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THREE WEST ARCTIC MOSS SPECIES IN GREENLAND

ON THE OCCURRENCE OF *CINCLIDIUM LATIFOLIUM*, *AULACOMNIUM ACUMINATUM* AND *TRICHOSTOMUM CUSPIDATISSIMUM*

BY

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WITH 2 FIGURES IN THE TEXT

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INTRODUCTION

Most of the moss-species found in the arctic regions have a very wide distribution, often including the temperate zones as well. As demonstrated by STEERE (1953), there is, however, a rather large group of species which are exclusively arctic. *Cinclidium latifolium*, *Aulacomnium acuminatum*, and *Trichostomum cuspidatissimum* all belong to this group, but until now neither of them has been recorded from Greenland. When I, as bryologist, in the summer of 1956 joined the expedition of the Greenland Geological Survey (G.G.U.), I had a great opportunity to make studies on these species in the field and to make notes on their occurrence. I ask the leader of the expedition, Professor A. ROSENKRANTZ, to accept my most cordial thanks for his hospitality and his great interest in my work. I am also indebted to the Carlsberg Foundation for economic help.

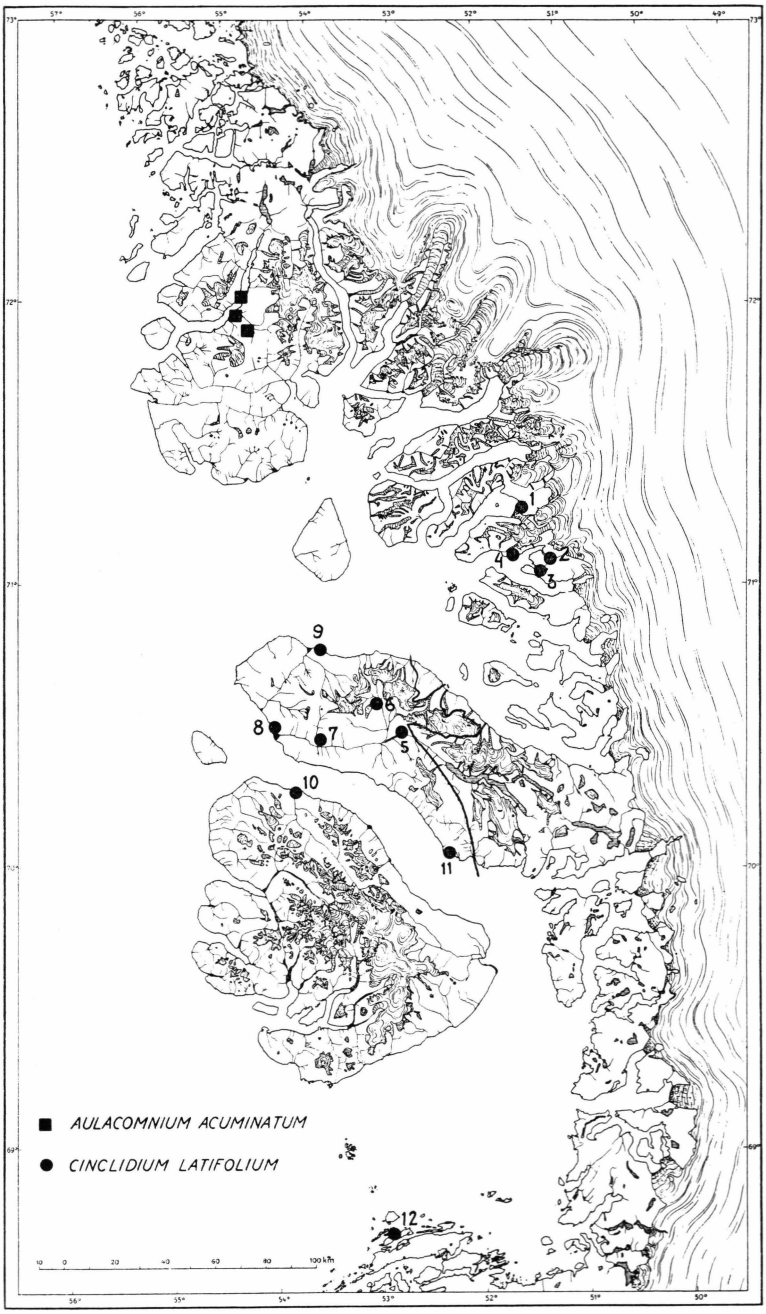

Fig. 1. Map of *Aulacomnium acuminatum* and *Cinclidium latifolium* in Greenland. The line intersecting the Nugssuaq peninsula indicates the limit between the eastern pre-Cambrian part of the peninsula and the western part with basalt and sediments. (After Rosenkrantz, 1951).

Cinclidium latifolium LINDB.

The history of this rather rare arctic species is given in STEERE (1953). In addition to the statements of STEERE it may, however, be mentioned that the first collection of the species in the western Arctic, and next to the original collection of LINDBERG (1877), was a sampling made in Greenland by the late M. P. PORSILD on a journey to the Disko island in 1902. The rather large collection of mosses, which PORSILD made on this expedition was, however, left undetermined until 1955, when I had an opportunity to study it.

Forty-five years passed before the species was collected again in Greenland. It was found on the Nûgssuaq peninsula in 1947 and 1948 by KNUD JAKOBSEN, who has kindly handed over his large collection of mosses from West Greenland to me. When I visited West Greenland in the summer of 1956, I was of course looking eagerly for the species, and I happened to find it in nine new localities. All localities of *Cinclidium latifolium* now known in Greenland are restricted to the areas between 68°30′ lat. N. and 71°20′ lat. N.

Below is given a list of the localities including information about the ecological conditions and about the composition of the plant-community in which the species was growing. Only the most prominent species are mentioned.

1. Head of the Kangerdluarssuk fjord. July 28, 1956. At the stony edge of an alkaline pond. Soil muddy-sandy. Subsoil phyllitic schists. Field-layer dominated by *Carex stans*, *Eriophorum polystachyum* (s. lat.), *Carex saxatilis*, Bottom-layer dominated by *Drepanocladus brevifolius*, *Bryum neodamense*, *Campylium stellatum*, *Calliergon trifarium*, and *Distichium capillaceum*.

2. Head of small fjord south of Marmorilik. August 9, 1956.

a. Wet muddy, calcareous soil. Subsoil marble. Field-layer dominated by *Eriophorum polystachyum*, *Kobresia simpliciuscula*, and *Saxifraga aizoides*. Bottom-layer dom. by *Drepanocladus brevifolius*, *Cinclidium stygium*, and *Orthothecium chryseum*.

b. Wet, sandy soil, sloping slightly. Subsoil marble. Field-layer dom. by *Carex stans* and *Equisetum variegatum*. Bottom-layer by *Drepano-*

cladus brevifolius, *D. revolvens*, *Cinclidium stygium*, and *Orthothecium chryseum*.

3. Head of the Tasiussaq fjord. August 11, 1956.

a. Sandy soil along a fast rivulet. Subsoil marble.
Field-layer dominated by *Carex scirpoidea* and *Saxifraga aizoides*. Bottom-layer by *Drepanocladus brevifolius*, *Blindia acuta*, *Campylium stellatum* and *Orthothecium intricatum*.

b. Bog beside a lake. Soil muddy. Subsoil gneissic (but not far from areas with marble).
Field-layer dominated by *Carex saxatilis*, *C. rariflora*, *Kobresia simpliciuscula* and *Eriophorum polystachyum*. Bottom-layer by *Drepanocladus brevifolius*, *Bryum neodamense*, *Scorpidium scorpioides*, *Calliergon turgescens*, *Campylum stellatum*, *Fissidens osmundoides* and *Tayloria lingulata*.

4. Alfred Wegeners Halvö, at Magdlak. August 12, 1956. Wet sandy soil at river-side. Subsoil marble. Field-layer dominated by *Carex stans*, *Equisetum variegatum*, *Kobresia simpliciuscula*, *Saxifraga aizoides* and *Carex atrofusca*. Bottom-layer by *Cinclidium stygium*, *Campylium stellatum*, *Meesia triquetra*, *Calliergon giganteum* and *Drepanocladus brevifolius*.

5. The Nûgssuaq Peninsula, Tasíngortarssuaq. August 25, 1956. The subsoil there was gneissic, here and there with marble, but also calcareous sediments were present in the area.

a. Wet, sandy-clayey soil. Field-layer dominated by *Eriophorum polystachyum*, *Juncus triglumis*, *Juncus castaneus*, *Kobresia simpliciuscula*, *Carex stans* and *C. misandra*. Bottom-layer by *Campylium stellatum*, *Cinclidium stygium*, *Fissidens adianthoides*, *Distichium capillaceum*, *Bryum neodamense*, *Calliergon turgescens*, and several others, especially calcicole species.

b. Wet stony-sandy soil. Field-layer dominated by *Carex stans*, *Kobresia simpliciuscula* and *Salix arctophila*. Bottom-layer by *Drepanocladus brevifolius*, *Catoscopium nigritum*, and *Cinclidium stygium*.

6. The Nûgssuaq peninsula, Agatdalen, beside the lake Sill Sø. August 29, 1956. Swamp at the edge of the lake, soil wet an muddy. Subsoil basaltic, but calcareous sediments common in the area. Field-layer dominated by *Carex stans* and *Equisetum variegatum*. Bottom-layer by *Bryum neodamense*, *Campylium stellatum*, *Cyrtomnium**) *(Mnium) hymenophyllum*, *Orthothecium chryseum* and *Tayloria lingulata*.

7. The Nûgssuaq Peninsula, east of Quvnilik Elv. September 1, 1956. Moist, sandy soil beside a pond. Subsoil basalt with cover of moraines. Field-layer dominated by *Eriophorum polystachyum*, *Equisetum*

*) This new generic name is proposed by HOLMEN (1957).

variegatum, *Carex saxatilis*, and *Kobresia simpliciuscula*. Bottom-layer by *Calliergon turgescens*, *Catoscopium nigritum*, *Campylium stellatum*, *Tayloria lingulata*, *Calliergon giganteum*, and *Orthothecium chryseum*.

8. The Nûgssuaq peninsula, Marrait. Subsoil basaltic with cover of moraines.

a. September 9, 1948. Collector KNUD JAKOBSEN. One sample from *Carex stans-Equisetum variegatum*-marsh, another from a *Dupontia psilosantha-Eriophorum scheuchzeri*-marsh.

b. September 3, 1956. Bog, slightly sloping, with percolating water. Field-layer dominated by *Eriophorum polystachyum*, *Carex rariflora*, and *Carex stans*. Botton-layer by *Drepanocladus brevifolius*, *Calliergon giganteum*, *C. turgescens*, *Bryum neodamense*, and *Meesia uliginosa*.

c. September 5, 1956. Wet, sandy side of rivulet. Field-layer dominated by *Equisetum variegatum*, *Salix arctophila*, and *Carex stans*. Bottom layer by *Campylium stellatum*, *Calliergon giganteum*, *Cinclidium arcticum*, *Drepanocladus revolvens*, and *Philonotis tomentella*.

9. The Nûgssuaq peninsula, Niaqornat. August 1, 1947. Collector KNUD JAKOBSEN. Subsoil sediments, basalt present in the area. Bog beside a lake, soil muddy. Field-layer dominated by *Carex stans* with *Eriophorum polystachyum*, *Juncus triglumis*, *Saxifraga aizoides*, *Carex misandra*, and *Kobresia simpliciuscula* and many others (fide KNUD JAKOBSEN). Frequent in the moss-sample were *Tomenthypnum nitens*, *Aulacomnium palustre*, *Campylium stellatum*, *Meesia uliginosa*, and *Bryum neodamense*.

10. The Disko island, Ignagnaq. July 20, 1902. Collector M. P. PORSILD. Subsoil basaltic. In the sample with *Cinclidium latifolium*, this species was found mixed with *Calliergon turgescens*, *Campylium stellatum*, *Calliergon giganteum*, *Meesia uliginosa*, *Ditrichum flexicaule*, and *Bryum neodamense*.

11. The Nûgssuaq peninsula, Atanikerdluk. July 4, 1956. Subsoil cretaceous coal-bearing sandstone and shale. Station: wet sandy river-delta. Field-layer dominated by *Juncus arcticus*, *Salix arctophila*, *Equisetum arvense*, and *Carex maritima*. Bottom-layer by *Philonotis tomentella*, *Campylium stellatum*, and *Bryum obtusifolium*.

12. The Tupilak island at Egedesminde. June 5 and 30, 1956. Subsoil gneissic. In bog near a lake. Field-layer dominated by *Carex rariflora*, *Equisetum variegatum*, *Salix arctophila*, and *Kobresia simpliciuscula*. Bottom-layer by *Meesia triquetra*, *Calliergon turgescens*, *Cinclidium stygium*, *Meesia uliginosa*, *Catoscopium nigritum* and *Drepanocladus revolvens*. Because of the gneissic subsoil the locality was expected to be acid, nevertheless several calciphilous species occurred, so this can hardly be the case.

Table I.

Locality No.	1	2a	2b	3a	3b	4	5a	5b	6	7	8a	8b	9	10	11	12
Eriophorum polystachyum s. l.	×	×	×	—	×	—	×	×	—	×	×	—	×	—	—	×
Carex stans	×	—	×	—	—	×	×	×	×	—	×	×	×	—	—	—
Equisetum variegatum	×	—	×	—	—	×	—	—	×	×	—	×	×	—	—	×
Kobresia simpliciuscula	—	×	—	—	×	×	×	×	—	×	—	—	×	—	—	×
Salix arctophila	×	—	×	—	—	×	—	×	—	—	—	×	—	—	×	×
Polygonum viviparum	—	—	—	×	×	—	×	×	—	—	—	—	×	—	—	×
Carex saxatilis	×	—	—	—	×	—	×	—	—	×	—	—	—	—	—	—
Pedicularis flammea	—	—	—	—	—	—	×	×	—	—	×	—	×	—	—	—
Juncus triglumis	—	×	—	—	—	—	×	—	—	—	—	—	×	—	—	×
Saxifraga aizoides	—	×	—	×	—	×	—	—	—	—	—	—	×	—	—	—
Carex rariflora	—	—	—	—	×	—	—	—	—	—	×	—	—	—	—	×
Tofieldia pusilla	—	×	—	—	—	—	—	—	×	—	—	—	×	—	—	—
Carex misandra	—	—	—	—	—	—	×	×	—	—	—	—	×	—	—	—
Campylium stellatum	×	—	—	×	×	×	×	×	×	×	—	×	×	×	×	—
Drepanocladus brevifolius	×	×	×	×	×	×	×	×	—	—	×	—	—	—	—	—
Cinclidium stygium	×	×	×	×	—	×	×	×	—	—	—	—	—	—	—	×
Drepanocladus revolvens	×	—	—	×	—	—	×	—	×	×	—	—	×	×	—	×
Bryum neodamense	×	—	—	—	×	—	×	×	×	—	×	—	×	×	—	—
Calliergon turgescens	—	—	—	—	×	—	×	—	×	×	×	—	—	×	—	×
Meesia uliginosa	—	—	×	—	—	—	—	—	—	×	×	—	×	×	—	×
Calliergon giganteum	—	—	—	—	—	×	—	×	—	×	×	×	—	×	—	—
Tayloria lingulata	—	—	—	—	×	—	—	—	×	×	×	—	—	—	—	×
Orthothecium chryseum	×	×	×	—	—	—	—	—	×	×	—	—	—	—	—	—
Calliergon trifarium	×	—	—	—	—	—	×	—	—	—	—	—	×	—	—	×
Catoscopium nigritum	—	—	—	—	—	—	×	×	—	×	—	—	—	—	—	×
Philonotis tomentella	—	—	—	—	—	×	—	—	—	×	—	×	—	—	×	—
Distichium capillaceum	×	—	—	—	—	×	×	—	—	—	—	—	×	—	—	—
Meesia triquetra	—	—	—	—	—	×	—	×	—	—	—	—	—	—	—	×
Oncophorus wahlenbergii	—	—	—	—	—	×	—	—	—	—	×	—	—	—	—	×
Orthothecium intricatum	—	—	—	×	—	—	×	—	—	—	×	—	—	—	—	—
Brachythecium salebrosum	—	—	—	—	—	—	—	—	—	×	—	—	×	—	×	—

On the basis of the field studies *Cinclidium* may be said to occur in three different vegetation-types (with transitional forms). These are 1) *Carex stans-Eriophorus polystachyum-Drepanocladus brevifolius-Cinclidium stygium*-bogs or -marshes with muddy or sandy soil. 2) *Carex rariflora-Calliergon turgescens-Tayloria lingulata*-bogs with muddy soil. 3) *Salix arctophila-Calliergon giganteum*-vegetation on sandy soil with percolating water. Of these three types the one first mentioned is the most important.

To demonstrate the species in company with which *Cinclidium latifolium* usually is growing, the above table is given (Table 1). It is based upon the analyses, and arranged in two groups. One group of vascular plants, the other of mosses. An "×" indicates the presence of

a species in a locality. Species found in less than three localities are omitted. These would make the list very long.

It appears from the table that *Cinclidium latifolium* shows the highest "affinity" to *Campylium stellatum*; in 12 out of 16 occasions they were found together. Furthermore it is often growing in company with the following pronounced calciphilous species: viz. *Carex stans*, *Equisetum variegatum*, *Kobresia simpliciuscula*, *Saxifraga aizoides*, *Drepanocladus brevifolius*, *Bryum neodamense*, *Orthothecium chryseum*, *Catoscopium nigritum*, and *Philonotis tomentella*. There are reasons for regarding *Cinclidium latifolium* as a distinct calciphilous species, too. And this is further supported by the fact that in the rather well investigated the Nûgssuaq peninsula the species is narrowly restricted to the western areas, where basalt-covered calcareous sediments are found, while, apart from the areas consisting of marble, it seems absent from the eastern pre-Cambrian part of the peninsula (cp. map fig. 1). In Loc. 2–4 the species was found on marble; it was very vigorous there, and was rarely absent from the vegetation of bogs and marshes.

According to the rather little ecological information of the finds outside Greenland it thus seems that the species there may be found under similar conditions as in Greenland, and is there also often found together with *Campylium stellatum* (cp. Arnell (1913), Hesselbo (1935), and Persson (1949)).

The climatic variation present in the Greenland area of the species does not seem to have any influence on the occurrence of it. It was found both in continentally and in maritimely accentuated climates.

As to literature the species does not seem previously to have been found fruiting in the American arctic regions. In the present material from West Greenland it has been collected with sporophytes in three localities, viz. Loc. 1, 2, and 8. Female plants with archegonia were found in almost all places, while the male plants seem rare. In the places where the species was found to be fruiting, the sporophytes were very rare, hardly a dozen was collected in all.

Aulacomnium acuminatum (Lindb. & Arn.) Paris

Although this species apparently is rather frequent in certain parts of the Canadian Eastern Arctic not far from Greenland, is has never been recorded from the latter area. When during my summer journey to West Greenland 1956 I found it in large quantities on the Svartenhuk peninsula, I first thought that this find was the first made in Greenland. Dr. H. Crum, Ottava, however, called my attention (in litt.) to a collection made a Thule by Peter Freuchen in 1914. I have studied this specimen,

which by HESSELBO (1923) was referred to *A. palustre*, but I dare not refer the plants to *A. acuminatum* (as estimated by Dr. CRUM), especially because of the dense tomentum of the stems, the form and size of the leaf papillae and the cells of the leaf-base, which are all those of *A. palustre*. On the other hand, the cells of the leaves are almost as strongly incrassate as those of *A. acuminatum*, and the leaves are not crisp when dry. These plants from Thule are doubtful, but this is not the case of those from Svartenhuk; they agree excellently with the Siberian plants.

The locality on Svartenhuk was situated about the middle of the Umîarfik fjord. *Aulacomnium acuminatum* was there one of the commonest mosses in the broad valley of the river Simiútap kûa. The vegetation of the valley consists of extensive tundras with a deep and dense cover of mosses. In the wet part of this tundra-area, *Tomenthypnum nitens* is almost the only important species, forming carpets for miles and miles. Next to *Tomenthypnum* the species *Hylocomium splendens*, *Aulacomnium acuminatum*, *Cinclidium arcticum*, *Philonotis tomentella*, and *Timmia austriaca* are the commonest in the valley. These are frequent in the moist part of the tundra, usually on the slightly sloping valley-sides.

To illustrate the composition of the vegetation in which *Aulacomnium acuminatum* is common, the results of some analyses are given below (Table II). The analyses were made by means of a square-method. The figures indicate the degree of covering for each species, so that the figure 5 indicates a covering of more than half of the square, 4: $^1/_4$–$^1/_2$, 3: $^1/_8$–$^1/_4$, 2: $^1/_{16}$–$^1/_8$, and 1: $^1/_{32}$–$^1/_{16}$. A "+" indicates that a species is just present.

Squares 7–9 have a vegetation which to some degree indicates that it may have a heavier cover of snow in winter than the others. In such places *A. acuminatum* is found in extensive mats.

Farther north, and on the other side of the Umîarfik fjord, at Qôrnoq, the species was found to be frequent, too.

The area of the species in Svartenhuk was basaltic with scattered outcrops of the underlying sediments. It is, however, doubtful whether the soil there is really calcareous, so I dare not refer *A. acuminatum* to the true calcicole species. In a station of the species STEERE (1951) says "boggy places that are not necessarily very acid". On the other hand, it was later on during my journey possible to establish that the species was absent in a locality near the mouth of the Umîarfik fjord, where the subsoil was basaltic, too, but the climate more humid and the soil accordingly more acid.

A. acuminatum, too, is based upon Siberian material. The first record of the species in the American arctic regions was that of BRYHN (1906); material collected by H. G. SIMMONS. As BRYHN (*l. c.*) enummerates

Table II.

No. of Square	1	2	3	4	5	6	7	8	9
Cassiope tetragona	3	—	—	4	3	2	3	4	2
Dryas integrifolia	1	2	1	—	1	2	3	—	+
Equisetum arvense	1	1	2	1	1	2	—	—	—
Pirola grandiflora	+	—	+	+	—	+	—	—	+
Vaccinium uliginosum microph.	—	—	2	1	2	—	—	—	—
Salix arctophila	1	—	—	—	—	—	1	—	—
Carex stans	+	—	—	—	1	—	—	—	—
Tofieldia pusilla	—	—	+	+	—	—	—	—	—
Equisetum variegatum	—	1	—	—	—	—	—	—	—
Cyrtomnium hymenophyllum	1	+	—	4	+	1	2	1	1
Aulacomnium acuminatum	1	—	2	2	+	—	4	3	5
Tomenthypnum nitens	2	1	2	1	2	1	1	—	—
Cinclidium arcticum	5	5	3	—	4	4	—	—	—
Hylocomium splendens	—	—	—	5	+	—	4	5	3
Orthothecium chryseum	+	+	+	—	+	2	—	—	—
Bryum neodamense	—	+	—	+	—	+	—	—	—
Hypnum bambergeri	—	—	3	—	—	1	—	+	—
Philonotis tomentella	—	—	—	—	+	—	+	—	+
Distichium capillaceum	+	—	—	—	—	1	—	—	—
Ditrichum flexicaule	—	—	—	—	—	+	—	1	—
Plagiopus oederi	—	2	—	—	—	—	—	—	—
Oncophorus wahlenbergii	—	—	+	—	—	—	—	—	—
Drepanocladus uncinatus	—	—	—	—	1	—	—	—	—
Timmia austriaca	—	—	—	—	—	—	+	—	—

all species in the samples collected, it should now be possible to compare if *A. acuminatum* is growing together with the same moss-species in the Canadian Eastern Arctic and in Greenland. This seems really to be the case. In most of the samples from North Lincoln and King Oscar's Land the species was collected together with such mosses as *Tomenthypnum nitens*, *Cyrtomnium* (*Mnium*) *hymenophyllum*, *Cinclidium arcticum*, *Ditrichum flexicaule*, *Orthothecium chryseum*, *Distichium capillaceum*, *Timmia austriaca*, and *Philonotis tomentella*.

It was an interesting feature that the two other elsewhere in Greenland so very common representatives of the genus, viz. *A. palustre* and *A. turgidum*, were not common in the Svartenhuk localities of *A. acuminatum*. From an ecological point of view we may possibly say that the latter species replaces the others, especially *A. turgidum*, in the vegetation there.

A. acuminatum was not collected with sporophytes in Svartenhuk; only male plants were commonly seen. Outside Greenland it has been collected fruiting several times.

Trichostomum cuspidatissimum CARD. & THÈR.

This species is a third example of an arctic species on which the spotlight has recently been directed. It was first described on the basis of a specimen from a Beringian island by CARDOT & THÉRIOT (1902). Very recently the history of the species until now has been summarized by SAVICZ-LJUBITZKAJA (1955). It appears there that the species now is known from some American arctic stations and from a single station in Siberia.

In Greenland it was unknown until 1946, when I collected it in two places at the head of Søndre Strømfjord (during the "Botaniske Ekspedition til Vest Grønland 1946" under the leadership of T. W. BÖCHER). The next find was made by KNUD JAKOBSEN on Svartenhuk in 1950, and finally I had an opportunity in the summer of 1956 to state that the species is fairly common in the basaltic province between 69° and 72° lat. N. in West Greenland (cp. map fig. 2), just as *Cinclidium latifolium*.

The Greenland localities of *Trichostomum cuspidatissimum* are from north to south the following:

The Svartenhuk peninsula: Qôrnoq, 72°02′ lat. N. Leg. KH. July 14, 1956.
– — — Savît, 71°25′ lat. N. Leg. K. Jakobsen. June 24, 1950.
Umanak Fjord: Kangerdlugssuakavsak, 71°22′ lat. N. Leg. KH. Aug. 1, 1956.
— — Akuliaruseq, 71°20′ lat. N. Leg. KH. July 27, 1956.
— — Esersiutilik, 71°17′′ lat. N. Leg. KH. July 28, 1956.
— — Marmorilik, 71°08′ lat. N. Leg. KH. Aug. 8, 1956.
— — Magdlak, 71°07′ lat. N. Leg. KH. Aug. 12, 1956.
— — South of Marmorilik, 71°06′ lat. N. Leg. KH. Aug. 9, 1956.
— — South of Marmorilik, 71°06′ lat. N. Leg. K. Jacobsen. Aug. 9, 1956 (500 above sea-level).
— — Tasiussaq, 71°04′ lat. N. Leg. KH. Aug. 11, 1956.
— — Umanak, 70°41′ lat. N. Leg. KH. Aug. 15, 1956.
The Nûgssuaq peninsula: Nûgssuaq, 70°41′ lat. N. Leg. KH. July 7, 1956.
– — — Marrait, 70°30′ lat. N. Leg. KH. July 5, 1956.
– — — Tasingortarssuaq, 70°27′lat. N. Aug. 25, 1956. Leg. KH.
The Disko island: Godhavn, 69°15′ lat. N. Leg. KH. June 6, 1956.
Sdr. Strømfjord: Taserssuatsiaq, 66°59′ lat. N. Leg. KH. Aug. 4, 1946.
– — Umîvît, 66°50′ lat. N. Leg. KH. Aug. 21, 1946.

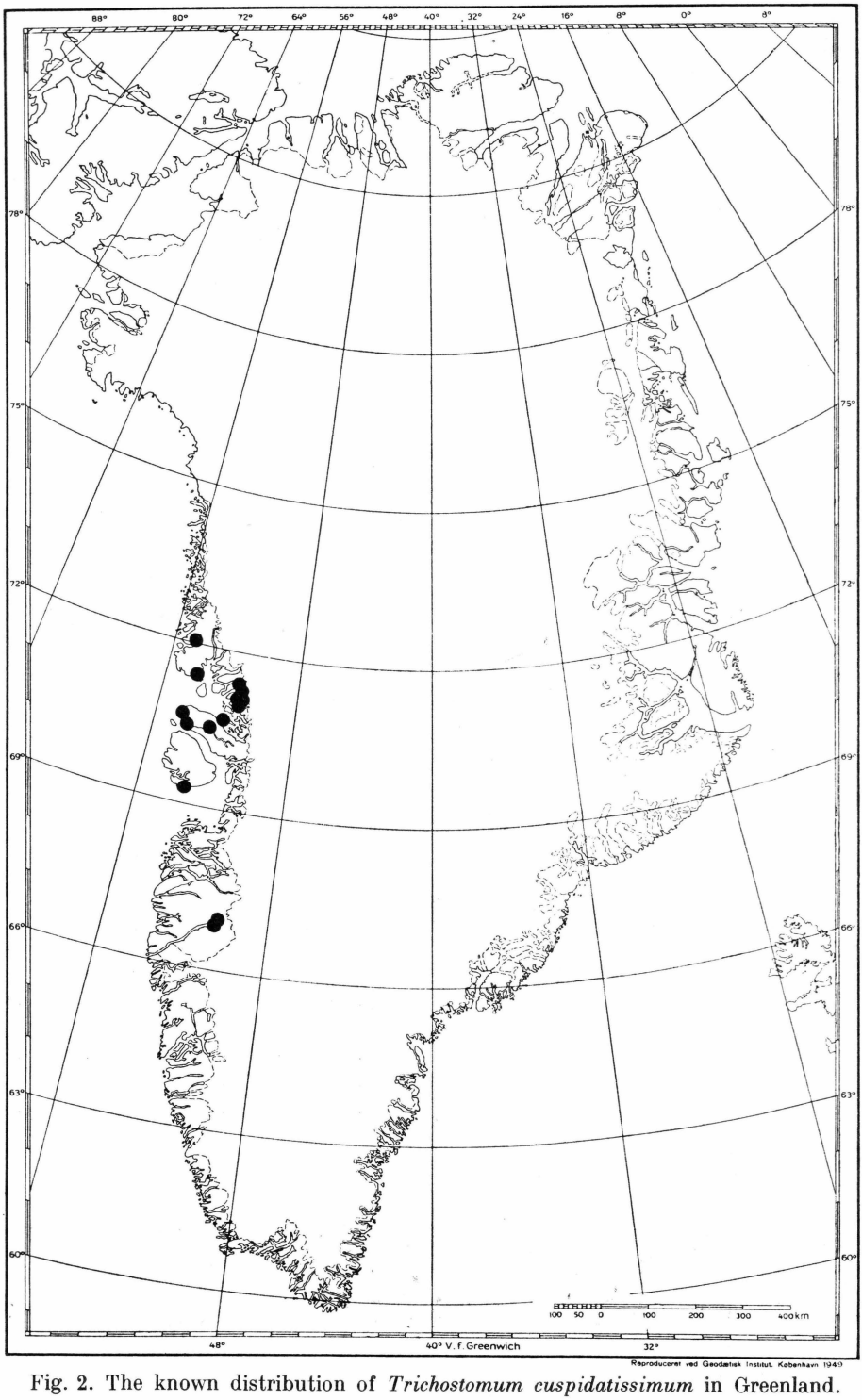

Fig. 2. The known distribution of *Trichostomum cuspidatissimum* in Greenland.

The occurrence of *T. cuspidatissimum* in Greenland clearly shows that it is a calciphilous species, and as to ecology it has very much in common with *Cinclidium latifolium*, which, however, seems to have a somewhat narrower ecological range.

The species is frequent in basaltic areas, but is most luxuriantly developed on marble. In the areas around Marmorilik ("the place of marble") it is a very important plant in bogs and marshes. Only at the head of Søndre Strømfjord it was found on gneiss, but because of the highly continental climate there, soils with rather high pH values are frequent (cp. BÖCHER, 1949).

The species occurs in several plant-communities. However, two types seem to be of importance. (1) Wet marshes (or bogs) dominated by *Eriophorum polystachyum*, *Vaccinium uliginosum microphyllum*, *Dryas integrifolia*, *Kobresia simpliciuscula*, and the mosses *Drepanocladus revolvens*, *Meesia uliginosa*, *Catoscopium nigritum*, and *Ditrichum flexicaule*. (2) A community which in the first part of the summer is wet, but later dries up, and which is dominated by *Dryas integrifolia*, *Carex rupestris*, and the mosses *Hypnum bambergeri*, *Ditrichum flexicaule*, *Tomenthypnum nitens*, and in some places also by a large terrestrial form of *Schistidium apocarpum*. It is a characteristic of *Trichostomum cuspidatissimum*, that it is hardly ever found mixed with other mosses, but forms rounded pure tufts of 5–10 cm in diameter.

In Table III an example is given of the composition of a vegetation in which *Trichostomum* is frequent. This analysis was made on wet flats between the tufts in a tussocky, calcareous bog south of Marmorilik. (For the value of the figures, see p. 10).

Table III.

No. of Square	1	2	3	4	5	6
Eriophorum polystachyum s. lat.	..	..	..	2–3	..	..
Kobresia simpliciuscula	..	..	..	1–2	..	..
Dryas integrifolia	..	..	..	1–2	..	..
Equisetum variegatum	..	..	..	1	..	..
Polygonum viviparum	..	..	..	+	..	..
Drepanocladus brevifolius	5	4	2	2	2	2
Ditrichum flexicaule	3	1	3	1	2	2
Distichium capillaceum	1	1	2	3	+	—
Bryum neodamense	1	—	2	+	2	3
Calliergon turgescens	+	3	—	1	1	3
Trichostomum cuspidatissimum	—	3	1	2	2	1
Calliergon trifarium	—	—	+	+	—	—
Catoscopium nigritum	—	—	—	1	+	—
Fissidens osmundoides	—	—	—	—	1	—

On the basis of all information on the species in Greenland, it is calculated which species *Trichostomum* most commonly is met with. Among the flowering plants there are:

Kobresia simpliciuscula, *Dryas integrifolia*, *Vaccinium uliginosum*, *Juncus triglumis*, *Eriophorum polystachyum*, and *Equisetum variegatum.*

Among the mosses are:

Campylium stellatum, *Ditrichum flexicaule*, *Drepanocladus revolvens*, *Meesia uliginosa*, *Catoscopium nigritum*, *Distichium capillaceum*, *Fissidens osmundoides*, *Calliergon turgescens*, *Tomenthypnum nitens*, and *Hypnum bambergeri.*

Apparently *Tr. cuspidatissimum* has never been found fruiting, nor were any sporophytes to be found in Greenland. The species was usually sterile there; and only in four localities were male plants observed.

Conclusion.

As appears from the account above, *Cinclidium latifolium* and *Trichostomum cuspidatissimum* may be said to belong to almost the same ecological type, while *Aulacomnium acuminatum* seems to belong to a related type. It is interesting to state that this relationship between the three species to some degree also includes their geographical distribution. They are all true arctic species, but none of them are circumpolar. They are lacking between West Greenland and Siberia. Having seen these species in the field, I consider that from an ecological point of view there would be suitable habitats for the species both in East Greenland and in Scandinavia. The fact that they seem to be absent there is probably due to historical factors.

In his paper on the bryophyte flora of Alaska-Yukon Persson (1949) operates with a group of species which have almost the distribution mentioned. In this group, besides *Cinclidium latifolium* and *Aulacomnium acuminatum*, he also includes the hepatics *Plagiochila arctica*, *Mesoptychia sahlbergi* and *Radula prolifera.* Of these the two last-mentioned species have not been found in Greenland, while *Plagiochila arctica* is known from a couple of localities in Northwest Greenland. It is evident that *Trichostomum cuspidatissimum* must be referred to the same group. Closely related to this group is *Sphagnum lenense*, which in Greenland is known from the middle part of the west coast (cp. Lange, 1952).

Species with a similar arctic distribution are also known among the flowering plants. Good examples are *Potentilla vahliana* and *Carex gynocrates*, while such species as *Pedicularis labradorica*, *Anemone richardsonii*, and *Parnassia kotzebuei* are species which at least belong to a related distributional type.

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