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ON THE HYDRACARINA OF
GREENLAND WITH A DESCRIPTION OF
LEBERTIA (PSEUDOLEBERTIA)
GROENLANDICA n. sp.

BY

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WITH 14 FIGURES IN THE TEXT AND 7 TABLES

KØBENHAVN

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Abstract.

In the summer of 1956 some water mites belonging to *Lebertia* (*Pseudolebertia*) *groenlandica* n. sp. were collected in three spring areas near Godhavn, Disko Island, Greenland.

The description of the localities contains notes concerning their situation, exposure, bottom conditions and vegetation. A short survey on the physical and chemical conditions of the water is given from one of the spring areas (Østerli). Morphological comparisons are made between *Lebertia groenlandica* and three closely allied species, viz. *Lebertia convergens*, *Lebertia glabra* and *Lebertia zschokkei*. Finally, a list of Hydracarina finds from Greenland is given.

INTRODUCTION

In the summer of 1956, when I was in Greenland, I had an opportunity of studying three spring areas near the town of Godhavn on the island of Disko in West Greenland. I was especially interested in the hydracarinid fauna, which, however, was very poor. The number of water mites collected was only twenty-five, all of which belonged to one and the same species, viz. *Lebertia* (*Pseudolebertia*) *groenlandica* n.sp.

The field work began on June 22 and finished on August 12, 1956. In the spring area at Østerli samples were taken during the whole period. In the spring areas at Engelskmandens Havn and Lyngmarken, however, samples were taken only once (on June 27 and on July 19 respectively).

Mr. ULRİK RØEN, Cand. mag., teacher at the University of Copenhagen, also collected some water mites while living in Greenland as the scientific leader of the Arctic Station at Godhavn and carried on extensive limnological field work (1958; 1959). He has kindly given me his collection of water mites as a complement to my own Hydracarina material. Thanks to Mr. RØEN I also got an opportunity of looking through the material of Greenlandic water mites in the Zoological Museum of the University of Copenhagen. In this way I got another twenty-eight specimens, which together with my own material are discussed in the present paper.

Mr. ULRİK RØEN originally inspired me to undertake the present work and provided me with samples from various parts of Greenland; equipment and laboratory facilities were kindly placed at my disposal by the Arctic Station; Miss CHARLOTTE HOLMQUIST, Fil. dr., has given me valuable encouragement in my work; and Professor PER BRINCK of the Zoological Institute, Lund, has looked through the manuscript. I wish to express my sincere thanks, especially to these persons, for all help and encouragement.

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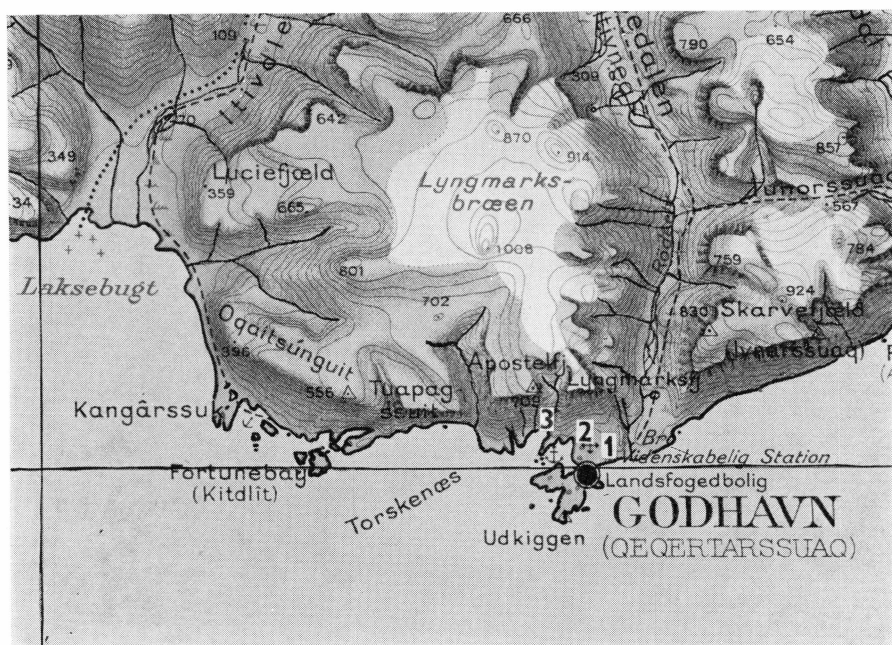


Fig. 1. The southern part of Disko with Godhavn and the three investigated spring areas marked: 1. Østerli, 2. Lyngmarken, and 3. Engelskmandens Havn. From the map-sheet Godhavn 69 V. 1, scale 1:250,000. Geodætisk Institut, Copenhagen 1954.

THE LOCALITIES

The island of Disko, the largest island of Greenland, is mainly built up of basalt from the Tertiary. On the south coast of Disko a peninsula composed of gneiss projects into Disko Bugt. Godhavn is situated on this peninsula (Fig. 1). At the Arctic Station, somewhat less than one kilometre north-east of Godhavn, a dislocation line runs in a NNW.—SSE. direction as a steep rock-face of ?palagonite (M. P. PORSILD 1915, p. 253) overlying the gneiss (Fig. 2). The talus slope at the base of the precipice is called Østerli. From several points on the cliff groundwater emerges and rushes down the talus. Below the descent there are also springs, which are helocrenes with water slowly trickling out. The springs on the cliff are usually rheocrenes. From the springs the water runs in several small brooks over a broad valley called Østerdalen, which is covered with rich *Salix* vegetation growing on large tussocks. In western part of Østerdalen runs a brook called Vandelven, which leaves the valley in a fall, passes west of the Arctic Station and flows out into a little lagoon at Sorte Sand. The localities with the numbers 1–10, 12–13, and 17 are

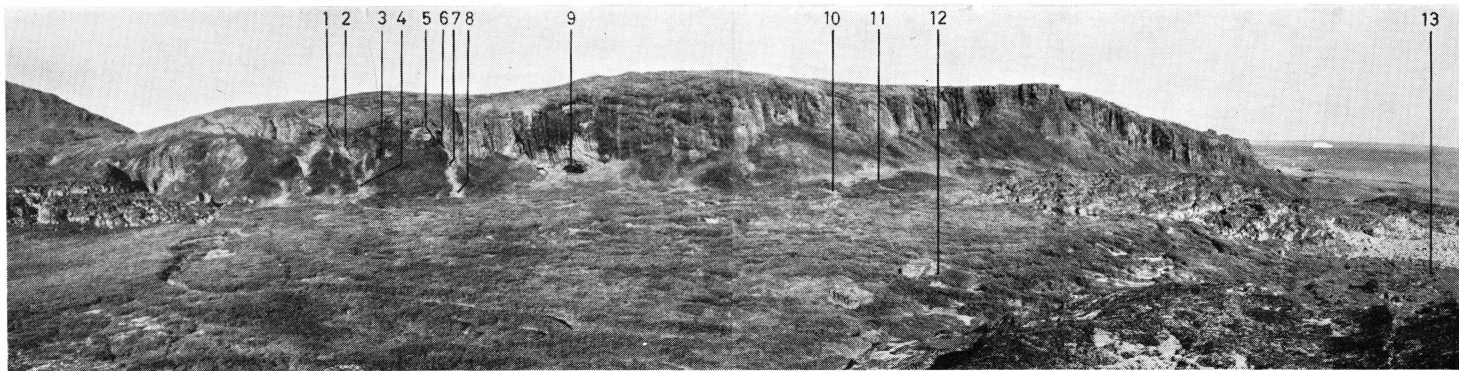


Fig. 2. The spring area at Østerli. The valley called Østerdalen with the Vandelven brook in the foreground. The photo is taken at about a right angle to the dislocation line. The figures indicate the locality numbers. August 11, 1956.

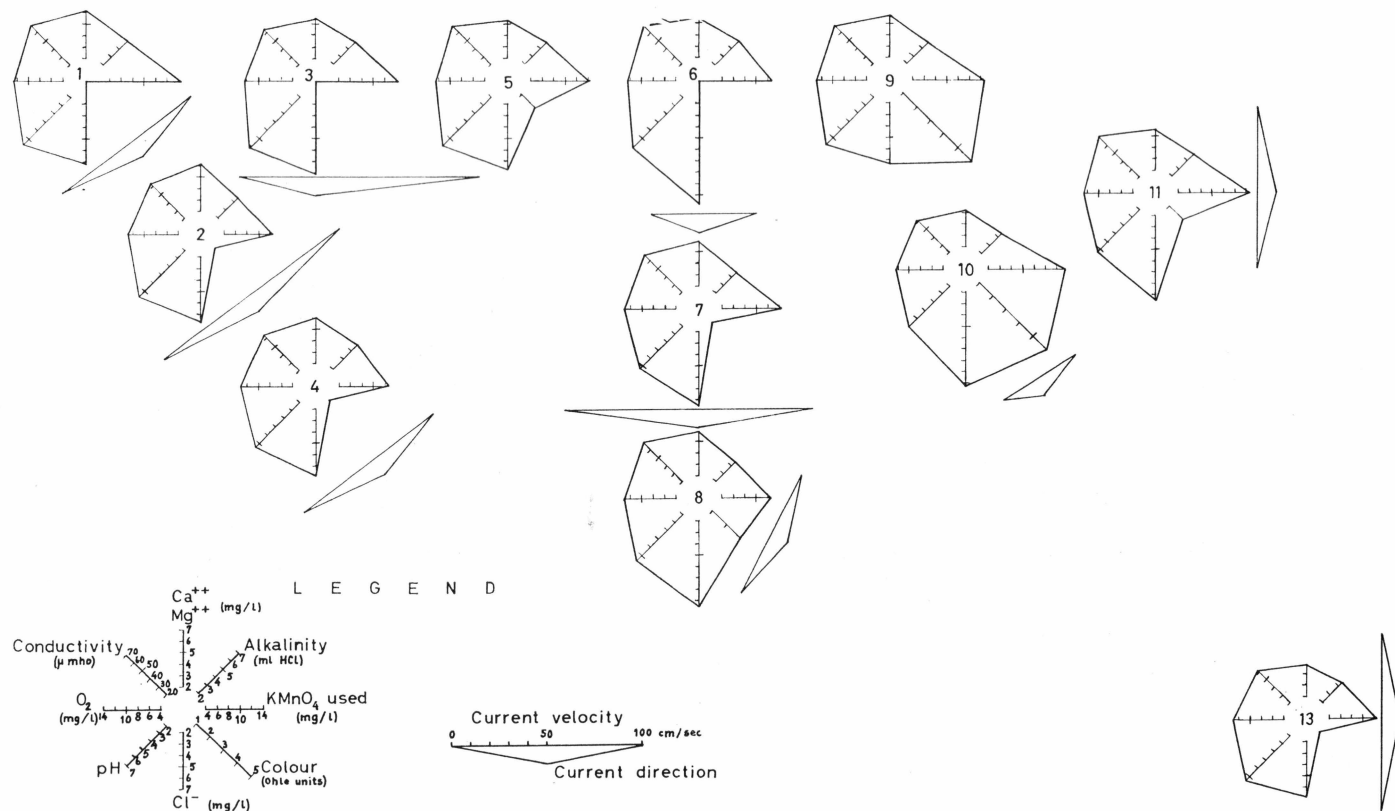


Fig. 3. Physical and chemical conditions of the water of the spring area at Østerli. The localities are arranged approximately according to their geographical situation (Fig. 2). The water current velocity was measured on July 29 and the other analyses were made on August 2–10. The figures in the centre of each octagon indicate the locality numbers.

situated inside the basin of this brook. The locality number 11 is the southernmost spring at Østerli and drains through a rivulet east of the Arctic Station.

The localities with the numbers 14–16 are situated northwest of Godhavn inside the basin of the more westerly of the two brooks which debouch into Engelskmandens Havn. This brook is called Ûnartorssuaq by M. P. PORSILD (1915).

Finally some localities by the Lyngmarkselven, the eastern brook (loc. 18–21) to the north-northwest of Godhavn, have been investigated.

There is a comparatively rich literature dealing with these three spring areas near Godhavn, especially from a botanical point of view, for instance M. P. PORSILD (1902; 1915) and A. E. PORSILD (1925). The most recent paper seems to be that by Prof. T. W. BÖCHER (1959).

Loc. 1 was a rheocene. The snow remained very long in the locality and did not disappear until the beginning of July. The spring lay on the upper part of the talus slope and was exposed to the SSW. A soft moss bed of *Pohlia albicans*, abt. 1 m broad, grew round the spring, which was c. 2 dm broad and c. 1 cm deep. The current velocity of the water was strong (p. 14) and the water temperature almost constant ($1\frac{1}{4}$ – $1\frac{3}{4}$ °C.). The fauna was very poor, only a few chironomid larvae and a few oligochaetes being found.

Loc. 2 was the rivulet conveying the water from loc. 1 down the talus, abt. 10 m below the above mentioned spring. The bottom of the rivulet was covered with stones, between which the water ran with a strong to very strong current velocity. The rivulet was about half a metre broad and its greatest depth only abt. 5 cm. On both sides of the rivulet *Pohlia* was growing in a thick carpet. Chironomid larvae and chironomid pupae and a few oligochaetes were the only animals collected in the locality.

Loc. 3 was a little rheocene exposed to the WSW. high up on the cliff, which was wet with the water trickling out. On a shelf 3 m long and $\frac{1}{2}$ m broad the water accumulated before falling down a wall of rock 4–5 m high. Below this wall there was rich vegetation of *Pohlia* and *Alchemilla* wet with the sprinkling water. The water volume was relatively large and the current velocity on the small shelf was very strong (one of the strongest velocities noted at Østerli). The temperature ranged from $1\frac{1}{4}$ to $1\frac{1}{2}$ °C. The rivulet from the spring united with the rivulet from loc. 1 at loc. 4. The snow lay at loc. 3 until the beginning of July. Relatively many chironomid larvae were collected at loc. 3, where for the rest the fauna consisted of chironomid pupae, oligochaetes and a small water beetle larva.

Loc. 4 was situated at the junction of the rivulets from loc. 1 and loc. 3. The rivulet was at this point 1–5 dm broad and 1–3 dm deep. The current velocity of the water was medium to strong. *Pohlia* formed a broad green carpet on both sides of the rivulet. Nine water mites (three adults and six larvae) were found in this locality besides oligochaetes and chironomid larvae.

Loc. 5. Even from Østerdalen it could be seen that the vertical rock-face at one spot shone red in the sunshine. The colour came from algae growing on a 3 m high rock, which was separated from the real rock-face by a gap about 1 m wide. The algae growing in cavities on the wall of rock had a dark green colour, but for the

rest the colour was rust red. The water oozed out to the surface of the rock, which was wet inside a sharply delimited area, with a vertical wall exposed to the WSW. (the largest part of the spring) and another exposed to the SSE. The uppermost part of the talus consisted of an almost horizontal bed of moss. The water trickled slowly out of the rock, flowed down over the algal vegetation, and dripped (sometimes flowed) down onto the moss, which was not drained by any rivulet or rill. There was a considerable number of chironomid larvae and chironomid pupae on the algal vegetation on the wall of rock. In the wet moss at the base of the rock many oligochaetes and a few water beetle larvae were found.

Loc. 6 was a rheocrene exposed to the SSW. and situated in the gap between the above mentioned rock (loc. 5) and the real rock-face. This gap was filled with deposits and was protected from wind, but had, on the other hand, a few hours of sunshine. The bottom of the spring was covered with stones and the margins were overrun with moss. The depth was only a few centimetres. The water flowed out of the spring (current velocity: medium to strong) and rushed down the talus slope, where loc. 7 and 8 were situated. The fauna was very poor. Only a few chironomid larvae were found, one oligochaete, and one water beetle larva. The flora of the gap with the damp soil was more luxuriant than elsewhere in the area.

Loc. 7. This locality was situated in the middle of the talus slope in the rivulet from loc. 6. The bottom was soft and the water was easily silted up by the loose deposits. A carpet of *Pohlia* covered the bottom and extended about 1 m at each side of the rivulet. The breadth of the rivulet was c. 25 cm and the greatest depth only 3 cm. From this locality the largest current velocity was noted (strong to very strong) at Østerli. Some chironomid larvae and oligochaetes were the only animals found.

Loc. 8 was the rivulet from loc. 6, where it had a slower velocity (medium to strong) at the base of the talus slope and flowed out into Østerdalen. The moss vegetation (*Pohlia albicans*) was very luxuriant and formed a thick carpet extending about 3 m on each side of the rivulet. The bottom was soft, as at loc. 7, and the water was easily silted up. The depth and breadth of the rivulet were 9 and 6 cm respectively. Comparatively many oligochaetes and chironomids (larvae and pupae) were collected from the locality together with three adults of Hydracarina and some harpacticids.

Loc. 9 was a rheocrene covered with snow until far into the summer. The first samples were taken as late as on July 17, when snow still remained at this place. The locality was situated in a vault at the base of the cliff. This vault was abt. 10 m broad, 3 m high and 1 m deep. One and a half metre above the ground the water emerged from under the vault with a very strong current velocity, pouring down the steep rock-face, finding its way among gravels and stones in small rills on the ground, which slightly declined to the south, and uniting in a rivulet at the southern part of the vault. In addition, water was continually dripping from the roof of the vault. The rock-face was covered with probably the same algae as at loc. 5, but here the carpet of algae was not reddish coloured anywhere. There was no other vegetation at the spring. Some chironomid larvae were the only representatives of animal life collected. The chemical analyses of the spring water gave a proportionately high value for the consumption of potassium permanganate and the highest value for the colour (together with loc. 10) at Østerli (p. 17).

Loc. 10 was a helocrene situated just at the foot of the talus slope surrounded by luxuriant *Salix* vegetation (almost metre high). The spring was oval (2 × 3 m)

with its longitudinal axis in the direction of ENE.—WSW. The eastern part was slightly higher than the western. The rich *Pohlia* vegetation, which gave the spring a convex profile, covered the whole spring except a narrow margin of free water surface at the western part, where the depth was about 10 cm. The water, which silted up very easily by the fine deposits, flowed with a very slight to medium velocity. In the height of the summer the water gave the impression of being stagnant. This spring showed relatively large differences in temperature ($2-7\frac{3}{4}^{\circ}\text{C}.$). The fauna was represented by comparatively many oligochaetes and chironomid larvae.

Loc. 11 was the southernmost of the springs investigated at Østerli and was situated below the talus. The spring water emerged at the south-western part of a *Pohlia-Alchemilla*-carpet and the flow was of medium to very strong current velocity in a furrow (abt. 1 dm broad) between two small boulders covered with moss. The depth was c. 15 cm. In its upper course the rivulet from this helocrene flowed towards the southwest, but then turned to the south towards the sea, east of the Arctic Station. Some oligochaetes and chironomid larvae and one chironomid pupa were collected in the locality.

Loc. 12 was a small brook in the western part of Østerdalen, just before its outflow into the Vandelven brook, with its water originating partly from the springs at Østerli and partly from melting snow and ice in the area. The depth of the brook was about 1 dm. On the bottom, where the upper layer consisted of fine deposits, *Pohlia* grew. Three water mites (one adult and two larvae) were found in this locality, which for the rest was biotope for oligochaetes, harpacticids, and chironomids (larvae and pupae).

Loc. 13. The Vandelven brook received water from most of the springs along Østerli and also from melting snow and ice higher up in the mountains. The brook flowed through the western part of the valley, rushed over a fall, passed immediately west of the Arctic Station and discharged its waters into a lagoon connecting with the sea. During the early summer snow and ice still dammed up the inflow of the water masses into a small lake close to the fall. Loc. 13 was stationed in the Vandelven immediately above this lake, which, however, disappeared later in the summer, when the damming snow and ice melted. The water current was of medium to strong velocity over the stony and gravelly bottom. The depth reached about 2 dm. The breadth of the brook in loc. 13 was about 1 m. *Pohlia* grew here and there along the margins of the Vandelven. Comparatively many chironomid larvae, some harpacticids and Trichoptera larvae, and one adult water mite were collected in this locality.

Loc. 14—16 lay in the Ûnartorssuaq, the more westerly of the two brooks rushing down the steep cliff into the bay of Engelskmandens Havn, northwest of Godhavn. The localities were very difficult of access.

Loc. 14 was a helocrene on the flat heath above Engelskmandens Havn. A light green bed of *Pohlia albicans* (c. 4 m²) marked the position of the spring. Besides five adult water mites and two larvae, oligochaetes, harpacticids, and pupae and larvae of Chironomidae were collected.

Loc. 15 was situated on the verge of the heath quite close to the cliff, where the brook rushed down the steep towards Engelskmandens Havn. Around the helocrene *Pohlia albicans* and *Alchemilla* grew amongst others. One Hydracarina larva was found besides one oligochaete and some chironomid larvae.

Loc. 16 was not very different from loc. 15. Here too the helocrene was lying on the verge of the heath exposed to the SW. *Pohlia albicans* and *Alchemilla* grew in



Fig. 4. The spring area at Lyngmarken. In the foreground the Lyngmarkselsen, the eastern brook. Photo: CH. HOLMQUIST July 19, 1956.

and around the small spring. Chironomid larvae, oligochaetes, and two Hydracarina (one nymph and one larva) were the animals collected.

Loc. 17 was a small brook in the mountainous section west of the Vandelven brook. It flowed in a terrain of primary rocks with large stones and boulders partly subterraneously. To judge from my collection, the fauna was composed of chironomid larvae and pupae.

Loc. 18—21 (Fig. 4) were situated in the spring area at Lyngmarken. Loc. 18—20 were three of the many small springs of the Lyngmarkselsen, the eastern brook, on the slopes of a long valley (about 100 m in length) open to the WSW. *Pohlia albicans* grew in all localities investigated at Lyngmarken.

Loc. 18 was the highest (100 m above sea level) of the springs on the southern slope of the valley. Oligochaetes and chironomid larvae were the only animals collected.

Loc. 19 was apparently the lowest situated spring (83 m above sea level) on the southern slope of the valley. Only chironomid larvae were established from this locality.

Loc. 20 lay on the northern slope of the valley and arose as a small rill. All the animals collected here belonged to the Chironomidae family.

Loc. 21 was the Lyngmarkselven at the point (72 m above sea level), where it bent to the south, immediately after leaving the valley. Oligochaetes were collected in comparatively large numbers in addition to several chironomid larvae, one Trichoptera larva, and one adult Hydracarina.

The position of the localities above sea level was determined by means of an aneroid barometer. Loc. 1 was the highest situated locality at Østerli (92 m above sea level) and loc. 13 the lowest (37 m above sea level). At Lyngmarken the corresponding figures were 100 m above sea level for loc. 18 and 72 m above sea level for loc. 21. At Engelskmandens Havn, where water mites were found in each of the three localities investigated, no determination of the height above sea level was made. The three localities were probably situated between 100 and 125 m above sea level according to Mr. ULRIK RØEN (verbal information). Loc. 21 was the only locality at Lyngmarken where water mites were found. Finally, the localities with Hydracarina at Østerli were between 70 and 37 m above sea level.

Thirteen of the localities described above were springs, four rivulets, and four brooks. The composition of the fauna varies considerably in

Table 1. The composition of the animal communities. The number of specimens of the different groups as a percentage of the total number of specimens from the different types of biotopes. Only true water animals are noted, and therefore animals collected in fresh water such as collembolus, tipulid larvae and terrestrial gastropods, are neglected.

Animal groups	Springs	Rivulets	Brooks	Localities with water mites
Chironomids larvae and pupae.....	83	74	62.5	65
Oligochaetes.....	15	20	26	24
Harpacticids.....	0.5	2	8	6
Hydracarina.....	1	4	1.5	4
Trichoptera larvae.....	0	0	2	1
Other animals.....	0.5	0	0	0
Total.....	100	100	100	100

these three types of biotopes. No quantitative investigations properly speaking were undertaken. As, however, all animals found by careful sorting were preserved, figures of their abundance could be calculated approximately as a percentage of the different animal groups in proportion to the fresh-water community in question (Table 1). The chironomid larvae were predominant in all investigated biotopes. About three-fourths of the animal material collected consists of chironomids (larvae and pupae). Oligochaeta is the next best represented group (almost one fifth). Thus the remaining animal groups constitute only a very small part of the fauna (about one twentieth).

Chironomid larvae decrease relatively with the distance from the springs, while the other animal groups increase. The dominance of the chironomids becomes less striking downstream. No water mites were found in rheocrenes but, on the other hand, in three of the helocrenes. Evidently the rivulets were a relatively favourable biotope for the Hydracarina. The water mites decrease in the brooks and the Trichoptera larvae appear as a new component in the fauna.

PHYSICAL AND CHEMICAL CONDITIONS

Analyses were made on July 29 for determination of the water current velocity and on August 2–10 for determinations of the pH, alkalinity, conductivity, hardness, iron content, chloride content, consumption of potassium permanganate, colour and oxygen content of the water at loc. 1–11 and 13 in Østerdalen. The results can be seen in Fig. 3.

The measurements of the **water current velocity** were made after ten days of almost continuous rain, so the quantity and the current velocity of the water were estimated as almost corresponding to the springtime flow. A Pitot-tube was used for the measurements (WELCH 1948, pp. 141–142). The computed values of the current velocity were rounded off to the nearest five. Several measurements were made in each cross section of the stream, viz. on the margins and in the centre vertically at every fifth centimetre from the surface to the bottom. In Fig. 3 only the maximum value for the cross section is noted. According to BERG (1943, p. 54) the values of the current velocity have been divided into the following groups: very slight (< 10 cm/sec), slight (10–25 cm/sec), medium (25–50 cm/sec), strong (50–100 cm/sec), and very strong (> 100 cm/sec) current velocity. The current velocity of the rheocrenes, the rivulets and the brooks did not fall below 30 cm/sec. One of the two helocrenes investigated (loc. 10), however, had a very slow rate. The greatest value of the velocity of this spring was almost as great as the smallest values of the other localities. The other helocrene (loc. 11) was entirely covered with *Pohlia* and *Alchemilla*, so the current velocity was measured downstream the spring, where the water flowed relatively rapidly as a result of the gradient of the ground.

The **temperature** of the water was measured in the shade in all the localities on each occasion when samples were taken. Furthermore, regular measurements were made in loc. 5, 7, 8, and 10 during twenty-four hours of the height of the summer (July 12–13) and during twenty-four hours later in the summer (August 9–10). The thermometers used were graduated in whole centigrades and corrected by a normal thermometer. The readings were made in quarters of a centigrade.

Fig. 5 shows the results of some of the measurements made during the two periods of twenty-four hours (July 12–13 and August 9–10).

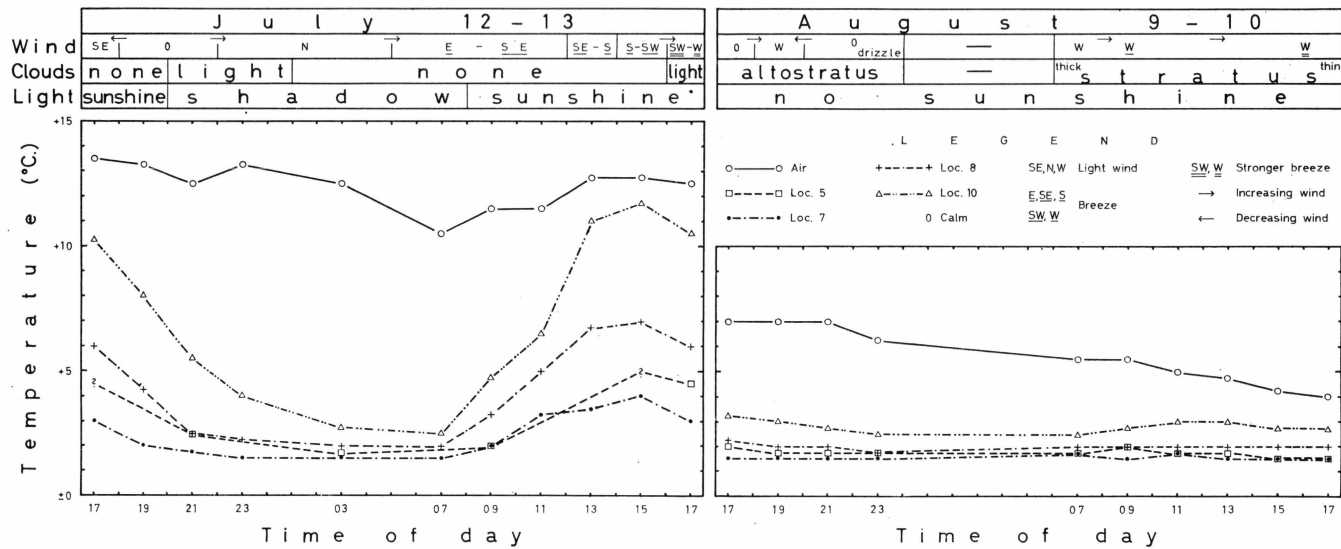


Fig. 5. The results of measurements of the water temperature in loc. 5, 7, 8, and 10 and the air temperature in connection with observations on clouds, wind, and light conditions during one period of 24 hours in July and another in August 1956.

The temperature of the air on the arctic heath was measured at the height of vision in the shade. At night the area investigated was in the shadow of the mountain of Lyngmarksfjæld. The water temperature was measured without screening from the sun, except in loc. 5. Loc. 10 (a helo-crene) had the greatest variation during the twenty-four hours on July 12–13, which is not so remarkable, as the water was almost stagnant and therefore it could be warmed for a longer time.

The temperature amplitudes of the twenty-four hours on August 9–10 were considerably smaller than those on July 12–13, which is clear from Fig. 5. Also on August 9–10 the temperature of the air was higher than that of the water. The curves are, however, close together and run almost parallel. In the night the temperature of the water is almost the same in the localities investigated during the two periods of twenty-four hours. As all localities concerned are in the shadow at night, the light conditions are the same. Therefore the temperature of the spring water, not being influenced by the sun, is constant, at least from the end of June to the middle of August, for only very small deviations from these results were observed by measurements of the water temperature every time samples were taken.

The measurements of the temperature were made principally in order to test whether the springs at Østerli were really as hot as they are said to be in literature. From the source of the Vandelven A. E. PORSILD (1925, p. 172) gives a temperature of $+4$ to $+5^{\circ}\text{C}$. in the summer. From springs entirely overgrown with moss at Engelskmandens Havn REISINGER & STEINBÖCK (1927, p. 41) record 14–17 degrees above zero. In Grønlandskommissionens betænkning (The Report of the Greenland Commission) $+2^{\circ}\text{C}$. is recorded from the Vandelven during the winter (p. 85).

From the results given of my observations on water temperature it is clear that the temperature of the spring water is only 1 à 2 degrees above zero, consequently lower than the statements of A. E. PORSILD (1925) and REISINGER & STEINBÖCK (1927).

As a rule the water temperature of a spring is about the same as the annual mean temperature at the place concerned. The springs near Godhavn are called hot, which is right, as the annual mean temperature at Godhavn is only about -5°C . (Summary stat. inform. Greenland, Table 1). The water runs from the springs during all seasons (A. E. PORSILD 1925), which is remarkable, bearing in mind that the temperature in the winter falls towards -30°C . PORSILD declares that this occurs because of the domes and tunnels of ice formed over the springs and the rivulets. Below the layers of snow and ice, insulating from coldness, a water temperature just above zero is quite sufficient to keep the water running all the year round.

These "hot" springs are naturally of great importance as refuges for the over-wintering fauna during the long and cold arctic winter.

The determination of the **reaction** of the water was made electrometrically by Radiometer's "pH-meter 24". According to IVERSEN (1929) not only was the pH-value measured on the occasion in question but also the theoretically highest and lowest pH-value. The actual pH-value varied from 7.0 to 8.2, while the mean value of the theoretically highest and lowest pH-value was 8.6 and 5.6 respectively.

The **alkalinity** of the water was determined according to BENNIKE (1943, p. 12).

To measure the **specific conductivity** of the water (at 20°C.) a "Dionic Water Tester" was used (WELCH 1948, pp. 224-226).

The **hardness** of the water was measured by titration with a versenate solution (HERON & MACKERETH 1955).

With the potassium rhodanide method there was no trace of **iron** at all from any locality.

The content of **chloride** was determined by titration with 0.05 N silver nitrate and with potassium chromate present.

By determining the potassium permanganate consumption and the colour of the water, values are obtained which give an idea of the amount of organic matter of the water. The results from the determination of the **potassium permanganate consumption** given in Fig. 3 come from unfiltered water samples. For the rest the analysis has been made according to THUNMARK (1937, p. 122). The highest values (17 mg KMnO_4 /l) are from loc. 1, 9-11, which were all springs. Loc. 1 was a rheocene with very shallow water, so the water samples probably contained detritus silted up from the bottom, which gives an explanation of the proportionately high value for the KMnO_4 consumption.

The **colour** of the water was determined in "Ohle"-units by adding methylorange to distilled water according to BENNIKE (1943, pp. 9-10). The colour was 0 "Ohle"-units in loc. 1, and the character of a spring is unmistakable. Hence, the high value of the potassium permanganate consumption in this locality is accidental, as mentioned above. Perhaps loc. 9 was not a spring; in either case its water was mixed with surface water on account of cracks in the area, because both the KMnO_4 consumption and the colour are too high for this rheocene. (The water samples were taken after a period of rain.) On the other hand, the localities 10-11 were helocrenes. The high values of KMnO_4 consumption and the colour in these localities are not remarkable.

The determination of the **oxygen** content of the water was made according to WINKLER's method with the bromine procedure by ALSTERBERG. The bottles for the samples were filled up in the field with water through a rubber tube with the greatest care. The bottom of this tube

Table 2. Physical and chemical analyses of the localities in Østerdalen.

Physical and chemical factors	Springs (loc. 1, 3, 5-6, 9-11)	Rivulets (loc. 2, 4, 7-8)	Brooks (loc. 13)	Localities with water mites (loc. 4, 8, 13)
Current velocity (cm/sec)	(0-45)- -(120-125)	(30-70)- -(60-130)	30-95	(30-70)- -(30-95)
Temperature (+ °C.)	(1-2)- -(2-7 ³ / ₄)	(1-3 ¹ / ₄)- -(1 ¹ / ₂ -6 ¹ / ₂)	3 ¹ / ₄ -5 ¹ / ₄	3-7 ¹ / ₂
pH	7.0-8.2	7.3-7.7	7.5	7.4-7.7
Alkalinity (ml 0.01 N HCl/100 ml)	4.5-5.0	4.5-5.1	4.6	4.5-5.1
Conductivity (μ mho at 20°C.)	61-71	63-68	61	61-68
Hardness (mg Ca ⁺⁺ and Mg ⁺⁺ /l)	5-6	6	5	5-6
Iron	0	0	0	0
Chloride (mg Cl ⁻ /l)	7.3-10.8	7.7-9.5	6.9	6.9-9.5
KMnO ₄ consumption (mg KMnO ₄ /l)	13-17	13-14	13	13
Colour (Ohle units)	0-6	1-3	1	1-3
Oxygen (mg O ₂ /l)	12.2-12.7	12.8-13.1	12.9	12.8-13.1
(saturation ‰)	87-90	92-97	98	93-98

was in the bottle and the top was pushed into the spring orifice as far as possible. The values of the oxygen content became high (the saturation was about 90 per cent) compared with THIENEMANN's values (1924, pp. 180-183) from springs in Holstein (Germany), where the saturation of the rheocrenes varied from 15.1 to 43.7. The lowest and the highest values from this region were however, 3.6 and 98.2 per cent respectively. The values given by DITTMAR (1955, p. 331) from springs in Sauerland (Germany), viz. 79.6-98.4 per cent saturation, correspond better to those of the springs at Østerli. From Table 2 it is evident that the oxygen saturation is smallest in the springs, a little greater in the rivulets, and greatest in the Vandelven. The saturation varied in the area from 87 to 98 per cent.

In comparing the physical and chemical conditions of the localities investigated, it is seen that there are only slight variations from one

locality to another (Fig. 3 and Table 2). The only factor with greater variation is the water current velocity. The width of the variation is greatest in the springs and smallest in the brook investigated (the Vand-elven). The same is on the whole also the case in respect to the other factors. But in making such a comparison it is important to bear in mind that a greater variation is to be expected from seven springs rather than from four rivulets or one brook. A quite different picture of the variation is given by examining the values of the oxygen saturation, which increases from the springs to the brook. The values from the three types of biotopes do not intrude upon each other, but are distinctly separated.

On the basis of the physical and chemical conditions analyzed some conclusions may be drawn concerning the ecology of the species of Hydracarina found in the spring areas near Godhavn. Because there are very few finds of the species just from Godhavn, conclusions must be drawn very carefully. It is obvious that the species is rheophilous – but not so marked. The current velocity was medium to strong in the localities where water mites were found. To judge from my observations in the biotopes the species also seems to be cold stenothermal and to prefer pure water with a high oxygen content.

THE HYDRACARINA FROM THE SPRING AREAS NEAR GODHAVN

The list of the water mites found in the spring areas near Godhavn (Table 3) shows that males and females as well as nymphs and larvae were caught at the beginning of the summer (June 27). The last find of Hydracarina was made on July 19. During August no water mites were found.

The species of Hydracarina from Godhavn belongs to one species of the subgenus *Pseudolebertia*, the different characters of which have a striking resemblance to *Lebertia (Pseudolebertia) convergens* THOR 1911 (distribution: Kamchatka), *Lebertia (Ps.) glabra* THOR 1897 (distribution: most European countries), and *Lebertia (Ps.) zschokkei* (KOE-NIKE 1902) (distribution: the alpine countries, North Spain, and Czechoslovakia). But there are also certain differences between the Greenlandic water mite and the above mentioned species. I have had the opportunity of studying one microscopical slide of *L. glabra* kindly lent to me by Professor O. LUNDBLAD, Stockholm. Otherwise I have been restricted entirely to figures and descriptions in literature.

Table 3. Hydracarina found in Østerdalen, at Lyngmarken, and at Engelskmandens Havn.

Loc.	Date	Males	Females	Nymphs	Larvae	Slide No.
4	July 15	1	2	..	6	15-23
8	June 28	1	1	..	..	9-10
	July 12	..	1	..	..	13
12	June 28	..	..	..	2	11-12
	July 12	1	..	..	..	14
13	Aug. 11	..	1	..	..	25
14	June 27	2	1	..	2	1-5
15	June 27	..	..	..	1	6
16	June 27	..	..	1	1	7-8
21	July 19	1	..	..	..	24
Total		6	6	1	12	

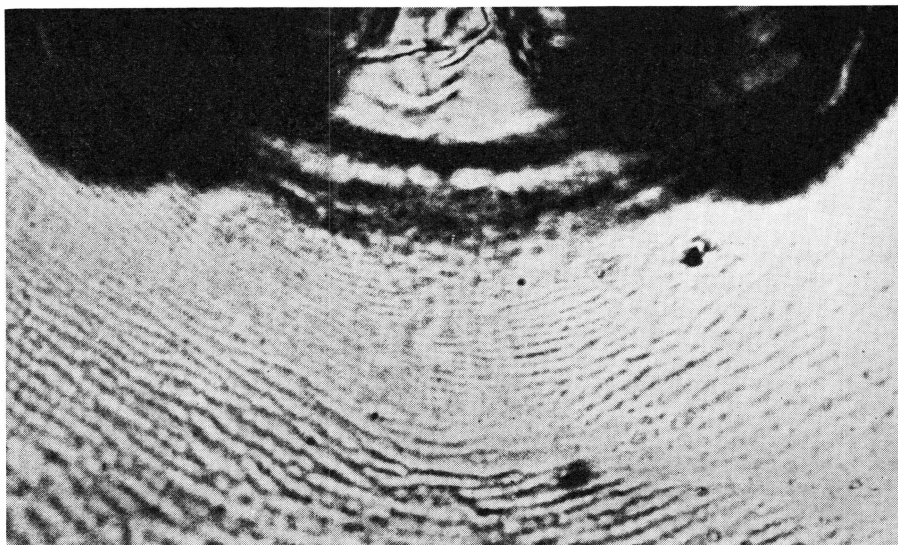


Fig. 6. *Lebertia* (*Pseudolebertia*) *groenlandica* n.sp., ♀, skin from the area between the genital field and the excretory pore; detail of Fig. 11a. Enlargement abt. 700×.

Photo: S. BJÖRK.

In the making of the slides the penis was removed together with the entrails. The determination of sex has therefore been done later on with the guidance of the sexual dimorphism in the number of hairs on the inner margins of the genital valves, in the size of the projecting part of the genital organ outside the genital bay, and in the shape of the anterior sclerite in the genital bay.

In the following description the terminology and abbreviations used are mainly from VIETS (1936).

Males. The comparison with *Lebertia convergens* is incomplete in this description of the males, because only a female is described in literature. The colour of the sclerotized parts of the prepared animals is yellowish just as in *L. convergens* and *L. glabra*. *L. zschokkei* has a violet colour (KOENIKE 1918/19; LUNDBLAD 1957), but VIETS (1930, p. 366) asserts that his material of *L. maculosa* (= *L. zschokkei* according to LUNDBLAD 1957) consists of two forms in respect of the colour of the epimeral shield, one with a yellow and one with a reddish violet tinge.

The body length is about 1300–1400 μ , i.e. considerably bigger than *L. glabra* and *L. zschokkei*. Because the specimens were not measured before the preparation, only the approximate length can be given.

The skin is thinner and has more slender ridges than in *L. glabra*. Dorsally the very faint ridges are difficult to observe. They are ramified like a network, but not arranged in a particular manner, except for the

circular arrangement around the epidermal glands. The minute pores in the skin, however, are easier to observe. Ventrally the ridges are longer and especially distinct between the genital field and the excretory pore (Fig. 6), where they are intermittent in varying lengths of a few μ to more than 100 μ . Around the slit-like excretory pore the ridges are arranged more or less circular. By comparison with *L. glabra* the skin of the Greenlandic specimens seems to be almost smooth. The sclerotized ridges of the Greenlandic animals are much narrower and lower. The distance between two ridges in the latter species varies from 1.5 to 2.5 μ according to my material. Consequently the ridges lie considerably more closely here than in *L. glabra* and *L. zschokkei*. KOENIKE (1918/19) states concerning *L. alpina* (= *L. zschokkei* according to LUNDBLAD 1957) that the skin is "weitläufig sehr fein geadert, auf einem Hautstreifen von 20 μ Breite 4–5 Adern nebeneinander". That means that the distance between two ridges is 4–5 μ , consequently twice as large as in the Greenlandic specimens. The skin of *L. convergens* is almost smooth with very faint ridges, according to THOR (1911).

The mandible does not differ very much in shape from that of other *Pseudolebertia* species. But the size is larger than in most of them (251–318 μ). The broad distal part of the mandible, including the claw, is a little longer than its proximal part (Fig. 7a). These two parts form an obtuse angle. The ventral sclerotized border of the proximal part is slightly curved.

The maxillar palp (Fig. 7b) is very much like that of *L. zschokkei*. The first segment of the palp (P.I) has a bristle on the dorsal margin. P.II is stout, with the robust ventral bristle situated just behind the distal end. This bristle is often pubescent in front. The ventral margin of the segment is slightly concave. The dorsal bristles are more robust than those of the comparison species. The two distal bristles are placed close to each other just behind the distal end of the segment and reach the two middle hairs of P.III. The bristles are often pubescent. The remaining two (sometimes three) dorsal bristles stand behind each other on the dorsal margin about the middle of the palp segment. P.III has about the same shape as in *L. convergens* and *L. zschokkei*. The palp segment of *L. glabra* is shorter in relation to the length of the epimeral shield than that of *L. convergens*, *L. zschokkei* and the Greenlandic specimens (Fig. 8). The distal part of the palp segment of the Greenlandic specimens, *L. convergens* and *L. zschokkei*, is very little broader than its proximal part. The segment seems to be uniformly broad. In *L. glabra*, on the other hand, the segment is obviously broader towards the distal end. Fig. 9 shows the location of the hairs of the segment (males and females not separated). The diagram is drawn so that the inner distal hair is placed in the origo and the abscissa runs through the inner middle

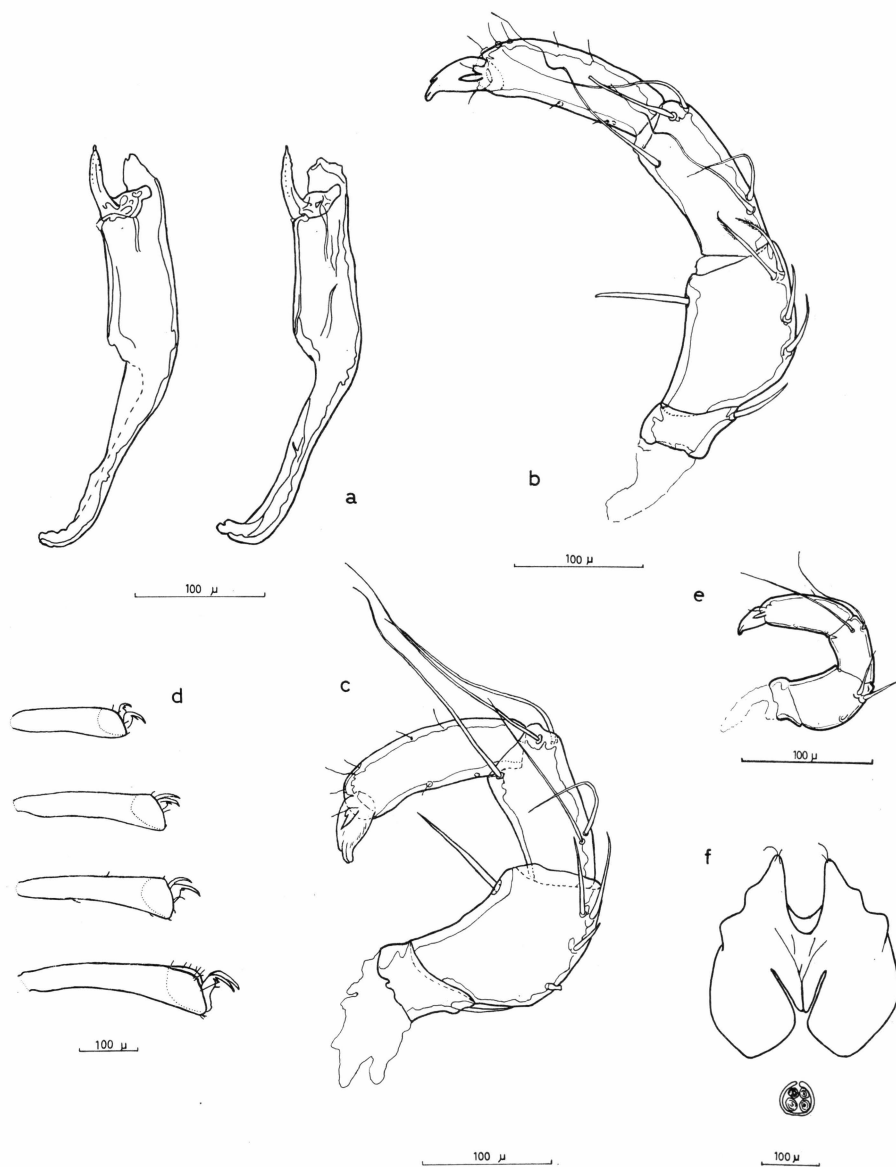


Fig. 7. *Lebertia* (*Pseudolebertia*) *groenlandica* n.sp. (type material). *a* mandibles (♀, slide 15); *b* right maxillary palp, inner view (♂, slide 14); *c* right maxillary palp, inner view (♀, slide 15); *d* terminal segments of the left legs, lateral view, from the top to the bottom: I.B.6, II.B.6, III.B.6, and IV.B.6 (♂, slide 14); *e* right maxillary palp, inner view (nymph); *f* epimeral shield (nymph). Cf. Table 7.

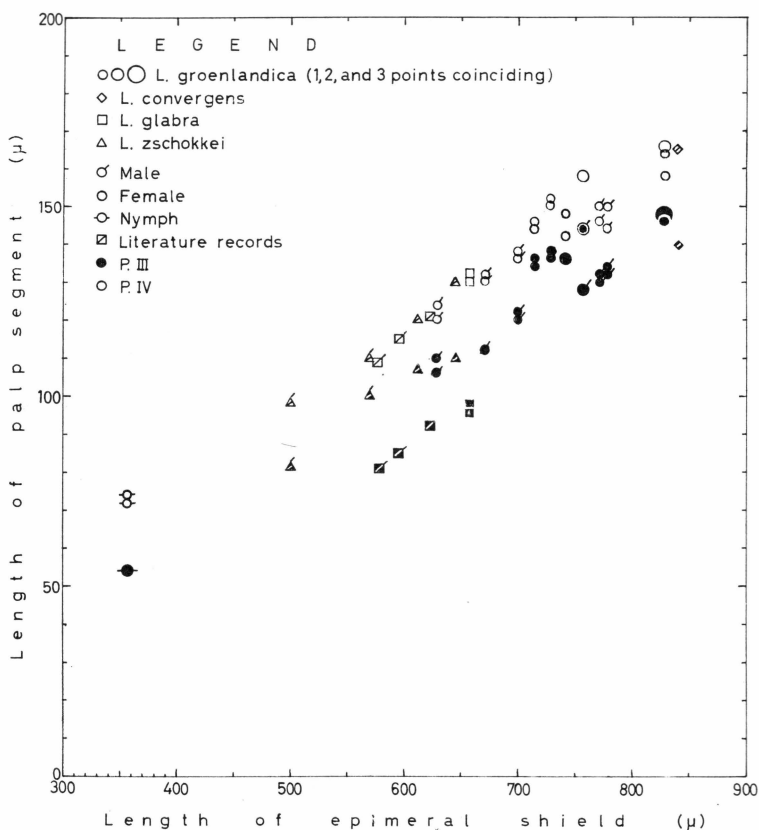


Fig. 8. The length of the third and fourth segment of the maxillary palp in relation to the length of the epimeral shield of *Lebertia* (*Pseudolebertia*) *groenlandica* n.sp., *Lebertia* (*Ps.*) *convergens* THOR 1911, *Lebertia* (*Ps.*) *glabra* THOR 1897, and *Lebertia* (*Ps.*) *zschokei* (KOENIKE 1902). Literature records:

L. convergens from THOR 1926;

L. glabra from VIETS 1924; LUNDBLAD 1957;

L. zschokkei from KOENIKE 1918/19; LUNDBLAD 1957.

One of the values given in the diagram concerning *L. glabra* comes from my own measurements on a slide borrowed from Prof. O. LUNDBLAD.

hair. The distal and the proximal ends of the palp are projected at right angles to the abscissa. The hairs are thicker than in *L. glabra* and according to figures also thicker than in *L. zschokkei*. The distance from the inner to the dorsal distal hair is half as long as from the inner to the ventral distal hair. From the diagram it is evident that the distal hairs are placed so that they form an obtuse angle. It is quite the same as regards *L. convergens*. Corresponding hairs in *L. glabra*, however, form an almost right line, if their points of attachment are joined. The three distal hairs reach past the distal end of P. IV, which is the same in *L. convergens* and

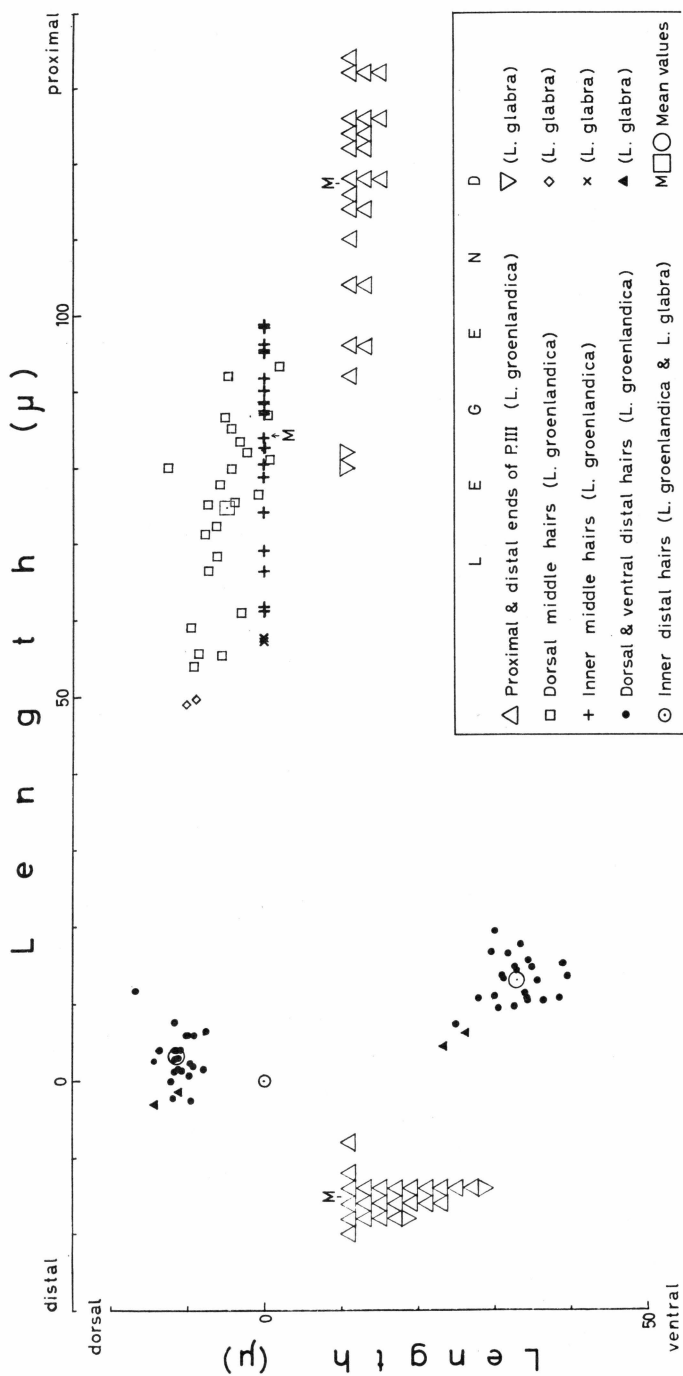


Fig. 9. The location of the hairs of the third segment of the maxillary palp of *Lebertia* (*Pseudolebertia*) *groenlandica* n.sp. (own slides) and *Lebertia* (*Ps.*) *glabra* Thor 1897 (LUNDBLAD's slide). Further explanations of the diagram are given in the text.

Table 4. List of measurements of the maxillar palp of the males.
Maximum length and breadth, when not otherwise stated.

Segment	P. I	P. II	P. III	P. IV	P. V
Length (μ)	40–52*)	102–132*)	106–134	120–150	44–54
Breadth (μ)	53–64**)	62–78**)	48–58**)	—	20–24

*) Measured along the dorsal margin.

**) Measured distally.

L. zschokkei. Both the middle hairs stand behind the middle of the segment, the inner hair a little behind the dorsal one. P. IV is almost uniformly broad, as in *L. convergens* and *L. zschokkei*, and not distally tapering, as in *L. glabra*. (As a rule the distal end is even a few μ broader than the proximal end.) The Greenlandic specimens, *L. glabra* and *L. zschokkei*, have the distal part of the palp segment ventrally bent to a greater extent than *L. convergens*. The proximal half of the ventral margin is convex and the distal half is concave, while the dorsal margin is convex in its whole length (the roundness, however, increases towards the distal end). In relation to the length of the epimeral shield, P. IV of the Greenlandic specimens is as long as that of the comparison species (Fig. 8). If the distance from the ventral hair pores to the distal end is noted in per cent of the total length of the palp segment, the proximal hair pore will be placed between 67 and 75 per cent from the distal end (consequently $\frac{1}{3}$ – $\frac{1}{4}$ from the proximal end) and the distal hair pore between 40 and 49 per cent from the distal end (consequently just in front of the middle) (Fig. 10). The location of the small dorsal hairs is not so fixed as that of the hair pores, which is clear from the same diagram. The first and second small hairs from the proximal end are placed almost opposite to the two hair pores of the ventral margin, the first at 53–68 per cent from the distal end (consequently just behind the middle and in front of the proximal hair pore) and the second at 20–56 per cent from the distal end (consequently at a greatly varying distance). The first small dorsal hair of *L. glabra*, the specimen of which I have studied a slide, stands behind the proximal hair pore of the ventral margin. From figures in literature the location of the first small dorsal hair in relation to the proximal hair pore in *L. glabra* is, as a rule, placed either just as mentioned above, or opposite to each other. But there are exceptions and therefore this character is of doubtful taxonomical value by separating the Greenlandic species from others of the subgenus. From the figures *L. convergens* and *L. zschokkei* seem to resemble the Greenlandic specimens according to the location of the ventral pores and the dorsal hairs. The sclerotized peg lying close to P. V is much more robust (14–24 μ long)

than that of the comparison species. P.V is perhaps proximally a little stouter than that of *L. glabra* and *L. zschokkei*. Table 4 shows the magnitude of the maxillar palp.

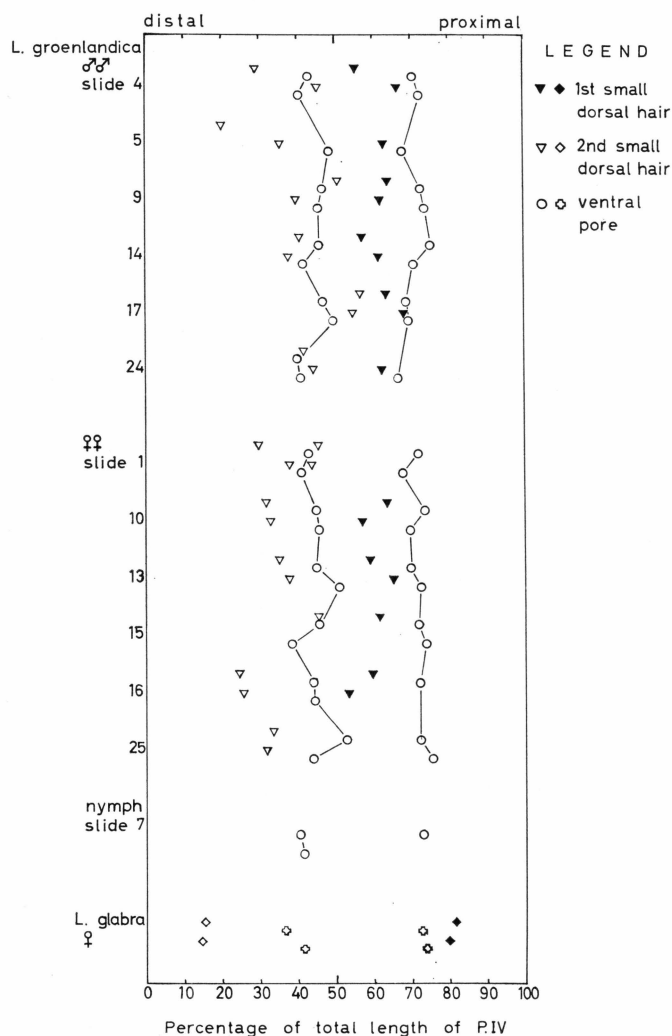


Fig. 10. The location of the small dorsal hairs and the ventral hair pores of the fourth segment of the maxillar palp of *Lebertia* (*Pseudolebertia*) *groenlandica* n.sp. (own slides) and *Lebertia* (*Ps.*) *glabra* THOR 1897 (LUNDBLAD's slide). In each slide the values of the right palp segment are above those of the left one. Further explanations of the diagram are given in the text.

The epimeral shield is of about the same length (629–779 μ) as breadth (571–729 μ) and almost circular (Fig. 11 a). The fourth pair of epimera (Ep.IV) is a little incurved laterally in front of the epidermal



Fig. 11. *Lebertia* (*Pseudolebertia*) *groenlandica* n.sp. *a* epimeral shield, ♀; *b* left hind leg (IV.B.1-6), ♀. Enlargement abt. 70×. Photo: S. BJÖRK.

glands. The margin of Ep.IV forms a right angle at its posterior corner. This angle is obtuse in *L. convergens* and the epimeral shield is broad at its posterior corner (seems to be cut). *L. glabra* is the species whose posterior corner most resembles that of the Greenlandic specimens. The margin of the epimeral shield of these specimens, however, runs almost rectilinearly (about 100–150 μ) between the posterior corner and the slight indentation in front of the epidermal glands, while the margin is slightly convex at the same part in *L. glabra*. Another difference is

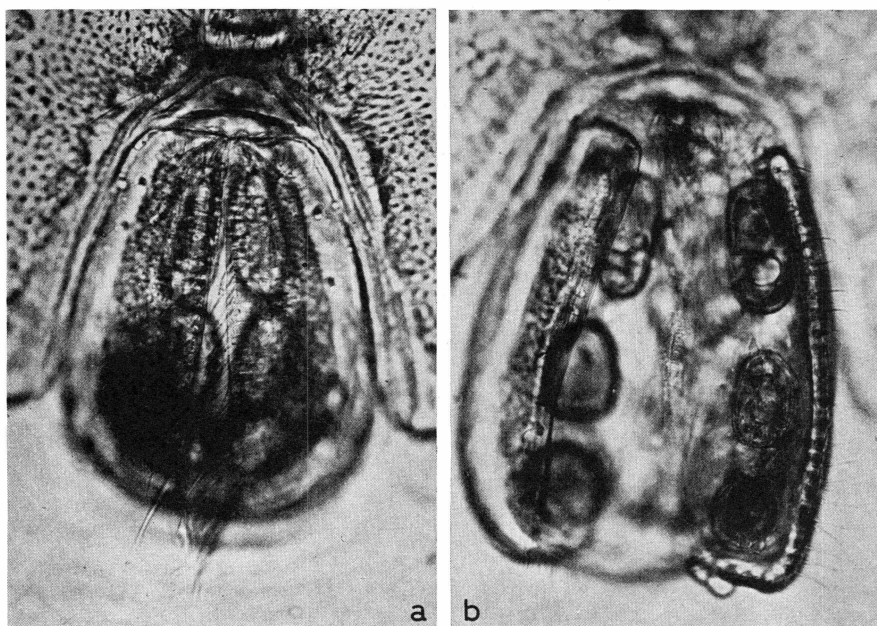


Fig. 12. *Lebertia* (*Pseudolebertia*) *groenlandica* n.sp., genital valves. Enlargement abt. $250\times$. *a* ♂, slide 14; *b* ♀, slide 15. Photo: S. BJÖRK.

that the inner margin of the shield by the genital organ is straight in the Greenlandic specimens, but slightly concave in *L. glabra*. Ep.II of *L. convergens* is proximally proportionately broader than that of the Greenlandic specimens as well as that of *L. glabra*. In this respect *L. zschokkei* is almost the same as *L. convergens*.

The genital valves ($188\text{--}214\ \mu$ in length) reach to about $\frac{1}{4}\text{--}\frac{1}{3}$ of its length outside the genital bay (Fig. 12a and 13). The number of hairs on the inner margin of each valve is 27–38, i.e. almost double as many as in *L. glabra* and *L. zschokkei*.

The excretory pore has no sclerotized ring.

The legs resemble the legs of *L. glabra* very much with their proportionally thin segments, but the terminal segments of the three posterior pairs of legs (II.–IV.B.6) grow distally thicker (the distal ends are about double as thick as the proximal ends), just as in *L. zschokkei*. As distinguished from *L. zschokkei* I.B.6 also are distally thicker (about one and a half times). The terminal segments of the fourth pair of legs (IV.B.6) are more bent in the Greenlandic specimens than in *L. glabra* (Fig. 7d and 11b). Swimming hairs are lacking.

The **females** resemble the males very much. They are, however, bigger than the males (body length about $1300\text{--}1600\ \mu$), have a smaller

number of hairs on the inner margin of the genital valves (Fig. 13), have a greater part of the genital valves projected outside the bay (about $\frac{2}{5}-\frac{1}{2}$), and have a different shape of the anterior sclerite in the genital bay. The body length of the female of *L. convergens* described is 1600 μ (THOR 1926), while the females of the other two comparison species are considerably smaller.

The mandible of the Greenlandic females varies from 293 to 344 μ in length. The magnitude of the maxillar palp (Fig. 7c) is clear from

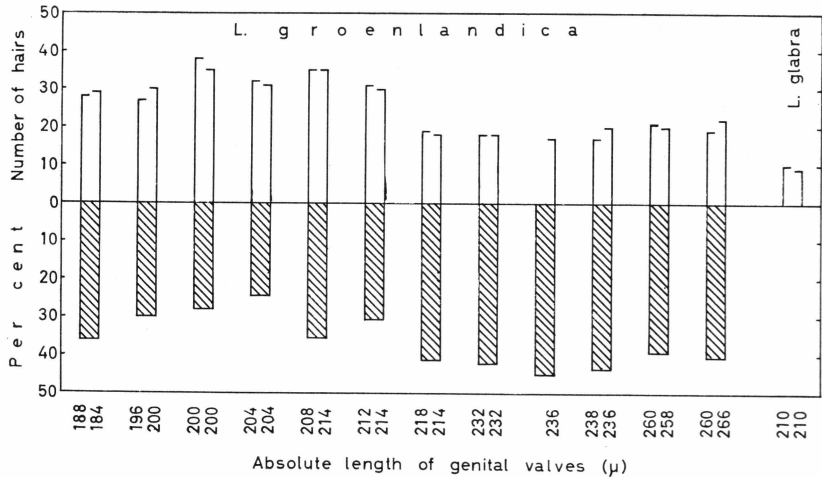


Fig. 13. The number of hairs on the inner margin of the genital valves and the percentage of the valves projecting outside the genital bay of *Lebertia* (*Pseudolebertia*) *groenlandica* n.sp. (own slides) and *Lebertia* (*Ps.*) *glabra* THOR 1897 (LUNDBLAD'S slide). In each slide the values of the right genital valve stand to the left and those of the left valve to the right. The first six bars from the left indicate males and the rest females.

Table 5. In relation to the length of the epimeral shield the palp segments P. III and P. IV are a little longer in the females than in the males, which is evident from Fig. 8. With respect to the location of the hair pores and the small dorsal hairs of P. IV (Fig. 10), there are no sexual differences.

Table 5. List of measurements of the maxillar palp of the females. Maximum length and breadth, when not otherwise stated.

Segment	P. I	P. II	P. III	P. IV	P. V
Length (μ)	44-60*)	128-146*)	134-148	142-166	50-60
Breadth (μ)	62-74**)	74-86**)	56-66**)	-	22-26

*) Measured along the dorsal margin.
**) Measured distally.

The epimeral shield is 714–829 μ long and 671–814 μ broad. Each of the genital valves (214–266 μ in length) has 17–22 hairs on the inner margin (Fig. 12b and 13). The number of hairs in *L. glabra* and *L. zschokkei* is only about 12, while *L. convergens* has 22 hairs according to THOR (1926, p. 151).

The terminal segments of the legs are enlarged in the same proportions as in the males.

Only one **nymph** was collected. It was from loc. 16, where no adults were found. But as the nymph belongs to the subgenus *Pseudolebertia*, it probably also belongs to the same species as the other specimens from Godhavn. As the nymph was preserved in alcohol and partly damaged by the preparation, no description can be given.

Table 6. List of measurements of the maxillar palp of the nymph. Maximum length and breadth, when not otherwise stated.

Segment	P. I	P. II	P. III	P. IV	P. V
Length (μ)	20*)	62–64*)	54	72–74	27–28
Breadth (μ)	36**)	34–36**)	30**)	—	13–14

*) Measured along the dorsal margin.

**) Measured distally.

The skin is very thin and no ridge structure can be observed. The shape and the proportions of the palps correspond to the appearance of the palps of the adults (Fig. 7e and 8). The hairs and bristles are also placed as in the adults (Fig. 10). The magnitude of the palps is evident from Table 6. The epimeral shield is 357 μ long. The provisional genitalia consist of four acetabula surrounded by a sclerotized ring, which is open anteriorly (Fig. 7f). The terminal segments of all the legs are distally enlarged as in the adult *Pseudolebertia* specimens from the area.

Twelve **larvae** of *Lebertia* were collected. As it is impossible to examine this type of larvae, I shall not try to give a report of the morphological structure of the larvae. However, they probably belong to the same species as the adults found in the same localities.

The Greenlandic specimens are bigger than *L. glabra* and *L. zschokkei*. Only one female of *L. convergens* is described. This is, however, of about the same magnitude as the Greenlandic specimens, and there are further resemblances. Some of the most striking morphological resem-

blances are the very fine sclerotized ridges of the skin, the almost uniformly broad P.III with the three distal hairs, the attachments of which form an obtuse angle, the uniformly broad P.IV, and the same number of hairs on the inner margin of the genital valves. The greatest differences between the Greenlandic water mites and *L. convergens* are the terminal segments of the legs, which are very enlarged distally in the Greenlandic specimens, and the different form of the epimeral shield (the posterior corner of Ep.IV and the posterior part of Ep.II). In addition P.IV is much more ventrally bent in these specimens than in *L. convergens*.

In making comparisons between the Greenlandic specimens and *L. glabra* the greatest resemblances are found in the shape of the epimeral shield and in the structure of the legs. The segments of the legs are in both cases comparatively gracile, but the terminal segments are more enlarged in the Greenlandic specimens. There are, however, many differences in appearance. *L. glabra* is unlike the Greenlandic water mites, amongst other things on account of its having much more vigorous sclerotized ridges of the skin and relatively shorter and broader P.III; further by the location of the three distal hairs of the same palp segment, the attachments of which form an almost straight line, in P.IV, which is distally tapered, and by the smaller number of hairs on the inner margin of the genital valves.

L. zschokkei corresponds mainly to the Greenlandic specimens, especially in the form and relative magnitude of the palp (Fig.8). Besides differences in the body length, the most striking morphological differences are in the shape of the sclerotized ridges of the skin, in the form of the epimeral shield (the proximal parts of Ep. II and Ep. IV), in the number of hairs on the inner margin of the genital valves and in the structure of the legs.

From the statement above it is clear that the Greenlandic specimens cannot be assigned to any of the comparison species, because there are too many and too great differences. Therefore they probably belong to a new species, for which the name *Lebertia* (*Pseudolebertia*) *groenlandica* is proposed. (Type material is deposited in the Zoological Museum, Copenhagen, Denmark. Type locality: the spring area at Østerli, Godhavn, Greenland.) Table 7 gives the measurements of one male (typus) and one female of *L. groenlandica*.

Table 7. List of measurements of *Lebertia* (*Pseudolebertia*) *groenlandica* n.sp. based on two of the described specimens.

	Male (typus) (slide 14)		Female (slide 15)	
Body length (μ).....	abt. 1300		abt. 1400	
Mandible length, claw included (μ).....	311 & 318		302 & 300	
Maxillar palps:	right	left	right	left
P. I dorsal length (μ).....	52	—	52	54
distal breadth (μ).....	64	—	68	68
P. II dorsal length (μ).....	130	131	132	127
distal breadth (μ).....	78	76	80	76
P. III maximum length (μ).....	134	132	138	136
distal breadth (μ).....	56	58	60	62
P. IV maximum length (μ).....	144	150	150	152
P. V maximum length (μ).....	54	54	54	54
maximum breadth (μ).....	24	22	25	24
Sclerotized peg of P. IV length (μ).....	20	22	20	20
Epimeral shield:				
length (μ).....	780		730	
breadth (μ).....	707		714	
ratio: length/breadth.....	1.1		1.0	
Ep. I medial length (μ).....	236		240	
Ep. II medial length (μ).....	142		96	
distance from maxillar bay to				
genital bay (μ).....	378		336	
length of Ep. I as a percentage of the distance from the maxillar bay to the genital bay (μ).....	62		72	
Genital valves:	right	left	right	left
length (μ).....	204	204	238	236
number of hairs on the inner margin.....	32	31	17	20
part of the valves projected outside the genital bay as a percentage of the total length of the valves.....	25		44	
Legs:	right	left	right	left
IV. B. 1 number of spines.....	5	4	5	4
I. B. 6 ratio of breadths:				
distally/proximally.....	1.7	1.9	1.6	1.7
II. B. 6 ratio of breadths:				
distally/proximally.....	2.3	2.5	1.9	2.0
III. B. 6 ratio of breadths:				
distally/proximally.....	2.2	2.5	2.0	1.8
IV. B. 6 ratio of breadths:				
distally/proximally.....	2.2	2.1	1.8	2.0
IV. B. 1 maximum length (μ).....	187	196	200	200
IV. B. 2 maximum length (μ).....	204	213	196	222
IV. B. 3 frontal length (μ).....	258	258	236	253
IV. B. 4 frontal length (μ).....	351	351	320	378
IV. B. 5 frontal length (μ).....	373	369	378	396
IV. B. 6 frontal length (μ).....	316	320	311	324
IV. B. 1–6 frontal length (μ).....	1636	1645	1583	1725

THE HYDRACARINA OF GREENLAND

Hydracarina have been recorded from Greenland by FABRICIUS (1780), THORELL (1872), JOHANSEN (1914) and TRÄGÅRDH (1912). Taxonomical discussions on *Lebertia* (*Pseudolebertia*) *fabricii* have occurred in several publications by TRÄGÅRDH (1901, p. 62; 1904, pp. 4, 7, 62–63; 1912, pp. 420–421) and THOR (1906, pp. 272–273, 275; 1910, pp. 5, 18). The Greenlandic records of water mites have further been treated by NEUMAN (1880, p. 14), PIERSIG (1897–1900, p. 11), and KOENIKE (1918/19, p. 685). The water mite fauna was most recently summarized in works by TRÄGÅRDH (1912) and HENRIKSEN & LUNDBECK (1917). The following list includes, on the one hand, earlier recorded finds and, on the other hand, earlier unrecorded finds from the collections of the Zoological Museum of Copenhagen, from Mr. ULRIK RØEN's collection and from my own.

Hydrachnellae.

***Sperchon brevirostris* var. *lineatus* THOR 1899.**

- 30.VII.1930. 1 female from Station no. 4. Stream at Loch Fyne, East Greenland.
Leg. B. LØPPENTHIN, Godthaab Exp. 1930.
Zool. Museum, Univ. Copenhagen.

***Lebertia* (*Pseudolebertia*) *fabricii* (THORELL 1872).**

- 1872 THORELL (pp. 163–164): ***Hygrobates Fabricii***. 1 adult from Quannersoit (= Kuánerssuit), West Greenland.
Leg. J. LINDAHL.
- (? = 1780 FABRICIUS (pp. 222–223): ***Acarus aquaticus***).
An unknown number of specimens from the Frederikshaab district, West Greenland.
(= 1912 TRÄGÅRDH (pp. 420–421): ***Lebertia* (*Pseudolebertia*) *fabricii***).

***Lebertia* (*Pseudolebertia*) *groenlandica* n.sp.**

- 27.VI.–11.VIII.1956. 6 males, 6 females, 1 nymph and 12 larvae from the spring areas at Østerli, Engelskmandens Havn and Lyngmarken near Godhavn, West Greenland.
Leg. U. LETTEVALL.

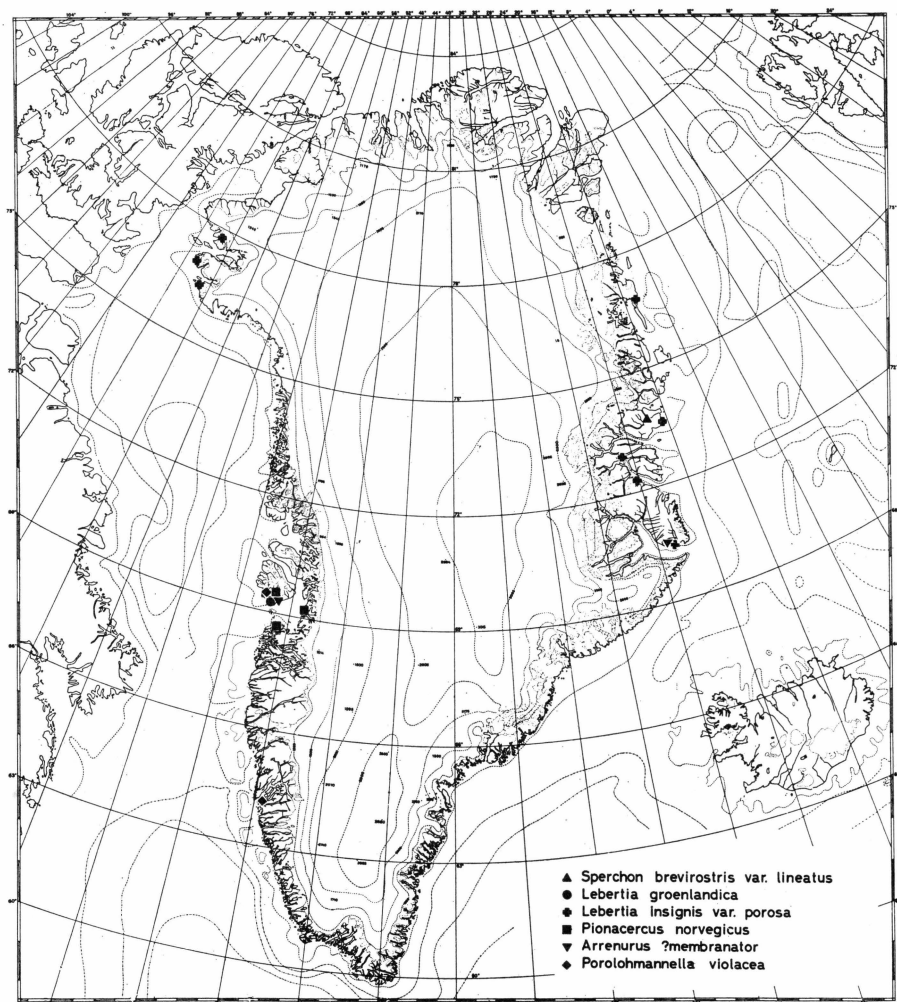


Fig. 14. The localities of Hydracarina found in Greenland.

***Lebertia (Pilolebertia) insignis* var. *porosa* THOR 1900.**

- 3.VII.1900. 3 adults from a pool without outlet, Hurry Inlet, East Greenland.

Leg. SØREN JENSEN, Østgrønl. Exp. 1900.

Zool. Museum, Univ. Copenhagen.

1912 TRÄGÅRDH (pp. 421–422):

- 25.V.1907. An unknown number of specimens from a small fresh-water lake near the “Bastion”, Hvalrosodden, East Greenland.
- 4. and 5.VII.1908. An unknown number of specimens from a swamp between Rypefjældet and Hvalrosodden, East Greenland.

- Leg. F. JOHANSEN, Danmark-Exp. til Grønlands nordøstkyst 1906-08.
- 5.VIII.1930. 6 adults from Knudshoved, Karlshavn (depth 1 m), East Greenland.
- Leg. B. LØPPENTHIN, Godthaab Exp. 1930.
Zool. Museum, Univ. Copenhagen.
- 22.VIII.1958. 1 adult from loc. 143, Lake Store Sø, Maria Ø, East Greenland.
- 31.VIII.1958. 1 adult from loc. 161, Mestersvig, East Greenland.
- 28.VIII.1959. 3 adults from loc. 2, Mac Cormick Fjord, Thule, North Greenland.
- 4.IX.1959. 1 nymph from loc. 14, Igánaq, North Greenland.
- 8.IX.1959. 1 nymph from loc. 16, Dundas, North Greenland.
- Leg. U. RØEN.

***Pionacercus (Pionacercus) norvegicus* THOR 1898.**

- 31.V.1954. 1 nymph from loc. 94, pool in the valley east of loc. 93, Jakobshavn, West Greenland.
- 23.IX.1955. 2 females from loc. 60, Lake Mellemsø, West Greenland.
- 22.VII.1957. 2 females from loc. 107, Egedesminde Vandsø (lake), West Greenland.
- Leg. U. RØEN.

***Arrenurus (Megaluracarus) ?membranator* (THOR 1901).**

- 5.VII.1900. 2 females from a pool at Hurry Inlet, East Greenland.
Leg. SØREN JENSEN, Østgrønl. Exp. 1900.
Zool. Museum, Univ. Copenhagen.
- 31.VII.1954. 1 female from loc. 76, pond in Langekær, Godhavn, West Greenland.
- Leg. U. RØEN.

Porohalacaridae.

***Porolohmannella violacea* KRAMER 1879.**

- 4.II.1956. 1 adult from loc. 62, lake at Eqigtok (Evqitsoq), West Greenland.
- 26.V.1956. 2 adults from loc. 134, pond on the plain, Godthaab, West Greenland.
- Leg. U. RØEN.

Sperchon brevirostris var. *lineatus* has earlier been found in Norway (THOR 1899), Sweden (WALTER 1911; BRINCK & WINGSTRAND 1951), and on Bear Island (SOAR 1922; THOR 1930). The species has a more extensive geographical distribution than this arctic variety; it is found almost without exception in the brooks of most European countries, Central Siberia, Japan, the Azores, Madeira and Canada.

Lebertia (Pseudolebertia) fabricii is recorded from Greenland, but has not been found there again. As the description of the species is very scanty and the type specimen has been lost as well as the figures of this specimen (mentioned by TRÄGÅRDH 1912, p. 421), it can only be stated that a species of *Pseudolebertia* has been earlier found in Greenland and that this species might be identical with *Lebertia (Pseudolebertia) groenlandica*. Perhaps it seems rather obvious that these two *Pseudolebertia*-species are synonymous, especially as they have been found on the same island, Disko, and hitherto nowhere else. To this the objection must be raised that *L. fabricii* is only about $\frac{5}{6}$ mm long, while the smallest specimen of *L. groenlandica* is about 1300 μ , that is almost half a mm bigger. The six ?*Trombidium* larvae found on a larva of *Chironomus frigidus* ZETT. (THORELL 1872, p. 163) in the same locality as *L. fabricii*, are scarcely *Lebertia* larvae (TRÄGÅRDH 1904, pp. 62–63), because these rarely parasitize (LUNDBLAD 1924; SPARING 1959). Nor is it quite sure if they were larvae (THOR 1906, p. 273), as TRÄGÅRDH (1904, Fig. 125–126) has reproduced an *Arrenurus* nymph. The material is lost (TRÄGÅRDH 1912, p. 421).

Lebertia (Pseudolebertia) groenlandica has hitherto only been recorded from helocrenes, rivulets and brooks at Godhavn in West Greenland.

Lebertia (Pilolebertia) insignis var. *porosa* is a holarctic species living in lakes, ponds and pools as well as in brooks and rivers. It is known in Northwest and East Greenland.

Pionacercus (Pionacercus) norvegicus is only earlier known in lentic environments in Northern and Central Europe. The three Greenlandic localities are situated in the region round Disko Bugt.

Arrenurus (Megaluracarus) ?membranator is a European species which occurs in lotic environments. On the Faroes which, besides, is the locality nearest Greenland, this species lives especially in lakes, ponds and pools (LUNDBLAD 1930, p. 44). One locality in West Greenland and one in East Greenland are hitherto known.

Porolohmannella violacea is a fresh-water species from Europe, but is now recorded also in West Greenland.

Consequently two rheophilous species are known from Greenland, viz. *Sperchon brevirostris* and *Lebertia groenlandica*. *Pionacercus norvegicus* and *Porolohmannella violacea*, on the other hand, belong to the lentic communities. Finally, *Lebertia insignis* and *Arrenurus ?membranator* can be found in both lotic and lentic environments.

From a zoogeographical point of view the hydracarinid fauna includes the following five species found in West Greenland: *Lebertia groenlandica*, *Lebertia insignis*, *Pionacercus norvegicus*, *Arrenurus ?mem-*

branator and *Porolohmannella violacea*, all of which are known in Europe. In East Greenland two circumpolar species are hitherto known, viz. *Sperchon brevirostris* and *Lebertia insignis*, and one palearctic species, *Arrenurus ?membranator*, which as mentioned above, is recorded also from West Greenland (Fig. 14).

West Greenland evidently constitutes the furthest northwest outpost of the distribution areas of the palearctic water mites.

Sperchon brevirostris and *Lebertia insignis*, which are the most decided arctic water mites of those from Greenland, have a morphological peculiarity in the skin worth mentioning. The variety of *Sperchon brevirostris* has its skin lined, as the name intimates, this character separating the variety from the main species with normally papillose skin. The variety of *Lebertia insignis* normally has porous skin, but in the material prepared (RØEN's collection) there were six specimens with lined skin (those from the Thule district in Northwest Greenland and that from Mestersvig in East Greenland). The specimen of *Lebertia insignis* from Maria Ø, East Greenland, has another abnormality of the skin, which is very thick and spongy. It is interesting that the northernmost water mites have lined or thickened skins. This deviation from the rule may depend upon ecological circumstances rather than on hereditary ones, i.e. they are probably modifications (ecophenes).

The hydracarinid fauna of Greenland must be regarded as very poor. Regarding the water mite fauna of some other arctic islands, it can be mentioned that Spitsbergen and Bear Island have been investigated amongst others by THOR (1930), who did not find any species of Hydracarina on Spitsbergen and only one on Bear Island, viz. *Sperchon brevirostris* var. *lineatus*. The Russian Polar Expedition 1900–1903 did not catch any water mites on Novaya Zemlya (THOR 1910). Nor have any water mites been reported from Jan Mayen. From Icelandic springs, three species (*Sperchon squamosus*, *Forelia liliacea*, and *Hydryphantes ruber ruber*) have, however, been recorded (TUXEN 1944, pp. 54–55), none of which is known from Greenland. The islands mentioned above are situated far away from the continent, which makes the distribution of the water mites to these islands much more difficult. The long winter with freezing solid to the bottom of most of the possible water mite biotopes and the short vegetation period during the summer are factors of great ecological importance in these arctic regions. Production in the arctic waters is naturally very low and carnivores and parasites constitute an exceedingly small part of the communities. Even if certain developmental stages are skipped by some Hydracarina, they nevertheless require a relatively long period of production.

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