

Botanical Investigations of the Mummies

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Pollen analysis of a faecal lump shows that the food was contaminated by soil and soot. *Oxyria digyna* had presumably been eaten, as indicated by unripe pollen of this plant. The major part of the grassy soles of the stockings and *kamiks* was made up of *Elymus arenarius* ssp. *mollis* and *Alopecurus alpinus*. The bodies were laid down on a layer of *Cassiope tetragona*. Two independent indices point to, but do not prove, a burial during July–August.

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Pollen analysis

A faecal lump from the intestine of mummy II 7 was processed by standard methods. The result of the analysis is given in Table A. On the assumption that the faeces have not been contaminated between death and the preparation of slides, there are three possible ways in which the pollen, spores and other microscopic remains can have ended up in the intestine: 1) filtering in the nose of inhaled air, followed by swallowing, 2) eating of dirty food, or 3) eating of plant material containing pollen.

The first explanation is unlikely, since no *Cyperaceae* pollen was found. *Cyperaceae*, represented by more than thirty species in this part of Greenland, are wind-pollinated and characterize any arctic sediment containing wind-transported material like mud on the bottom of lakes and ponds (cf. Fredskild 1973: Table 22). Here they usually make up 10–30% of the total pollen. Likewise, moss polsters in plant communities in which Sedges, Cottongrass and other *Cyperaceae* grow, are rich in *Cyperaceae* pollen, whereas polsters in vegetations without plants of this family are very poor or even extremely poor in their pollen (Fredskild 1967: Tables III–XIV). In the same analyses the Rhizopod *Assulina* was found in 13 out of 15 moss polsters. The fruit-bodies of *Microthyrium* occur in humus-rich soil under vegetation.

The frequent pollen of *Cassiope tetragona*, an insect-pollinated plant with drooping flowers, and the occurrence of *Assulina* and *Microthyrium* in connection with the numerous sand grains point to a contamination of the food by soil from a mossy *Cassiope* heath, either directly by contact with the ground during the preparation of the food, by dirty cooking utensils or by soil falling from a turf-and-stone wall, if the meal was pre-

pared in a winter house. *Cassiope* was, and still is, common on the site.

The major part of the *Poaceae* pollen is of *Alopecurus* type. This high-arctic grass, favoured by manured soil, beyond doubt grew luxuriantly at the site, as also indicated by its frequent occurrence as part of the *kamik*-grass.

Charred and uncharred fragments of Conifer wood, transported by air currents from Canada or other forested areas, occur in small quantities in Greenland lake

Table A
Pollen

Dwarf-shrubs	
<i>Betula nana</i>	8
<i>Cassiope tetragona</i>	44
<i>Empetrum hermaphroditum</i>	5
<i>Ericales</i> , indeterminate	17
<i>Salix arctica</i> / <i>S. glauca</i>	13
Herbs	
<i>Artemisia</i> sp.	1
<i>Campanula gieseckiana</i> / <i>C. uniflora</i>	1
<i>Cerastium</i> / <i>Stellaria</i>	1
<i>Juncus</i> / <i>Luzula</i>	1
<i>Minuartia</i> / <i>Silene</i>	1
<i>Oxyria digyna</i>	19
<i>Poaceae</i>	59
<i>Saxifraga oppositifolia</i> type.	1
Spores	
<i>Huperzia selago</i>	5
<i>Lycopodium annotinum</i>	4
Fungi, indeterminate	14
Diverse	
<i>Assulina</i>	2
<i>Microthyrium</i>	2
Fragments of wood, charred, few Conifers . . .	c
Fragments of wood, uncharred, mainly Conifers	8
Fragments of moss leaves	4
Grains of sand, mainly <30µm	cc

sediments and have even been found in the Ice Cap cores (Fredskild & Wagner 1974), but local sources must be responsible for the many fragments in the samples. Driftwood from the Canadian or Siberian taiga has been used by the Eskimos for spears, sledges, handles, kayaks etc. The many charred fragments indicate that the chips and other waste from the woodworking have been used as fuel. It must be borne in mind that the lungs of the woman in question had heavy deposits of soot (Hart Hansen, this volume).

One of the common pollen in the faecal sample does point to the use of plants as food: *Oxyria digyna*. Pollen of this widespread, wind-pollinated plant occur in most Greenland pollen samples as single, well developed grains. However, most of the pollen found in the sample were unripe, and, in one case, still united in the tetrad, indicating that flower buds had been eaten. *Oxyria*, a good source of Vitamins A and C, is most often eaten

raw. If this was the case, the woman died in July-August, but as the plant was often also preserved in seal oil by the Eskimos (de Bonneval & Robert-Lamblin 1979; Simmons & Miller 1982) a death during winter can not be excluded.

Macroscopic remains

A total of nineteen samples, partly grass from the *kamiks*, partly plants from the lining of the graves has been determined. Yet clearly every fragment in the (often large) samples could not be put under the microscope. The results are given in Table B, but some of the determinations will be commented on. Nomenclature is in accordance with Böcher *et al.* 1978.

Table B

1. Grave I, mummy 5, layer of grass between *kamiks* and the skin, in which the mummy was wrapped: mainly (?only) *Elymus mollis*, partly "fresh", partly worn, with only the ribs left. Besides, a couple of cakes of worn *Elymus* and sealskin, and one cake, consisting of *Cassiope tetragona*, a bit of moss and grass.
2. Grave II, mummy 6, grass from the underside of skin in which the mummy was wrapped: *Elymus* and a leaf fragment of *Salix arctica*/S. *glauca*.
3. Grave I, mummy 2, grass inside the stocking: *Elymus*.
4. Grave I, mummy 2, grass between *kamik* and stocking: mainly *Alopecurus alpinus*, some *Elymus*. The grass partly worn, partly "fresh". Furthermore a twig of *Salix arctica*/S. *glauca* and a flower of *Puccinellia cf. vaginata*.
5. Grave I, 1/4-78, grass inside stocking from the entire *kamik*: mainly *Alopecurus alpinus*, some *Elymus*. A couple of moss fragments: *Calliergon cf. sarmentosum* (Wahlenb.) Kindb., *Ditrichum sp.* and *Brachythecium sp.*, and also two leaves of *Empetrum*, one leaf of *Vaccinium uliginosum*, one seed of *Cerastium alpinum ssp. lanatum*, three seeds of *Draba sp.* and one seed of *Empetrum nigrum ssp. hermaphroditum*.
6. Grave I, 1/4-78, grass inside the stocking from the *kamik*, cut short: mainly *Alopecurus*, a couple of *Elymus*. One leaf of *Salix arctica*/S. *glauca*, one of *Cassiope*, one grass floret, three bits of moss: *Aulacomnium turgidum* (Wahlenb.) Schwaegr., *Dicranum sp.* and *Calliergon sp.*
7. Grave I, 1/4-78, grass between *kamik* and stocking from the entire *kamik*: mainly (?only) *Elymus*.
8. Grave I, 1/4-78, grass between stocking and *kamik* from the *kamik*, cut short: mainly (?only) *Elymus*. One leaf of *Empetrum* and one of *Dryas integrifolia*.
9. 999×30, grass inside stocking: mainly (?only) *Elymus*. One leaf of *Empetrum*, one twig and a couple of leaves of *Cassiope*, two twigs of *Salix arctica*/S. *glauca*. A couple of moss fragments: *Aulacomnium turgidum*, *Drepanocladus uncinatus* (Hedw.) Warnst., *Hylocomium splendens* (Hedw.) B.S.G., *Polytrichum alpinum* Hedw., *Schistidium sp.*
10. 999×31, grass inside stocking: mainly *Elymus*.
11. 999×31, grass between stocking and *kamik*: mainly (?only) *Elymus*.
12. Grave II, no. 5b, mummy 8, grass inside stocking: mainly (?only) *Elymus*. One leaf of *Cassiope*, one of *Vaccinium uliginosum*, two spikelets of *Elymus* and one lemma, most likely of *Puccinellia sp.*
13. Grave II, no. 5a, mummy 8, grass between stocking and *kamik*: *Elymus*.
14. Grave II, mummy 8, below the legs: mainly twigs of *Cassiope*, some of *Empetrum*. Further, leaves of *Salix arctica*/S. *glauca* and of *Vaccinium uliginosum*, some mosses: *Drepanocladus uncinatus*, *Aulacomnium turgidum*, *Racomitrium lanuginosum* (Hedw.) Brid.
15. Grave II, mummy 8, inside the skin wrapping: many twigs of *Cassiope*, some of *Empetrum* and one of *Vaccinium uliginosum*. Only few mosses: *Drepanocladus uncinatus*, *Aulacomnium turgidum*, *Racomitrium lanuginosum*, *Pohlia cf. nutans* (Hedw.) Lindb.
16. Grave I, lining from the bottom: seemingly one giant specimen of *Cassiope*, torn up with root, with some soil and a moss cushion of *Kiaeria glacialis* (Berggr.) Hag. and *Polytrichum alpinum* Hedw. still adhering. One of the *Cassiope* twigs with a flower with two anthers still attached to the filament, but without corolla.
17. Grave I, lining from the bottom: mainly (?only) *Elymus*. One leaf of *Salix arctica*/S. *glauca*, one of *Vaccinium uliginosum*, one twig of *Cassiope*, one seed of *Empetrum*. A couple of mosses: *Hylocomium splendens*, *Drepanocladus uncinatus* and cf. *Kiaeria glacialis*.
18. Grave I, lining from the bottom: *Cassiope*. Besides, a couple of *Elymus* leaves, one of *Vaccinium uliginosum* and a few mosses: *Kiaeria glacialis*, *Aulacomnium turgidum*, *Hylocomium splendens*, *Polytrichum juniperinum* Hedw., *Racomitrium lanuginosum*.
19. Recent collection of "heather" near the graves: almost exclusively *Cassiope*, yet with one twig of *Empetrum* and one of *Pyrola grandiflora*, a couple of *Salix arctica*/S. *glauca* leaves and a few mosses: *Dicranum elongatum* Schleich., *Hylocomium splendens*, *Pohlia cf. nutans*, *Drepanocladus uncinatus*, *Tritomaria quinqueidentata* (Hueb.) Buch and *Ptilidium ciliare* (L.) Dum.

Kamik-grass

The *kamik*-grass was found as insoles in the stocking (Fig. 1) or simply lay as an insulating layer between the stocking and the *kamik*. The preferred species in South and West Greenland is *Calamagrostis langsdorffii*, which does not reach Nuussuaq peninsula. Up to the present day Eskimos around Disko Bay have used *Elymus mollis* if they could not get *Calamagrostis* (Porsild 1920). *Elymus*, making up the major part of most of the samples, is common on sandy shores and in riverbeds, and also on manured soil at bird cliffs and inhabited sites, northwards to Fladø (72°15' N), well north of



Fig. 1. Insole, 17 cm long, made of *Elymus mollis*. Mummy 2.



Fig. 2. Upper side of *Elymus* leaf, 14 x. Grave I, 1/4-78.

Qilakitsoq. This robust grass has long runners and straw more than half a metre high. The leaf is 20–30 cm long, 1 cm broad, flat or slightly convolute, smooth underneath, but with many, 0.2 mm wide ribs, covered with tiny, upright bristles on the upper side, visible also in the samples (Fig. 2). In some of the samples, the grass was worn, leaving nothing but the ribs. Sometimes material like this was mixed with “fresh” material, in-



Fig. 3. *Cassiope tetragona* without corolla. One stamen visible, c. 7 x. Grave I, lining on the bottom.

dicating that a worn sole was not thrown away, but supplemented when necessary.

Only a few fragments of straw were found, in one sample the upper part of the straw with the lower part of the spike axis, in another sample two spikelets. *Elymus* was formerly used for basketry (Birket-Smith 1924; Porsild & Cody 1980) as well as for kamik-grass.

Another grass, *Alopecurus alpinus*, dominates in some of the samples. It is widespread from northernmost Greenland southwards to Holsteinsborg. In natural plant communities it is a small, slender grass, whereas on manured ground it grows robust, with 30–40 cm straw. The leaves are 1 cm broad, with the upper side densely ribbed, carrying scattered, thin, hair-like bristles. On the whole, the leaves do not seem to be as wear-resisting as those of *Elymus*. Only a single straw with spike axis of *Alopecurus* was found, but no spikelets, whereas a single spikelet of a *Puccinellia*, most likely *P. vaginata*, was found. This species is likewise very common at seashores and inhabited sites between Disko Bay and Thule.

Besides many fly maggots, proving that the freeze-drying process in the cave was not too effective, most grass samples contained tiny feathers and down, seemingly intentionally used as part of the soles. Further, leaf fragments of *Salix arctica*/*S. glauca*, *Empetrum nigrum* ssp. *hermaphroditum*, *Vaccinium uliginosum* ssp. *microphyllum*, *Cassiope tetragona* and *Dryas integrifolia*, as well as seeds of *Empetrum*, *Cerastium alpinum* and

Draba sp. were found. The use of kamik-grass may have contributed to the spreading of plants. Thus *Elymus mollis* was recently found near an Eskimo site on Ellesmere Island, almost 1000 km to the north of its northern limit (Porsild & Cody 1980). Another likely instance of spreading by man could be the tiny *Chryso-splenium tetrandrum*, widespread in arctic North America, where it grows on soil enriched by animal manure, on ruins of former dwellings, meat caches etc. In Greenland it is only found at a couple of sites at some former Eskimo habitations on Clavering Island on the NE coast.

Lining of the graves

The mummies lay on a lining of plant material, in one case *Elymus mollis*, otherwise of dwarf-shrubs, in most cases *Cassiope tetragona* (Table B). This high-arctic plant is very common on Nuussuaq, preferring snow-protected heaths. It is often used as fuel, and because of its content of resin it can burn, even when wet. The seeds ripen during winter and are dispersed during springtime. The capsules found therefore tell us nothing about the season in which they were gathered. However, sample 16 contained a flower with two anthers still attached to the filament, but without the bell-shaped corolla (Fig. 3). This would indicate picking in July–August, but an investigation of more than 100 sheets in the Greenland Herbarium revealed a couple of anthers in the flowers from the previous year. Another common dwarf-shrub in the samples is *Empetrum nigrum* ssp. *hermaphroditum*, likewise common in the area. It is often used as fuel, and the tasty berries are eaten.

A total of ten phanerogam species was proved. In addition, Jette Lewinsky, Botanical Museum, University of Copenhagen, has determined 12 moss species. All of the plants found are common in the area today.

References

- Birket-Smith, K. 1924. Ethnography of the Egedesminde District with aspect of the general culture of West Greenland. – Meddr Grønland 66: 484 pp.
- Bonneval, L. de & Robert-Lamblin, J. 1979. Utilisation des végétaux à Ammassalik (Est Groenland). – Études/Inuit/Studies 3(2): 103–117.
- Böcher, T. W., Fredskild, B., Holmen, K. & Jakobsen, K. 1978. Grønlands flora. – Haase & Søn, Copenhagen: 318 pp.
- Fredskild, B. 1967. Palaeobotanical investigations at Sermermiut, Jakobshavn, West Greenland. – Meddr Grønland 178 (4): 54 pp.
- Fredskild, B. 1973. Studies in the vegetational history of Greenland. Palaeobotanical investigations of some Holocene lake and bog deposits. – Meddr. Grønland 198(4): 245 pp.
- Fredskild, B. & Wagner, P. 1974. Pollen and fragments of plant tissue in core samples from Greenland Ice Cap. – Boreas 3: 105–108.

Porsild, A. E. & Cody, W. J. 1980. Vascular plants of Continental Northwest Territories, Canada. – National Museum of Natural Sciences, Ottawa: 667 pp.

Porsild, M. P. 1920. The flora of Disko Island and the adjacent coast of West Greenland. – Meddr Grønland 58: 155 pp.

Simmons, H. & Miller, S. 1982. Notes on the vascular plants of the Mackenzie Mountain Barrens and surrounding area. – Northwest Territories Renewable Resources, Wildlife Service. Information Report No. 3: 132 pp.