *ununguiculata* Tullb.
Zenylla humicola O. Fabr.
Anurida granaria Nic.
Polyacanthella quinquespinosa Wahlgren.
Onychiurus armatus Tullb.
\+ — *affinis* Ågren var. *grønlandicus* Tullb.
\+ — *sibiricus* Tullb.
\+ *Tetracanthella wahlgreni* Axels. New to East Greenland.
\+ *Isotoma viridis* Bourl.
\+ — *olivacea* Tullb.
— *sexoculata* Tullb.
— *finitima* Stscherbakow.
\+ — (*Pseudisotoma*) *sensibilis* Tullb.
Folsomia fimetaria L.
\+ — *quadrioculata* (Tullb.).
\+ *Archisotoma besselsi* Packard. New to East Greenland.
*+ *Lepidocyrtus lanuginosus* (Gmel.).
\+ *Sminthurinus concolor* (Mein.).
*+ *Sminthurides malmgreni* (Tullb.).

Acarina.

*+ *Brachychthonius brevis* (MICH.).
*+ — *sellnicki* SIG THOR.
*+ *Trhypochthonius tectorum* (BERL.).
*+ *Nothrus silvestris* NIC.
— *biciliatus* C. L. KOCH.
\+ — *horridus* (HERM.).
\+ *Platynothrus peltifer* (C. L. KOCH).
*+ *Heminothrus thori* (BERL.).
\+ *Hermannia reticulata* THORELL.
*+ *Oppia quadricarinata* (MICH.)
*+ — *neerlandica* (OUDMS.).
*+ — *translamella* (WILLM.).
*+ — *ornata*? (OUDMS.).
\+ *Ceratoppia bipilis* (HERM.).
*+ — *hoeli* SIG THOR.
\+ *Ameronothrus lineatus* (THORELL). var. *nigrofemorata* (L. KOCH). New to East Greenland.
\+ *Tectocepheus velatus* (MICH.).
\+ *Oribatula exilis* (NIC.).
\+ *Trichoribates trimaculatus* (C. L. KOCH).
Oribata lucens L. KOCH.
Liponyssus semitectus (L. KOCH).
\+ *Eulaelaps ambulans* (THORELL).
\+ *Zercon triangularis* C. L. KOCH.
Parasitus fucorum (D. GEER).
\+ — *fucicola* TRÄG. New to East Greenland.
*+ — *spinipes* ? C. L. KOCH.
*+ *Eupodes lapponicus* ? TRÄG.
*+ — *clavifrons* R. CAN.
\+ *Penthaleus hæmatopus* C. L. KOCH.
— *insulanus* THOR.
\+ *Rhagidia gelida* THOR.
\+ *Bryobia prætiosa* C. L. KOCH.
*+ *Raphignathus patrius* BERL.
*+ — *siculus* BERL.
*+ *Bdella longicornis* (LIN.).
*+ — *semiscutata* SIG THOR.
— *littoralis* (L.).
\+ *Cyta latirostris* (HERM.).
\+ *Podothrombium bicolor* C. L. KOCH.
\+ *Erythraeus miniatus* HERM. New to East Greenland.
— *unidentatus* TRÄG.

\+ *Erythraeus vertex* ? KRAMER. New to East Greenland.
\+ — *groenlandicus* TRÄG. New to East Greenland.
\+ — *phalangioides* D. GEER var. *gracilipes* TRÄG. New to East Greenland.
\+ *Tyroglyphus* sp.
*+ *Rhizoglyphidae.*
*+ *Glyciphagus* sp.

On the basis of the animal groups previously mentioned, notably the *Collembola* and *Acarina*, all the samples from each plant community are tabulated separately. The purpose is to discover whether each plant community has its particular fauna, or whether the distribution of the animal communities is due to other causes. The treatment of the particular plant community investigated is preceded by a brief characterisation of it by the botanist TH. SØRENSEN.

In cases where several species of the same genus occur together in great numbers and are difficult to distinguish from one another, as for instance species of the genus *Brachychthonius*, species of the genus *Oppia*, etc., the more precise determination is not always given in the list, merely the genus being stated, e. g. *Brachychthonius* sp. When animals are stated to be "indeterminable", this most frequently means that they were so young (often only just hatched) that a closer determination was impossible.

The Plant Communities and the Microfauna of the Soil.

In the following section an account is first given of the twelve plant communities occuring on Ella Island and of the animals found in them. As a thirteenth community or locality is mentioned the littoral meadow, likewise from Ella Island.

After treatment of the material from Ella Island, which is by far the most comprehensive, the animals collected from Suess Land, Traill Island, and the Nordfjord are in a similar way considered in relation to the plant life. As already stated, the samples from these places are very few in number, having been collected on small excursions in the course of some few days. For the same reason information of the vegetation, moisture, etc., is rather incomplete. Another reason for this is that the samples were originally taken merely to obtain knowledge of the species usually occurring in the soil without actually attaching any biological importance to the collections. However, the material may very well be employed for a comparison with the results from Ella Island.

1. "Fjældmark" (fell-field).

The soil not covered with a closed vegetation. The plants are scattered and generally form dense cushions (the Berlese samples were taken from the cushions). No bottom vegetation of moss. Usually free of snow in the winter. Very dry in the summer. The soil mostly made up of sharp-edged gravel.

The principal plant species are:

Carex nardina.
Dryas octopetala.
Saxifraga oppositifolia.
Carex rupestris (not caespitose).

Of less importance are:

Silene acaulis.
Lesquerella arctica.

The columns give the number of individuals.

D. = 24 hours V. = warm water funnel K = without heating	1 D. V. $^{22}/_{5}$ 32	7 D. K. $^{22}/_{5}$ 32	4 D. K. $^{19}/_{6}$ 32
Hypogastrura longispina	..	..	1
Onychiurus sibiricus	..	2	8
Folsomia quadrioculata	1	..	9
Sminthurinus concolor	..	..	1
Indeterminable Collemboles	..	..	28
Pseudococcinae	32	125	12
Dictynidae	..	..	3
Nothrus horridus	..	..	1
Platynothrus peltifer	..	..	1
Oppia neerlandica	..	..	6
Tectocepheus velatus	..	..	1
Oribatula exilis	2	4	3
Trichoribates trimaculatus	..	..	1
Zercon triangularis	..	..	3
Indeterminable *Parasitidae*	..	..	24
Bdella longicornis	..	1	2
Erythraeus miniatus	7	1	..
Erythraeus vertex?	..	..	2
Indeterminable nymphs	15	20	37

As will appear from the table, the animal life on the "Fjældmark" is very sparse. Of *Collembola*, *Onychiurus sibiricus* and *Folsomia quadrioculata* are most frequently met with, while the oribatid *Oribatula exilis* is by far the commonest Acarine. *Zercon triangularis* is the only representative of the parasites, while the *Trombidiidae* are represented by *Bdella longicornis* and *Erythraeus miniatus*, both of which, however, are sparse. *Pseudococcidae* occur throughout the "Fjældmark".

2. *Carex-rupestris*-Herb-Vegetation.

The ground more or less densely covered with grass. No bottom vegetation of moss. Free of snow in the winter. Very dry in the summer. The soil consisting of fine, humus-like sand.

Characteristic species of plants:

Carex rupestris.

Further, the following species are often of high frequency:

Carex nardina.
Saxifraga oppositifolia.
Minuartia rubella.

Frequent, but mostly more scattered, are generally found:

Arenaria ciliata (subsp. *pseudofrigida*).
Draba daurica.
Draba cinerea.
Melandryum triflorum.
Lesquerella arctica.
Poa glauca.
Dryas octopetala.

As on the "Fjældmark", here, too, the animal life is very sparse. As already stated, the late samples contain a far greater number of individuals than the early ones; the sample from August 25 is a distinct example of this, exhibiting not only a greater abundance of species but also a greater number of individuals of each species than samples taken earlier in the year. The latter statement applies to some of the characteristic animals of this type of vegetation, as for instance *Onychiurus sibiricus*, *Pseudococcinae*, *Oribatula exilis*, and *Bdella longicornis*, all forms common in the "Fjældmark" also. Here, too, *Zercon triangularis* is the parasite of most common occurrence. *Diptera* and *Araneida* are only occasionally met with.

The columns give the number of individuals.

D. = 24 hours V. = warm water funnel K. = without heating	$1^1/_2$ D. V. $^{19}/_5$ 32	4 D. K. $^{19}/_5$ 32	14 D. K. $^{25}/_8$ 32
Hypogastrura longispina	..	..	1
Onychiurus sibiricus	2	..	44
Isotoma viridis	..	..	3
Isotoma sensibilis	..	..	3
Folsomia quadrioculata	..	..	18
Indeterminable Collemboles	..	1	356
Pseudococcinae	1	..	8
Phaenocladius sp.	2	..	..
Mycetophilidae	1	..	..
Lycosidae	..	1	..
Linyphiidae	..	..	2
Trhypochthonius tectorum	..	..	4
Nothrus horridus	..	2	..
Tectocepheus velatus	..	2	2
Oribatula exilis	2	..	12
Trichoribates trimaculatus	..	..	7
Eulaelaps ambulans	..	..	1
Zercon triangularis	..	2	1
Indeterminable *Parasitidae*	..	..	3
Eupodes sp.	..	..	8
Rhagidia gelida	..	..	1
Bdella longicornis	1	..	20
Cyta latirostris	..	..	1
Podothrombium bicolor	..	1	2
Erythraeus miniatus	7	..	1
Indeterminable nymphs	52	30	c. 150

3. Dry *Elyna*-Vegetation.

The soil covered with a grass carpet often somewhat tufted. No bottom vegetation of moss. Sometimes a very few lichens (*Cladonia*, *Stereocaulon*). Free of snow in the winter. Very dry in the summer. Slopes or declivities with a southward exposure, on mineral soil.

Characteristic species of plants:

Elyna Bellardii.
Carex rupestris.

Species of high frequency:

Polygonum viviparum.
Carex supina.
Calamagrostis arundinacea (*purpurascens*).
Potentilla nivea.
Euphrasia latifolia.

The columns give the number of individuals.

D. = 24 hours V. = warm water funnel K = without heating	1 D. V. $^{21}/_{5}$ 32	1 D. V. $^{21}/_{6}$ 32	1 D. V. $^{22}/_{6}$ 32	3 D. K. $^{23}/_{6}$ 32
Hypogastrura longispina	1	..	..	..
Onychiurus sibiricus	9	4	..	..
Isotoma sensibilis	8	..	..	..
Folsomia quadrioculata	..	2	..	..
Sminthurinus concolor	40	..	..	..
Indeterminable Collemboles	3	1	2	47
Pseudococcinae	28	..	8	3
Tipulidae	2	..	..	..
Forcipomyia sp.	1	..	..	..
Lycosidae	4	..	..	..
Linyphiidae	2	..	..	..
Brachychthonius brevis	..	..	..	5
Trhypochthonius tectorum	2	..	..	..
Nothrus horridus	11	..	..	..
Heminothrus thori	1	..	..	..
Oppia quadricarinata	..	..	..	3
Tectocepheus velatus	15	3	..	55
Oribatula exilis	3	6	2	7
Trichoribates trimaculatus	8	..	..	11
Eulaelaps ambulans	2	..	..	..
Zercon triangularis	1	1	..	..
Indeterminable *Parasitidae*	8	..	1	9
Eupodes sp.	..	2	..	..
Rhagidia gelida	..	..	1	..
Bryobia praetiosa	..	9	15	11
Raphignathus siculus	1	..	..	..
Bdella longicornis	2	6	5	10
Bdella semiscutata	..	1	..	..
Erythraeus miniatus	1	..	2	2
Indeterminable *Trombidiidae*	..	3	..	64
Glyciphagus sp.	..	..	..	1
Indeterminable nymphs	12	4	c. 20	c. 280

Otherwise the following species are frequently found:

Carex nardina.
Lesquerella arctica.
Campanula rotundifolia.
Braya humilis.

As will appear from the table, the dry *Elyna* vegetation harbours an animal life greatly resembling that of the "Fjældmark" and the *Carex-rupestris*-herb-vegetation. The same species occur as characteristic animals, viz. *Onychiurus sibiricus*, *Pseudococcinae*, *Oribatula exilis*, *Zercon triangularis*, and *Bdella longicornis*, but in addition the Oribatid *Tectocepheus velatus* is rather numerous in this plant community. The same is the case with *Bryobia praetiosa*, which, being parasitic on plants, must be assumed to be connected with a plant belonging to this community.

4. Damp *Elyna*-Vegetation.

A very dense and thick cover of grass. No bottom vegetation of moss or lichens. Slight or no snow-covering in the winter. Abundant water supply in the spring. Desiccating rather late. Somewhat peaty mineral soil. With a southward (or at any rate a favourable) exposure.

Characteristic species of plants: *Elyna Bellardii*, often, however, highly mixed with the below-mentioned very frequent *Carex* species (and *Cobresia*).

Species of high frequency:

Carex scirpoidea.
Carex capillaris.
Carex rupestris.
Cobresia bipartita.
Polygonum viviparum.
Euphrasia latifolia.

Further, the following species are of frequent occurrence:

Salix arctica.
Dryas octopetala.
Carex misandra.
Juncus triglumis.
Pedicularis flammea.
Braya purpurascens.
and some few other species.

On the whole a luxuriant vegetation rich in species.

The columns give the number of individuals.

D = 24 hours V = warm water funnel K = without heating	$1^1/_2$ D. V. $^2/_6$ 32	$1^1/_2$ D. V. $^{26}/_6$ 32	$1^1/_2$ D. V. $^{27}/_6$ 32	4 D. K. $^{30}/_6$ 32
Hypogastrura longispina	2	1	..	..
Onychiurus sibiricus	11	2	6	..
Isotoma sensibilis	1	..	..	..
Folsomia quadrioculata	1	1	..	..
Sminthurinus concolor	24	2	1	..
Indeterminable Collemboles	11	..	..	1
Pseudococcinae	..	6	..	..
Phoridae	1	1	..	1
Linyphiidae	..	1	..	..
Nothrus horridus	3	..	..	..
Nothrus silvestris	..	22	..	2
Oppia neerlandica	1	..	..	..
Tectocepheus velatus	5	3	..	..
Oribatula exilis	5	9	2	2
Eulaelaps ambulans	..	..	1	..
Zercon triangularis	4	1	1	..
Indeterminable *Parasitidae*	7	2	..	1
Rhagidia gelida	..	4	1	..
Bryobia praetiosa	..	3	4	3
Bdella longicornis	2	4	..	1
Cyta latirostris	..	2	1	..
Erythraeus miniatus	..	3	2	..
Indeterminable *Trombidiidae*	..	..	3	..
Glyciphagus sp.	..	..	..	14
Indeterminable nymphs	3	19	12	3

The fauna of the damp *Elyna*-vegetation greatly resembles that of the dry *Elyna*-vegetation, and the same species of animals are characteristic. The *Acarina* dominate over the other animal groups, which apart from the *Collembola* are very sparsely represented.

5. Birch-Scrub (*Betula nana*).

As a rule a dense scrub vegetation of a height of 5—20 cm. The ground mostly covered with a comparatively thick layer of withered foliage. No moss vegetation. Free of snow early in the spring. Desiccating in the summer. Slopes and declivities with a favourable exposure. Beneath the withered leaves covering the soil mostly a thin layer of raw humus.

Characteristic species of plants:

Betula nana.

Further, the following species are generally of high frequency:

Pyrola grandiflora.
Carex rupestris.

Of more scattered occurrence are:

Dryas octopetala.
Salix arctica.
Saxifraga oppositifolia.
Polygonum viviparum.
Draba cinerea.

The columns give the number of individuals.

D. = 24 hours V = warm water funnel K = without heating	2 D. V. $^{24}/_{5}$ 32	6 D. K. $^{24}/_{5}$ 32	3 D. K. $^{23}/_{6}$ 32	1 D. V. $^{24}/_{6}$ 32	4 D. K. $^{26}/_{6}$ 32
Onychiurus sibiricus	..	..	16	1	35
Sminthurinus concolor	..	..	1	..	..
Indeterminable Collemboles	7	21	..	..	8
Pseudococcinae	4	..	1	124	2
Phaenocladius sp.	..	..	1	..	..
Mycetophilidae	..	..	1	..	..
Linyphiidae	..	2	..	..	1
Brachychthonius brevis	..	..	..	..	6
Trhypochthonius tectorum	..	..	..	31	10
Oppia quadricarinata	..	..	..	..	2
Oribatula exilis	1	1	3	..	16
Zercon triangularis	..	1	1	2	7
Indeterminable *Parasitidae*	..	..	1	..	2
Rhagidia gelida	..	3	1	..	..
Bryobia praetiosa	..	..	56	31	50
Bdella longicornis	..	..	3	5	2
Cyta latirostris	1	1	..	2	..
Erythraeus miniatus	..	..	..	4	..
Glyciphagus sp.	..	..	1	2	1
Indeterminable nymphs	8	37	20	5	c. 110

The birch-scrub-vegetation, whose flora deviates rather considerably from the above-mentioned plant community, exhibits an animal

life corresponding entirely to those of the latter; all the same forms occur as characteristic animals. The Trombidiid *Bryobia praetiosa* is present in great abundance, presumably it is associated with a certain plant characteristic of this community.

6. Birch-"stripes" *(Betula nana).*

A form of vegetation occurring on gently sloping ground. From a distance it is recognisable as stripes of vegetation extending in the direction of the inclination of the ground between the much broader belts of polygonous soil almost devoid of vegetation. Within the birch stripes, which appear as small furrows in the territory, a rather lively movement of melt-water takes place when the snow is dissolving. However, in the late summer a more or less complete desiccation of the upper layers of the soil can be observed. Often a fairly large quantity of hypnoid mosses in the soil.

The columns give the number of individuals.

D = 24 hours V = warm water funnel K. = without heating	2 D. V. $^{26}/_{5}$ 32	1 D. V. $^{18}/_{6}$ 32	4 D. K. $^{2}/_{7}$ 32	4 D. K. $^{2}/_{7}$ 32	1 D. V. $^{4}/_{7}$ 32	14 D. K. $^{25}/_{8}$ 32
Hypogastrura longispina	..	..	1	..	..	..
Onychiurus sibiricus	9	26	19	6	13	..
Isotoma sensibilis	..	1	..	..	..	..
Sminthurinus concolor	2	..	..	..	..	..
Pseudococcinae	..	..	..	4	..	21
Linyphiidae	1	2	..	..	1	..
Nothrus horridus	18	18	..	1	2	1
Tectocepheus velatus	2	..	..	..	..	..
Oribatula exilis	..	41	2	..	..	92
Trichoribates trimaculatus	..	1	..	..	..	14
Eulaelaps ambulans	..	2	..	..	..	3
Zercon triangularis	..	4	..	..	..	4
Indeterminable *Parasitidae*	1	3	..	..	..	..
Rhagidia gelida	..	5	..	..	..	..
Bryobia praetiosa	..	4	..	5	8	..
Bdella longicornis	3	2	1	..	1	..
Cyta latirostris	..	1	..	2	..	..
Erythraeus miniatus	2	2	..	..	..	..
Indeterminable *Trombidiidae*	8	1	..	..	..	..
Indeterminable nymphs	..	..	5	14	5	c. 200

Characteristic plant: *Betula nana*, which, however, is often highly mixed with *Vaccinium uliginosum* and *Dryas octopetala.*

Of high frequency are further:

Salix arctica.
Carex rupestris.
Saxifraga oppositifolia.
Polygonum viviparum.
Equisetum variegatum.

More scattered, but still frequent are:

Cassiope tetragona.
Carex scirpoidea.
Carex capillaris.
Carex misandra.
Silene acaulis.
Pedicularis lapponica.
Pedicularis flammea.

The greater dampness of the birch-"stripes" seems to cause a more frequent occurrence of the Collembole *Onychiurus sibiricus*, which like all Collemboles prefers rather wet localities. Apart from the presence of the Oribatid *Nothrus horridus*, which is fairly common, the same forms as are met with in the plant communities previously mentioned are characteristic of this type of vegetation, viz. *Oribatula exilis*, *Zercon triangularis*, *Bryobia praetiosa*, and *Bdella longicornis.*

7. Birch-Grass-Vegetation.

Occurs mostly on level ground. The vegetation is closed, but somewhat tufted. The dwarf birch is very low and almost disappears among the grass. No moss vegetation at the bottom. It is highly saturated with water in the spring, but usually dries up early. The type must be regarded as a transitional form between birch-scrub and the damp *Elyna*-vegetation. As regards exposure it is more favoured than these two types of vegetation. As regards water supply it is much less favoured than the *Elyna* type.

Characteristic species of plants:

Elyna Bellardii.
Carex nardina.
— *scirpoidea.*
— *rupestris.*

Betula nana.
Cobresia bipartita.

all more or less mosaic-like or in patches. Patches devoid of vegetation which have been flooded in the spring also occur.

The columns give the number of individuals.

D. = 24 hours V. = warm water funnel K. = without heating	1 D. V. $^{25}/_{6}$ 32	4 D. K. $^{26}/_{6}$ 32	1 D. V. $^{28}/_{5}$ 32	 $^{16}/_{8}$ 32	 $^{16}/_{8}$ 32	14 D. K. $^{16}/_{8}$ 32
Onychiurus sibiricus	..	5	1	11	..	..
Sminthurinus concolor	..	..	15	..	..	..
Indeterminable Collemboles	6	..	18	1	..	..
Pseudococcinae	8	3	2	..	..	28
Mycetophilidae	1	..	..	..	..	..
Dictynidae	..	..	1	..	..	..
Thomisidae	..	..	..	..	..	1
Linyphiidae	1	..	..	..	..	..
Brachychthonius brevis	..	15	..	13	..	..
Trhypochthonius tectorum	..	..	1	..	..	..
Nothrus horridus	2	1	3	4	..	1
Oppia quadricarinata	..	7	..	..	..	..
Oppia neerlandica	..	..	..	2	..	..
Oribatula exilis	9	17	..	17	1	60
Trichoribates trimaculatus	..	1	..	2	..	..
Zercon triangularis	3	..	..	3	..	..
Indeterminable *Parasitidae*	..	1	..	..	..	..
Rhagidia gelida	2	..	1	1	..	..
Bryobia praetiosa	1	6	..	..	..	..
Bdella longicornis	3	5	..	..	1	10
Erythraeus miniatus	1	2	..	2	2	24
Glyciphagus sp.	..	8	..	..	..	..
Indeterminable nymphs	19	107	3	14	30	c. 230

This plant community, which, like any other plant community, must be considered a fairly well-defined whole with its characteristic flora, situation, water supply, etc., does not either contain a fauna deviating essentially from that living in the previously mentioned plant communities. The same species occur as characteristic animals. *Diptera* larvæ and *Araneida* rarely occur.

8. The *Dryas*-Heath.

The columns give the number of individuals.

D. = 24 hours V = warm water funnel K = without heating	1 D. V. $^{23}/_{5}$ 32	4 D. K. $^{19}/_{6}$ 32	1 D. V. $^{19}/_{6}$ 32	14 D. K. $^{26}/_{8}$ 32
Hypogastrura longispina	1	3	2	..
Onychiurus sibiricus	60	16	10	109
Isotoma sensibilis	4	..	..	4
Folsomia quadrioculata	8	7	..	8
Sminthurinus concolor	4	..	..	..
Sminthurides malmgreni	..	1	..	..
Indeterminable Collemboles	15	69	3	262
Pseudococcinae	42	5	5	39
Phaenocladius sp.	1	..	..	..
Phoridae	..	..	1	..
Dictynidae	1	2	1	..
Lycosidae	..	1	1	..
Thomisidae	..	1	..	..
Linyphiidae	7	9	..	3
Brachychthonius brevis	..	1	..	1
Nothrus horridus	..	..	1	1
Platynothrus peltifer	..	1	..	..
Oppia quadricarinata	1	..	..	..
Oppia neerlandica	..	15	..	..
Tectocepheus velatus	31	4	4	..
Oribatula exilis	..	4	5	..
Trichoribates trimaculatus	14	..	..	27
Eulaelaps ambulans	4	4	11	3
Zercon triangularis	3	1	1	4
Parasitus fucicola	1	..	..	..
Indeterminable *Parasitidae*	5	3	1	1
Eupodes sp.	..	..	..	5
Rhagidia gelida	5	..	..	..
Bryobia praetiosa	..	3	1	..
Bdella longicornis	8	7	8	11
Bdella semiscutata	..	1	..	..
Cyta latirostris	..	1	..	..
Erythraeus miniatus	..	..	..	1
Erythraeus ph. var. *gracilipes*	..	..	2	..
Erythraeus sp.	..	..	4	..
Indeterminable nymphs	16	36	..	179

An evenly distributed, or more or less caespitose or pulvinate, usually fairly thick cover of vegetation. Often occurring in small, flat depressions in rocky territory, and hence exposed to much saturation in the spring by the water originating from the melting of the snow, and strong deciccation later in the summer. Moss vegetation quite inconsiderable.

Characteristic species of plants:

Dryas octopetala.

Further the following species are often of high frequency:

Carex rupestris.
— *misandra.*
Saxifraga oppositifolia.

Species of rather frequent occurrence:

Salix arctica.
Polygonum viviparum.
Silene acaulis.
Carex nardina.

In this fairly dry locality the animal life is characterised by the great number of species. This applies to all the animal groups. Especially remarkable is the large number of *Araneida.* Of the *Collembola*, *Onychiurus sibiricus* is numerous here. Of the *Oribatidae*, *Tectocepheus velatus* and *Trichoribates trimaculatus* are of rather frequent occurrence, less frequent is *Oribatula exilis.* As regards the parasites, *Eulaelaps ambulans* and *Zercon triangularis* are common. The Trombidiid *Bdella longicornis* is likewise of common occurrence.

9. Mixed Dwarf-Shrub-Vegetation (Mixed Chamaephyte Vegetation).

Usually occurs on more or less level ground, often on flats outside the *Cassiope* snow-patch proper, and is thus generally more sparsely snow-covered and becomes free of snow earlier than the latter. It dries up relatively late in the summer, or retains a certain dampness throughout the summer. There is often some bottom vegetation of moss. Further, there is usually a thin layer of raw humus above the mineral soil.

The characteristic species of plants are dwarf shrubs, viz.:

Betula nana.
Dryas octopetala.

The columns give the number of individuals.

D. = 24 hours V. = warm water funnel K. = without heating.	1 D. V. $^{20}/_{5}$ 32	1 D. V. $^{21}/_{5}$ 32	14 D. K. $^{25}/_{8}$ 32
Hypogastrura longispina	1	..	4
Onychiurus sibiricus	26	28	92
Isotoma sensibilis	..	..	5
Folsomia quadrioculata	..	..	20
Sminthurinus concolor	..	1	..
Indeterminable Collemboles	..	..	143
Pseudococcinae	15	2	23
Dictynidae	..	1	..
Linyphiidae	..	..	1
Brachycthonius brevis	1	..	..
Trhypochthonius tectorum	..	64	..
Nothrus horridus	..	..	1
Oppia sp.	..	2	3
Tectocepheus velatus	1	7	61
Oribatula exilis	1	1	4
Trichoribates trimaculatus	7	2	10
Zercon triangularis	..	1	..
Parasitus spinipes?	..	..	1
Indeterminable *Parasitidae*	2	2	..
Eupodes sp.	..	..	21
Rhagidia gelida	..	..	2
Bdella longicornis	5	4	..
Podothrombium bicolor	..	1	..
Erythraeus sp.	2	3	..
Indeterminable nymphs	1	6	c. 350

Vaccinium uliginosum.
Rhododendron lapponicum.
Cassiope tetragona.

Of high frequency are:

Carex rupestris.
Silene acaulis.
Polygonum viviparum.
Tofieldia palustris.
Carex scirpoidea.
Equisetum variegatum.

Frequent are further:

Arctostaphylos alpina (with a tendency to form patches).
Salix arctica.
Carex nardina.
— *capillaris.*
— *misandra.*
Pedicularis flammea.
— *lapponica.*

And often several other species.

Despite the great difference between the early samples and the last sample collected, it is quite clear what species may always be expected to occur in this type of vegetation. Thus *Onychiurus sibiricus* is rather numerously represented in all the samples; the same applies to the *Pseudococcinae* and the *Oribatidae: Tectocepheus velatus*, *Oribatula exilis*, and *Trichoribates trimaculatus*. The *Parasitidae* are very sparsely represented. Specimens belonging to the genus *Eupodes*, which occurs in rather great numbers in the sample collected latest in the season, will presumably be found in the earlier samples, too, when by collection in Berlese funnels they are treated in the same way as this sample. *Bdella longicornis* is the commonest Trombidiid.

10. The *Cassiope*-Snow-patch (*Cassiope*-Heath).

This type of vegetation is of characteristic occurrence in the form of bands of a fairly considerable width at the foot of slopes and declivities, that is, in places where the snow accumulates in the winter. Thus the *Cassiope* vegetation becomes free of snow late in the spring and is not particularly liable to desiccation in the summer. *Cassiope* here forms a dense carpet. The moss vegetation is almost entirely absent. No actual humus layer is formed. Sometimes a slight accumulation of dust and sand takes place, which will remain when the snow has melted.

Characteristic species of plants:

Cassiope tetragona.

Other species of high frequency:

Salix arctica.
Polygonum viviparum.

Further the following species occur, but play a subordinate role:

Dryas octopetala.
Vaccinium uliginosum.

Carex rupestris.
— *misandra.*
Equisetum arvense.
Tofieldia palustris.
Pedicularis hirsuta.

The columns give the number of individuals.

D = 24 hours V = warm water funnel K = without heating	1 D. V. $^{30}/_{6}$ 32	1 D. V. $^{1}/_{7}$ 32	2 D. V. $^{2}/_{7}$ 32	14 D. K. $^{26}/_{8}$ 32
Hypogastrura longispina	..	..	..	1
Onychiurus sibiricus	40	33	25	255
Folsomia quadrioculata	..	..	1	37
Sminthurinus concolor	1	..	..	..
Indeterminable Collemboles	..	..	25	487
Pseudococcinae	6	25	29	89
Phaenocladius sp.	1	..	..	..
Brachychthonius brevis	..	..	..	5
Nothrus horridus	2	1	..	..
Tectocepheus velatus	3	..	..	..
Oribatula exilis	..	..	4	..
Trichoribates trimaculatus	4	1	8	92
Zercon triangularis	..	..	..	5
Indeterminable *Parasitidae*	..	..	2	10
Eupodes sp.	..	..	..	1
Rhagidia gelida	2	..	..	..
Raphignathus siculus	..	..	..	5
Bdella longicornis	1	1	1	1
Erythraeus miniatus	1	6	3	..
Erythraeus sp.	2	..	1	..
Glyciphagus sp.	..	3	..	..
Indeterminable nymphs	2	6	10	111

Onychiurus sibiricus is very numerous and present everywhere; the same applies to the *Pseudococcinae*. Of the *Oribatidae*, *Trichoribates trimaculatus* is by far the commonest, while *Oribatula exilis* is represented by a few specimens only. None of the *Parasitidae* are common, whereas among the *Trombidiidae*, *Bdella longicornis* and *Erythraeus miniatis* are present everywhere, but in small numbers.

11. Bog. (Tufted Bog).

The columns give the number of individuals.

D. = 24 hours V. = warm water funnel K. = without heating	1 D. V. $^{20}/_{5}$ 32	1 D. V. $^{17}/_{6}$ 32	$1^{1}/_{2}$ D. V. $^{29}/_{6}$ 32	4 D. K. $^{30}/_{6}$ 32	14 D. K. $^{16}/_{8}$ 32	14 D. K. $^{16}/_{8}$ 32	14 D. K. $^{16}/_{8}$ 32	14 D. K. $^{16}/_{8}$ 32	14 D. K. $^{16}/_{8}$ 32
Hypogastrura longispina	..	1	..	..	15	5	3	7	8
Onychiurus sibiricus	155	56	42	16	87	152	110	84	126
Isotoma sensibilis	1	4	..	..	18	8	10	5	8
Isotoma viridis	..	..	4	..	..	1	..	3	..
Folsomia quadrioculata	..	5	16	1	25	21	24	22	56
Lepidocyrtus lanuginosus	..	..	..	..	..	..	..	1	..
Sminthurinus concolor	3	2	..	2	34	30	5	8	..
Indeterminable Collemboles	..	..	26	4	555	513	325	137	365
Pseudococcinae	13	1	3	2	15	38	22	36	40
Phaenocladius sp.	..	..	..	..	3	..	1	1	..
Phoridae	..	..	..	..	1	..	1	..	1
Dictynidae	..	..	..	..	..	1	..	..	..
Linyphiidae	4	..	..	..	..	..	..	3	..
Brachychthonius brevis	..	2	..	..	25	..	..	..	..
Nothrus horridus	3	4	1	..	..	3	1	..	..
Heminothrus thori	..	13	2	..	176	55	94	210	171
Tectocepheus velatus	3	8	2	..	104	30	c. 150	90	45
Oribatula exilis	..	..	..	..	1	..	..	..	..
Trichoribates trimaculatus	11	9	1	2	10	52	31	17	7
Indeterminable *Oribatidae* one species	..	18	36	15	22	43	14	46	29
Eulaelaps ambulans	..	1	..	..	..	3	2	9	2
Parasitus sp.	..	..	..	..	4	4	1	1	..
Indeterminable *Parasitidae* one species	2	..	3	7	30	35	18	15	8
Eupodes clavifrons	..	..	..	..	7	1	3	30	36
Raphignathus patrius	..	..	..	..	..	..	2	1	5
Bdella longicornis	2	1	..	..	..	15	14	10	5
Cyta latirostris	..	..	..	2	1	4	3	1	4
Erythraeus miniatus	..	5	2	..	3	6	..	1	5
Indeterminable *Trombidiidae*	..	..	13	..	..	..	..	..	..
Indeterminable nymphs	..	15	11	6	c. 110	c. 300	c. 270	c. 230	c. 300

Big tufts, chiefly built up of fibrous raw humus. The tufts are separated by passages of mineral soil, which are flooded with water in the spring and sometimes most of the summer. (The Berlese samples were taken from the tufts). A bottom vegetation of moss, where the higher plant-cover is not very dense.

As a rule there is no distinct characteristic species, since dwarf shrubs and gramineous plants exhibit almost the same luxuriance and density.

Species of plants of high frequency:

Dryas octopetala.
Betula nana.
Vaccinium uliginosum.
Salix arctica.
Cassiope tetragona.
Eriophorum polystachyum.
Carex parallela.
Equisetum variegatum.

Species of more scattered occurence:

Polygonum viviparum.
Carex rupestris.
— *atrofusca.*
Eriophorum callitrix.
Tofieldia palustris.
Pedicularis lapponica.
— *flammea.*

The animal life of the bogs, in contrast to the animal life in all the plant communities previously mentioned, is very rich, both as regards the species and the individuals. This applies to both the large animal groups *Collembola* and *Acarina.* As is evident from the table, the characteristic animals in this community are partly some of the same forms that are met with as characteristic animals in the above-mentioned plant communities, partly other forms characteristic of this community. Of *Collembola* the following species are common and fairly numerously represented: *Hypogastrura longispina*, *Onychiurus sibiricus*, *Isotoma sensibilis*, *Folsomia quadrioculata*, and *Sminthurinus concolor. Pseudococcinae* are also very common. All three groups of *Acarina* are abundantly represented. Of *Oribatidae: Heminothrus thori*, *Tectocepheus velatus*, *Trichoribates trimaculatus*, and an undetermined species are numerous everywhere.

As regards the *Parasitidae*, several species are fairly common. The *Trombidiidae* are richly represented by *Bdella longicornis*, *Cyta latirostris*, and *Erythraeus miniatus. Diptera* and *Araneida* rarely occur.

12. Banks of Lakes.

The columns give the number of individuals.

D = 24 hours V = warm water funnel K = without heating	1 D.V. $^{29}/_{5}$ 32	4 D. K. $^{15}/_{6}$ 32	4 D. K. $^{15}/_{6}$ 32	14 D. K. $^{25}/_{8}$ 32	14 D. K. $^{25}/_{8}$ 32	14 D. K. $^{25}/_{8}$ 32	14 D. K. $^{25}/_{8}$ 32	14 D. K. $^{25}/_{8}$ 32
Hypogastrura longispina	..	..	8	..	..	..	..	..
Onychiurus sibiricus.....	210	..	..	11	33	15	7	27
Onychiurus affinis var. *grønlandicus*	..	..	..	..	..	..	..	c. 10
Isotoma sensibilis.....	3	..	2	5	20	6	..	5
Isotoma viridis.....	28	..	..	..	5	..	..	..
Isotoma olivacea.....	..	..	2	..	..	..	1	..
Folsomia quadrioculata.....	91	..	4	24	282	60	96	104
Sminthurinus concolor	1	..	..	..	..	..	..	..
Sminthurides malmgreni.....	..	..	9	..	..	..	..	..
Indeterminable Collemboles .	9	..	..	13	..	4	..	20
Culicoides sp.....	..	..	1	..	..	..	..	..
Forcipomyia sp.....	..	..	..	2	..	5	..	4
Camptocladius hexatomus group.....	..	29	2	..	1	..	43	20
Camptocladius vitellinus group	..	38	26	2	..	..	2	4
Psectrocladius sp.....	..	..	1	..	..	..	..	..
Phaenocladius sp.....	2	..	..	1	3	..	1	..
Cecidomyia sp.....	2	..	..	..	..	..	..	..
Phoridae.....	1	..	..	1	1	..	1	..
Linyphiidae.....	1	..	..	..	..	2	..	..
Brachychthonius brevis.....	..	..	..	..	1	12	..	1
Platynothrus peltifer.....	..	26	168	1867	1008	1445	1623	1963
Heminothrus thori.....	..	..	..	..	3	..	..	..
Oppia sp.....	..	..	..	..	..	..	..	1
Oribatula exilis.....	..	2	..	..	..	..	..	..
Trichoribates trimaculatus ...	..	..	1	1	..	..	1	..
Parasitus spinipes?.....	..	..	..	..	1	..	..	1
Indeterminable *Parasitidae*..	11	..	..	5	1	5	8	2
Eupodes clavifrons.....	..	..	..	..	..	..	7	..
Rhagidia gelida.....	2	..	..	..	..	..	..	..
Bryobia praetiosa.....	..	..	1	..	..	..	..	..
Raphignathus patrius.....	..	..	..	..	..	1	c. 15	..
Raphignathus siculus.....	8	..	..	1	57	12	c. 55	115
Bdella longicornis.....	1	..	..	..	..	..	..	1
Cyta latirostris.....	..	..	..	..	2	1	..	1
Indeterminable *Trombidiidae*	5	..	..	..	..	..	..	..
Glyciphagus sp.....	..	..	..	..	1	..	..	..
Rhizoglyphidae.....	..	..	..	..	12	13	35	84
Indeterminable nymphs.....	10	..	1	..	..	1	..	..

Flat, saturated stretches on banks of lakes. Mostly a thick, swampy moss carpet at the bottom. The flats are visibly manured by the excrements of geese and other aquatic birds.

Characteristic plant species mostly *Equisetum variegatum*, in patches also the following species, usually of high frequency:

Eriophorum Scheuchzeri.
Carex subspathacea.
— *atrofusca.*

Of high frequency, but less dominant physiognomically:

Salix arctica.
Juncus biglumis.
Polygonum viviparum.

In contrast to the bog, only few species are numerous on the banks of lakes. Of the *Collembola: Onychiurus sibiricus*, *Isotoma sensibilis*, and *Folsomia quadrioculata* are very common. *Diptera* larvæ occur in large numbers, especially forms belonging to the genus *Camptocladius*. Of *Acarina*, only the Oribatid *Platynothrus peltifer* and the Trombidiid *Raphignathus siculus* are present in great numbers. Finally, there is reason to note the complete absence of *Pseudococcinae*.

13. Littoral Meadow.

In addition to the above-mentioned twelve plant communities represented on Ella Island, H. MADSEN has made an investigation of the littoral meadows on the same island. From these, four samples are available, each of $^1/_{200}$ sq. m. Further information of the vegetation is not available.

1) August 1, 1933. Beneath washed-up sea-weed.
   23 *Archisotoma besselsi.*
   1 *Sminthurinus* sp.
2) August 1, 1933. Lagoon at the water's edge.
   8 *Archisotoma besselsi.*
3) August 3, 1933. Lagoon, dry at low-water. No iron sulphide.
   About 110 *Ameronothrus lineatus.*
4) August 4, 1933. Lagoon with iron sulphide; clayey soil. At river mouths.
   About 40 *Ameronothrus lineatus.*

The two forms occurring here, the Collembole *Archisotoma besselsi* and the Oribatid *Ameronothrus lineatus*, were not found in any other place on Ella Island. They are both typical littoral forms.

14. Table of the species found on Suess Land.

By Mineral Bay in Suess Land a number of samples were taken, partially from the same plant communities as on Ella Island. The subjoined table shows that the animal life here agrees so closely with that of the ten plant communities first treated, that there is every reason to assume that the same conditions prevail here as on Ella Island.

The columns give the number of individuals.

	"Fjældmark" 15/8 32			*C. rupest.* Herb-V. 15/8 32		Birch-scrub 15/8 32		Mixed dwarf shrub-V. 15/8 32		*Calamagrostris Chamaenerium*-Veg. 15/8 32	
Hypogastrura longispina ..	..	..	..	..	..	..	..	..	..	13	48
Onychiurus sibiricus	3	..	..	..	25	..	..	50	8	96	34
Isotoma viridis	..	..	..	..	..	..	..	1	..	..	..
Folsomia quadrioculata	..	..	..	..	2	..	..	..	..	..	..
Indeterminable Collemboles	20	..	..	6	..	..	..	..	25	20	..
Pseudococcinae	6	..	26	1	20	..	..	..	..	..	..
Phaenocladius sp.....	..	..	..	1	..	..	..	..	..	..	..
Linyphiidae	1	..	..	..	..	..	..	..	2	..	..
Brachychthonius sp.	..	..	..	..	5	10	..	35	c. 50	50	50
Nothrus horridus	..	1	5	2	4	3	..	1	1	..	..
Heminothrus thori	..	..	..	..	..	..	..	..	..	28	5
Oppia neerlandica	1	..	..	..	..	..	..	8	2	1	..
Oppia translamella	..	..	..	..	..	1	..	..	..	..	..
Tectocepheus velatus	2	..	..	..	..	..	..	..	..	82	10
Oribatula exilis	1	3	34	30	14	34	37	5	10	4	..
Trichoribates trimaculatus ..	14	..	..	..	1	4	..	9	8	14	26
Eulaelaps ambulans	..	..	..	1	2	1	..	..	1	1	1
Zercon triangularis	4	..	..	2	..	..	..	1	..	9	1
Parasitus spinipes?	..	..	..	..	..	..	..	1	..	..	..
Indeterminable *Parasitidae*	..	..	..	..	..	..	1	5	..	31	7
Bryobia praetiosa	..	..	..	..	..	..	1	..	..	..	..
Bdella longicornis	..	..	9	2	6	3	5	5	..	..	..
Cyta latirostris	..	..	..	..	2	..	..	..	..	..	..
Erythraeus miniatus	2	2	3	..	..	..	1	..	1	..	..
Indeterminable nymphs ..	17	3	56	c. 480	98	23	53	45	c. 100	c. 90	c. 100

15. Table of the species found on Traill Island.

The investigated samples of soil from Traill Island were taken in plant communities which deviate rather considerably from those existing on Ella Island. Otherwise the information about the vegetation is very deficient, so at present it is impossible to say anything about possible animal communities. As will appear from the table, it is largely the same species that occur here as on Ella Island and Suess Land, but in addition some few species occur here which have not been found in the two other areas investigated, viz. *Oppia ornata?*, *Ceratoppia bipilis*, *Ceratoppia hoeli*, *Penthaleus haematopus?*, and *Tyroglyphus* sp. It might look as if some of them are special outer coast forms, since *Oppia ornata?*, *Ceratoppia bipilis*, and *Ceratoppia hoeli* have also been found in Scoresby Sound; *Hermannia reticulata* and the Collembola *Tetracanthella wahlgreni* are further derived from this place.

The columns give the number of the individuals.

	Ranunculus-pygmæus (snow-patch). 2 D. V.	Luxuriant *Salix* bog. 1 D. V.	*Cassiope*-heath with moss. 1 D. V.	*Cassiope*-heath with moss. 15 D. K.	*Salix* solifluction soil. 15 D. K.	*Salix* solifluction soil. ? D.	*Salix* solifluction soil. ? D.	Bog with *Cassiope*, *Salix*, *Dryas* on solifluction soil. ? D.	*Cassiope* heath with lichens. ? D.
Hypogastrura longispina	..	..	5	..	..	..	..	..	..
Onychiurus sibiricus	8	30	40	39	17	16	19	2	6
Isotoma olivacea	..	..	2	..	..	..	..	..	..
Isotoma sensibilis	..	1	2	..	4	..	..	..	..
Folsomia quadrioculata	12	9	2	6	10	9	45	9	10
Sminthurinus concolor	..	1	1	..	..	..	..	..	..
Indeterminable Collemboles	..	10	31	..	3	1	11	..	5
Pseudococcinae	..	3	6	2	..	..	..	2	..
Camptocladius hexatomus group	..	..	..	..	7	..	..	..	..
Camptocladius vitellinus group	..	2	..	..	29	..	..	..	..
Phaenocladius sp.	3	1	1	..	2	1	..	..	..
Linyphiidae	1	1	..	..	..	..	..	..	..
Brachychthonius brevis	..	..	1	10	..	2	3	..	..
Nothrus horridus	..	..	1	..	10	..	..	..	2
Oppia neerlandica	..	..	1	..	..	..	4	..	..
Oppia ornata?	..	10	..	..	..	..	..	..	..
Ceratoppia bipilis	..	..	..	..	7	..	..	..	..
Ceratoppia hoeli	..	..	1	..	..	..	..	..	..

(Finished page 31).

	Ranunculus-pygmæus-(snow-patch). 2 D. V.	Luxuriant *Salix* bog. 1 D. V.	*Cassiope*-heath with moss. 1 D. V.	*Cassiope*-heath with moss. 15 D. K.	*Salix* solifluction soil. 15 D. K.	*Salix* solifluction soil. ? D.	*Salix* solifluction soil. ? D.	Bog with *Cassiope*, *Salix*, *Dryas* on soliffuction soil. ? D.	*Cassiope* heath with lichens. ? D.
Tectocepheus velatus	13	26	1	..	4	..	..	..	..
Trichoribates trimaculatus	1	18	1	6	15	3	4	..	..
Zercon triangularis	1	..	..	..	..	..	..	..	..
Indeterminable *Parasitidae*	1	..	..	..	2	..	..	..	..
Penthaleus haematopus?	..	1	..	..	..	..	..	..	..
Rhagidia gelida	..	..	3	..	..	..	..	..	..
Raphignathus siculus	..	9	..	..	..	5	15	..	..
Cyta latirostris	..	1	..	..	..	..	..	..	..
Indeterminable *Trombidiidae*	..	..	2	..	..	..	..	..	..
Tyroglyphus sp.	..	..	1	..	..	..	1	..	..
Glyciphagus sp.	..	..	2	..	..	..	..	..	..
Indeterminable *nymphs*	2	9	..	58	18	12	7	..	..

16. Table of the species found by the Nordfjord.

As regards the seven samples available from the Nordfjord, as was the case with the samples from Traill Island, the information about the vegetation, moisture, etc., is very incomplete, and hence it is impossible to give a precise statement as to the distribution of the species within the various types of vegetation. However, here, as everywhere, the dry localities harbour a very "poor" animal life, the damper localities a richer animal life. Of species not previously mentioned in this investigation, *Hypogastrura purpurascens* is represented by a couple of specimens.

The columns give the number of individuals.

	Moss, *Eriophorum*, *Salix arctica*. damp. $^{28}/_{7}$ 32	Luxuriant grass $^{30}/_{7}$ 32	*Dryas* vegetation $^{31}/_{7}$ 32	Grass vegetation dry. $^{31}/_{7}$ 32	Moss, *Carex*, *Eriophorum*, *Salix* sp. damp. $^{1}/_{8}$ 32	*Vaccinium uliginosum*, *Cassiope tetragona*. *damp*. $^{2}/_{8}$ 32	Grass vegetation $^{3}/_{8}$ 32
Hypogastrura purpurascens	..	..	..	..	1	1	..
Hypogastrura longispina	..	42	..	..	18	2	..
Onychiurus affinis var. *grønlandicus*	13	c. 15	..	..	38	..	..
Onychiurus sibiricus	..	..	..	3	..	..	5

(Finished page 32.)

	Moss, *Eriophorum, Salix arctica*. damp. 28/7 32	Luxuriant grass 30/7 32	*Dryas* vegetation 31/7 32	Grass vegetation dry. 31/7 32	Moss, *Carex, Eriophorum, Salix* sp. damp. 1/8 32	*Vaccinium uliginosum, Cassiope tetragona. damp.* 2/8 32	Grass vegetation 3/8 32
Isotoma olivacea	..	..	..	..	28	..	..
Isotoma sensibilis	..	..	..	..	..	..	2
Folsomia quadrioculata	6	5	..	..	20	11	4
Sminthurinus concolor	..	..	..	..	3	..	..
Indeterminable Collemboles	1	55	6	..	8	..	..
Pseudococcinae	..	..	39	..	..	3	2
Camptocladius vitellinus group	..	..	..	..	4	..	..
Phaenocladius sp.	1	..	..	..	..	1	..
Phoridae	..	..	..	..	1	..	..
Dictynidae	..	..	..	..	..	3	..
Linyphiidae	..	..	..	..	1	5	2
Brachychthonius brevis	..	1	..	..	60	7	1
Trhypochthonius tectorum	..	..	..	..	..	127	..
Heminothrus thori	..	..	..	..	..	..	3
Tectocepheus velatus	5	..	..	..	..	24	..
Oribatula exilis	..	..	..	..	..	5	..
Trichoribates trimaculatus	..	..	..	..	..	2	4
Eulaelaps ambulans	..	..	..	1	..	1	1
Zercon triangularis	..	..	..	..	..	..	1
Parasitus spinipes?	..	..	..	..	..	1	..
Indeterminable *Parasitidae*	1	..	..	..	6	..	..
Eupodes sp.	c. 50	9	2	..	c. 200	2	36
Penthaleus haematopus?	..	..	..	..	2	1	1
Rhagidia gelida	..	..	..	1	..	5	..
Bryobia praetiosa	..	..	1	..	6	..	..
Raphignathus siculus	6	..	..	..	..	..	..
Bdella sp.	..	..	49	6	..	3	..
Cyta latirostris	..	3	..	..	..	1	..
Podothrombium bicolor	..	..	..	..	..	..	1
Erythraeus miniatus	..	3	1	3	..	10	9
Erythraeus phalangioides	..	..	..	..	..	2	..
Indeterminable nymphs	c. 15	15	7	5	..	c. 50	6

The Micro-Animal Communities.

It appears from the tables that only four animal communities can be erected, viz. one associated with the banks of lakes, one with bogs, and one comprising all the other plant communities except the littoral meadow, which has its special, very characteristic, animal community.

The fauna of the banks of lakes is by far the richest as regards individuals. The community is characterised by the Oribatid *Platynothrus peltifer*, which occurs in great abundance. All the other *Acarina*, 13 species in all, are but sparsely represented. Of the *Collembola* notably *Folsomia quadrioculata* is numerous, and in addition *Onychiurus sibiricus* and *Isotoma sensibilis* should be mentioned. Finally, there is some reason to mention the vast number of *Diptera* larvæ, chiefly Chironomide larvæ. *Araneida* are very sparsely represented, and *Pseudococcinae* are entirely absent.

Since the banks of lakes and bogs resemble one another to a very great extent, and in nature almost pass into one another, it may be anticipated that the fauna of the two plant communities will agree in a smaller or greater number of features. It is therefore a little surprising that the characteristic animals of the bog are almost entirely different from those of the banks of lakes. The two characteristic *Acarina* of the latter community, *Platynothrus peltifer* and *Raphignathus siculus*, are not met with at all. Instead of *Platynothrus peltifer*, the closely related *Heminothrus thori* occurs, which on the banks of lakes was only found in a number of three specimens in one sample. These two species alone suffice to show the great difference existing between the two communities. Of other *Oribatidae*, *Tectocepheus velatus* and *Trichoribates trimaculatus* occur as characteristic animals. The former Acarine was not found at all on the banks of lakes, of the latter only three specimens occurred. Finally, large numbers of an Oribatid species occurred, which so far I have been unable to determine, and which was found nowhere on the banks of lakes. As regards the *Trombidiidae*, several species occur in bogs, where they are fairly constant, viz. *Bdella longicornis*, *Cyta latirostris*, and *Erythraeus miniatus*. The *Collembola* show a similar behaviour to the *Acarina*. Several species occur, which are present in fairly great numbers and almost constant in all the samples. This applies principally to the same three species which are comparatively numerous on the banks of lakes, viz. *Folsomia quadrioculata*, *Onychiurus sibiricus*, and *Isotoma sensibilis*, but in addition *Hypogastrura longispina* and *Sminthurinus concolor* occur. In contrast to the banks of lakes, hardly any *Diptera* occur here. *Pseudococcinae*, on the contrary, are numerous, while these, as already stated, are entirely absent from the banks of lakes.

The third community, comprising all the remaining plant commun-

ities except the littoral meadow, is by far the poorest in individuals but very rich in species. To facilitate the general view, all the animal groups mentioned here from the plant communities belonging to the third animal community are given in one table (table 17).

Of the characteristic animals, the Oribatid *Oribatula exilis* occurs almost everywhere. In the samples from the banks of lakes this Acarine is present in two specimens, while only one has been found in those from the bogs. Further, the parasite *Zercon triangularis* and the Trombidiid *Bdella longicornis* are typical. Apart from *Onychiurus sibiricus* the *Collembola*, like most of the *Acarina*, occur in fairly small numbers. The *Pseudococcinae* are of almost constant occurrence, and fairly numerous. The *Araneida* are of scattered occurrence everywhere.

The fourth animal community, associated with the littoral meadow, is characterised by the Collembole *Archisotoma besselsi* and the Oribatid *Ameronothrus lineatus*, both of which are strictly littoral forms.

The results arrived at by this investigation are the following. The plant communities do not seem to have any direct influence on the origin of the animal communities, whereas the dampness of the soil seems to be the direct cause of the formation of the various animal communities.[1]) There occur animals that are associated with the very wet banks of lakes, with the bog damp throughout the summer, with the third community dry in the summer, and with the littoral meadow, where, however, conditions are so special that a particular fauna must live here. That this third animal community also occurs in places where there is dripping water in the spring, as for instance in birch "stripes" and damp *Elyna*-vegetation, or stagnant water, as in *Cassiope* snow-patches, is easily understood upon studying the table showing the water supply of the plant communities, prepared by TH. SØRENSEN. It appears from the table that these localities, which are wet or damp in the spring, as for instance birch "stripes", damp *Elyna*-vegetation, and *Cassiope* snow-patches, dry up in the course of the summer, as regards some localities rather late in the summer. The result of such a period of drought, however short it may be, is that only animals adapted to live in dry localities can thrive there. It further appears from the table that bogs and banks of lakes alone do not dry up; this seems to agree excellently with the formation of special animal communities in these two kinds of locality provided that the moisture is the direct cause of this.

The supposition that the plant communities or the plants play no

[1]) Possibly the pH values may play a part also, but since so far no information of it is available, the question must for the time being remain unanswered. Moreover the moisture in part determines the pH value.

direct role in the formation of animal communities, is perhaps not quite correct. Most frequently, however, a plant community is erected on the basis of higher plants. As regards the *Collembola* and the *Acarina*, it might almost be stated beforehand that the higher plants are of no importance for them. Their nourishment consists in great part of lower plants such as fungi, lichens, mosses, decaying vegetable matter, etc., and accordingly it would seem more natural to erect the plant communities on the basis of the lower plants. A study of the characterisation of the plant communities will reveal a close agreement between the animal communities erected here and the content of lower plants of the plant communities, since the first-mentioned ten plant communities belonging to the third animal community nearly all of them lack the bottom vegetation of the above-mentioned lower plants, or, if such a vegetation is present, it consists of lichens and a small amount of moss, which, like the fauna living on it, will withstand desiccation, while bogs and the banks of lakes give room for a rich flora of mosses, which on decaying form large quantities of organic matter; these condition a fauna that will not survive desiccation. The final result, however, is that moisture is of decisive importance, it being also essential for the presence of the lower plants in the particular localities.

Table of the water supply and relation to moisture of the plant communities occurring on Ella Island.

	water supply from other places (melt-water)										
	circulating	stagnant	no water supply slight water supply	drying up early	drying up late	not drying up	no snow-covering	slight snow covering free of snow early	thicker snow-covering later free of snow	deflation of earth	accumulation of earth
"Fjældmark"	..	..	+	+	..	..	+	..	..	+	..
Carex rupestris-herb-vegetation	..	..	+	+	..	..	+	..	..	..	+
Dry *Elyna*-vegetation	+	..	..	+	..	..	+	..	..	..	..
Damp *Elyna*-vegetation	+	..	..	..	+	..	+ or +		..	..	..
Birch scub	+	..	..	+	..	..	..	+	..	..	..
Birch "stripes"	+	..	..	..	+	..	..	+	..	..	..
Birch-grass vegetation	(+)	+	..	+	(+)	..	..	+	..	..	..
Dryas heath	..	+	(+)	+	..	..	..	+	..	..	..
Mixed dwarf shrub vegetation	+	(+)	..	..	+	..	..	..	+	..	..
Cassiope-snow-patch	..	+	..	..	+	..	..	..	+	..	(+)
Bog	..	+	..	..	..	+	..	+ or +		..	..
Banks of lakes	..	+	..	..	..	+	..	..	+	..	..

That the third animal community is extremely rich in species but poor in individuals is very natural, since the many different kinds of vegetation will present life conditions for many forms that, apart from their similar reaction to moisture, have a rather different mode of life.

On the other hand, the area poor in lower plants nowhere presents conditions favourable to a rich fauna. This, however, is the case on the banks of lakes, where partly decaying plants, partly excrements of aquatic birds afford the best chances for the few species that have adapted themselves to live here, where conditions are very uniform and hence do not favour the existence of many species. The same applies to bogs.

Some few species, as for instance *Onychiurus sibiricus*, have adapted themselves to an existence even in very dry localities; however, they much prefer the damper areas.

Thus the dry animal community as opposed to the animal life on the banks of lakes and in bogs exhibits the same conditions as make themselves felt in so many other places in nature. As regards the animal life in the forest soil BORNEBUSCH (1930, p. 150) has ascertained that "In the superior mull, where decomposition was particularly brisk" — comparable to the favourable conditions on river banks and in bogs — "we found the weight of animals preponderating, but their number small; in soil where the process of decomposition is slow and accumulation of humus takes place" — the dry animal community — "we found the greatest number of animals, but these were minute". The number of individuals does not, perhaps, agree entirely with the conditions recorded by BORNEBUSCH. The result, however, is the same, viz. that few and big animals, which in Greenland are replaced by a single or some few species present in great numbers, occur where a lively assimilation takes place, whereas many and small animals, none of which has a possibility of becoming predominant, live in localities where assimilation is but slight.

The three samples from **Scoresby Sound** will not be discussed in detail in this preliminary report, apart from the information about the presence of the Collembole *Tetracanthella wahlgreni* and the Oribatid *Hermannia reticulata*, both forms which were not found in any other place within the localities investigated here. As already stated, a very large material of soil samples is at hand from Scoresby Sound. Together with the three samples discussed in this report it will be treated in a paper to be published later, which in addition will comprise the results of the investigations on the microfauna of the soil in Clavering Island, Mikis Fjord, and Angmagssalik.

Possibly the working up of the large material still untreated will

cause changes in the conception of the animal communities erected here, and probably some further communities will prove to exist in vegetation types deviating greatly from those mentioned in the present paper. Thus on the extensive lichen-heath at Angmagssalik there seems to be a rich animal life which in no way agrees with the four animal communities erected here. At any rate samples collected last summer in lichen-heaths by Angmagssalik contain a very large number of *Collembola* but a comparatively small number of *Acarina*. Since no such lichen-heaths occur on Ella Island, where the main investigation was made, there is every possibility that other, new, animal communities may be encountered in other places. On the other hand, the animal life in the bogs by Angmagssalik seems to agree with the corresponding conditions on Ella Island, so there is every reason to assume that this type of vegetation, on the whole uniform, is everywhere inhabited by the same animal life, of course apart from the variations which the different geographical distribution may cause.

Summary.

Prior to the present report only 20 species of *Collembola* were known from East Greenland, now 24 are known. Of *Acarina* 22 species were known, now 47. The richly represented microfauna is equally distributed over the four animal communities: one is associated with the banks of lakes (wet all the year round); one with the bog (damp all the year round); one with the special conditions prevailing on littoral meadows; and one comprising all the remaining plant communities occurring on Ella Island, which have the feature in common that they dry up during a certain period of the year. The result of this period of drought is that only animals adapted to live in such dry places can thrive. Accordingly, the dampness seems to be the direct cause of the formation of animal communities, while the plant communities are apparently of no importance. The importance of the plant communities for the formation of animal communities becomes evident, however, if the plant communities are erected on the basis of the lower plants, as for instance fungi, lichens, and mosses, in that these directly as well as indirectly by their decay give off nourishment to the animal groups mentioned here, and accordingly are a condition of life for the animals. However, in this case, too, the dampness is the primary factor, being a condition for the presence of the said plants.

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