

The Oribatid and Collembola fauna in some soil samples from Søndre Strømfjord.

By
Marie Hammer.

On a botanical expedition to West Greenland in the summer of 1946 under the leadership of Dr. T. W. Bøcher*) he took a few soil samples from selected plant associations in order to find out whether the microfauna showed any sign of dependence on the climatic and microclimatic conditions prevailing in the different biotopes, as is the case with the plants.

Søndre Strømfjord, the entrance of which is in 66° lat. N. and its head very close to 67° lat. N., exactly the same latitude as the settlement Holsteinsborg, is about 180 km long and at its extremes show very pronounced climatic differences; the inner part is strongly marked by the small amount of precipitation which according to Bøcher (1949 b, p. 8) is only 120 mm annually on an average, while the outer coast has an annual average precipitation of 953 mm. The mean temperature in July at the head of the fjord is 10.1° C., at the coast 6.8° C. On account of these contrasting climatic conditions which manifest themselves very clearly in the vegetation (see Bøcher 1949 b) a distinct difference in the animal life at the head of the fjord and at the coast might be expected. The soil samples were therefore collected partly at the very head of the fjord, mainly on dry biotopes, partly near Kangamiut at the entrance, and a single sample in South Greenland near Ivigtut, which as regards pre-

*) I take the opportunity here to thank Dr. Bøcher for having collected the samples for me and Mrs. Agnete Volsøe for having translated the paper.

precipitation is comparable to the outer coast locality Kanga-miut. On each of the following biotopes, arranged in a series from dry to damp localities a sample was taken on $\frac{1}{100}$ sq. m. from 11th July to 1st September. The samples were sent to Copenhagen in tins and the animals were not expelled until the middle of October. Some species may therefore have perished during the long stay in the tins, while others may have found the conditions of life so favourable that a multiplication of these species may have taken place. Too far-reaching conclusions should therefore not be drawn on the basis of the figures given in the table below.

**Inner Fjord, Hassels Fjæld,
locality 3 in fig. 1, p. 4, Bøcher 1949 b.**

- 1) Steppe-like vegetation of *Carex supina* spp. *spaniocarpa*. Loess, with a southern inclination of 30°, cracked loess soil in polygons. The vegetation covers 80—90% of the ground; pH 6.8—7.3. Rest of vegetation mainly *Artemisia borealis*, *Calamagrostis purpurascens*, *Potentilla chamissonis*, *Erigeron compositus*, *Melandrium triflorum*, *Cerastium alpinum* var. *lanatum*, *Campanula rotundifolia*, *Poa glauca*, *Cornicularia aculeata*, and *Cladonia pyxidata*. 28th August.
- 2) Steppe-like vegetation of *Kobresia myosuroides* (*Elyna Bellardii*). Dense *Kobresia* vegetation on a south exposed slope near Hassels Fjæld, dry but not so dry as no. 1; inclining 20—30° south, loess, pH 6.5; 100 % covering of soil. Rest of vegetation: *Erigeron compositus*, *Polygonum viviparum*, *Campanula rotundifolia*, *Potentilla chamissonis*, *Arnica alpina*, *Carex supina* spp. *spaniocarpa*, *Poa glauca*, *Euphrasia frigida*, *Gentiana aurea*, *Cornicularia aculeata*, *Cetraria cucullata*, *C. nivalis*, *Physcia muscigene*, and *Tortula ruralis*. 29th August.
- 3) Willow shrub. Two m high shrub of *Salix glauca* on south exposed slope of Hassels Fjæld about 75 m a. s. l., fairly dry; dense undergrowth of *Pirola grandiflora*, *Cylopteris fragilis* spp. *Dickieana*, *Poa glauca*, and *Polygonum viviparum*. 29th August.
- 4) *Rhododendron* heath. At the foot of Hassels Fjæld about 50 m a. s. l., fairly moist, with a rich moss vegetation; big tufts with *Rhododendron* as dominating heath bush; in addition,

Carex maritima, *Betula nana*, *Kobresia simpliciuscula*, *Tofieldia minima*, *Equisetum scirpoides*, *E. arvense*, and *Dryas integrifolia*. 25th August.

- 5) *Betula nana*-*Ledum decumbens*-*Aulacomnium turgidum* heath. North exposed dense moss carpet; Ravneklippen (loc. 7 see Bøcher 1949b), acid, pH 5.6, but not particularly poor soil. Continental *Caluna* heath. 29th August.
- 6) *Calamagrostis neglecta* vegetation; high, luxuriant, dense vegetation. Bog, dry in summer but may be with water in winter. Loess, at the head of Søndre Strømfjord, on the bottom of the valley near the aerodrome. 31st August.
- 7) Fell-field with *Dryas* on top of Hassels Fjæld about 500 m a. s. l., flat land; much exposed to the wind with half-open vegetation. *Dryas integrifolia* dominant, in addition, *Vaccinium uliginosum*, *Carex glacialis* and *C. nardina*; numerous lichens: *Stereocaulon*, *Cetraria*, *Cladonia*, and species of *Alectoria*. Alpine. 24th August.

Outer coast. Kangamiut.

- 8) *Caluna* heath south of the entrance of Søndre Strømfjord. South exposed, inclining about 30°. Dominated by *Phyllodoce coerulea*, *Empetrum*, *Louiseleurea*, *Lycopodium alpinum*, *Gnaphalium supinum* and *Coptis trifolia*. Covered by snow in winter; rather poor soil; pH 4.9. 1st September.
- 9) *Salix herbacea* vegetation. Completely dominated by *Salix herbacea* with *Lycopodium alpinum*, moss carpet on bottom. Typical snow patch inclining 15° south. 1st September.

Outer coast. Ivigtut.

- 10) Urteli. Near Ivigtut fjord off Grønnedal about 120 m a. s. l., inclining 40° southwest; the sample was taken right below a steep rock. Subarctic vegetation consisting of 80 cm high *Streptopus amplexifolius*, *Archangelica officinalis*, *Alchemilla glomerulans*, *Chamaenerium angustifolium* with an undergrowth of *Dryopteris phegopteris*, *Galium triflorum*, *Veronica Wormskjoldii*; bottom vegetation of mosses, mainly *Brachythecium trachypodium* and *Pseudoleskea filamentosa*. High stau-deli. Very rich soil; pH 5.7, moist, water oozing constantly through it, always covered by snow in winter. 11th July.

The species found and the number of specimens of each species in the different biotopes are listed in table 1. Species marked with an asterisk have not hitherto been

recorded from Greenland. The species of *Brachychthonius* will be discussed in more detail because of small deviations from those described previously.

Eobrachychthonius sexnotatus Jacot has a very strong orange colour but otherwise agrees with Jacot's drawing (1936).

Brachychthonius scalaris Forssl. shows only one of the three light spots which are situated in an oblique line laterally of C 1;

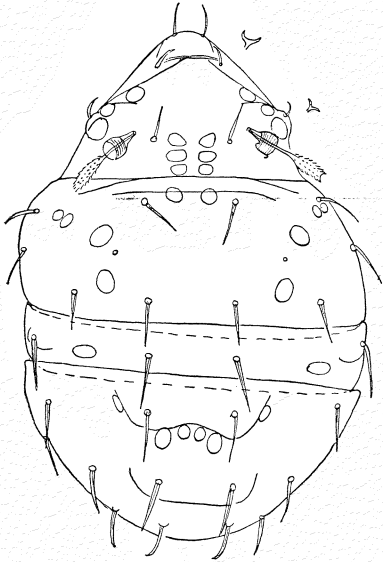


Fig. 1.

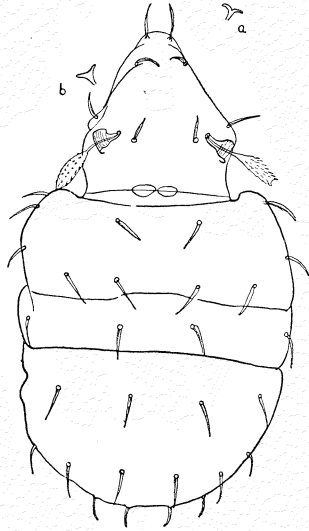


Fig. 2.

this may be due to the fact that the three spots are placed vertically on the sides of "the hill", so that only one of them is seen in profile. All setae are provided with "wings" issuing from the central rib (see the detail drawings of lamellar hairs and exopseudostigmatic hair in fig. 1). The hysterosoma is densely and finely punctate all over. The specimens found agree otherwise with those known from northern Canada.

Brachychthonius sellnicki Thor has considerably longer hairs than stated by Strenzke (1950 fig. 1). Thor (1930) writes that "Die dorsalen, abdominalen Haare sind lang, schwach abgeflacht"; that they are considerably longer than figured by Strenzke and Weis-Fogh (1947-48, fig. 81) is also evident from Thor's photo.

The hairs are like peach leaves with distinct "wings" in profile, which is most obvious on the lamellar hairs and the exopseudostigmatic hairs (see the detail drawings in fig. 2). The pseudostigmatic organ is bifurcate at the tip. Apart from two indistinct light areas on the transition between the propodosoma and the hysterosoma no sculpture is seen. The "hills" round C 1 mentioned and figured by Strenzke are not visible. The transition between the

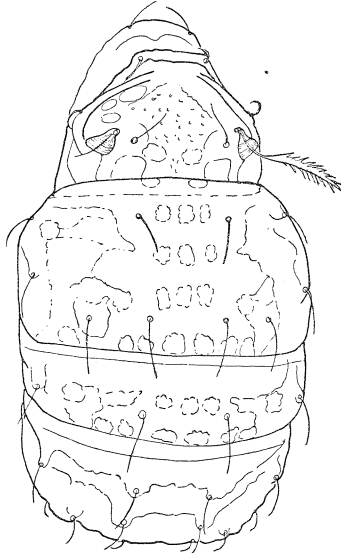


Fig. 3.

propodosoma and the hysterosoma is strongly narrowed as a neck (cf. Weis-Fogh 1947-48, fig. 4), and the shoulders are very broad, projecting slightly forwards. Size about 0.20×0.11 mm. That *Br. scalaris* and *Br. sellnicki* should be identical as indicated by Strenzke I consider absolutely out of the question. Their whole habitus is so different that there can be no doubt that they are two well separated species; in addition, there are all the light areas in *Br. scalaris* which apparently are almost absent in *Br. sellnicki*.

Brachychochthonius crenulatus Jacot has a somewhat more distinct sculpture on the hysterosoma (fig. 3) than drawn by Jacot; there is however no doubt that the specimen belongs to *Br. crenulatus* Jacot.

Unfortunately, the number of samples is far too small to show any great difference in the composition of the animal life in the interior part of the fjord and in that on the coast. It is however evident that the very dry biotopes as e. g. the *Carex supina* steppe and the *Kobresia myosuroides* steppe (nos. 1-2) have a much poorer animal life than the somewhat more humid biotopes as e. g. the *Betula-Ledum* heath (no. 5) which is very rich in individuals, which is presumably due to the luxuriant moss vegetation of this biotope. The *Rhododendron* heath (no. 4) is richest in individuals of them all, both as regards oribatids and collemboles. The animal life of *Calamagrostis neglecta* vegetation (no. 6) is unusually poor, since only two species with eleven individuals have been found here. Such a uniform vegetation type without a moss or lichen carpet on the bottom offers practically no possibility of existence for these animals which principally occur in the bottom vegetation on which they feed. The fell-field with *Dryas* (no. 7) is also very poor, but considering that this sample was taken at an altitude of about 500 m a. s. l. where there is very often a strong wind and only a scattered vegetation under pure arctic conditions, only a small number of animals could be expected to occur there. Only a few very hardy species as e. g. *Tectocopheus velatus*, *Hammeria groenlandica* and *Mycobates sarekensis* occur in fairly large numbers.

The figures for the outer coast show that both the number of species and the number of individuals are considerably greater. A few species as e. g. *Camisia lapponica*, *Platynothrus peltifer*, *Heminothrus paolianus* v. *longisetosus*, *Oppia ornata*, *Micranurida hasai*, *Isotomina coeruleogrisea* etc. have been found only on the outer coast. Several of these species have a wide distribution along the coasts of Greenland, but the material from the inner part of Søndre Strømfjord is too small to decide whether these species are unable to live in the con-

tinental climate prevailing here with the small amount of precipitation and the violent fluctuations of temperature.

A number of species has been found only near Ivigtut in South Greenland: *Brachychochthonius crenulatus*, *Oppia fallax* v. *obsoleta*, *Liebstadia similis*, *Phthiracarus piger*, *P. borealis*, and *Friesea mirabilis*. Here where the summer is comparatively warm (mean temperature for July 10.0°C.) and the humidity very great (yearly amount of precipitation 1330 mm.) the possibility for a rich microfauna is far greater than elsewhere in Greenland.

The occurrence of *Jugoribates gracilis* and *Hammeria groenlandica* in Søndre Strømfjord is very interesting, because these two species were hitherto known only from Upernavik in West Greenland, *Hammeria groenlandica* also from Canada. *Hammeria groenlandica* is an arctic species which in Canada has been met with only in pure arctic localities (see Hammer 1952); in southwest Greenland it has not been found on the outer coast. *Jugoribates gracilis* likewise has only been found in the inner part of Søndre Strømfjord. *Peloribates pilosus* is an American species which in Greenland, besides in Søndre Strømfjord, is also known from the Franz Joseph Fjord area in East Greenland (see Hammer 1952).

Since very little is known of the microfauna in southwest Greenland the samples are of a certain interest despite their small number, and the fairly large number of species new to Greenland may indicate that better results might be obtained by thorough investigations of these areas, and in particular of the hitherto unexplored inner deep fjords.

Table 1.

species of oribatids and collemboles	<i>Carex supina</i> steppe	<i>Kobresia myosu-</i> <i>roides</i> steppe	<i>Salix glauca</i> shrub	<i>Rhododendron-</i> heath	<i>Betula-Ledum</i> heath	<i>Calamagrostis</i> vegetation	<i>Dryas</i> fell-field	<i>Caluna</i> heath	<i>Salix herbacea</i> vegetation	Urteli
	no. 1	2	3	4	5	6	7	8	9	10
<i>Eobrachychthonius sexnotatus</i> Jacot			9							
* <i>Brachychthonius scalaris</i> Forssl.		3	50		58		1	1		3
— <i>sellnicki</i> Thor.							2			
* <i>Brachychochthonius crenulatus</i> Jacot										1
<i>Camisia horrida</i> (Herm.)				9	8				1	
— <i>lapponica</i> (Trgdh.)								2		2
<i>Nothrus borussicus</i> Sell.				5				19	1	
<i>Platynothrus peltifer</i> (C. L. Koch) ...								1	1	
<i>Heminothrus thori</i> (Berl.)				124						
— <i>paolianus</i> Berl. var. <i>longisetosus</i> Willm.	1							19		
<i>Hermannia reticulata</i> Thorell			11	14						
* <i>Suctobelba acutidens</i> Forssl.				2	3			7	4	1
<i>Oppia quadricarinata</i> (Mich.)			4					1		3
— <i>neerlandica</i> (Oudms.)				5			2		1	
— <i>translamellata</i> (Willm.)		2		4						58
* — <i>fissurata</i> Hammer		2	288		218				1	
— <i>ornata</i> (Oudms.)								1		
* — <i>fallax</i> v. <i>obsoleta</i> (Paoli)										15
<i>Eremaeus oblongus</i> C. L. Koch		1	1		5					
<i>Tectocepheus velatus</i> (Mich.)	1	46		378			17	162	15	48
<i>Liebstadia similis</i> (Mich.)										57

Table 1 (cont.).

species of oribatids and collemboles	no.	<i>Carex stipina</i>	<i>Kobresia myosuroides</i>	<i>Salix glauca</i>	<i>Rhododendron-</i>	<i>Betula-Ledum</i>	<i>Calamagrostis</i>	<i>Dryas</i>	<i>Caluna</i>	<i>Salix herbacea</i>	Urteli
		steppe	steppe	shrub	heath	heath	vegetation	fell-field	heath	vegetation	
		1	2	3	4	5	6	7	8	9	10
<i>Oribatula tibialis</i> (Nic.).....				14		16			4	7	
<i>Peloribates pilosus</i> Hammer.....			8		1	25					
<i>Jugoribates gracilis</i> Sell.....					2						
<i>Ceratozetes thienemanni</i> Willm.....			2							5	
<i>Melanozetes meridianus</i> Sell.....					12	1			21	18	
<i>Trichoribates notatus</i> (Thorell).....				1						3	
<i>Hammeria groenlandica</i> Sell.....				1		2		8			
<i>Mycobates sarekensis</i> (Trgdh.).....			261	1	4			29	90	11	
<i>Pelops bilobus</i> Sell.....				16	16	67			2	10	
<i>Phthiracarus piger</i> (Scop.).....											2
* — <i>borealis</i> (Trgdh.).....											6
nymphs.....				c. 200		c. 285		c. 54	c. 40	c. 140	c. 39
number of species of oribatids.....	2	8	11	13	10		6	13	13	13	11
number of individuals.....	2	325	596	576	688		113	c. 370	218	227	
<i>Ceratophysella armata</i> (Nic.).....				5		3					
<i>Willemia anophthalma</i> Börner.....			2	126	1	8		4	c. 10	61	c. 25
* <i>Friesea mirabilis</i> (Tullb.).....											60
* <i>Micramurida hasai</i> Ksen.....										1	c. 5
* — <i>pygmaea</i> Börner.....				13	2	5					
<i>Neamura muscorum</i> (Templ.).....					7						
<i>Onychurius ?sibiricus</i> (Tullb.).....					1						
— <i>armatus</i> (Tullb.) (after Folsom 1917).....				3		1	10		3	9	617
* <i>Tullbergia collis</i> Bacon.....					1		1		c. 10	40	c. 150
<i>Tetracanthella wahlgreni</i> Linn.....						308			27		
<i>Folsomia diplophthalma</i> (Axels.)....				1	5	1					
— <i>quadrioculata</i> (Tullb.).....				2	1	20			138	15	213
— <i>fimetaria</i> (L.).....			3	175	1						
<i>Isotomina coeruleogrisea</i> (Hammer)..										160	272
<i>Isotoma notabilis</i> Schöff.....											20
— <i>notab. v. pallida</i> Agrell....					3	1					
— <i>viridis</i> Bourl.....									1		
— <i>violacea</i> Tullb.....					2	2			7		
— <i>olivacea</i> Tullb.....									50	13	
— <i>oliv. var. neglecta</i> Schöff....										2	
<i>Isotomiella minor</i> (Schöff.).....										16	4
undetermined collemboles.....						8			8	13	225
number of species of collemboles..		2	7	10	9	2	1	8	9	9	9
number of individuals.....		5	325	24	357	11	4	254	330	1591	
total number of species.....	2	10	18	23	19	2	7	21	22	21	
total number of individuals.....	2	330	921	600	1045	11	117	624	548	1818	

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