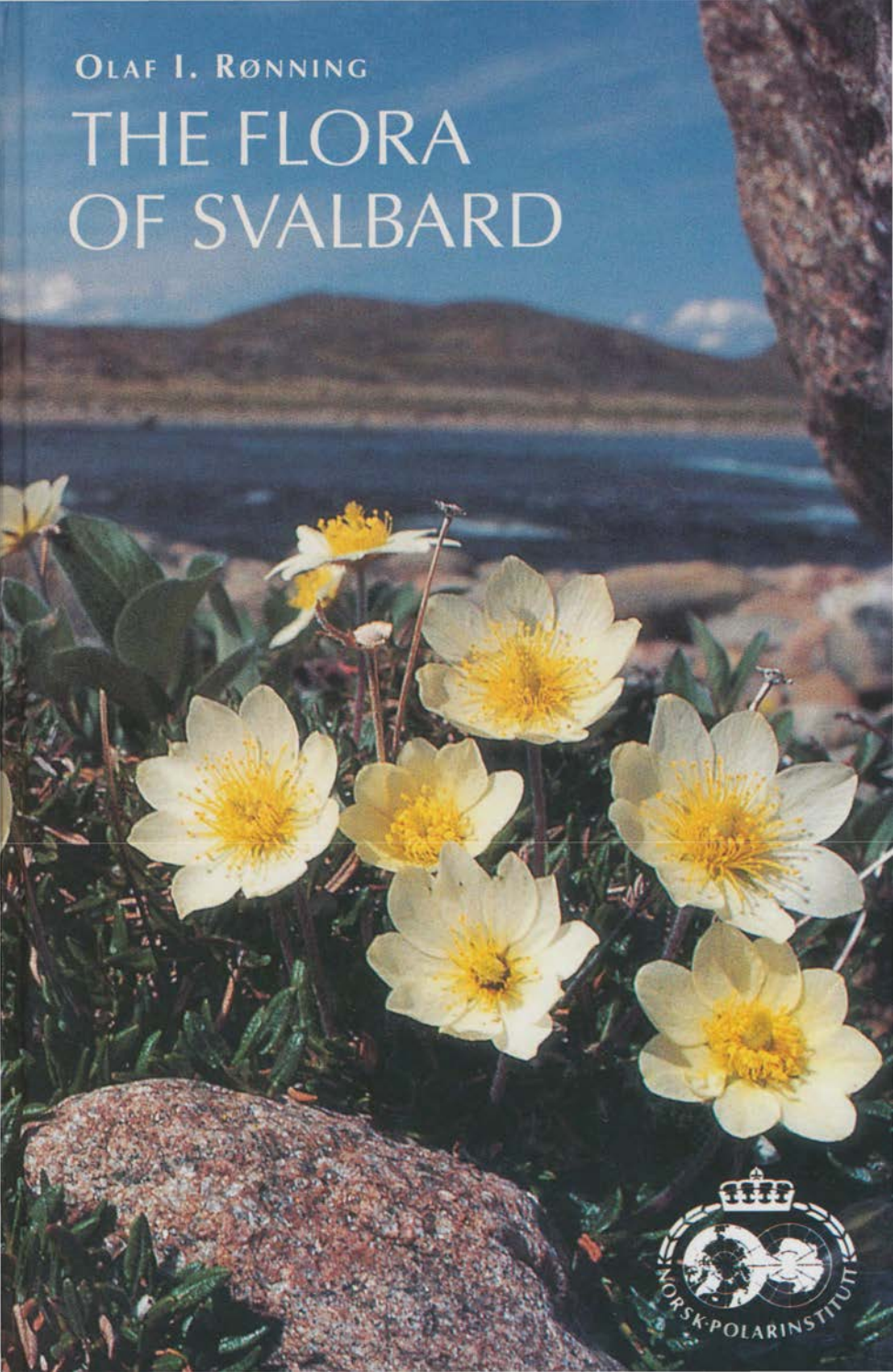


OLAF I. RØNNING

THE FLORA OF SVALBARD



NASJONALATLAS FOR NORGE

HOVEDTEMA 4: VEGETASJON OG DYRELIV

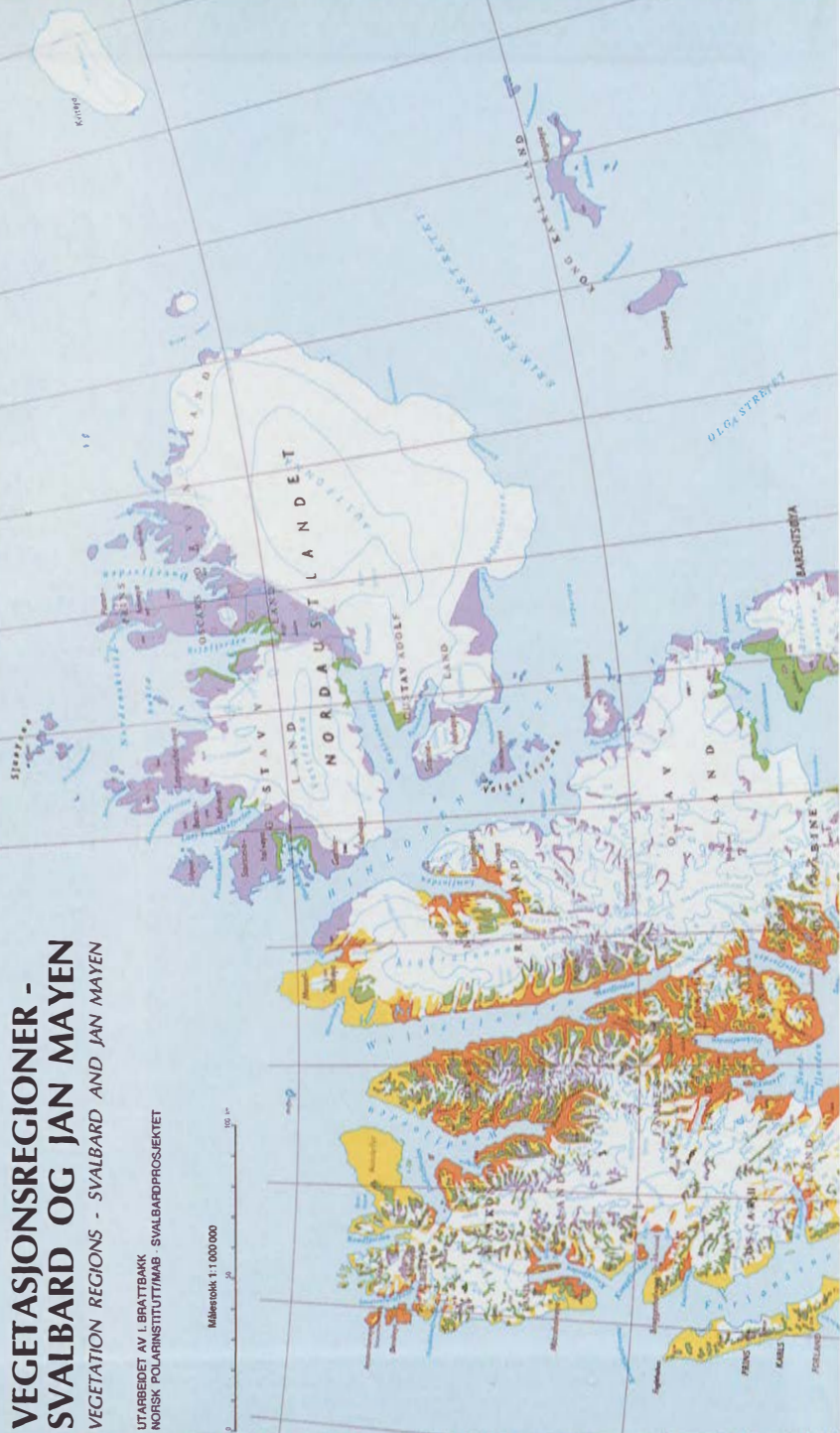
KARTBLAD 4.1.3

VEGETASJONSREGIONER - SVALBARD OG JAN MAYEN

VEGETATION REGIONS - SVALBARD AND JAN MAYEN



UTARBEIDET AV I. BRÅTTBAKK
NORSK POLARINSTITUTT/IMAB · SVALBARDPROSJEKTET

Målestokk 1:1 000 000















MELLOMARKTIS/MID ARCTIC

-  Kartlyngsonen (oro-kartlyngbelte)
-  Cassiope tetragona zone (oro-Cassiope tetragona belt)
-  Reinrossonen (oro-reinrosebelte)
-  Dryas octopetala zone (oro-Dryas octopetala belt)

HØYARKTIS/HIGH ARCTIC

-  Polarvisjonen (oro-polarvierbelte)
-  Salix polaris zone (oro-Salix polaris belt)
-  Svalbardvaimuesonen (oro-svalbardvaimuebelte)
- Papaver dahlianum zone (oro-Papaver dahlianum belt)

REGION (Region)	MELLOMARKTIS (Mid Arctic)	HØYARKTIS (High Arctic)	m.o.h. (m a s.l.)
HØYDEBELTE (oro-belt)			900
			600
			300
SONE (zone)			

Fargebruk for regioner, soner og høydebelter.
 Colours used for regions, zones and orographic belts.

POLARHÅNDBOK No. 10

THE FLORA OF SVALBARD

BY

OLAF I. RØNNING



OSLO 1996

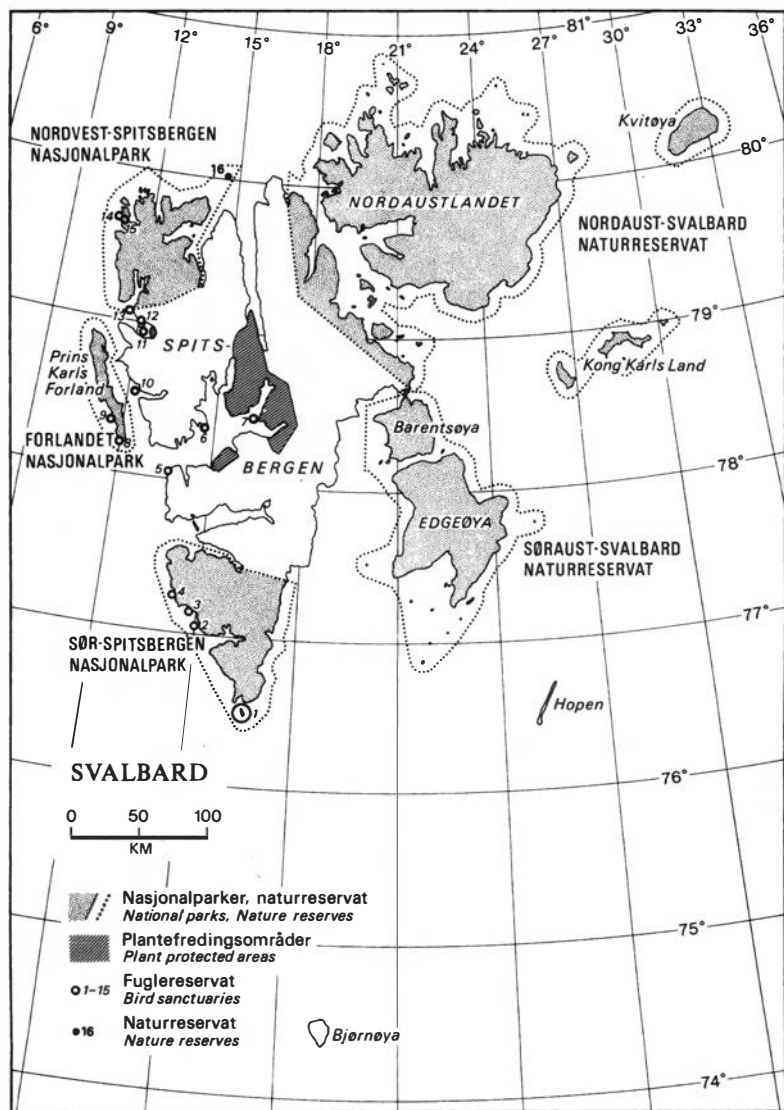
Translation third,
revised edition of Svalbards Flora (1996)
by Richard Binns

All drawings show the plants half size.

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Protected areas in Svalbard. Svalbard.

Conservation rules on p. 119.

PREFACE

Svalbard is the collective name for all the large and small islands situated within the 62,000 km² bounded by longitudes 10° and 35° E, and latitudes 74° and 81° N. The largest island is Spitsbergen, followed by Nordaustlandet, Barentsøya and Edgeøya.

This edition has been extended with a chapter on the vegetation of Svalbard, including colour photographs of many of the vegetation types described. Some colour photographs of selected plants which are rare and little known, and therefore seldom photographed, are also included in this edition.

Please note the following points when using the flora. The species have been classified according to generally accepted principles of systematics. Differences of opinion will always exist regarding the classification of some species belonging to certain critical genera, such as Buttercups, Whitlow-grasses, Cinquefoils and Meadow-grasses. In this edition, some Latin names have been changed from those used in the previous Norwegian editions. Some of these also differ from those used in some other flora, such as the Flora of Norway. These changes are listed in Appendix to the Flora.

The species presented here are chiefly the spontaneous ones found in Svalbard. Only a few introduced (anthropochorous) species have been included, and these are printed in petit. Many more introduced species than these have been found in Svalbard at one time or another. I have tried to follow the principle of mentioning only those species which it may be envisaged will survive for several years in succession. Hence, the number will be greatly reduced. Introduced species have disappeared from Norwegian settlements, but some are still found in the Russian towns of Barentsburg and Pyramiden.

Latin, English and Norwegian (in brackets) names of families, genera and species precede the individual descriptions. The Latin name of the species is followed by the abbreviated name of the person who first described the plant. It has not always been possible to trace a British English name for the species, especially those confined to the high Arctic. A name has then been coined during the translation process, generally by using the words Arctic, Svalbard, Tundra or Polar in front of the common species name, or by drawing upon a characteristic feature of the plant. These 71 names are marked with an asterisk (*), as are five subspecies and variety names. The remainder have been taken from standard British floras (Fitter et al. 1983, Stace 1991), a list drawn up by the Nordic Council of Ministers (Påhlsson 1985), and the pocketbook of Svalbard plants by Gjærevoll & Rønning (1989). Some important mosses and lichens are mentioned in the vegetation chapter, and these have also been given common English names. Nine of these derive from Glime (1989–92) and Goward et al. (1994) (*Arne Frisvoll* and *Håkon Holien* are thanked for tracing these names); the remaining 17 have been coined (marked with an *).

The distribution of each plant is indicated in simple geographical terms. The modern name Svalbard, rather than Spitsbergen, is used to signify the entire archipelago. If the plant is found on Bjørnøya (Bear Island), this is specifically stated.

The illustrations of the individual species form a vital part of this flora. I am extremely grateful to the artist, *Dagny Tande Lid*, for the great deal of painstaking effort she has put into these drawings. All of them are reproductions of specimens collected in Svalbard. I would like to thank fellow botanists *Arne Frisvoll* and *Ingvar Brattbakk* for considerable help and advice given to me in the field and while preparing this flora, and *Arve Elvebakk*, *Reidar Elven* and *Tommy Præstø* for reading the manuscript and offering valuable suggestions. However, I am entirely responsible for opinions concerning species, etc., as well as for comments.

I hope this flora has been prepared in such a way that it will be able to be used by amateur and professional botanists alike. I trust that it will be useful for everyone who, over the years, visits Svalbard, and will help to extend their knowledge of, and delight in, the Arctic plants they observe.

The vegetation is protected in certain areas, and regulations governing this are to be found at the end of the book. The protected areas are shown on the map on page 4.

The plant life of Svalbard extends right to the margin of the icy wastes of the Arctic. Regenerative and reproductive processes in plants move extremely slowly so far north. The picking and collecting of plants therefore has much more serious consequences here than in more southerly locations, and the risk of a plant becoming extinct is significantly greater. Please allow the Arctic plant life to retain its distinctive character and special beauty by refraining from collecting plants unnecessarily.

Olaf I. Rønning

THE PLANT LIFE OF SVALBARD

Sooner or later when we travel northwards, we will cross the polar tree line; in other words, we will reach the area where first the forest and then individual trees have their extreme northern boundary. The areas north of the polar tree line may be grouped together as the Arctic or Arctic region. But not all these areas have a climate or natural environment like those we usually associate with the word Arctic. The full range of transition can be found from the conditions in the northernmost forests to the bleak, icy tracts furthest north, where scarcely any vegetation can survive.

To characterise this gradual transition in a better way and achieve a practical subdivision of the Arctic region, we generally distinguish between low arctic, middle arctic and high arctic zones. These subdivisions are primarily based upon the development and composition of the flora. When they are applied to Norwegian territory, the northern fringe of mainland Norway (the northernmost part of the county of Finnmark) will fall within the low arctic zone, and all of Svalbard within the high arctic zone.

Nonetheless, even though Svalbard lies so far north, the sea surrounding it is generally open and more or less ice free for most of the summer months, enabling ships to sail further north than anywhere else in the world at the present time. The reason for this is that a branch of the Gulf Stream extends along the west coast of Spitsbergen. This warmer water has a favourable effect on the climate in the Svalbard region making it more amenable than other areas situated equally far north.

On the east side of Spitsbergen, cold arctic water pours south from the Northern Polar Basin and some of it rounds the southern tip of Spitsbergen (Sørkapp) to push northwards along the west coast between the land and the warmer water of the Gulf Stream.

The climatically most favourable part of Svalbard is central Spitsbergen, in the vicinity of Van Mijenfjorden, Isfjorden and Kongsfjorden. The climate is appreciably more severe to the south, east and north. In summer, drift ice is chiefly found south and east of Spitsbergen and in the northeast.

The mean annual temperature for 1966–1975 in the outer Isfjord area was about -5° C. At the Isfjord radio station, the July average for the same 10-year period was $+4.9^{\circ}$ C, whereas it was $+6.6^{\circ}$ C at Longyearbyen, which is situated further up the fjord and consequently has a more continental climate.

Permanently frozen ground, permafrost, can be met with at varying depths anywhere within the Arctic. The upper layer, which thaws each year, is called the active layer. It is only in this active layer that animals and plants can live and search for food. Plant roots can penetrate the ground here to absorb water and nutrients. The active layer is also very important for drainage. Water cannot penetrate further down than the permafrost



Fig. 1. Variegated Horsetail in a Purple Saxifrage-Icelandmoss Lichen community.

ceiling, which therefore determines the water table and helps bring about variations in the selection of plants at the various locations.

That the same plants are not found everywhere is chiefly because plants themselves are adapted to different modes of living and can grow under different external conditions. In Svalbard, and in arctic regions generally, these conditions are determined by several factors. The level of the water table, itself determined by the permafrost, has already been mentioned. The depth of the snow cover in winter is another important factor. Plants which need protection in winter can only survive beneath a protective snow cover. Generally speaking, there will be just as much or just as little snow in the same places from year to year. Consequently, plants will distribute themselves according to whether the snow cover is thin or thick.

Plants which flower first will be found on ridges with a thin snow cover and favourable exposure in relation to dominant wind directions. In spring, while it is still cold at night and the sun heats the surface during the day, these ridge plants are exposed to considerable stresses. Large fluctuations in temperature are experienced in that period.



Fig. 2. Fluvial gravel, moraines, block fields and rock with little or no vegetation. Patches of vegetation are found between stones and knolls, and on river banks. The dark patches represent the Purple Saxifrage-Icelandmoss Lichen community which takes up large parts of Svalbard, particularly in the north and east.

In contrast to these, there are plants living close to glaciers or glacial streams and rivers, sometimes in ice-cold water. Here, temperature fluctuations are relatively minor, not so many degrees either side of freezing. But the plants, nonetheless, live and flower, even though they probably find it difficult to produce mature seeds and have to reproduce in another way.

Several more factors influence the distribution of plants in the terrain. The nature of the bedrock is of great importance, especially whether the rocks are granitic or calcareous. Saltmarshes have their own particular flora, springs theirs and moist valley floors theirs. The climate and the substrate are interlinked with the plants to form an inseparable entity. If external conditions are changed, the plant life will be affected, and in arctic regions quite small changes may have a drastic effect on the plant life. Here, close to the outer limits for life, there need only be small changes in the conditions supporting life for it to be a matter of life or death for the plants.



Fig. 3. Lush vegetation develops on slopes beneath bird cliffs owing to the abundant fertilisation provided by the nesting birds. The green areas on the slopes show this clearly.

What sort of plants do we find when we step ashore in Svalbard? Those who are familiar with the plant life in areas with high alpine plants will immediately recognise a number of species. But it will not be long before we come across plants that do not occur in such areas, or are rare there. Suffice to mention such plants as Spiked Snow-grass* (*Phippisia algida*), Svalbard Poppy (*Papaver dablianum*), Tundra Chickweed* (*Stellaria crassipes*) and Sulphur-coloured Buttercup (*Ranunculus sulphureus*), all of which are rare in Scandinavia, but among the commonest plants in Svalbard.

On the other hand, many species are rare in Svalbard but very common in the Scandinavian mountains. Alpine Rock-cress (*Arabis alpina*), Mossy Mountain-heather (*Cassiope hypnoides*), Polar Bilberry (*Vaccinium gaultherioides*), Mountain Crowberry (*Empetrum hermaphroditum*) and Dwarf Birch (*Betula nana*) are examples of such species.

The birch woodland and willow thickets that are such a characteristic feature of mountainous parts of Scandinavia are botanical formations that we will search for in vain in Svalbard. Nowhere will we meet thickets. They are replaced by a low, creeping vegetation which is always more or less fragmented and is able to reach a height of 25–30 cm only at the most favourable sites. The only representative of the birch family is the little Dwarf Birch and that is extremely rare, being found in only a few places in

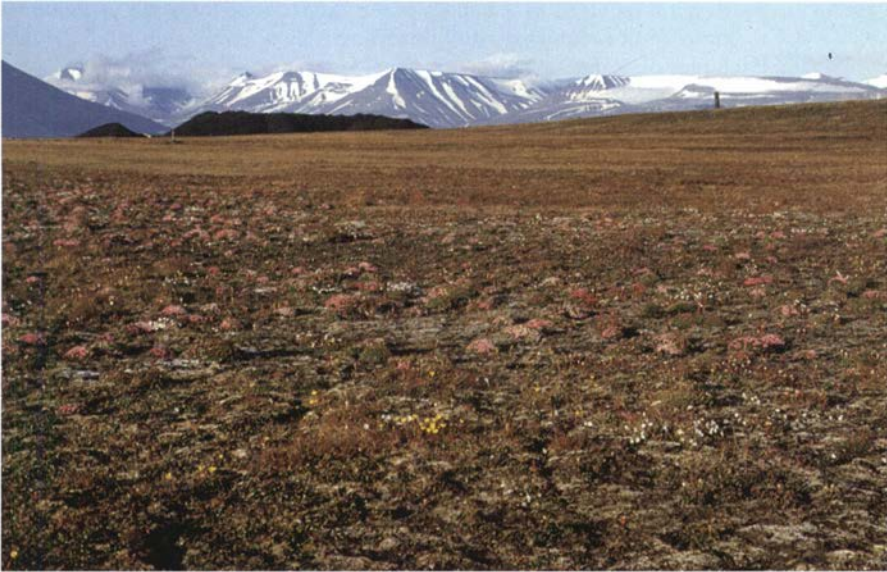


Fig. 4. Heath vegetation that is particularly rich in species, including the red Moss Campion, white Arctic Mouse-ear, Alpine Knotgrass, Purple Saxifrage, Northern Wood-rush and Yellow Marsh Saxifrage, and many mosses and lichens.

inner Isfjorden. The small willow species, especially Polar Willow* (*Salix polaris*) and Net-leaved Willow (*Salix reticulata*), are the most common twig-bearing plants or dwarf shrubs. The genuine heaths that are found are all rare, except for White Arctic Bell-heather (*Cassiope tetragona*) which grows wherever it finds suitable conditions. With its characteristic brownish-green colour it may dominate the entire landscape, standing out as long, dark-coloured belts. In full bloom, with its beautiful, small, white, bell-shaped flowers, the White Arctic Bell-heather is a magnificent sight.

One of the most beautiful and interesting plant communities in Svalbard is that dominated by the attractive dwarf shrub Mountain Avens (*Dryas octopetala*). As in Norway, these plant communities may be called Mountain Avens heaths. To experience a Mountain Avens heath in full bloom is in itself impressive, and it is even more beautiful in Svalbard where the surrounding landscape is so much more barren.

Typical Mountain Avens heaths are particularly found on the old shore ridges of raised strandlines, on morainic ridges and on screes where the snow cover in winter is thin and the soil is well drained. If the groundwater rises too high, or reaches the surface, the Mountain Avens disappear. Even in plant communities dominated by Mountain Avens, we will find every transition from a community entirely dominated by Mountain Avens and

growing on highly exposed spots where the snow cover is sparse in winter to communities requiring a fully protective snow cover and damp subsoil. Examples of plants occurring on the exposed places, apart from Mountain Avens itself, are Rock Sedge (*Carex rupestris*) and Cushion Sedge (*Carex nardina*). The other type of locality is dominated by White Arctic Bell-heather, apart from the Mountain Avens. Intermediate between these two types of plant community, we find the peculiar combination of Mountain Avens and Polar Willow. Common to all the Mountain Avens heaths is that they require a relatively calcareous soil.

On moist soils where the water table is high or reaches the surface, plant communities are found that differ completely in character and composition from the Mountain Avens heaths. Where there is marked surface erosion and a high water table, we find a type of vegetation consisting of Alpine Hair-grass (*Deschampsia alpina*), Polar Foxtail* (*Alopecurus borealis*), Mountain Sorrel (*Oxyria digyna*), Polar Mouse-ear* (*Cerastium regelii*) and several other species. Where surface erosion is less pronounced and there is seepage of nutrient-rich water, a very characteristic and well-developed moss vegetation occurs together with grasses dominated by Tundra Grasses* (*Dupontia*) and Arctic Marsh Grass (*Arctophila fulva*), along with other species with subterranean runners, such as Yellow Marsh Saxifrage* (*Saxifraga hirculus*).

This type of vegetation is quite extraordinary and clothes the landscape in bright greens and yellows. The ground may be completely covered, making it seem astonishingly fertile. However, the number of species is obviously limited, with mosses dominating, and it is those which give the vegetation its bright colour.

The extensive strandflats or saltmarshes which occur so frequently in Svalbard carry typical arctic plant communities with a selection of species differing greatly from that which we find in Scandinavia. Saltmarshes tend to be very well developed around the many lagoon-like bays which fill and empty with each tide and where the sediment is not too coarse grained. Oysterplant (*Mertensia maritima*) grows close to the inner fringe of the kelp belt at a number of localities, but is always sufficiently far from the shore to avoid standing in water at high tide. A little further inland from the kelp belt is a continuous, unusually reddish-brown zone produced by Creeping Saltmarsh-grass* (*Puccinellia phryganodes*), a species that is common in Svalbard but also occurs on shores in a few places in northern Norway. Higher up, we will find a very dense cover of Arctic Chickweed* (*Stellaria humifusa*), Creeping Saltmarsh-grass and Polar Bear Sedge* (*Carex ursina*), along with several species of moss, particularly *Bryum* species.

The next vegetation belt we meet is on slightly drier localities, about 0.5–1 m higher up. Here, Creeping Saltmarsh-grass has largely had to give way to species such as Highland Saxifrage (*Saxifraga rivularis*), Northern Wood-rush (*Luzula confusa*) and Polar Bear Sedge. Where the water table reaches the surface, or shallow, brackish-water pools form, a characteristic, dense type of vegetation tends to develop that shows many similarities with



Fig. 5. Heath vegetation with the Northern Wood-rush community. This is widely distributed in Svalbard, but in various forms. The photograph shows a comparatively dry type with Northern Wood-rush, Purple Saxifrage, Moss Campion, Polar Willow, and many other vascular plants, along with numerous mosses and lichens.

the above, except that the number of species is significantly greater. Creeping Saltmarsh-grass, Tundra Grasses, Arctic Marsh Grass, Arctic Saltmarsh Sedge (*Carex subspathacea*) and Spiked Snow-grass are the most important species, and form an open, interwoven cover.

However, the vegetation is most densely developed at the foot of bird cliffs or other nesting sites for birds. Here, we meet a flora that is so well developed and luxuriant that it is impossible to believe we are close to the arctic wastes. The moss, grass and herb flora in such places exceeds anything we find elsewhere in Svalbard as regards its development and the number of species present. When we walk around there, we sink deep into the moss carpet, and beneath the upper, living layer is a thick mass of dead, but little decomposed, plant remains.

A question that is often asked is how many species are to be found in Svalbard. This book describes 171 species, about 164 of which can be regarded as genuinely growing wild in Svalbard. The remaining 7 were probably introduced with the help of man, along with hay and straw for instance. The origin of a couple of species is doubtful.

It must also be admitted that the classification made within certain critical genera, such as Buttercups (*Ranunculus*), Whitlow-grasses (*Draba*), Cinquefoils (*Potentilla*) and Meadow-grasses (*Poa*), may be open to debate.

The number of species in these genera, moreover, varies according to how individual authors look upon the definitions of species, subspecies and forms. Using the classification employed here, we find that Svalbard has 38 species that are unknown in Scandinavia, but some of these have isolated occurrences on the mainland south of Novaya Zemlya.

Among the remaining species, there are about 42 which are commonly referred to as centric plants, i.e. plants which, in Scandinavia, are chiefly found in the mountainous Dovre-Trollheimen district in central Norway and a similar area extending from around Salten in northern Nordland to western Finnmark. They are called unicentric if they only occur in one of these areas, and bicentric if they are found in both. These are among the rarest alpine plants in Scandinavia and are very important from a phytogeographical point of view. In Svalbard, we can find representatives of both the unicentric and the bicentric species in Scandinavia. There is even a small, but clearly defined element whose distribution jumps from the mountains of southern Norway directly to Svalbard. The remaining species have a relatively wide distribution and are common in both Scandinavia and other arctic and subarctic regions.

However, if we look at the Svalbard flora in isolation and study the distribution of the plants within the archipelago, we will quickly discover the outstanding importance of the inner fjord districts of Spitsbergen with their special flora comprising numerous species. More than 75% of all the species found in Svalbard are present there. This is not just because the climate or soil cover are particularly favourable here, since it is easy to point to equally suitable localities elsewhere on Spitsbergen.

Furthermore, Svalbard contains species with a very isolated occurrence. Thus, the Starwort Mouse-ear (*Cerastium cerastoides*) and Mare's-tail (*Hippuris vulgaris*) are only found on Bjørnøya. In the Hornsund-Sørkapp area, where the flora is otherwise not particularly rich, we find the little shrub Dwarf Willow (*Salix herbacea*) and the Glacier Buttercup (*Ranunculus glacialis*), and species are found near the thermal springs in Bockfjorden that are not otherwise known to occur in Svalbard.

We must look to history to try to find the reasons for this, on the one hand concentration, and on the other hand isolated occurrence, of several species. An explanation based simply on differences in climate and soil leads us nowhere. If the plants had reached Svalbard from the south relatively recently, it would, for instance, be expected that the number of species would increase the further south one went in the archipelago, but this is not the case. It is more likely that both the Svalbard flora as a whole, and the isolated occurrence of the above-mentioned species, have historical causes. They are likely to be relicts of a far richer and more varied vegetation that subsequently became fragmented into isolated occurrences. Such fragmentation may have taken place when the climate became worse, permitting survival only of plants in favourable localities, or small areas may have remained uncovered by ice during the Ice Age, allowing plants to survive there.

MAIN KEY

This key is arranged according to the appearance of the plants and should help to identify the plants included in this book. Some features may be difficult to determine. If so, you should try both the alternatives mentioned.

Group 1. Plants lacking flowers

A. Leaves directly from the rhizome

I. Sori on lowerside of pinnules

- a. Petiole with a small joint near its base;

2–5 cm tall plants

Woodsia

- a. Petiole without joint; pinnate leaves that easily break; 5–10 cm tall

Cystopteris

I. Leaves relatively broad, 2-pinnate, with free, branching sporangia

Botrychium

A. Plants with erect stem

I. Scale-like leaves or also branches in distinct whorls

Equisetum

I. Stem densely covered with small pointed leaves

Huperzia

Group 2. Grass-like plants with long, narrow leaves

A. Small, inconspicuous flowers, without perianth (sepals and petals)

I. Stem prostrate and hollow between nodes

Gramineae

I. Stem compact, usually 3-sided

Cyperaceae

A. Small flowers with distinct perianth

I. Leaves along stem; brownish flowers

Juncaceae

I. All leaves at base; small, yellowish-white flowers

Tofieldia

Group 3. Woody plants or small shrubs

A. Leaves shed in autumn, flat leaves

I. Amentiferous flowers, no sepals or petals

- a. Fruit is a capsule, seed silky

Salix

- a. Fruit is a winged nut

Betula

I. Bell-shaped flowers in axils

Vaccinium

A. Leaves green in winter; narrow leaves covering stem, or flat leaves, pubescent on lowerside

I. Sepals and petals free

- a. Three inconspicuous, brownish-red petals; fruit is a berry

Empetrum

- a. Eight large, white petals; fruit is a nut with a pappus

Dryas

I. Petals sympetalous (united), bell shaped; fruit is a capsule

Cassiope

Group 4. Herbaceous plants with single perianth

- A. Flowers borne in common receptacle *Asteraceae*
- A. Flowers not borne in receptacles
 - I. Base of petiole sheathed by stipule *Polygonaceae*
 - I. Lacking such a stipule; no petals, but flowers surrounded by bracts *Chrysosplenium*

Group 5. Herbaceous plants with double perianth (sepals and petals); petals free

- A. Three petals *Ranunculus hyperboreus*
- A. Four petals
 - I. Fruit is a capsule opening by pores *Papaver*
 - I. Fruit is a capsule opening by 2 valves *Brassicaceae*
 - I. Fruit is a follicle, several gathered in a cluster *Sedum*
- A. Five petals
 - I. Opposite leaves *Caryophyllaceae*
 - I. Leaves alternate on stem, or in rosette at base
 - a. Leaves in rosette, no stem leaves *Saxifraga*
Plants have stem leaves
 - b. 5 stamens; small greenish flowers *Sibbaldia*
 - b. 10 stamens *Saxifraga*
 - b. Many stamens
 - c. Leaves with stipule *Rosaceae*
 - c. Leaves without stipule *Ranunculaceae*

Group 6. Herbaceous plants with double perianth and sympetalous crown

- A. Opposite leaves, annuals
 - I. Blue flowers *Gentianella*
 - I. White and blue, irregular flowers *Euphrasia*
- A. Alternate leaves, perennials
 - I. Leaves entire, blue flowers
 - a. Wide, bluish-grey leaves; littoral plant *Mertensia*
 - a. Narrow leaves; stem leaves linear *Campanula*
 - I. Pinnate leaves
 - a. Blue, regular flowers; usually only one leaf on the stem *Polemonium*
 - a. Red and white irregular flowers; flat calyces, woolly-haired plants *Pedicularis*

PTERIDOPHYTA - PTERIDOPHYTES

Flowerless plants lacking seeds or fruits and reproducing by microscopic spores. In common with spermatophytes, they have roots, stems and leaves. Sporangia occur in groups, either on the lowerside of ordinary green leaves, in axils, or in dense clusters terminally on the plant.

- A. With distinct aerial stem; small leaves
 - B. Small, pointed leaves in distinct whorls 1. *Equisetaceae*
 - B. Pointed leaves, green and appressed-sessile on stem 2. *Lycopodiaceae*
- A. No aerial stem; leaves divided, with distinct petiole
 - I. Leaves pinnate with wide pinna (leaflets); sporangium on separate free part of leaf (spike) 3. *Ophioglossaceae*
 - I. Leaf double-pinnate with small, narrow pinnae; sporangium on lowerside of leaf 4. *Polypodiaceae*

1. EQUISETACEAE - HORSETAIL FAMILY

Equisetum L. Horsetails (Snelle)

Dark, creeping subterranean rhizomes. Erect or procumbent stems with branches in whorls and small, fused leaf sheaths (teeth). Branches on procumbent plants are unilaterally bent upwards. Stem hollow with elongate ridges. Transformed leaves with sporangium, grouped in a cone-like spike, terminally either on special, pale-coloured vernal plants or on ordinary plants.

- A. Stem with branches in whorls, generally one-sided 1. *E. arvense*
- A. Stem without branches in whorls, dry, rough and overwintering
 - B. Leaf sheaths with 3-4 leaves (teeth) 2. *E. scirpoides*
 - B. Leaf sheaths with 6-8 leaves 3. *E. variegatum*

1. *E. arvense* L. Field Horsetail, Polar Horsetail; (Polarsnelle, Åkersnelle) Fig. 6a and b.

Two main forms of the species occur in Svalbard. One, as commonly found elsewhere, has a special (fertile) vernal plant which is unbranched and which has a spore-bearing spike terminally on the stem. The summer plant is green, procumbent and has branches in whorls, usually unilaterally bent upwards; branching is often more pronounced on lower part of stem. The

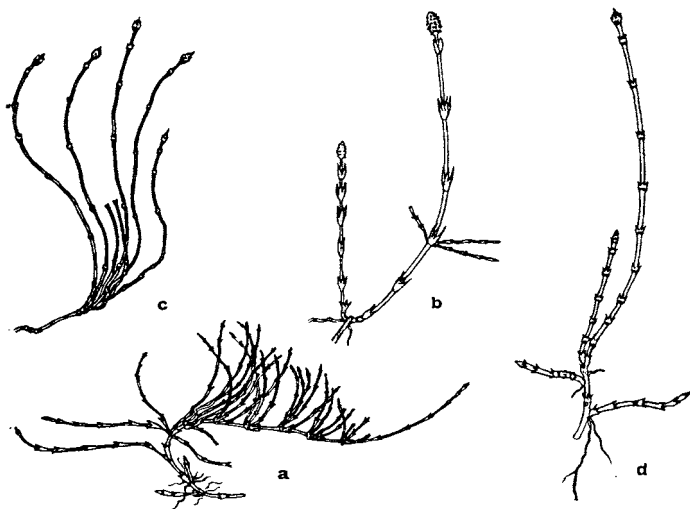


Fig. 6. a,b. *Equisetum arvense*. c. *E. scirpoides*. d. *E. variegatum*.

vernal plant appears in June, simultaneously with the green, fertile plant, but disappears after a short time. This form differs from the main one, *E. arvense* L., and should be named *E. arvense* subsp. *alpestre* (WAHLENB.) RØNNING comb. nov. Grows densely on slightly damp ground. The second form lacks a distinct main stem, is more irregularly branched and is creeping. The spore-bearing spike is small and terminally placed on branches on the summer plant. More slender, and become fertile later in spring or summer. This form has been described under several names. Here, called *E. arvense* subsp. *riparium* (FR.) RØNNING comb. nov. Grows on damp, mossy tundra, generally in wet places between hummocks. Widespread throughout Svalbard; Bjørnøya. Subsp. *alpestre* chiefly occurs in inner fjord areas in somewhat more favourable localities.

2. *E. scirpoides* MICHX. Dwarf Horsetail* (Dvergsnelle) Fig. 6c

5–10 cm tall, growing in tufts, hard, rough to touch. Stem 0.5–1 mm thick, generally 6-sided with 6 distinct ridges, erect or procumbent, but always unbranched. Plant remains green in winter. The base (rhizome) is dark and irregularly branched. Leaf sheaths have 3 teeth tapering to a long tip. Small, terminal, spore-bearing spike. Chiefly grows on calcareous soil, often among other plants. Widespread on west and north coasts of Spitsbergen; Bjørnøya.

3. *E. variegatum* SCHLEICH. Variegated Horsetail (Fjellsnelle) Fig. 6d

Loosely tufted. Stems creeping or erect, 1–2 mm thick, stiff and rough to the touch, with 6–8 (5–12) elongate ridges. Generally unbranched or with

two branches near the ground. Stem is hollow and has as many ridges as teeth in the leaf sheath. Ridges have an axial furrow. Remains green in winter. Distinguished from *E. scirpoides* by the number of teeth in the leaf sheath and the axial furrow. Usually grows on calcareous soil in both dry and wet places. Widespread throughout Svalbard; Bjørnøya.

2. LYCOPODIACEAE – CLUBMOSS FAMILY

Huperzia BERNH. Fir Clubmoss (Lusegras)

H. selago (L.) BERNH. subsp. *arctica* (GROSSH.) A. & D. LØVE Polar Fir Clubmoss* (Polarlusegras) Fig. 7c

Coarse, erect stems densely covered with small, stiff, scale-like leaves in 8 rows. Stems somewhat creeping at base, erect and divided several times; 5–10 cm tall. Wintergreen plant. Sporangium at base of ordinary leaves on annual shoot. Numerous bulbils form near apex and are released when touched. Grows among other plants in sunny places protected by snow in winter. Widespread on the west coast of Spitsbergen and along fjords, but not common.

3. OPHIOGLOSSACEAE – ADDER’S-TONGUE FAMILY

Botrychium SW. Moonworts (Marinøkkel)

Light-green perennials with leaves divided into a pinnate blade and a branching portion with a sporangium (when in fertile state). Plants are small and difficult to see.

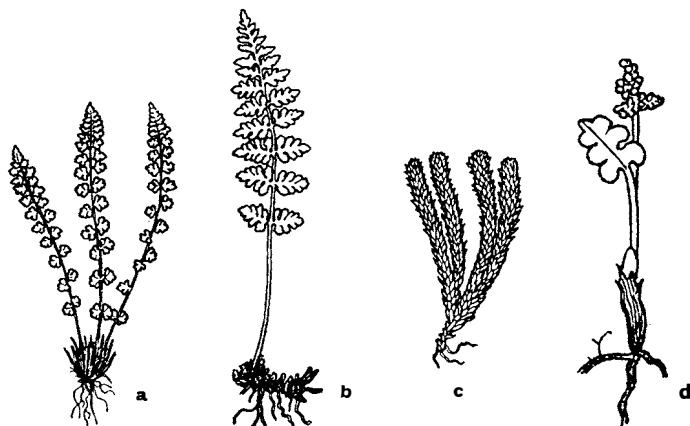


Fig. 7. a. *Woodsia glabella*. b. *Cystopteris dickieana*. c. *Huperzia selago*. d. *Botrychium lunaria*.

- | | |
|--|----------------------|
| A. Fertile blade oblong or oval; equally large,
undivided lobes | 1. <i>B. lunaria</i> |
| A. Fertile blade triangular, with indentations | 2. <i>B. boreale</i> |

1. *B. lunaria* (L.) Sw. Moonwort (Marinøkkel) Fig. 7d

Small plant, 2–4 cm tall. Leaves spring from a subterranean rhizome, growing anew each year and occurring solitarily among other plants; light green with somewhat overlapping, broad pinnae. Sporangium is yellow and branched, with distinct stem. Grows in dense vegetation in especially favourable places. Only found once in Woodfjorden.

2. *B. boreale* MILDE Northern Moonwort (Fjellmarinøkkel)

Wider and more lobed leaves than in *B. lunaria*. Only reported once in Bockfjorden and once in Wijdefjorden.

4. POLYPODIACEAE – POLYPODY FAMILY

Woodsia R. BR. Woodsia (Lodnebregne)

Creeping, subterranean rhizome with leaves arising from it. Pinnate leaves with distinct petiole.

W. glabella R. BR. Smooth Woodsia (Dverglodnebregne) Fig. 7a

Small fern, ca. 5 cm tall, with short, delicate rhizome. Leaf narrow, almost linear, slightly wider above midway. Petiole short, light coloured and lacks scales and hairs. At the base of the petiole is a visible, ring-shaped abscission joint where the leaf readily breaks off. Blade is glabrous. Sporangia covered with hair-like veils. Grows in rock crevices. Only found at a few localities in Isfjorden and Kongsfjorden.

Cystopteris BERNH. Bladder-fern (Lok)

C. dickieana R. SIM. Dickie's Bladder-fern (Berglok) Fig. 7b

Fragile, glabrous plants with double-pinnate leaves, 5–15 cm tall. Leaves, arising from a stout rhizome, are thin and may seem transparent. Petiole shorter than blade and easily breaks off; has scattered, light-coloured, pointed scales lowermost. Brown sporangia on lowerside of leaf have flap-like covers (sori) that quickly dry up and disappear. Grows in rock crevices and among stones along the west coast fjords; uncommon.

The only Bladder-fern species found in Svalbard and differs from *C. fragilis* by having spores with rugose nipples or bars.

MAGNOLIOPHYTA – ANGIOSPERMS, FLOWERING PLANTS

The seed germinates with two cotyledons. The leaves have a multiplicity of shapes, often rounded and veined like a hand or feather. The root is generally a taproot.

SALICACEAE – WILLOW FAMILY

Salix L. Willows (Vier)

Small shrubs with alternate, entire leaves. Male and female plants have flowers in catkins. Each flower has a bract (catkin scale) and a style or 1–2 stamens. The fruit has many seeds with white, silky hairs. In all species in Svalbard the main stem creeps along the ground or lies partially beneath the surface.

- A. Glabrous, smooth, green leaves
 - B. Leaves crenate-serrate, rounded; capsule not pubescent 1. *S. herbacea*
 - B. Leaves entire; capsule pubescent 2. *S. polaris*
- A. Pubescent leaves
 - C. Leaves smooth on upperside, greyish-white silky pubescent on lowerside 3. *S. reticulata*
 - C. Leaves pubescent on both sides 4. *S. arctica*

1. *S. herbacea* L. Dwarf Willow (Musøre) Fig. 8b

Low, creeping shrub with long, pale shoots creeping beneath the surface or in moss; only leaf-bearing shoots above ground level. Leaves are round and crenate with a dense network of veins and a fresh green colour. Catkins located terminally on the shoot and have a few smooth, reddish-brown capsules. Style short and stigmas strongly outward-curved. Grows in dense, continuous stands in wet places, on gravel and among mosses. Rare species, only found near Sørkapp, at Hornsund and on Bjørnøya.

2. *S. polaris* WALENB. Polar Willow* (Polarvier) Fig. 8a

Low, creeping shrub with long, creeping shoots, subterranean or in moss carpets. Erect shoots with leaves above ground level. Leaves are oval, dark green and entire. Catkins placed terminally on shoots and have relatively few pubescent capsules. Style thin and long with outward-curved stigma. Like the last species, it grows in large, highly branching stands, usually on gravel. Becomes autumn-coloured early. Common throughout Svalbard.

On Bjørnøya and in a few places on southern Spitsbergen there are intermediate forms between this and the last species, *S. x nothula* ANDERSS.

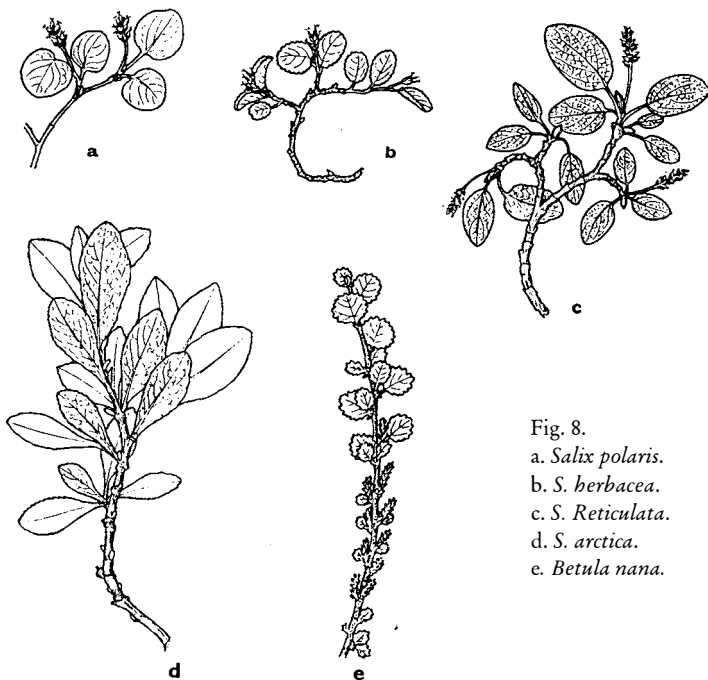


Fig. 8.
 a. *Salix polaris*.
 b. *S. herbacea*.
 c. *S. Reticulata*.
 d. *S. arctica*.
 e. *Betula nana*.

3. *S. reticulata* L. Net-leaved Willow (Rynkevier) Fig. 8c

Low, creeping shrub whose main stem is marginally subterranean; nodose branches lie on the surface. Leaves are oval, stiff, dark green and have depressed veins on their upperside. Their lowerside is entirely silvery grey owing to small, silky hairs, and has elevated veins. Leaf margin is recurved. Catkins located terminally on shoots and have grey-pubescent capsules. Short, coarse style with distinct red stamens. Forms which are also pubescent on upperside are found locally. Grows on dry, sunny, gravel slopes, usually on calcareous substrates. Widespread along the west and north coasts of Spitsbergen, especially in fjord areas; Bjørnøya..

4. *S. arctica* PALLAS Tundra Willow* (Tundravier) Fig. 8d

Small shrub with oblong, somewhat pointed and pubescent leaves. Young shoots are pubescent and have a glossy bark. Grows in rather damp places. Rare, only found in inner Isfjorden and in Kongsfjorden.

The species has died at the only known locality in Kongsfjorden and is severely threatened at the other known locality in Adventdalen.

BETULACEAE – BIRCH FAMILY

Betula L. Birch (Bjørk)

B. nana L. Dwarf Birch (Dvergbjørk) Fig. 8e

Small shrub with tough, pubescent twigs. Creeps along the ground. Small, rounded leaves, somewhat broader than long, crenate and glabrous. Flowers in erect catkins. The fruit, a nut with a narrow, membranous wing, is inside a bract scale with three equally long lobes. Grows in dry places with some snow protection. Rare species, found in only a few localities in inner Isfjorden.

Spitsbergen plants differ from those on the mainland, for instance in the mode of branching, position of their catkins, their leaf shape and pubescence.

POLYGONACEAE – KNOTWEED FAMILY

Knotweeds have alternate leaves and a thin stipule sheathing the base of their stems. Flowers are small and lack petals; pale or light pink. Fruit is a flat or triangular achene.

- A. Very small (0.5–2 cm), delicate annuals;
reddish brown 2. *Koenigia*
- A. Larger species with several tepals; perennials
 - B. Rounded leaves with long stalks, red fruits 3. *Oxyria*
 - B. Oval leaves, much longer than broad
 - C. Leaves lack lobes at base; white or pink flowers; no fruit, but achene has brownish-red bulbils 1. *Polygonum*
 - C. Leaves with lobes at base 4. *Rumex*

1. *Polygonum* L. Knotgrass (Harerug)

P. viviparum L. Alpine Bistort (Harerug) Fig. 9b

Erect, ca. 10 cm tall, with curved, tuberous rhizome. Lower leaves ovate-lanceolate and long-stemmed; stem leaves sessile and lanceolate. Flower spike densely covered with small, white or pink flowers which usually do not produce fruit but develop round, dark red bulbils, especially from the lowest part of the spike. These often germinate in the spike, ultimately falling off to provide vegetative reproduction. Great variation in size, maybe



Fig. 9. a. *Oxyria digyna*. b. *Polygonum viviparum*. c. *Rumex acetosa*.
d. *R. acetosella*. e. *Koenigia islandica* (2).

reaching 15–20 cm in height at favourable, nutrient-rich sites. Grows on almost any substrate and is often very abundant. Widespread throughout Svalbard and one of the commonest plants; Bjørnøya.

Some floras allocate this species to the genus *Bistorta* MILL., as *B. vivipara* (L.) S.F. GRAY.

2. *Koenigia* L. Iceland-purslane (Dvergisyre)

K. islandica L. Iceland-purslane (Dvergisyre) Fig. 9e

Small (2–3 cm), delicate, unbranched reddish-brown annual. Leaves are obovate, the uppermost ones forming a whorl just beneath minute yellowish-green flowers. Fruit is a very small achene. Grows on bare ground,

often among stones in damp places. Scattered throughout Svalbard, but more seldom on the north coast; Bjørnøya.

The arctic forms differ somewhat in appearance from the southerly ones and have been looked upon as a variety, var. *arctica* HADAČ, or a separate species, *K. hadači* A. LØVE & D. LØVE.

3. *Oxyria* HILL Mountain Sorrel (Fjellsyre)

O. digyna (L.) HILL. Mountain Sorrel (Fjellsyre) Fig. 9a

Erect, unbranched, 10–20 cm tall, with sturdy yellow root. Stem and petioles usually red, particularly on upper half. Thick, round or reniform, glabrous leaves on long petioles, gathered near foot of stem. Inflorescence dense with erect branches and pendulous flowers, later pendulous, flat achene with distinct broad, red wing. Grows in damp places, close to streams, among stones, etc. Widespread throughout Svalbard and very common; Bjørnøya.

4. *Rumex* L. Docks (Syre)

Stem unbranched lowermost. Tongue-shaped leaves. Flower has three outer and three inner tepals. These grow around the fruit which is an achene. The species in this genus have been introduced.

A. Basal leaf lobes point basally (sagittate)

1. *R. acetosa*

A. Basal leaf lobes broad and point laterally

2. *R. acetosella*

1. *R. acetosa* L. Common Sorrel (Engsyre) Fig. 9c

Erect, 20–30 cm tall. Leaves ca. 2 cm wide and more than twice as long, with distinct petiole and acutely, basally-directed lobes. Outer tepals curved upwards. Chiefly on grassland and near waste dumps. Only near settlements.

2. *R. acetosella* L. Sheep's Sorrel (Småsyre) Fig. 9d

Erect, 10–20 cm tall. Leaves ca. 1 cm wide, long and narrow, and with laterally-directed lobes. Outer tepals curved downwards. Grows on fairly dry places, on grassland and the like. Introduced species, only found near settlements.

CARYOPHYLLACEAE – PINK FAMILY

Plants with opposite leaves. Flower regular with 5 sepals and 5 petals. Capsule opens at its tip.

- A. Petals and sepals free
 - B. Narrow, almost needle-like leaves
 - C. Flower buds round; 4–5 styles 1. *Sagina*
 - C. Flower buds oblong; 3 styles 2. *Minuartia*
 - B. Wide leaves, ovate or lanceolate; white petals; 5 styles
 - D. Petals entire
 - E. Glabrous, succulent shore plant, with relatively large leaves; petals shorter than sepals 3. *Honkenya*
 - E. Leaves smaller than 1 cm; petals twice as long as sepals 4. *Arenaria*
 - D. Petals deeply bifid or with distinct notch at apex
 - F. Petals bifid almost to base 5. *Stellaria*
 - F. Petals with distinct notch at apex 6. *Cerastium*
- A. Calyx sympetalous, somewhat expanded, corolla free with red or white petals, indistinct in one species 7. *Silene*

1. *Sagina* L. Pearlworts (Småarve)

Small, low, creeping plants with narrow leaves. Flowers have 4 or 5 small petals. Sepals are evenly rounded, causing flower bud to appear spherical.

- A. With distinct leaf rosette in centre, petals shorter than calyx 1. *S. nivalis*
- A. In tufts; petals slightly longer than calyx 2. *S. cespitosa*

1. *S. nivalis* (LINDB.) FR. Snow Pearlwort (Jøkelarve) Fig. 10a

Small, delicate, tufted plant with long, narrow leaves. Entire plant measures ca. 1 cm across; often somewhat brownish green and with distinct leaf rosette in the centre. Stems slender and decumbent. Small, white flowers with 4 petals which are a little shorter than the sepals. Pedicel is short and straight, and flower bud spherical. Fertilisation takes place before flower opens (cleistogamy). Widespread throughout Svalbard and quite common; Bjørnøya.

The species is also called *S. intermedia* FENZL.

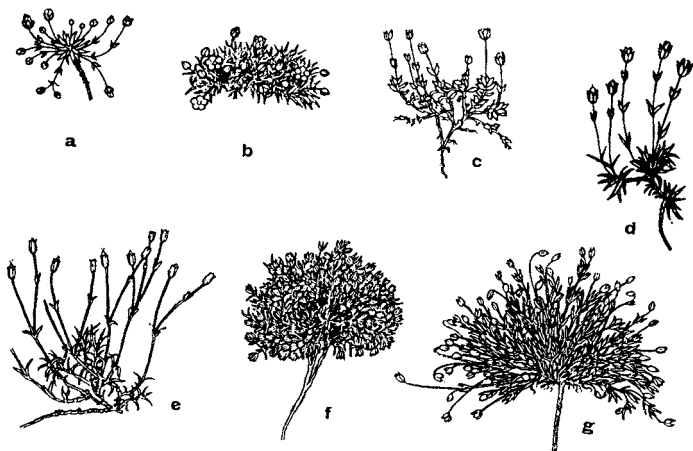


Fig. 10. a. *Sagina nivalis*. b. *S. cespitosa*. c. *Arenaria humifusa*. d. *Minuartia rubella*.
e. *M. biflora*. f. *M. rossii*. g. *M. stricta*.

2. *S. cespitosa* (J. VAHL) LANGE Tufted Pearlwort* (Stuttarve) Fig. 10b

Small, compact, tufted plant. Old, withered leaves near base. Flower has five petals and sepals; petals slightly longer than sepals and carrying 10 stamens. Pedicels straight, usually only one flower on each. Grows on wet gravel or solifluction ridges. Rare, found in only a few places on the west coast of Spitsbergen

2. *Minuartia* LOEFL. Sandworts (Tuearve)

Small, tuft-forming species with filamentous leaves. Flower has 5 petals and sepals, and sepals are relatively long, causing flower bud to be long and narrow.

- | | |
|--|----------------------|
| A. Entirely glabrous | |
| B In compact cushions with short, filamentous leaves; usually lacking a flower | 1. <i>M. rossii</i> |
| B. In small, loose tufts; long leaves and usually has a flower on a long pedicel | 2. <i>M. stricta</i> |
| A. Glandular-pubescent, especially stem and pedicel | |
| D. Sepals obtuse, slightly shorter than the leaves, decumbent plant in flat cushions | 4. <i>M. biflora</i> |
| D. Sepals pointed and longer than the petals; fairly erect plant in flat cushions | 3. <i>M. rubella</i> |

1. *M. rossii* (R. BR.) GRABEN. Cushioned Sandwort* (Putearve) Fig. 10f

Compact plant growing in 5–15 cm broad cushions. Leaves compactly arranged, filiform, not exceeding 0.5 cm in length, slightly curved, glabrous and somewhat succulent. Entire plant is brownish green. Flowers have short pedicels and occur singly. Sepals pointed and lack membranous margin. Petals pink and slightly longer than sepals. Seldom flowers and therefore seldom forms fruit, instead reproducing by the shoot end readily falling off and taking root. Grows on wet gravel, damp places and patterned ground. Occurs locally along the fjords on western and northern coasts of Spitsbergen.

2. *M. stricta* (SW.) HIERN. Teesdale Sandwort (Grannarve) Fig. 10g

Erect stems in small, loose tufts; entirely glabrous. Filiform leaves exceeding 0.5 cm in length, obtuse with indistinct veins. Flowers usually single on 2–4 cm long pedicels. Sepals pointed, with narrow membranous margin. Petals white and same length as sepals. Flower does not open during flowering. Grows on clay in wet places, or on margins of mossy cushions; also marginal to patterned ground (ring structures). Distribution somewhat uncertain, but is widespread on western and northern coasts, mostly in inner stretches of fjords.

3. *M. rubella* (WAHLENB) HIERN. Mountain Sandwort (Nålearve) Fig. 10d

Erect stems in tufts. Stems and pedicels glandular-pubescent, or rarely glabrous. Leaves filiform and pointed, with 3 distinct veins and occasionally with hairs on margin. Flowers usually single. Sepals slightly reddish, 3-veined, pointed and a little longer than petals which are white or pale pink. Capsule same length or slightly longer than sepals. Grows on fairly dry gravel, screes, etc. Widespread throughout the area and quite common.

4. *M. biflora* (L.) SCHINZ & THELL Tufted Sandwort* (Tuearve) Fig. 10e

Tufted, with short stems or creeping, in which case somewhat more extended. Stems and pedicels glandular-pubescent. Leaves filiform, obtuse, 3-veined and often with hairs on margin. Flowers generally paired; usually with 3 styles, sometimes 4. Sepals obtuse, 3-veined. Petals somewhat longer than sepals, white and fairly wide open during flowering. Capsule longer than sepals. Grows in fairly damp places, often where vegetation is quite dense. Widespread throughout Svalbard and quite common.



Fig. 11. a. *Honkenya peploides*. b. *Cerastium arcticum*. c. *C. regelii*. d. *Silene acaulis*.

3. *Honkenya* EHRH. Sea Sandwort (Strandarve)

H. peploides (L.) EHRH. Sea Sandwort (Strandarve) Fig. 11a

5–10 cm tall, with creeping rhizomes and erect stems. Leaves succulent, glabrous and glossy; opposite. Flowers small, unisexual and occur singly on short pedicels in axils. Petals white and slightly longer than sepals. Round capsule. Grows on shingle near the sea. Found in only a few places at the heads of Isfjorden and Kongsfjorden, and in eastern Spitsbergen. Only occurs in Svalbard as subsp. *diffusa* (HORN.) LØVE.

4. *Arenaria* L. Sandworts (Sandarve)

Small plants with oblong or ovate leaves. White flowers with entire petals. Creeping or in tufts.

- A. Pedicellate flowers; leaves with hairs along margin; tuft-forming
- A. Sessile flowers; wholly glabrous stems and leaves; low and creeping

- 1. *A. pseudofrigida*
- 2. *A. humifusa*

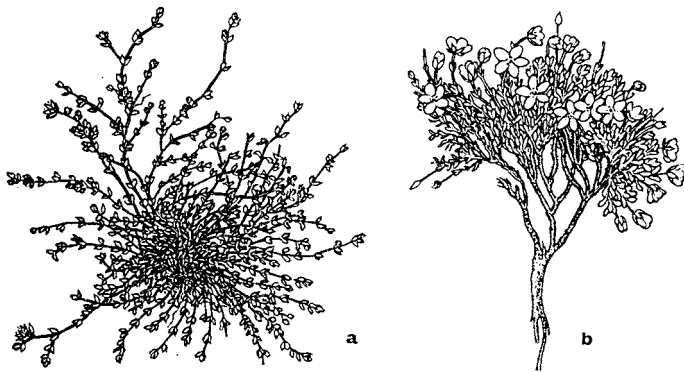


Fig. 12. a. *Stellaria humifusa*. b. *Arenaria pseudofrigida*.

1. *A. pseudofrigida* (OSTF. & DAHL) JUZ. Fringed Sandwort (Kalkarve) Fig. 12b

Forms flat tufts. Glabrous stems, but leaves have hairs along their margin. Leaves close set, oblong with obtuse apex. Pedicellate flower. Flower is large, and opened petals are twice as long as sepals. Usually flowers profusely and flowers have noticeable scent. Occurs in several forms, including with broad or narrow petals. Grows on gravel and sand, often on dry, calcareous shingle close to the shore. Widespread, but uncommon, on western and northern coasts of Spitsbergen, rare on east coast.

The species is also named *A. ciliata* L. subsp. *pseudofrigida* OSTF. & DAHL.

2. *A. humifusa* WAHLENB. Low Sandwort (Dvergarve) Fig. 10c

Tiny, creeping plant with light-coloured, subterranean runners. Entirely glabrous. Leaves oblong, small and rather succulent. Flowers single, without or with very short pedicels. Petals and sepals equal in length. Grows on damp gravel. So far only found in the Kongsfjord area and in Woodfjorden.

5. *Stellaria* L. Stitchworts (Stjerneblom)

Generally glabrous, with white flowers. 5 petals which are bifid almost to the base, giving the appearance of 10. Capsule opening by 6 teeth.

- A. Petiolate leaves; stem pubescent on one side; short petals 1. *S. media*
- A. Narrow, sessile, somewhat succulent leaves; glabrous stem
- B. Procumbent stems, often flatly cushion shaped; obtuse sepals; whole plant often brownish red; near the shore 3. *S. humifusa*
- B. Erect, bluish-green plant; petals twice as long as sepals 2. *S. crassipes*



Fig. 13. a. *Stellaria media*. b. *S. crassipes*. c. *Cerastium cerastoides*. d. *C. alpinum*.

1. *S. media* (L.) VILL. Common Chickweed (Vassarve) Fig. 13a

Procumbent, light-green plant with stem pubescent on only one side. Glabrous leaves, lower ones petiolate, higher ones sessile. Small flower, 4–5 mm across, with petals only half as long as sepals. Introduced species with fortuitous occurrence. Grows on waste dumps and nutrient-rich sites in built-up areas. Found earlier in Longyearbyen and Ny-Ålesund. Can probably be found in other settlements.

2. *S. crassipes* HULT. Tundra Chickweed* (Snøstjerneblom) Fig. 13b

Entire plant often rather bluish green, 5–10 cm tall, growing in loose tufts. Stem erect and glabrous, easily breaking at leaf nodes. Leaves relatively stiff, bluish green, widest at base, tapering evenly towards apex. Flowerless shoots often grow from the axils.

Flowers white, relatively large, occurring singly on long pedicels from the axils. Petals much longer than sepals. Capsule and calyx equal in length.

The plants in Svalbard have two types of flower, bisexual and purely female flowers (gynodioecious).

Generally found in dry places on calcareous substrates, but may also occur in damper localities.

Widespread throughout Svalbard and very common in places.

The Svalbard species belongs to the *S. longipes* GOLDIE coll. complex, *S. crassipes* being the only representative in Svalbard.

3. *S. humifusa* ROTTB. Arctic Chickweed* (Ishavsstjerneblom) Fig. 12a

Small, low plant with creeping stems or forming low, outspread mats. Leaves small and oval, completely glabrous and fairly thick. Large flowers with petals much longer than the obtuse sepals. Flowers profusely in late summer. Entire plant is often brownish red. Grows in damp places near the seashore and creeping among other plants. Widespread throughout Svalbard; Bjørnøya

6. *Cerastium* L. Mouse-ears (Arve)

Tuft-forming plants, glabrous or pubescent, with oval leaves. Pedicels have 1 or 2 white flowers with white petals which are slightly bifid apically. Round capsule opening by 10, rarely 6 teeth.

- A. Loosely tufted, almost glabrous on lower part, slightly pubescent higher up; flower has 3 styles; capsule opens with 6 teeth 1. *C. cerastoides*
- A. Distinctly or densely tufted; flower has 5 styles; capsule opens with 10 teeth
- B. Short, wide leaves, thick and glossy, glabrous or with a few stiff hairs along the edge; forms compact tufts, generally lacking flowers 2. *C. regelii*
- B. Oblong, not glossy, always more or less pubescent leaves
- C. Lower leaves lack hairs on blade, remainder are hairy; sepals obtuse; uppermost leaf pair oval, without membranous margins; forms compact tufts 3. *C. arcticum*
- C. Leaves distinctly pubescent, with long, glossy hairs; sepals pointed; uppermost leaf pair narrow with membranous margins; grows loosely or in tufts 4. *C. alpinum*

1. *C. cerastoides* (L.) BRITTON. Starwort Mouse-ear (Brearve) Fig. 13c

Loosely tufted plant with decumbent stems which are glabrous or a little hairy uppermost. Leaves narrow ovate, glabrous and light green. Flowers singly or 2–3 together. White petals somewhat longer than calyx. Capsule twice as long as calyx, opening with 6 teeth. Grows in fairly moist localities. Rare. In Svalbard found only on Bjørnøya.

2. *C. regelii* OSTENF. Polar Mouse-ear* (Polararve) Fig. 11c

Usually completely glabrous, but forms with hairs along leaf margins can be found. Generally grows in compact, arched tufts with densely packed leaves which are oval and glossy. Flower is large and white with petals ca. 3 times as long as sepals. Pedicels and sepals may be slightly hairy.

Usually sterile; if so, reproduces by the outermost part of the shoot falling off and taking root. Leaves below this break are often somewhat larger, yellowish and not as glossy green as the others. In fairly favourable localities the plant may flower profusely at the end of August or in September, after the midnight sun period.

Grows in fairly moist places, damp gravel and solifluction soil.

Widespread throughout Svalbard and also very common at quite high altitudes; Bjørnøya.

3. *C. arcticum* LGE. Arctic Mouse-ear (Snøarve) Fig. 11b

Grows in more or less firm tufts, with runners. Almost the whole plant is pubescent, but pubescence is less pronounced on leaf surfaces. Hairs seem rather stiff.

Bracts lack membranous margins. Sepals obtuse and have membranous margins. Pedicels have 1–2 large flowers. Grows in fairly moist, but not wet, places.

Widespread throughout Svalbard, both lowlands and mountains; Bjørnøya.

Three varieties of this species occur in Svalbard: var. *arcticum* with distinctly tufted growth, var. *vestitum* HULT., which is yellowish green and has sepals with broad membranous margins and usually only 1 long-pedicellate flower, and var. *sordidum* HULT., which is dark green with dark, more or less pointed sepals and usually a multibranched inflorescence.

Hybrids between this species and *C. regelii* probably also occur. These are usually distinguished by having somewhat longer and more pubescent leaves.

4. *C. alpinum* L. Alpine Mouse-ear (Fjellarve) Fig. 13d

Loosely tufted plant, richly pubescent with long, white, glossy hairs. Leaves oval, richly pubescent, also on surfaces; uppermost leaf pair (bracts) narrow, with membranous margins. Flower large and has longer petals than sepals, and these have membranous margins and are a little pointed with a rectangular base.

Grows on rather dry, sunny spots on rocks and screes.

Its occurrence in Svalbard has for a long time been considered uncertain, but recent finds and other information have confirmed its presence in several places on the west coast.

The plants in Svalbard differ from other forms of this species, for instance in their pubescence, having looser tufts and a membranous margin on the upper bracts, and a lack of runners.

7. *Silene* L. Campions (Smelle)

Long, stout taproot and close-set leaves and flower shoots. Composite and inflated calyx with 5 or 10 teeth. Large flowers with bifid petals.

- A. Erect plants, 5–10 cm, single or 2–5 stems together
 - B. Flowers single and nodding; strongly inflated calyx, petals protrude from calyx; stem downy 1. *S. arctica*
 - B. Several flowers together, white or pinkish flowers; calyx less inflated; large petals 2. *S. furcata*
- A. Substantial, compact cushions, often hemispherical, with pink flowers. 3. *S. acaulis*

1. *S. uralensis* (RUPR.) BOCQ. Polar Champion* (Polarblindurt) Fig. 14d

Erect, 5–10 cm tall. Straight, pubescent stem, usually carrying a pair of leaves and a single flower. Leaves long and narrow, and sparsely pubescent. Petals violet and extend just beyond the calyx lip. Calyx strongly inflated and has distinct dark violet stripes. After flowering, the calyx becomes straightly erect and has 10 teeth on its lip.

Seeds are flat and have a broad membranous margin.

Grows on open, fairly moist ground beside streams and seeps, usually on sand and gravel.

Widespread on western and northern coasts.

Other floras often attribute this species to *S. uralensis* (RUPR.) BOCQ. subsp. *arctica* (FRIES) BOCQ. It has been decided to recognise it as a separate species here, in part characterised by being smaller, more markedly reddish violet, and having a rounder calyx with petals protruding 2–3 mm from it.

The species used to be called *Melandrium apetalum* FENZL.

2. *S. furcata* RAFIN Arctic White Champion* (Polarjonsokblom) Fig. 14e

Erect, 5–15 cm tall. Stem glandular-pubescent with several slightly nodding flowers and 2–3 leaf pairs. Leaves narrow and somewhat glandular-pubescent. White or pale pink petals protruding far out of calyx which is somewhat less inflated than in the last species and has violet stripes lowermost. After flowering, calyx becomes straightly erect. Seeds have narrow membranous margin.

Grows on moderately dry ground in nutrient-rich places.



Fig. 14 a. *Ranunculus lapponicus*. b. *R. pygmaeus*. c. *R. hyperboreus*.
d. *Silene uralensis*. e. *S. furcata*.

Found in a few places along the fjords of the western and northern coasts.

The species is often referred to as *S. furcata* RAFIN. subsp. *furcata*, which is the Arctic form. It used to be called *Melandrium angustiflorum* (RUPR.) WALD.

3. *S. acaulis* (L.) JACQ. Moss Campion (Fjellsmelle) Fig. 11d

Grows in densely compact, often hemispherical cushions with strong tap-root. Leaves evenly wide, narrow and short with marginal hairs. Entire cushion may be densely covered with pink flowers. Flowers are very short-stemmed, only one per stem. Calyx is brownish red and tubular. The pink petals exceed the calyx in length and are widely opened. Capsule is twice as long as calyx.

Flowers are pleasantly scented. The species occurs with two main types of flower, large and small. Small flowers are female and have 3 stigmas, reduced pollen sacs being located in the flower base. Large flowers are male and have 5 protruding pollen sacs, and greatly reduced stigmas are sometimes also seen (gynodioecious). Plants with white flowers occur locally. At the end of August, or after the midnight sun period, the plants become very dark violet (anthocyanin-coloured) and look like dark hemispheres. The south side of the cushion flowers first. In August, capsules containing seeds occur on the south side and flowers on the north side (compass flowering). Grows in dry places, on gravel or in crevices. Widespread and very common throughout Svalbard.

The Svalbard plants are generally allocated to subsp. *arctica* A. LØVE & D. LØVE.

RANUNCULACEAE – BUTTERCUP FAMILY

Ranunculus L. Buttercups (Soleie)

Perennials with digitate, lobed or toothed leaves; white or yellow flowers; 3 or 5 sepals and 5(-8) petals, and many stamens and fruits (nuts).

- A. With creeping runners that root; white or yellow flowers
 - B. Submerged in water or in very moist places; 3 sepals, white or yellowish-white flowers; stems and leaves often floating in water
 - C. White flowers; 1.5–2 cm wide; 5–8 petals
 - D. Leaves 3-lobed or entire; one main lobe with one or two narrow, forward-directed lateral lobes; usually 6–8 petals 2. *R. pallasii*
 - D. Deeply 3-lobed leaves, sometimes 5-lobed; usually 5–6 petals 3. *R. spetsbergensis*
 - C. Yellow flowers, less than 1 cm across, 3 petals 5. *R. hyperboreus*
 - B. Terrestrial plants; deeply 3-lobed leaves with coarsely toothed lobes; yellow flowers 4. *R. lapponicus*
- A. In tufts, several close together, or singly and erect
 - E. Sepals strongly brown-pubescent
 - F. Yellow flowers, singly in the crown
 - G. Leaf base heart-shaped incised; glabrous between fruits 6. *R. nivalis*
 - G. Leaf base wedge-shaped; short, black hairs between fruits 7. *R. sulphureus*
 - F. White or pink flowers; leaves deeply bifid 1. *R. glacialis*
 - E. Sepals glabrous, or short-haired with light-coloured hairs

- H. Stem leaves and basal leaves shallowly lobed and resemble each other
 - I. Small flowers; petals shorter than sepals; small plant with brown-pubescent stem
 - I. Large flowers; petals longer than sepals; large plant with pubescent leaves
8. *R. pygmaeus*
10. *R. acris*
- H. Stem leaves and basal leaves differ; stem leaves divided into several linear lobes
 -
9. *R. affinis*

The genus *Ranunculus* s.l. can also be divided into three separate genera. If this is done, the division will be:

- No. 1. *R. glacialis* = *Bechnithia glacialis* (L.). A. LØVE & D. LØVE
- No. 2. *R. pallasii* = *Coptidium pallasii* (SCHLECHT) A. LØVE & D. LØVE
- No. 3. *R. spetsbergensis* = *Coptidium spetsbergensis* HADAČ
- No. 4. *R. lapponicus* = *Coptidium lapponicus* (L.) A. LØVE & D. LØVE

The remaining species, 5–10, then belong to the genus *Ranunculus* s.str.

1. *R. glacialis* L. Glacier Buttercup (Issoleie) Fig. 15a

Sturdy, fleshy plant, ca. 10 cm tall, glabrous and often glossy. 3–5 digitate leaves with lobed sections. Stem leaves resemble basal leaves. Large, ca. 2–3 cm wide, white flowers, usually a single one at apex. Sepals strongly brown-pubescent; large petals, white, later pink. Fruits have an apical membranous margin.

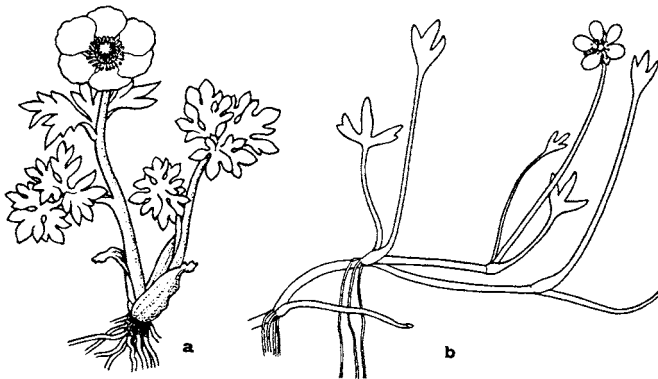


Fig. 15. a. *Ranunculus glacialis*. b. *R. spetsbergensis*.

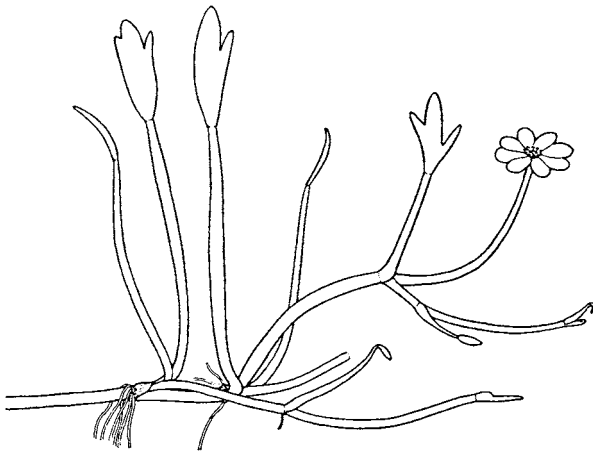


Fig. 16. *Ranunculus pallasii*.

Grows on moist, open gravel among stones.

Found a couple of times near Sørkapp and Hornsund, probably also in Kongsfjorden.

2. *R. pallasii* SCHLECHT. Glossy Buttercup* (Glinsesoleie) Fig. 16

Sturdy, procumbent plant, glabrous and distinctly glossy; rooting at the leaf nodes. Lower leaves have a long petiole, much longer than the leaf. Leaves are 3-lobed, usually with a broad median lobe and two narrower lateral lobes. Upper leaves are oval and entire. Erect pedicel with a large (1–1.5 cm across), white flower that is sweet-scented and has 6–8 petals and 3 sepals. Spherical infructescence, but seldom bears fruit.

Grows in very wet places, mostly in moss.

Rare species, only found a few times in Isfjorden and Hornsund.

3. *R. spetsbergensis* (NATH.) HADAČ. Svalbard Buttercup* (Svalbardsoleie) Fig. 15b

Procumbent, glabrous and glossy, but less so than *R. pallasii*. Roots at the leaf nodes. Leaves are bifid to about midway in three or five lobes which are outward-curved and distinctly separated; on 5-lobed leaves, the outermost lobes are less deeply bifid. Long pedicel with 1–1.5 cm wide, yellowish-white, sweet-scented flower, usually with 6 petals and 3 sepals.

Grows in very wet places, usually submerged in water or in compact, wet moss mats.

Widespread on Spitsbergen in areas around Isfjorden, Bellsund, Sør-

kapp, Edgeøya and Prins Karls Forland. The species may also be considered as a hybrid between *R. pallasii* and *R. lapponicus*.

4. *R. lapponicus* L. Lapland Buttercup (Lappsøleie) Fig. 14a

Small, ca. 10 cm, creeping plant with procumbent stem. Long-stalked leaves or flowers stretch straight up from the stem. Leaves circumferentially reniform, but deeply 3-lobed; lobes distinctly rounded. Sweetly-scented, yellow flower usually with 6 petals and 3 sepals. Grows in fairly moist places, generally in moss, or on the banks of lakes and streams.

Widespread on Spitsbergen in the Isfjord, Bellsund and Kongsfjord areas; also on Edgeøya, but absent from the north coast.

5. *R. hyperboreus* Rottb. subsp. *arnellii* SHEUTZ. Tundra Buttercup* (Tundrasøleie) Fig. 14c

Small, low plant with stem creeping in soil or floating in water. Leaves have short petioles and are distinctly 3-lobed; older leaves may be 5-lobed. Small flowers on short pedicels, ca. 0.5 cm wide, yellow, with 3 petals and 3 sepals. Ovary round, ca. 4 mm, nuts have short beak. Common in moist, clayey places or still, shallow water. Widespread throughout Svalbard and quite common. Also on Bjørnøya, where the plants must be distinguished as subsp. *hyperboreum*.

6. *R. nivalis* L. Snow Buttercup (Snøsøleie) Fig. 17d

Erect, 5–15 cm tall. One or more straight stems with brown hairs. Lower leaves deeply 3- or 5-lobed with heart-shaped bases. 1–2-lobed stem leaves with truncate bases; leaf base heart-shaped. Flowers single, 1.5–2 cm wide, with 5 deep yellow petals and 5 downy sepals with brown hairs. Fruit head oval, about twice as high as wide. After flowering, pedicel becomes significantly longer. Often difficult to distinguish from *R. sulphureus*, which is more common.

Grows in moist places beside streams and seeps; often near glaciers and snow drifts. Widespread in coastal and fjord areas on the western and northern coasts.

7. *R. sulphureus* SOL. Sulphur-coloured Buttercup (Polarsoleie) Fig. 17b

Erect, 5–15 cm tall. One or more close-set stems, straight and brown-pubescent. Lower leaves shallowly lobed and cuneate towards petiole; may also be almost round and crenate. 1–2 stem leaves with cuneate bases. Large, sulphur-coloured, 1–2 cm wide flower with 5 petals and 5 sturdy, downy sepals with brown hairs. Fruit head has long, brown hairs between the nuts.

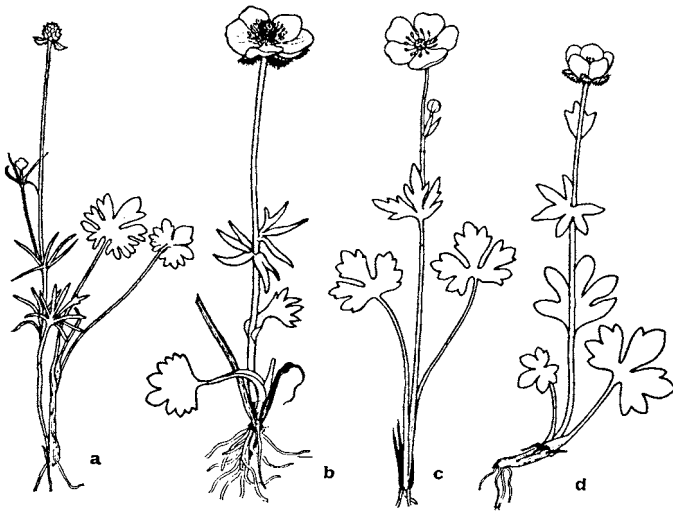


Fig. 17. a. *Ranunculus affinis*. b. *R. sulphureus*. c. *R. acris*. d. *R. nivalis*.

Grows in wet places alongside streams and near glaciers, but generally on open ground.

Widespread throughout Svalbard and quite common; Bjørnøya.

8. *R. pygmaeus* WAHLENB. Pygmy Buttercup (Dvergssoleie) Fig. 14b

Small, ca. 5 cm. Stem sparsely brown-pubescent. Leaves have long petiole; 3–5 irregular lobes; many leaves from base, 0–2 stem leaves. Flowers 5–6 mm broad, yellow with heavily pubescent sepals; petals a little shorter than sepals. 3–4 mm, round fruit head; small nuts have short, arcuate beak. Pedicel elongates considerably (5–10 cm) after flowering.

Grows in moist places, among moss and beside streams; often near glaciers and snowdrifts.

Widespread throughout the region and quite common; Bjørnøya.

9. *R. affinis* R. BR. Lobe-leaved Buttercup* (Flikbladssoleie) Fig. 17a

10–25 cm tall. Lower part of stem glabrous, upper part downy. Basal leaves long-stalked, rounded and divided into 5–9 distinct segments separated from each other. Stem leaves sessile, deeply divided into linear segments. Large flower with undulose petals, twice as long as sepals, and having grey hairs on lowerside. The species has many forms. The Svalbard form belongs to a complex with pubescent nuts.

Grows on nutrient rich sites, often where the plant cover is dense. Rare species. Found on Spitsbergen in a few places in the Isfjorden and Kongsfjorden areas.

A species named *R. wilanderi* (NATH.) A. LØVE & D. LØVE (Wilander's Buttercup* – Wilandersoleie) has also been described from Svalbard. It is doubtful whether this is a separate species; it has a very limited distribution and its occurrence in Svalbard is uncertain.

10. *R. acris* L. Meadow Buttercup (Engsoleie) Fig. 17c

Large species, 20–30 cm tall, covered in fine hairs. Leaves 3–7-lobed and sparsely silky-pubescent on lowerside. Basal leaves 3–5 lobed, stem leaves almost identical to basal leaves, but sessile. Upper stem leaf much smaller than the others. Flower is yellow with petals somewhat longer than sepals. Nut is glabrous, angular and lacks a distinct beak.

An introduced species, only found as a weed near waste dumps and similar places near settlements on Spitsbergen and Bjørnøya. The Svalbard plant belongs to the main form of the species, subsp. *acris*.

PAPAVERACEAE – POPPY FAMILY

Papaver L. Poppy

P. dablianum NORDH. Svalbard Poppy (Svalbardvalmue) Fig. 18a

10–25 cm tall with leaves in basal rosette and erect leafless stem with a solitary, large flower; white or rarely yellow latex. Leaves heavily pubescent,



Fig. 18. a. *Papaver dablianum*. b. *Cardamine bellidifolia*. c. *C. nymanii*.

lobed or pinnately lobed. Stem has protruding hairs. Flower bud bent downwards and somewhat pendulous, but flower straightly erect. Flower large, with 4 large, white or yellow petals. Sepals and capsule downy with brown hairs. Capsule on stiff, erect stem; ovate with flat, stellate stigma disc at apex and opening with apertures beneath stigma disc.

Generally grows on open, dry gravel, but also in fairly moist places with stones and gravel. Common in the lowlands and high on mountains, higher than any other species in Svalbard, and flowering from early spring (June) until well into September.

Widespread throughout Svalbard; Bjørnøya.

Very variable species, particularly in central Spitsbergen. Occurs with yellow and white flowers, which vary in diameter from 1–2 cm to 4–5 cm. Its height also varies from 7–8 cm to ca. 25 cm.

Occurs in at least two main forms. The most common one has a white or yellowish-white flower and a long, pear-shaped capsule; the flower stalk and capsule have more or less protruding hairs. The other form has a yellow flower and round (ellipsoidal) capsule, and is more densely pubescent with appressed hairs on both stem and capsule. The situation is made additionally complicated by other characters such as the size of the flower, the colour of the plant, where it grows and the time of flowering.

BRASSICACEAE – CABBAGE FAMILY

These species have alternate leaves; some form small tufts. The flower has 4 sepals and 4 petals. The fruit is a silique (>3x as long as wide) or silicula (<3x as long as wide).

- A. Siliculae/siliquae short, 3–4 times longer than wide, or less
- B. Leaves, entire or with scattered teeth, in a rosette, but also a few stem leaves
- C. Entire plant is glabrous
 - D. Siliquae oblong, with almost parallel sides, erect and appressed to stem; petals twice as long as sepals 4. *Eutrema*
 - D. Siliculae round or oval; small petals
 - E. Leaves round with long petiole, oval siliculae 2. *Cochlearia*
 - E. Leaves evenly narrow, almost linear; siliculae about as thick as they are wide 3. *Braya*
 - E. Leaves widest in upper half, gradual transition from node; siliquae/siliculae wider than they are thick 6. *Draba*

- B. Basal leaves clearly incised, stem leaves clasp stem; siliculae triangular, widest uppermost 7. *Capsella*
- A. Siliquae long, several times longer than they are wide
- F. Entire plant is glabrous
- G. Yellow flowers 9. *Barbarea*
- G. White or pink flowers
- H. Long, narrow siliquae, which open 1. *Cardamine*
- H. Shorter, double-jointed siliquae which do not open 8. *Cakile*
- F. Entire plant covered with small hairs
- All leaves have scattered teeth 5. *Arabis*

1. *Cardamine* L. Cresses (Karse)

Erect stem, white or pale violet flowers and protruding sepals. Long siliquae with short style. Siliqua cover springs open elastically when seeds are ripe.

- A. Pinnate leaves; long, white and pale violet petals, 3 times as long as sepals 1. *C. nymanii*
- B. Entire, ovate leaves; white petals, slightly longer than sepals 2. *C. bellidifolia*

1. *C. nymanii* GAND. Polar Cress (Cuckooflower) (Polarkarse) Fig. 18c
 5–15 cm tall, with basal leaf rosette and glabrous, succulent stem. Pinnate leaves with 4–6 pairs of round leaflets. 2–4 stem leaves with narrow leaflets, generally 3–5 pairs. Flowers gathered in an inflorescence at the top of the stem; 4–10 flowers which are white and violet with darker veins; petals three times as long as sepals which are green and have a membranous margin. Flower develops normally, but probably never bears ripe siliquae. Reproduces vegetatively by leaflets breaking off and taking root. Often only the leaf rosette is found, without a stem and flowers.

Grows in moist places, near streams and seeps, frequently interspersed with compact moss cushions.

Widespread throughout Svalbard, but rarely in any quantity; Bjørnøya.

Some floras place this species in the complex *C. pratensis* L., attributing it to *C. pratensis* L. subsp. *polemonioides* ROUY.

2. *C. bellidifolia* L. High Alpine Cress* (Høgfjellskarse) Fig. 18b

2–5 cm tall, with several erect stems from the root. Leaves in basal rosette, round and long-stalked. Short stems, often shorter than the leaves and with

few flowers. Flowers small, petals slightly longer than sepals and white; sepals reddish violet. Siliquae relatively long, close set and straightly erect.

Generally grows in moist, gravelly places, but also in denser vegetation, near streams and lakes.

Widespread throughout Svalbard, but never in large quantities.

2. *Cochlearia* L. Scurvygrass (Skjørbuksurt)

C. groenlandica L. Polar Scurvygrass* (Polarskjørbuksurt) Fig. 20a

Low plant with flat rosette. Entire plant appears succulent and glossy. Rosette leaves have long stems with round or reniform blades. Stem leaves sessile, sinuate and oval with base clasping the stem. Flowers small and inconspicuous on relatively coarse, thick stems. Plant fructifies richly. Siliculae vary from almost round to extended oval.

Plant lives 2–5 years. Leaf rosette develops during the first two years, forming large, long-stemmed leaves. Flowers in the last year and the rosette dies, but stems remain until seeds are dispersed. Widespread throughout Svalbard and very common; Bjørnøya. The leaves are a traditional remedy for scurvy and are edible both raw and boiled.

Variable species, but two main forms can be distinguished. One is found on open tundra, on gravel and in several different plant communities. It has a distinct rosette pressed down towards the ground and a central erect stem with an inflorescence.

It requires 2–5 years to produce ripe seeds which are very numerous and have a large capacity for germination. The other grows densely and profusely at the foot of bird cliffs. It has large, succulent leaves which are 2–3 cm in diameter, long-stemmed and equal in length or longer than the inflorescence.

3. *Braya* STERNB. & HOPPE. Rose Cress (Rosekarse)

B. purpurascens (R. BR.) BGE. Purplish Braya (Purpurkarse) Fig. 19a

4–8 cm tall, with narrow leaves in a basal rosette. Stem stiffly erect and with short hairs. Entire plant always more or less reddish. Leaves entire, linear and completely glabrous. Small flowers with white petals which become somewhat pink with age. Sepals pink. Flowers gathered in more or less dense inflorescence uppermost on stem. Siliculae elliptical and appear round. Short style. Regularly produces ripe seeds. Grows in fairly open places, generally on calcareous gravel. Widespread throughout Svalbard.

Variable species, especially with regard to pubescence and leaf shape



Fig. 19. a. *Braya purpurascens*. b. *Entrema edwardsii*. c. *Arabis alpina*.

(dentate). Two main forms may be distinguished. One is almost glabrous or slightly pubescent on stem and leaves, its leaves are entire and its stem lacks flowers; siliculae are ovate. The other form is extremely pubescent, especially on the siliculae and stem; leaves are pubescent on their margins and slightly dentate. A few leaves on the stem. Siliculae somewhat elongate. This second form can probably be attributed to the Greenland species *B. intermedia* TH. SØR.

The species is protected throughout the Kingdom of Norway.

4. *Entrema* R. BR. Polar Radish (Polarreddik)

E. edwardsii R. BR. Polar Radish* (Polarreddik) Fig. 19b

5–10 cm tall, with one or more erect stems from a stout taproot. Entirely glabrous. Basal rosette leaves are oval and on a fairly long stalk; 3–4 sessile, oblong stem leaves. Small flower with white petals about twice as long as the pinkish sepals. Inflorescence extended with siliquae stiffly erect and pressed tightly against the stem. Siliquae reddish brown and 3–4 times as long as wide. Grows in moist places, frequently in dense moss mats on peaty substrates. Generally close to small lakes and streams on somewhat calcareous substrates. Occurs in many places in Svalbard, particularly in the Isfjorden area, but also on the north coast.

5. *Arabis* L. Rock-cress (Skrinneblom)

A. alpina L. Alpine Rock-cress (Fjellskrinneblom) Fig. 19c

10–15 cm tall, erect, with basal leaf rosette. Entirely pubescent with protruding fork hairs. Rosette leaves oblong or on short petiole, the others being sessile, wide at the base and having stipules clasping the stem. All leaves are dentate. Flowers longer than pedicels and gathered in a large inflorescence uppermost. White petals 6–8 mm long, twice as long as sepals. Long, glabrous, protruding siliquae, 2–3 times longer than pedicels.

Grows on dry gravel, among stones and in crevices.

Only found a few times on the west coast; Bjørnøya.

6. *Draba* L. Whitlow-grasses (Rublrom)

Distinct leaf rosette at ground level and erect stems, 5–20 cm long, that lack or have few leaves. All leaves more or less clothed in stellate, unbranched or branched hairs. Yellow or white petals. Siliquae/siliculae oval and later somewhat arched and with a distinct internal dividing wall carrying two rows of seeds. The style at the silicula apex is usually very short.

The species may be difficult to distinguish from each other and are only reliably identified by combining the characters of petals, sepals, siliquae/siliculae, stems and leaves. It is particularly useful to examine flowers and siliquae/siliculae together. Early in the season, during flowering, the remains of siliculae from the previous year may be of great help.

A. Petals yellow; pubescent stems and leaves; no stem leaves.

B. Petals narrow, linear or slightly wider than sepals; leaves rounded, pubescent with many stellate and branched hairs

C. Petals light yellow, sepals usually slightly violet; siliculae about equally acute at both ends, usually densely pubescent; leaves fleshy, wide with rounded apex, dense stellate hairs simple or branched hairs on the margin

3. *D. micropetala*

C. Petals orange yellow, sepals usually deep violet; siliculae mostly narrow towards their base, generally only with simple hairs on the margin; leaves thinner, slightly acute, pubescent, mostly branched hairs, with long, simple hairs on the margin

4. *D. pauciflora*

B. Petals wider than sepals; leaves generally rather acute, pubescent with stellate, branched hairs and many simple hairs

- D. Siliquae generally long and narrow, fairly evenly acute at both ends, widest near the middle, generally glabrous, but pubescent types occur; petals pure yellow; sepals relatively long and narrow 5. *D. alpina*
- D. Siliculae generally short and wide, few or many hairs, usually widest below the middle; petals usually pale yellow; sepals cupulate, short and wide
- E. Petals wide with rounded, symmetrical lobes, colour varies from almost white to pure yellow; siliculae usually widest well below the middle, generally only pubescent on the margin 2. *D. oxycarpa*
- E. Petals have asymmetrical lobes, colour pale yellow; siliculae vary greatly in shape, but generally broadly elliptical, pubescent all over 1. *D. corymbosa*
- A. White flowers; more or less pubescent leaves; pubescent or glabrous stems
- F. Stems and siliquae glabrous; small plants
 - G. Leaves with unbranched, forked and simple stellate hairs; leafless stem 6. *D. lactea*
 - G. Leaves sparsely pubescent with unbranched hairs; stem has one leaf 7. *D. fladnizensis*
- F. Stems distinctly pubescent; siliculae/siliquae pubescent or glabrous
- H. Leaves densely clothed in short, stellate hairs; none or only a few unbranched fork hairs; plant appears more or less grey
- I. Completely glabrous or sparsely hairy siliculae/siliquae
- K. Leaves entire and have only stellate hairs, without or with one stem leaf; small species 10. *D. nivalis*
- K. Leaves have a few teeth and scattered stellate hairs; several stem leaves: larger species 11. *D. daurica*
12. *D. arctica*
- I. Densely pubescent siliquae
- H. Leaves and stems covered with unbranched or forked hairs; stellate hairs may occur
- L. Pubescent siliculae; 1-3 stem leaves, leaves dentate; inflorescence somewhat dispersed 8. *D. norvegica*

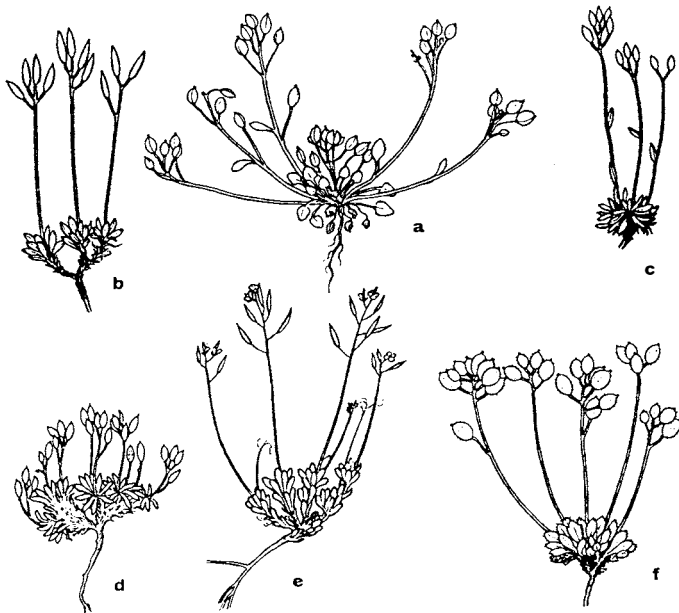


Fig. 20. a. *Cochlearia groenlandica*. b. *Draba lactea*. c. *D. fladnizensis*.
d. *D. subcapitata*. e. *D. nivalis*. f. *D. corymbosa*.

L. Glabrous siliculae; short leafless stems;
dense inflorescence; leaves entire with
pronounced midrib

9. *D. subcapitata*

1. *D. corymbosa* R. BR. Cushioned Whitlow-grass* (Puterublom) Fig. 20f
3–10 cm tall, pubescent plant. Leaves entire and distinctly pubescent with mostly unbranched and branched hairs, few stellate hairs. Stem leafless and rough-haired. Flowers light yellow, relatively short and broad, with irregular lobes. Siliculae dark, wholly pubescent, extremely variable in shape, occasionally oblong, often broadly elliptical to almost circular and with slightly asymmetrical apex. Flowering individuals easy to recognise by the colour and shape of their petals. Generally found on dry, gravelly places with a thin snow cover. Scattered throughout Svalbard.

2. *D. oxycarpa* SOMMERF. Pale Whitlow-grass* (Bleikrublom) Fig. 21c
3–10 cm tall, pubescent plant. Leaves oblong, often with few hairs on their blade. Stem pubescent and leafless. Flowers large and wide, with yellow,

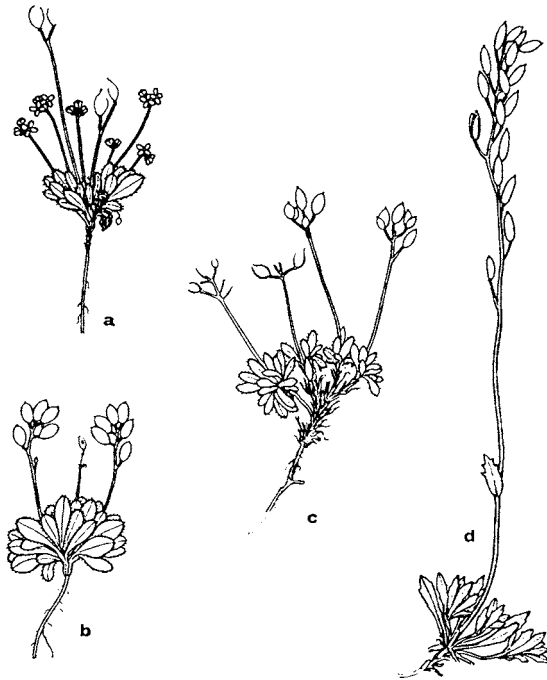


Fig. 21. a, b. *Draba pauciflora*. c. *D. oxycarpa*. d. *D. daurica*.

light- yellow or whitish-yellow petals. Siliculae generally pubescent on their margin, otherwise glabrous, relatively large and oval with large concave sides, widest below the middle; pressed or dried material shows distinct wrinkles. Grows in moist and dry places. Common throughout Svalbard.

3. *D. micropetala* HOOK. Polar Whitlow-grass* (Polarrubblom) Fig. 22a

3–10 cm tall, pubescent plant. Leaves entire and distinctly rounded at their apex. Leaves have their blade densely covered with stellate hairs, and have stellate and branched hairs on their margin. Stem pubescent and leafless. Flowers light yellow, petals no wider than sepals, insignificantly recurved when open. This species has the narrowest petals of all the yellow Whitlow-grasses in Svalbard. Siliculae extended, oval and somewhat acute; pubescent. Grows on open places on gravel and patterned ground. Widespread along fjords on the western and northern coasts of Spitsbergen. Previously called *D. adamsii* LEDEB. and *D. oblongata* R.BR.

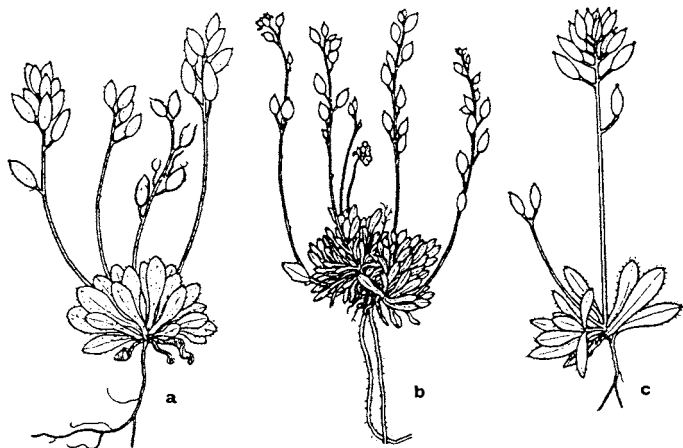


Fig. 22. a. *Draba micropetala*. b. *D. norvegica*. c. *D. alpina*.

4. *D. pauciflora* R. BR. Tundra Whitlow-grass* (Tundrarubblom) Fig. 21a and b

2–10 cm tall, pubescent plant. Leaves entire and oblong. Stem pubescent and leafless. Flowers orange yellow, with narrow petals which do not overlap each other and are longer than the sepals; recurved and undulate when open. Siliculæ oval, elliptical, more quickly tapering towards the base than towards the apex, brownish and glossy. Flowering individuals recognised by the colour and shape of their petals, and fruiting ones by the shape and colour of their siliculæ. Often grows in fairly protected places, especially in moist mossy mats, and flowers early in spring. Distribution in Svalbard uncertain, but locally common. Previously called *D. micropetala* HOOK.

5. *D. alpina* L. Golden Whitlow-grass* (Gullrubblom) Fig. 22c

3–15 cm tall, pubescent plant which seems to be entirely bright green. Leaves entire and oblong. Stem pubescent and leafless. Flowers relatively large with pure yellow petals which are much longer than the sepals. Siliquæ glabrous or with a few, scattered hairs, occasionally more strongly pubescent; widest near the middle and somewhat acute at both ends. Grows in slightly moist places, near snow patches. Common throughout Svalbard; Bjørnøya.

6. *D. lactea* ADAMS. Lapland Whitlow-grass (Lapprubblom) Fig. 20b

Small species, 2–5 cm, pubescent with unbranched, branched and occasionally a few stellate hairs. Leaves oblong and entire. Stem leafless and gla-

brous. Flower white with large petals, twice as long as sepals. Siliquae densely grouped apically, oblong and glabrous, with distinct style.

Fairly moist places, often among moss and other plants.

Widespread throughout Svalbard.

7. *D. fladnizensis* WULF. White Arctic Whitlow-grass (Alperublom) Fig. 20c

Small plant, 2–5 cm, strongly resembling *D. lactea* and may be difficult to distinguish from it. Leaves mostly have unbranched hairs. Stem generally has one leaf and is glabrous. Flower white with large petals. Siliquae glabrous and usually not so densely grouped as in *D. lactea*.

Relatively dry, warm places on gravel or among stones.

Found locally throughout Svalbard, but uncommon.

8. *D. norvegica* GUNN. Rock Whitlow-grass (Bergrublom) Fig. 22b

5–10 cm tall, with unbranched, branched and stellate hairs. Leaves oblong, frequently somewhat dentate. Stem has some stellate hairs and 1–3 stem leaves. Flower white. Siliculae oblong and slightly acute, pubescent or glabrous. Open, fairly widely spread inflorescence. The species has many different forms.

Grows in dry, gravelly and stony locations.

Distribution uncertain, most frequent in the fjord areas of Spitsbergen and Nordaustlandet, but seems to be otherwise rare; Bjørnøya.

9. *D. subcapitata* SIMM. Hemispherical Whitlow-grass* (Halvkulerublom) Fig. 20d

2–4 cm tall, forming small, dense hemispherical cushions. Branched and unbranched hairs. Leaves narrow and entire with a very prominent central vein which remains on the stem after the rest of the leaf has perished. Stem pubescent, short and leafless. Flowers white and small with short petals only slightly longer than calyx. Siliculae ovate, glabrous and densely grouped apically. Dry, exposed places with gravel and stones and a thin snow cover in winter. Widespread throughout Spitsbergen and quite common in some places.

10. *D. nivalis* LILJEBL. Snow Whitlow-grass (Snørublom) Fig. 20e

2–10 cm tall, densely covered with short, grey stellate hairs giving the whole plant, except the siliculae, a grey appearance. Leaf rosette forms small, compact cushions. Leaves oblong, seem stiff and are densely covered with small, stellate hairs. Stem leafless and has stellate hairs. Flower small, white and has small petals. Siliculae narrow and pointed, glabrous and somewhat glossy. After flowering, the inflorescence becomes somewhat extended so that the siliculae are generally scattered along the stem. Grows in dry places, on screes and in windy spots. Widespread throughout Svalbard, but uncommon.

11. *D. daurica* DC. Scree Whitlow-grass* (Skredrublom) Fig. 21d
5–15 cm tall with unbranched and stellate hairs. Leaves have distinct teeth and stellate hairs on blade. Stem has protruding hairs and 1–5 large, wide stem leaves with 4–5 pointed, protruding teeth. Flowers white or pale yellow, petals about 1.5 times longer than calyx. Short inflorescence which becomes extended when seeds are ripening. Siliquae oblong, 3–4 times as long as wide, glabrous or with scattered hairs. Style shorter than in *D. arctica*.

Grows in dry places, particularly on screes and beneath bird cliffs.

Widespread in coastal and fjord areas in the west and east, but seems rare on the north coast.

12. *D. arctica* J. VAHL. Mealy Whitlow-grass* (Mjølrublom)

5–15 cm tall, bluish-green plant, densely covered in stellate hairs and some unbranched hairs. Leaves long and narrow, densely covered in short, stellate hairs and some unbranched hairs; 1–2 stem leaves. Flowers white, with petals twice as long as sepals. sepals often densely covered in unbranched hairs. Siliquae elliptical and slightly acute at both ends, densely covered with stellate hairs. Style long and distinct.

Dry places, particularly gravelly slopes, moraines and rocky knolls.

Quite common in coastal and fjord areas in the west, but rare on the north and east sides of Svalbard.

7. *Capsella* MED. Shepherd's-purse (Gjetertaske)

C. bursa-pastoris (L.) MED. Shepherd's-purse (Gjetertaske)

Erect, generally slightly pubescent and has a rosette of long, narrow, lobed leaves. Stem leaves clasp the stem. Flower white and has longer petals than sepals. Siliculae have a characteristic, triangular heart shape, widest uppermost, and are on long stalks.

Grows beside roads and waste dumps.

Introduced to Svalbard and only found near settlements, currently only known from the Russian communities.

8. *Cakile* MILL. Sea Rocket (Strandreddik)

C. arctica POBED. Arctic Sea Rocket* (Ishavsreddik)

Procumbent, glabrous, bluish-green annual. Leaves pinnately lobed, sometimes also entire. Flowers large, pale pink and pleasantly scented. Fruit divided into two, a round lower portion and a pointed upper one.

Grows on the seashore. Only found once, in inner Isfjorden.

9. *Barbarea* R. BR. Winter-cress (Vinterkarse)

B. vulgaris R. BR. Winter-cress (Vinterkarse)

Fairly large, glabrous plant with angular stem. Basal leaves pinnate with two small lateral leaflets and one large, oval, terminal leaflet. Flowers have yellow petals which are much longer than the sepals. Siliquae splay outwards.

Recently introduced species growing near settlements, particularly where there are domestic animals.

CRASSULACEAE – STONECROP FAMILY

Rhodiola L. Stonecrop (Rosenrot)

R. arctica A. BOR. Arctic Roseroot* (Arktisrosenrot) Fig. 23a

Succulent plant with thick, powerful rhizome. 2–5 cm tall, with thick stem, densely covered with thick, oval, serrated leaves. Colour generally bluish green. Flowers dioecious, yellow and gathered in subcorymbose panicles. Separate male and female plants. Female plant ultimately has 4 reddish-brown carpels.

Grows in rock crevices and on stony substrates.

Found on Bjørnøya and on both sides of Forlandsundet in Spitsbergen.

Also called *R. rosea* L. subsp. *arctica* (A. BOR.) A. & D. LØVE.

SAXIFRAGACEAE – SAXIFRAGE FAMILY

Plants with alternate or opposite leaves. Regular 4- or 5-merous flowers; 2 styles. The fruit in these particular species is a capsule.

- | | |
|--|---------------------------|
| A. 5-merous flower with calyx and petals | 1. <i>Saxifraga</i> |
| A. 4-merous flower, without petals; flowers small in flat cymes with large, yellowish-green bracts | 2. <i>Chryso-splenium</i> |

1. *Saxifraga* L. Saxifrages (Sildre)

Perennials with leaves in a rosette or scattered on the stem. Regularly bisexual, flowers with 5 sepals and 5 petals, 10 stamens and 2 styles. Fruit is a capsule with outward-curved apices. Some species have a distinct scent.

- | | |
|---|---------------------------|
| A. With leaf rosette; stem leafless | |
| B. Small petals, only slightly longer than calyx | |
| C. Flowers reddish, on spikes; rosette leaves acute | 2. <i>S. hieracifolia</i> |

- C. Flowers white or pink, in branched inflorescence; rosette leaves with obtuse teeth, rounded towards apex
 - D. Stem densely pubescent with protruding hairs; short petioles 3. *S. nivalis*
 - D. Stem almost glabrous, without protruding hairs; branched inflorescence; small, 4–6 cm, reddish 4. *S. tenuis*
- B. White petals, 2–3 times longer than calyx; inflorescence in open, irregular cyme, its branches otherwise having bulbils 5. *S. foliolosa*

- A. Lacking leaf rosette; leaves dispersed up the stem
 - E. Entire leaves
 - F. Yellow flowers, leaves dispersed up the stem
 - G. Long, red, aerial runners 14. *S. platysepala*
 - G. Without aerial runners
 - H. Sepals erect, glabrous, about equal in length to petals 6. *S. aizoides*
 - H. Sepals downy, with brown hairs, half as long as petals 7. *S. hirculus*
 - F. Red petals; thick, opposite, close-set leaves 1. *S. oppositifolia*

- E. Lobed leaves, large teeth or indented
 - I. Lowest leaf reniform with 3–7 lobes, indented at base
 - K. Long petiole with red bulbils in axils; large petals
 - L. Lowest leaf has 5–7 lobes, 3 or more bulbils in each axil; white flower 8. *S. cernua*
 - L. Lowest leaf 3-lobed; bulbil in each axil; reddish flower 9. *S. svalbardensis*
 - K. Several flowers, no distinct petiole; no bulbils on stem
 - M. Green plant, 4–10 cm tall, with runners 10. *S. rivularis*

- M. Small reddish plant, 2–5 cm,
procumbent without runners;
flower slightly red
- I. Lowest leaf has distinct wedge-shaped base
- N. White flowers with petals
2–3 times longer than sepals
- N. Yellow flowers, narrow petals
11. *S. hyperborea*
12. *S. cespitosa*
13. *S. aurea*

1. *S. oppositifolia* L. Purple Saxifrage (Rødsildre) Fig. 23d

Low, creeping plant, forming mats or tufts. Leaves small, stiff and hard, terminally obtuse and with stiff hairs along margin. In four rows opposite each other, often very dense, causing the shoot to appear rectangular. Large, deep red flowers at the end of the shoot. Petals much longer than sepals. Capsule 6–8 mm, with apices bent far away from each other. Often flowers very profusely. Flowers have pleasant scent. The species shows considerable variation, growing in dense tufts, loose mats or with long, creeping runners. Colour of flower can vary from the usual deep red to light pink; all-white flowers occur, too.

Grows in both dry and moist places, on open gravel or in dense vegetation.

Widespread and common throughout Svalbard; Bjørnøya.

Many forms, but two main ones can be distinguished. The first grows in loose tufts or spread along lengthy runners in a loose network completely lacking a tuft shape. Flowers are then more open and petals narrower,

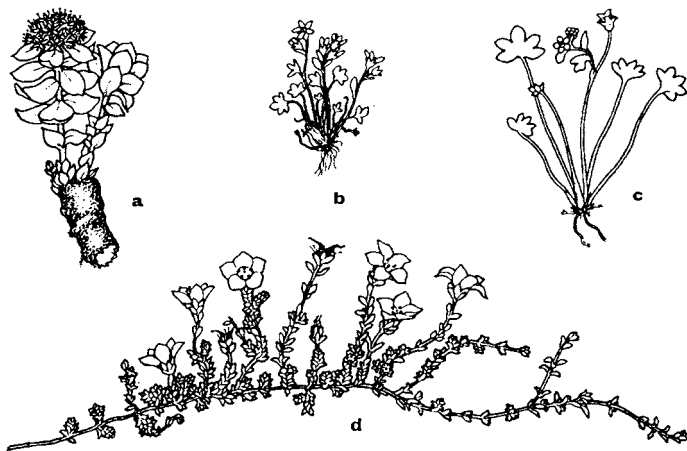


Fig. 23. a. *Rhodiola arctica*. b. *Saxifraga hyperborea*. c. *S. rivularis*.
d. *S. oppositifolia*.

not overlapping and longer than the sepals. It grows in flat, stony places. The other form more frequently grows in tufts 10–20 cm in diameter, and has short runners; usually one main root. Flowers are funnel or urn shaped with wide petals which overlap and are longer than the sepals. It grows in somewhat moister localities.

These forms used to be called *f. reptans* ANDERSS. & HESS. and *f. pulvinata* ANDERSS. & HESS. Here, they are looked upon as subspecies (see appendix).

2. *S. hieracifolia* WALDST. & KIT. Hawkweed-leaved Saxifrage (Stivsildre) Fig. 25c

Sturdy rosette of stiff, thick and coarsely crenate, acuminate leaves. Petiole short and has winged margins. Centrally in each rosette is a stiffly erect, 10–20 cm tall stem, which is brownish and glandular-pubescent. Flowers are in spike-like inflorescences and have small, red or greenish petals about equal in length to the sepals. Capsule is dark brown.

Grows in fairly damp places in compact tufts of moss.

Widespread, but not common on the west coast, rare on the east coast of Svalbard.

3. *S. nivalis* L. Alpine Saxifrage (Snøsildre) Fig. 26a

Rosette of thick, coarsely dentate and petiolate leaves which are obovate, broadly rounded apically and with strong petiole, red on lowerside. Erect stem with protruding hairs. Flowers in compact corymb, with short pedicels. Flowers small with tiny, white petals that are generally somewhat smaller than the sepals. Faintly scented. Capsule has two erect or slightly recurved horns.

Mostly found on gravel in both dry and moist localities.

Widespread throughout Svalbard. Bjørnøya.

4. *S. tenuis* (WAHLENB.) H. SM. Dwarf Saxifrage* (Grannsildre) Fig. 26c

Resembles previous species, but is smaller, 4–10 cm, and more delicate. Leaf rosette small with thick, glossy, small-toothed leaves with wide petioles. Leaves are often somewhat reddish brown on lowerside and have some coarse hairs. A thin, reddish-brown, almost glabrous pedicel rises from the rosette and has a fairly open inflorescence uppermost. Petals are white at first, later reddish. Capsule has pointed horn which is strongly recurved. Grows in moist places, particularly in damp moss beside snow patches or on damp tundra. Widespread throughout Svalbard and common; Bjørnøya.

5. *S. foliolosa* R. BR. Foliolose Saxifrage (Grynsildre) Fig. 26d

Rosette of wedge-shaped leaves. 8–15 cm tall stem, branched from the middle and may have a single flower uppermost. Lateral branches lack flowers, but have small fascicles of tiny, scale-like bulbils which easily fall off and are the vegetative reproductive organs of the plant.

Grows in wet places, generally in wet moss.

Widespread throughout Svalbard, but not common.

6. *S. aizoides* L. Yellow Mountain Saxifrage (Gulsildre) Fig. 24a

Low, tufted perennial with creeping stem and erect, flower-bearing pedicels. Leaves alternate, more or less sessile, with parallel margins and acute; glandular hairs along the margin and fairly succulent. Pedicel has 1–3 flowers which are outspread, yellow, and have somewhat longer petals than sepals. Petals may occasionally have a slightly orange tinge.

The Svalbard plants are characterised by narrower, bright yellow petals and by growing in distinct tufts with few runners. Mainly found in fairly dry or slightly damp localities, often on barren ridges and stony ground.

Widespread along the west coast of Svalbard, but not common; Bjørnøya.

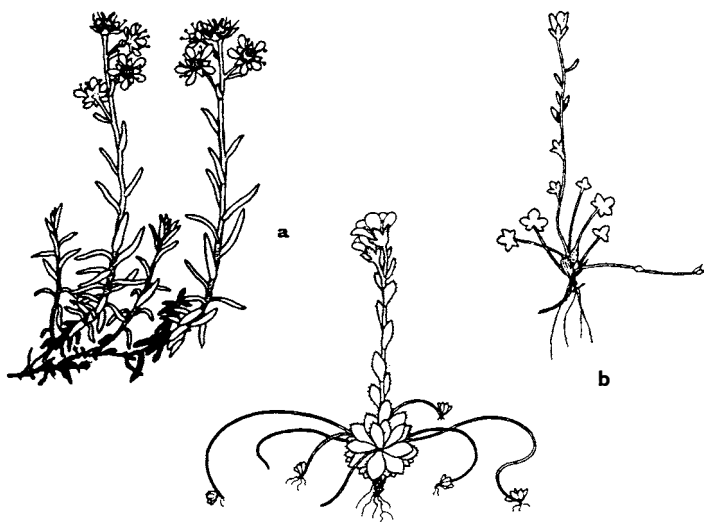


Fig. 24. a. *Saxifraga aizoides*. b. *S. svalbardensis*. c. *S. platysepala*.

7. *S. hirculus* L. Yellow Marsh Saxifrage* (Myrsildre) Fig. 25b

Compact, often long, narrow tufts, with erect, reddish-brown stems which are distinctly woolly-pubescent. Leaves are narrow, glabrous and entire. A single, terminal flower with large, yellow petals, twice as long as sepals and downy with brown hairs.

Grows in wet places, particularly wet moss.

Widespread throughout Svalbard and quite common; Bjørnøya.

The Svalbard form is subsp. *propinqua* (R. BR.) A. LØVE & D. LØVE.

8. *S. cernua* L. Drooping Saxifrage (Knoppsildre) Fig. 25a

Erect stem with 3–7 alternate, lobed leaves. Basal leaves have long petioles, stem leaves are sessile, all are thick and reniform. Stem is unbranched or has few branches, usually with a large terminal, white flower whose petals are 3–4 times longer than its sepals. Oblong, pale-coloured bulbils at the base of the stem. Up the stem, the axils have reddish-brown bulbils.

Grows in moist localities on gravel and in moss.

Very common throughout Svalbard; Bjørnøya.

9. *S. svalbardensis* D.O. ØVSTEDAL. Svalbard Saxifrage* (Svalbardsildre) Fig. 24b

Erect stem, 10–15 cm tall. Entire plant is rather dark or violet coloured. Basal leaves are 3-lobed. Terminal flower, usually fairly red and somewhat irregular. Stem leaves have a bulbil in their axils. Runners at base.

Grows profusely in wet, mossy sites. So far found in Isfjorden, Kongsfjorden and eastern Svalbard.

It is still uncertain what rank this form should have; perhaps a hybrid between *S. cernua* and *S. hyperborea* or *S. rivularis*.

10. *S. rivularis* L. Highland Saxifrage (Bekkesildre) Fig. 23c

Erect stem, 5–10 cm tall. Glabrous leaves, lower ones with long petioles and reniform with 4–7 obtuse teeth, upper ones long and narrow. Leaves almost as long as stem. Flowers singly or 2–3 together; petals white or pale pink, somewhat longer than sepals. Bulbils and thread-like runners often seen on lower part of stem. The plants are intertwined in loose tufts.

Found in very wet places, generally in moss cushions. May occur in large numbers at the foot of bird cliffs.

Widespread and common throughout Svalbard; Bjørnøya.

At least two varieties occur in Svalbard. One is green, relatively large,



Fig. 25. a. *Saxifraga cernua*. b. *S. hirculus*. c. *S. hieracifolia*.

has white flowers and particularly grows below bird cliffs and in nutrient-rich flushes. The other is short, slightly pink and grows in compact tufts; it has reddish flowers giving it an overall darker appearance (anthocyanin-coloured); found in damp places in flushes on open tundra.

11. *S. hyperborea* R. BR. Polar Saxifrage* (Polarsildre) Fig. 23b

Small plant, 2–5 cm tall, with distinctly reddish-brown stem, leaves and calyx. Leaves glabrous, lower ones petiolate, but with 3–4 teeth, reddish brown towards apex and on underside. Flower more or less red, and petals about twice as long as sepals. The whole plant is procumbent and does not form tufts; usually with two flowers on main pedicel. Generally 1 or 2 (rarely 3) pedicels from the base.

Grows in wet places, mostly in compact, mossy tufts.

So far found in a number of places along the fjords on the west coast of Spitsbergen, but probably more widely distributed.

12. *S. cespitosa* L. Tufted Saxifrage (Tuesildre) Fig. 26b

Grows in small, compact tufts. Leaves have short petioles in compact rosettes, with 3–5 lobes, a wedge-shaped base and glandular hairs. Erect stems, unbranched or with few branches and 1–2 flowers on each branch apex.

Plant is light green and more or less covered with glandular hairs. Flower is white, usually large, with petals more than twice as long as sepals and distinctly overlapping. Green sepals. Species has many forms owing to great variations in the size of the flower and the length of its pedicel.

Grows in both gravelly and vegetation-covered localities. Very widespread and common throughout Svalbard; Bjørnøya. Plants with short pedicels and flowers that are somewhat smaller than the main form are often attributed to var. *uniflora* (R.BR.) SIMM.

13. *S. aurea* (HADAČ) RØNNING Arctic Saxifrage* (Arktissildre)

Grows in small, compact tufts and the leaves form dense rosettes. Stem is brownish red, erect and somewhat pubescent. Flowers are small, 0.5–1.0 cm in diameter. Yellow or yellowish-green petals, narrow with parallel margins, not overlapping, and shorter than sepals which are triangular, reddish brown and a little longer than they are wide. Stamens are longer than sepals and protrude. Usually grows in compact, mossy mats. Flowers late in summer. Probably widespread throughout Svalbard; Bjørnøya.

This form has previously been called *S. cespitosa* L. var. *aurea* HADAČ, but is here attributed to *S. aurea* (HADAČ) RØNNING comb. nov.

Var. *apetala* (ANDERSS. HESS.) RØNNING lacks petals, or these are very small and inconspicuous with transitional forms to stamens (see appendix).

14. *S. platysepala* (TRAUTV.)TOLM. Polar Stoloniferous Saxifrage* (Polartrådsildre) Fig. 24c

Erect plant with lower leaves gathered in a compact rosette. Whole plant generally more or less red. Leaves oblong, stiff and have glandular hairs along their margins. A single pedicel leads from the rosette and has one, rarely two, yellow flowers apically. The flower is funnel shaped with petals twice as long as sepals. Long, red, beautifully arcuate runners (stolons) extend from the rosette, ending in a new, small leaf rosette. The same maternal plant often has stolons bearing leaf rosettes deriving from several different years.

Grows in fairly moist places with open gravel or sporadic vegetation.

Widespread throughout Svalbard, but uncommon.

2. *Chrysoplenium* L. Golden-saxifrage (Maigull)

C. tetrandrum (N. LUND) TH. FR. Dwarf Golden-saxifrage* (Dvergmaigull) Fig. 26e

Small plant with creeping rhizomes and weak, thin stem which has white hairs on its lower part. Leaves widely dispersed, reniform with round teeth and long petioles. Inflorescence flat and surrounded by yellowish-green

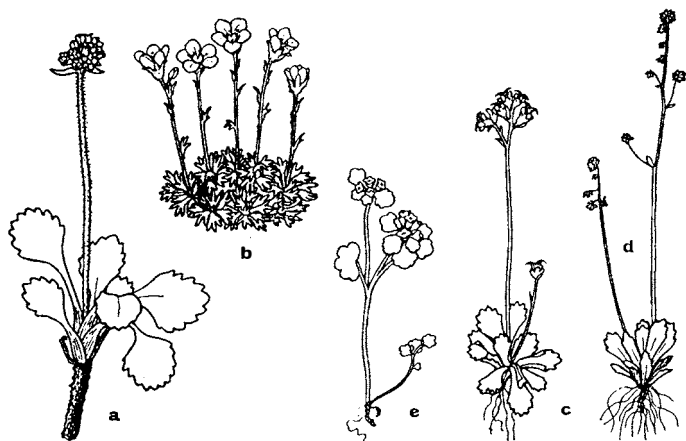


Fig. 26. a. *Saxifraga nivalis*. b. *S. cespitosa*. c. *S. tenuis*. d. *S. foliolosa*. e. *Chrysosplenium tetrandrum*.

bracts. Simple perianth with 4 yellowish sepals. Grows in moist places, always together with mosses in loose cushions. Especially common near bird cliffs.

Widespread throughout Svalbard, but not common; Bjørnøya.

ROSACEAE – ROSE FAMILY

Alternate leaves and regular flowers. Petals free, but base of sepals more or less compound. Generally 5 petals, but sometimes 8. Normally 5 sepals, which in a few genera seem to be 10 because of episepals between the sepals. Fruit is a nut or stone.

- | | |
|--|----------------------|
| A. Leaf fused or lobed; 5 petals | |
| B. Small, yellowish-green flowers; triple-fused, glabrous leaves | 3. <i>Sibbaldia</i> |
| B. Large, yellow flowers; downy leaves, fused or lobed | 1. <i>Potentilla</i> |
| A. Leaves lobed or sinuate | |
| C. Flowers white | |
| D. White flower with 8 petals; leaf crenate and downy on lowerside | 4. <i>Dryas</i> |
| D. White flower with 5 petals; leaves lobed and veined like a hand | 2. <i>Rubus</i> |
| C. Flowers yellowish green, lacking petals | 5. <i>Alchemilla</i> |

1. *Potentilla* L. Cinquefoils (Mure)

Leaves are pinnate, ternate or palmate. Flower has 5 petals and 5 sepals, but many stamens and carpels. Stout taproot. Fruit is a nut and is ultimately enclosed by the sepals to form a case. All Svalbard species have yellow petals.

- A. Pinnate leaves; inflorescence has few flowers; no runners
 - B. Flowers do not reach beyond the leaf tuft, or only just so; oval, obovate petals 1. *P. pulchella*
 - B. Flowers reach far above the leaf tuft; heart-shaped petals 2. *P. rubricaulis*
- A. Leaves ternate or palmate
 - C. Underside is white-tomentose and/or has silky hairs
 - D. Petioles in rosette have long, protruding hairs, or also short, closely sitting hairs
 - E. Underside of leaf is white-tomentose, but always covered by white, silky hairs forming a brush apically on the leaf teeth 2. *P. rubricaulis*
 - E. Underside of leaf is white tomentose, but lacks brush on the leaf apex 3. *P. chamissonis*
 - D. Petioles belonging to rosette leaves are white, woolly and lack stiff, straight hairs 4. *P. nivea* subsp. *subquinata*
 - C. Underside of rosette leaves have scattered hairs
 - F. Leaves are ternate, apical lobe (with leaflets) may be petiolate; long petals, longer than sepals; low species with erect stems 5. *P. hyparctica*
 - F. Rosette leaves usually palmate, petals have reddish-yellow spot near base 6. *P. crantzii*

1. *P. pulchella* R. BR. Tufted Cinquefoil (Tuemure) Fig. 27a

Pinnate leaves with 1–2 pairs of lobes; the two lower ones smaller than the others, and densely pubescent on both sides. Rosette leaves gathered in compact tuft. Flowers small, with light-yellow petals. During flowering, the flowers do not reach above the leaf tuft, or barely so. Stout taproot with a short rhizome uppermost.

Grows on open, gravelly soil, often in windy places. Scattered throughout Svalbard, but not common. A separate dwarf form occurs on rocky outcrops on the seashore and on gravel.

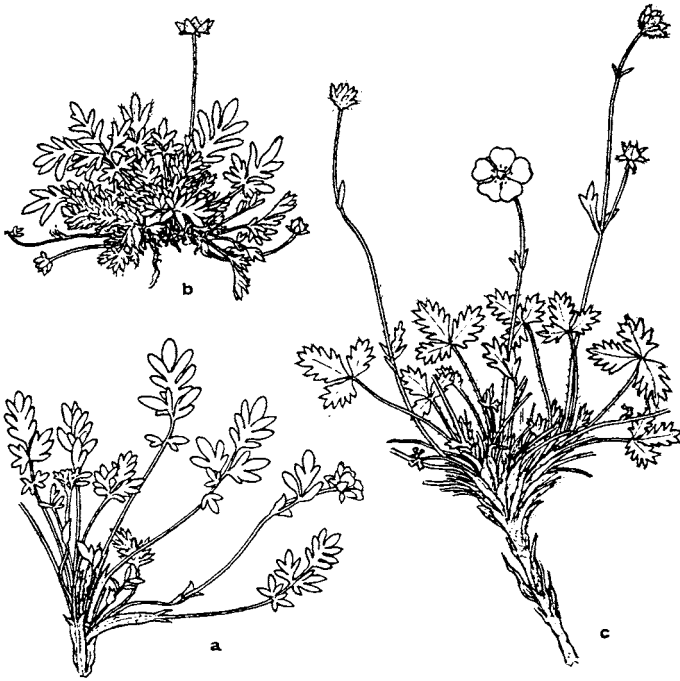


Fig. 27. a. *Potentilla pulchella*. b. *P. rubricaulis*. c. *P. hyparctica*.

2. *P. rubricaulis* LEHM. Red-stemmed Cinquefoil* (Rødstengelmure) Fig. 27b
 Leaves pinnate with 5 lobes or 3–5 fused, tomentose (white) and silky haired on lowerside, few silky hairs on upperside. Rhizome generally densely covered with old leaf remains. Compact tuft shape, but flowers reach far above the tuft, stems reddish brown, 5–10 cm tall. The species has many forms and has been little studied; it may be intermediate between nos. 1 and 3. Grows on solifluction terraces and gravel. Widespread in the Isfjorden area and near Kongsfjorden, but its distribution otherwise is little known.

3. *P. chamissonis* HULT. Bluff Cinquefoil (Flågmure) Fig. 28c
 Large plant, 10–25 cm tall, with 3- (seldom 5-) fused rosette leaves with a few large teeth. Lowerside tomentose (white), few hairs on lower side. Petiole has stiff, straight, protruding hairs. Large flowers on straight pedicels which stand erect.



Fig. 28. a. *Potentilla crantzii*. b. *P. nivea* L. ssp. *subquinata*. c. *P. chamissonis*.

Grows on gravelly slopes, rocky surfaces and close to bird cliffs. Distribution little known, but occurs uncommonly in fjord districts of Spitsbergen.

Occurs in several forms and may be attributable to the Greenland-American species *P. hookeriana* LEHM. as subsp. *chamissonis* (HULT.) K. JAL.

4. *P. nivea* L. subsp. *subquinata* (LGE.) HULT. Svalbard Snow Cinquefoil* (Svalbardsnøemure) Fig. 28b

5–20 cm tall, with ternate or palmate leaves that are densely white-pubescent on lowerside and weakly pubescent (small hairs) on upperside. Petioles have woolly hairs, without stiff, straight hairs. Narrow, 4–7 fused leaves (subsp. *subquinata*). Leaf teeth are obtuse. Flowers on erect pedicels with pale-yellow petals. Grows in dry places on rocks and gravelly slopes. On the west coast of Spitsbergen, particularly along inner parts of fjords.

5. *P. hyparctica* MALTE. Arctic Cinquefoil* (Raggmure) Fig. 27c

2–10 cm tall, compact, tufted plant with many brown remains of old leaves. Ternate leaves, pubescent, especially on lowerside along veins and on mar-

gin where straight, white hairs continue to a tip on the leaflet lobes. Large flowers, 1–1.5 cm in diameter, brownish-red stems, pale-yellow petals, much longer than sepals. Sepals and upper part of pedicel densely pubescent. Flowers early in spring.

Grows in moist places that are snow covered in winter.

Common throughout Spitsbergen.

6. *P. crantzii* (CR.) G. BECK Alpine Cinquefoil (Flekkmure) Fig. 28a

10–25 cm tall, with palmate leaves at base and ternate leaves on stem. Numerous leaf remains on rhizome. Leaves sparingly pubescent with straight hairs. Several flowers uppermost on erect pedicels. Petals have reddish-yellow spot near their base and are longer than the sepals. Variable plant; pubescence, size of flower and manner of growth can vary a great deal, for instance the spot may be lacking.

Grows on nutrient-rich substrates, on sunny slopes and in rock crevices. Only found a few times along the fjords of western and northern coasts of Spitsbergen.

2. *Rubus* L. Bramble (Multe)

R. chamaemorus L. Cloudberry (Multe) Fig. 29b

Separate male and female plants, 10–15 cm tall. Leaves reniform with 3–5 lobes. Flowers single and white, 5 petals and 5 sepals. Compound, red, be-

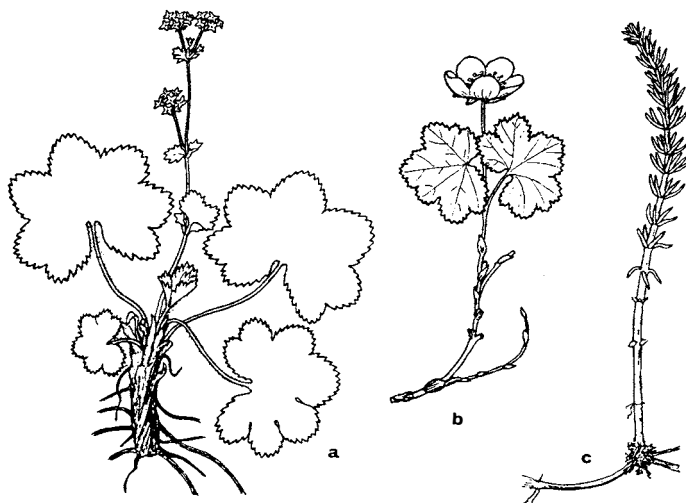


Fig. 29. a. *Alchemilla vulgaris*. b. *Rubus chamaemorus*. c. *Hippuris vulgaris*.

coming yellow, fruit; probably does not fruit in Svalbard. Grows in compact heather and moss.

Only found in a few places in the Isfjord area.

3. *Sibbaldia* L. Sibbaldia (Trefingerurt)

S. procumbens L. Sibbaldia (Trefingerurt) Fig. 30a

Low, perennial with sturdy, wood-hard rhizome. Stem very short, bearing leaves with long petioles. Leaves ternate, with petioles shorter than the leaf itself. Apical leaf lobes cut straight off and slightly dentate. Short pedicels, shorter than leaves. Flowers small and inconspicuous, with 5 yellowish-green petals, shorter than sepals, and 5 stamens.

Grows in compact vegetation with snow protection.

Only found at one locality in Bockfjorden on the north coast.

4. *Dryas* L. Mountain Avens (Reinrose)

D. octopetala L. Mountain Avens (Reinrose) Fig. 30b

Low, evergreen, in compact, flat cushions. Procumbent, strong, wood-hard stems. Leaves sinuate, glossy green on upperside, finely white-downy beneath. Midrib and petiole have light-brown, scale-like hairs with white hairs along their margin. Flowers are on long pedicels with 8 large, white petals. Fruit is a nut. The long, feather-shaped style remains fixed to the nut

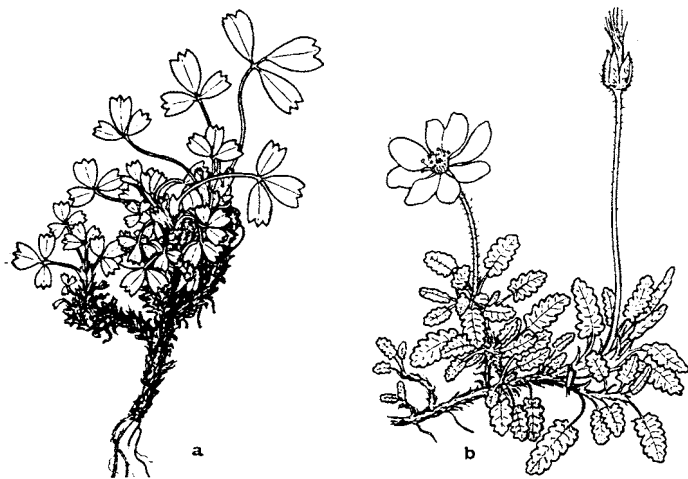


Fig. 30. a. *Sibbaldia procumbens*. b. *Dryas octopetala*.

after ripening and functions as a dispersal organ. Grows in dry localities, especially on calcareous substrates. Widespread throughout Svalbard and common.

Several forms occur in Svalbard, the most important of which can be distinguished as follows:

Subsp. *octopetala* Hult. – Within this subspecies there are variations in the shape and pubescence of leaves and stems, the colour of flowers and the number of petals; some forms have small, usually narrow, leaves with involuted margins and pale-yellow flowers (pure yellow can occur), whereas others have densely pubescent leaves (both sides).

Subsp. *punctata* (JUZ.) HULT. – Distinguished by having longer leaves that are sinuate along their entire length; typically, the whole plant is grey, leaves being more or less covered on both sides with flat, shield-like glandular hairs fastened at one point and quite unlike the usual branching *octopetala* hairs. This subspecies probably has a somewhat more northerly distribution than the main form.

5. *Alchemilla* L. Lady's-mantle (Marikåpe)

A. vulgaris L. coll. Lady's-mantle (Vanlig marikåpe) Fig. 29a

Perennial with lobed leaves and small yellowish-green flowers. Stems and petioles have protruding or appressed hairs. Glabrous or pubescent leaves.

Many small species are collected under this name. Introduced to several places near settlements on Bjørnøya and Spitsbergen.

HIPPURIDACEAE – MARE'S-TAIL FAMILY

Hippuris L. Mare's-tail (Hesterumpe)

H. vulgaris L. Mare's-tail (Hesterumpe) Fig. 29c

Erect, aquatic perennial with hollow stem and 5–8 leaves in a whorl. Aerial leaves are linear, underwater leaves longer and paler. Uppermost part of stem reaches above water level. Flowers are small, inconspicuous and located in the axils.

Found in shallow, stagnant water, or in swamps, only on Bjørnøya in the Svalbard region.

ERICACEAE – HEATHER FAMILY

Dwarf shrubs, mostly with evergreen leaves and sympetalous corollas (bell flowers). Fruit is a capsule or berry.

A. Round, sessile leaves completely covering the stem

1. *Cassiope*

A. Flat leaves dispersed along the stem

2. *Vaccinium*

1. *Cassiope* (L.) D. DON. Heaths (Lyng)

Dark-green, dwarf shrubs with evergreen leaves. Flowers solitary, pendulous and bell shaped. Leaves small, completely covering the stem and branches.

A. Erect shrub; stiff, round leaves in rows

2. *C. tetragona*

A. Procumbent shrub; soft, pointed leaves

1. *C. hypnoides*

1. *C. hypnoides* (L.) D. DON. Mossy Mountain-heather (Moselyng) Fig. 31b

Small, delicate, procumbent plant, often forming compact cushions or mats. Leaves small and sessile, soft, narrow and acute. Flowers white with reddish-brown calyces. Pedicels finely pubescent. Grows in moist places among stones, etc., generally where snow thaws relatively late. Rare, only found a few times in the Isfjorden area and in Kongsfjorden.

2. *C. tetragona* (L.) D. DON. White Arctic Bell-heather (Kantlyng) Fig. 31a

Rough, dark-green heath, 10–20 cm tall and much branched. Leaves small and obtuse, close-set in four distinct rows, making the shoot seem rectangular. White, bell-shaped flowers with greenish-yellow calyces placed singly on relatively long pedicels extending from the axils. The whole plant has a strongly aromatic scent.

Grows in dry localities, especially on slopes that have some snow cover.



Fig. 31. a. *Cassiope tetragona*. b. *C. hypnoides*. c. *Vaccinium gaultherioides*.

Widespread and common, particularly on western and northern coasts of Spitsbergen.

2. *Vaccinium* L. Bilberry (Blokkebær)

V. gaultherioides BIGEL. Polar Bilberry (Polarblokkebær) Fig. 31c

Low, highly branched plant. Leaves oval, short stemmed with entire margins. Flowers white or pale pink with pendulous, bag-shaped corolla, one or more together in axils. Pedicels much shorter than corolla. Fruit is a berry; ripe fruits never observed. Only found in a few places in inner Isfjorden.

The species has also been called *V. uliginosum* L. subsp. *microphyllum* LANGE.

EMPETRACEAE – CROWBERRY FAMILY

Empetrum L. Crowberry (Krekling)

E. hermaphroditum HAGERUP. Mountain Crowberry (Fjellkrekling) Fig. 32a

Dwarf shrub with evergreen leaves. Stems recumbent, erect towards apex. Leaves small, less than 1 cm, narrow, almost needle shaped. Flowers bisexual, small, brownish red, located in axils. Fruit is a black stone fruit («berry»). Well-developed fruits, in an unripe or semi-ripe state, occur.

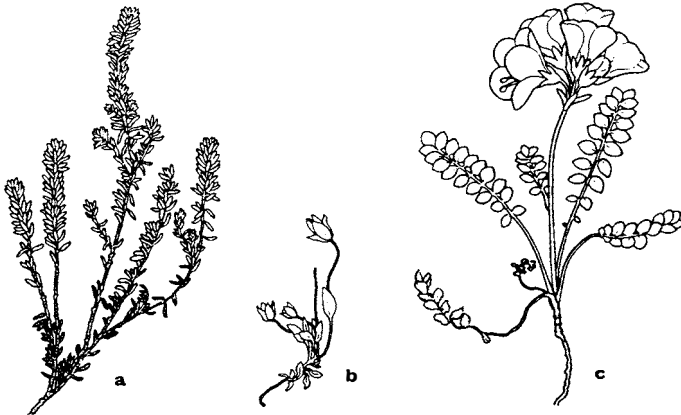


Fig. 32. a. *Empetrum hermaphroditum*. b. *Gentianella tenella*.
c. *Polemonium boreale*.

Grows in dry localities in a few places on western and northern coasts of Spitsbergen and on Nordaustlandet. Also called *E. nigrum* L. subsp. *hermaphroditum* (HAGERUP) BØCHER.

GENTIANACEAE – GENTIAN FAMILY

Gentianella MOENCH. Gentians (Søte)

G. tenella (ROTTB.) BÖRNER Diminutive Gentian* (Småsøte) Fig. 32b

Erect biennial, with stems ending in bell-like flower. Opposite leaves. Flower light blue, sympetalous and 4-lobed. Some fringes outermost in the corolla tube.

Only found in Wijdefjorden and Kongsfjorden.

POLEMONIACEAE – JACOB'S-LADDER FAMILY

Polemonium L. Jacob's-ladder (Flokk)

P. boreale ADAMS. Boreal Jacob's-ladder (Polarflokk) Fig. 32c

Erect perennial with unpleasant scent. 5–10 cm tall, sturdy, woolly- and glandular-pubescent. Leaves unequally pinnately lobed; basal leaves grouped in a rosette containing 12–14 small, oval leaves, generally only one leaf per stem. Flowers beautifully blue, bell shaped with 5 lobes, gathered in a compact corymb or crown.

Grows on gravel and in rock crevices.

Found uncommonly in a few places in the inner fjord areas of Spitsbergen.

BORAGINACEAE – BORAGE FAMILY

Mertensia ROTH. Oysterplant (Østersurt)

M. maritima (L.) S.F. GRAY. Oysterplant (Østersurt) Fig. 33a

Decumbent, seashore perennial, 15–20 cm tall, with oval, fleshy leaves on short petioles. Whole plant has a characteristic blue-grey colour. Bright blue flowers in a one-sided tuft, giving the inflorescence a characteristic bent appearance. The fruit is a nut whose outer layer is spongy, allowing it to be easily dispersed by ocean currents.

Grows on gravelly seashores, just above the seaweed belt.

Found in the Bellsund and Isfjorden areas, Kongsfjorden and a few fjords on the north coast of Spitsbergen.



Fig. 33. a. *Mertensia maritima*. b. *Euphrasia frigida*. c. *Pedicularis dasyantha*. d. *P. hirsuta*.

SCROPHULARIACEAE – FIGWORT FAMILY

Plants with alternate or opposite leaves which are lobed or sinuate. Flower is irregular and has upper and lower lips. Fruit is a capsule.

- | | |
|--|-----------------------|
| A. Leaves scattered, lobed or sinuate;
inflated calyx | 2. <i>Pedicularis</i> |
| A. Leaves opposite and sessile, ovate | 1. <i>Euphrasia</i> |

1. *Euphrasia* L. Eyebrights (Øyentrøst)

E. frigida PUGSL. Mountain Eyebright (Fjelløyentrøst) Fig. 33b

Small, 2–5 cm, erect annual, unbranched or sparsely branched, parasitising on roots of other plants. Downy, obtuse leaves with a few teeth. Stem is densely pubescent, with short hairs. Flower is sympetalous, with distinct upper and lower lips.

Grows in slightly moist places in dense vegetation.

Only found in one place in Bockfjorden on the north coast.

- A. Calyx lobes untoothed; sturdy plants;
strongly woolly-pubescent 1. *P. dasyantha*
A. Calyx lobes toothed; small, downy plants 2. *P. hirsuta*

2. *Pedicularis* L. Louseworts (Myrklegg)

Plants with alternate, pinnately lobed leaves. Flowers are irregular and have a helmet-shaped upper lip and 3-lobed lower lip and are grouped in apically-placed, spike-like clusters. Inflated calyx.

1. *P. dasyantha* (TRAUT.) HADAČ. Woolly Lousewort (Ullmyrklegg) Fig. 33c

Sturdy plants, 10–15 cm tall, growing solitarily or several from the same thick, bright yellow, taproot. Leaves in one or more rosettes, pinnately lobed with a relatively narrow midrib. Stem has many leaves and is woolly-pubescent uppermost among the flowers in a spike-like inflorescence. Flowers are large, light to dark red and their upper lip is pubescent. Corolla tube longer than calyx. Forms with lighter-coloured, slightly pink flowers occur.

Grows on moist ground, especially heaths and grassland.

Widespread in fjord districts on the west coast, particularly Bellsund, Isfjorden and Kongsfjorden, as well as in a few fjords on the north coast. Not common.

The species is also referred to as *P. lanata* CHAM. & SCHLECHT subsp. *dasyantha* (TRAUT.) HULT.

2. *P. hirsuta* L. Hairy Lousewort (Lodnemyrklegg) Fig. 33d

Erect, 5–10 cm tall, somewhat more delicate than the previous species. Taproot is pale. Lower rosette leaves are short stemmed and have a wide midrib. Stem is pubescent, particularly on upper part. Flowers are light red with corolla about equal to calyx in length. White-flowered forms also occur.

Grows on damp ground that is snow covered in winter. Common throughout Spitsbergen, on both west and east sides.

CAMPANULACEAE – BELLFLOWER FAMILY

Campanula L. Bellflowers

Lactescent perennials with alternate leaves. Flowers are sympetalous, regularly 5 petals and sepals; located solitarily or in scattered clusters. Fruit is a capsule.

- | | |
|---|--------------------------|
| A. Narrow corolla; lanceolate leaves, fastened at base | 2. <i>C. uniflora</i> |
| A. Open corolla; basal leaves round, stem leaves narrow | 1. <i>C. gieseckiana</i> |

1. *C. gieseckiana* VEST. Arctic Hairbell (Arktisk blåklokke) Fig. 34b

Erect, 10–15 cm, with slender stems, generally bearing one or a few flowers apically. Stem leaves narrow or linear, basal leaves round, distinctly petiolate and wither early. Flowers blue, large and bell shaped.

Grows in dry localities.

Only found in Colesbukta in Isfjorden.

Resembles the ordinary Hairbell (*C. rotundifolia* L.), but has only one large bellflower.

Also referred to as *C. rotundifolia* L. subsp. *gieseckiana* BÖCH.

2. *C. uniflora* L. High Alpine Hairbell* (Høgfjellsklokke) Fig. 34a

Erect, 5–10 cm, somewhat procumbent at the base. Stem leaves narrow, basal leaves somewhat wider. Usually only one stem with an apical flower. Flower blue and narrow, with lobes about equal in length to the corolla tube. Calyx fairly pubescent. Flower nods, but after flowering the fruit is erect.

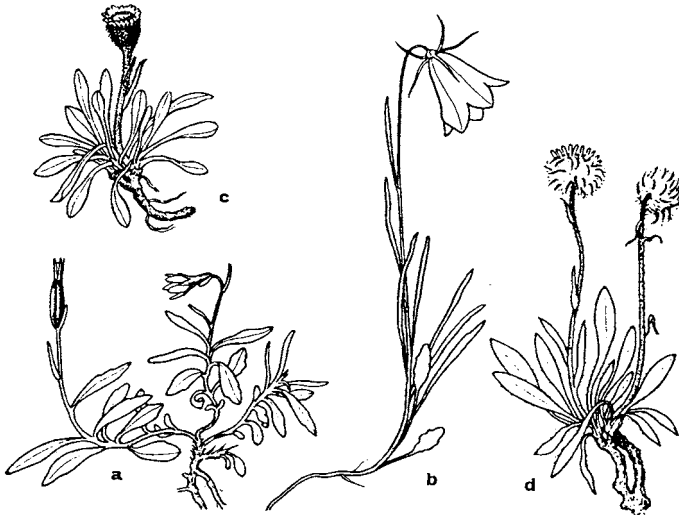


Fig. 34. a. *Campanula uniflora*. b. *C. gieseckiana*. c. *Erigeron humilis*. d. *E. eriocephalus*.

Grows in dry places, on screes and slopes facing the sun.
Rare; found only in the Isfjorden, Wijdefjorden and Kongsfjorden areas.

ASTERACEAE – DAISY FAMILY

Uppermost part of stem widened to form a flat surface on which many small flowers are gathered in a common receptacle. All these flowers may be identical, or the marginal ones may differ, generally being tongue shaped. Around the receptacle are several rows of phyllaries. Calyx transformed to a pappus, which serves as a seed dispersing organ. 5 stamens fused to form a corolla tube.

- A. All flowers tubular
 - B. Large, wide, heart-shaped and sinuate leaves 2. *Petasites*
 - B. Oblong, entire leaves 4. *Saussurea*
- A. With tongue-shaped marginal flowers
 - C. Narrow, white or reddish marginal flowers, receptacle 1–2 cm 1. *Erigeron*
 - C. Yellow flowers
 - D. Not lactescent; opposite stem leaves 3. *Arnica*
 - D. Lactescent; all leaves in rosette 5. *Taraxacum*

1. *Erigeron* L. Fleabanes (Bakkestjerne)

Perennials with entire leaves in a basal rosette and some stem leaves. Receptacle has several rows of marginal corolla. Entire plant more or less downy. Fruit has a pappus.

- A. Blackish-violet receptacle with wedge-shaped base 1. *E. humilis*
- A. Grey-pubescent receptacle with transverse base 2. *E. eriocephalus*

1. *E. humilis* GRAH. Black Fleabane* (Svartbakkestjerne) Fig. 34c

Erect, 4–6 cm, usually solitary. Single receptacle on end of stem. Completely downy with dark-violet hairs, especially on upper part and on phyllaries. Leaves entire and narrow, pubescent. Many stem leaves and these are more pubescent than basal leaves. Base of receptacle is wedge shaped.

Grows in moist localities, particularly close to snow patches and near streams.

Widespread in fjord areas on western and northern coasts of Spitsbergen. Edgeøya.

2. *E. eriocephalus* J. VAHL. Woolly Fleabane* (Ullbakkestjerne) Fig. 34d

Erect plant forming an 8–10 cm high tuft with a receptacle on each stem. Whole plant except lowermost leaves clothed in light-grey hairs. Leaves entire, lowermost ones practically glabrous and wider than stem leaves which are distinctly downy-pubescent with long hairs. Base of receptacle is transverse; outward-curved phyllaries.

Grows in dry places. Only found in Wijdefjorden, Kongsfjorden and on Nordaustlandet.

Dubious species, often referred to as *E. uniflorus* L. subsp. *eriocephalus* (S. VAHL) CRONQ.

2. *Petasites* MILL. Butterburs (Pestrot)

P. frigidus (L.) FR. Lapland Butterbur (Fjellpestrot) Fig. 35a

Erect plant, 10–25 cm, with deep rhizome. Thick stem has scale-like leaves arising from the rhizome. Stem appears early in spring before the leaves come. Leaves 2–4 cm wide, glabrous on upperside, white-downy below and with irregularly toothed margins. Flower receptacles white or pink, and gathered in a corymb. Receptacles have brown phyllaries. Fruit is a nut with long, white pappus. Separate male and female plants. Reproduction usually takes place vegetatively on subterranean runners.

Grows in very wet, mossy places at several localities in inner fjord areas along the west coast of Spitsbergen.

3. *Arnica* L. Arnica (Solblom)

A. angustifolia J. VAHL. Alpine Arnica (Fjellsolblom) Fig. 36b

Erect, 10–20 cm, with straight stem. Leaves entire, long and acute, and with arcuate veining; leaves at base form rosette. Pubescent stem with 2 opposite, acute leaves and a large, yellow receptacle apically. Marginal corollas have short teeth. Phyllaries woolly-pubescent.

Grows in dry localities, particularly on calcareous substrates.

Widespread in fjord areas along western and northern coasts.

4. *Saussurea* DC. Alpine Saw-wort (Fjellistel)

S. alpina (L.) DC. Alpine Saw-wort (Fjellistel) Fig. 35b

Erect perennial with stout, creeping rhizome. Leaves close set, long and acute, entire or with scattered teeth along their margins. Lower side grey-downy. Lower leaves petiolate, upper ones sessile. Receptacles gathered in



Fig. 35. a. *Petasites frigidus*. b. *Saussurea alpina*. c. *Taraxacum arcticum*.

a corymb. Phyllaries dark and all flowers in receptacle are tubular and bluish violet. Distinctly vanilla scented.

Only found in one place on the west coast of Spitsbergen, south of Storvika. Uncertain whether the species is growing wild, or has been introduced by chance.

5. *Taraxacum* WEB. Dandelions (Løvetann)

Perennials with stout taproot and white latex. Leaves in rosette. Single receptacle on a hollow, leafless stem. Capitulum light yellow or yellow. Fruit



Fig. 36. a. *Taraxacum brachyceras*. b. *Arnica angustifolia*.

has a white pappus. Three species in Svalbard, but introduced forms may occur near settlements. Names in brackets refer to the subdivision of the species into sections.

- | | |
|--|--------------------------|
| A. White or yellowish-white capitulum; dark fruit | 1. <i>T. arcticum</i> |
| A. Yellow capitulum, light-coloured or pinkish fruit | |
| B. Phyllaries have lateral lobe at apex; large plant with a large receptacle | 2. <i>T. brachyceras</i> |
| B. Phyllaries lack lateral lobe at apex; smaller receptacle | 3. <i>T. cymbifolium</i> |

1. *T. arcticum* (TRAUTV.) DAHLST. (*Arctica*) Arctic Dandelion (Arktisløvetann) Fig. 35c

Small, 5–8 cm, with 3–5 leaves in rosette. Leaves rather irregularly lobed and size of lobes varies somewhat. Capitula pale yellow or almost white with outermost corollas somewhat reddish brown on lowerside. Stem decumbent during flowering, but becomes erect when fruit is ripening.

Generally grows in dense vegetation, but also occurs at open, gravelly localities.

Widespread, but not common, on western, northern and eastern coasts of Spitsbergen.

2. *T. brachyceras* DAHLST. (*Ceratophora*) Polar Dandelion (Polarløvetann) Fig. 36a

Several leaves in a rosette. Leaves are irregular with teeth varying from shallowly to sharply dentate. Large receptacle on short pedicel. Capitulum bright yellow. Most of the uppermost phyllaries have a distinct horn on their backs.

Generally grows in dense vegetation at localities facing the sun.

Occurs in inner fjord districts on western and northern coasts of Spitsbergen.

3. *T. cymbifolium* H. LINDB. ex DAHLST. (*Spectabilia*) Bear Island Dandelion* (Bjørnøyløvetann)

Leaves are decumbent and in very outspread rosette. Phyllaries appressed against capitulum and lack a horn on their backs. Leaf lobes broadly triangular.

So far found only on Bjørnøya.

LILIOPSIDA – MONOCOTYLEDONS

Seed germinates with only one cotyledon. Leaves are long and narrow with parallel veins. Root is fasciculate.

MELANTHIACEAE – ASPHODEL FAMILY

Tofieldia HUDS. Scottish Asphodel (Bjørnbrodd)

T. pusilla (MICHX.) PERS. Scottish Asphodel (Bjørnbrodd) Fig. 37e

Small, 5–10 cm, compact plants with short, creeping rhizomes, growing close together in hard cushions. Leaves in dense, narrow rosette with flat, 1–2 mm wide, evergreen leaves. Erect stem with scale-like leaves near base and a short, compact inflorescence (head or short spike) at apex. Perianth segments (tepals) pale yellow and obtuse; rarely flowers.

Grows in moist places among mosses in dense vegetation.

Only found in a few places in Svalbard, near Isfjorden, Kongsfjorden and Woodfjorden.

JUNCACEAE – RUSH FAMILY

Grass-like perennials. Stem rounded, not hollow. Leaves narrow and keel shaped, or wide and flat. Flowers small and inconspicuous, grouped in open cymes or compact fascicles.

- A. Leaf keel shaped and seems somewhat glossy; glabrous 1. *Juncus*
- A. Leaf flat, almost glabrous or with soft hairs along margin 2. *Luzula*

1. *Juncus* L. Rushes (Siv)

Perennial species. Glabrous stems, often with loose pith. Narrow, grooved or rounded leaves. Brown flowers in compact inflorescences and capsule with numerous seeds. Bracts in species 1 and 2 stand erect.

- A. Stems stiffly erect with sheath lacking leaves; bracts 3–4 cm long and erect; flowers lateral; rhizome horizontal and has many stems in rows 1. *J. arcticus*
- A. Stems have leaves lowermost; short bracts; 1–2 inflorescences with many flowers in each

- B. Stems thick and with thin subterranean runners; usually 2 inflorescences with large, dark-brown flowers 2. *J. castaneus*
- B. Thin stems in small, loose tufts
- C. 3 flowers at the same height; short bracts about same length as flowers 3. *J. triglumis*
- C. 2 flowers above each other; bracts extend well above the flowers 4. *J. biglumis*



Fig. 37. a. *Juncus arcticus*. b. *J. castaneus*. c. *J. albescens*. d. *J. biglumis*.
e. *Tofieldia pusilla*.

1. *J. arcticus* WILLD. Arctic Rush (Finnmarkssiv) Fig. 37a

Coarse, stiffly erect stems, 10–20 cm tall, with brown sheaths at the base. Long, sturdy rhizome with stems in distinct rows. Head-shaped inflorescence with 4–5 close-set flowers. Bracts cusp shaped apically and much longer than the inflorescence. Tepals obtuse, broadly ovate and shorter than the capsule, which is ovate but broadly rounded and apiculate.

Grows on sand and clay near rivers.

Very rare, found only in inner Isfjorden.

2. *J. castaneus* SM. Chestnut Rush (Kastanjesiv) Fig. 37b

Erect stems, 10–20 cm tall, somewhat arcuate and widely spaced issuing from thin, subterranean runners. Short rhizome. 2–3 grooved leaves from the lowermost part of the stem. 1–2 inflorescences with several flowers in each. Flowers and capsules dark chestnut brown. Lower bracts leaf-shaped and reaching well above the inflorescences. Capsules almost twice as long as tepals.

Grows in moist places near rivers and streams.

Found only at a few localities in inner Isfjorden.

3. *J. albescens* (LANGE) FERN. Tundra Rush* (Tundrasiv) Fig. 37c

Short, loosely tufted, straight stems, 5–10 cm tall, with few leaves lowermost. Leaves short, 2–4 cm, and awl shaped. Single, apical inflorescence with 3 flowers. Bracts scale shaped and membranous, often slightly longer than the flowers. Tepals yellowish white. Capsule rounded, but distinctly apiculate, reddish brown and paler towards its base.

Grows in moist places, particularly on open patches of gravel and sand.

Found only in Isfjorden, Kongsfjorden and Wijdefjorden on Spitsbergen.

The species is also referred to as *J. triglumis* L. subsp. *albescens* (LANGE) HULT.

4. *J. biglumis* L. Two-flowered Rush (Tvillingsiv) Fig. 37d

Short, 5–10 cm, with loosely tufted stems and only one leaf lowermost. Single, apical inflorescence with 2 flowers above one another. One bract is blade shaped and extends somewhat above the flowers, the other is short and membranous. They may vary somewhat in length, extending from a few mm to 2–3 cm above the flowers, thus leading to possible confusion with *J. arcticus*. Tepals are initially light coloured, later dark. Capsule has distinct apical notch.

Grows in moist places with fine-grained sand and gravel, also on patterned ground and in places where the snow lies late.

Widespread throughout Svalbard and very common; Bjørnøya.

2. *Luzula* DC. Wood-rushes (Frytle)

Perennials with grooved or flat leaves, having scattered, long hairs along their margins in some species. Flowers solitary or tightly grouped in an inflorescence. Capsule triangular and has three seeds. The plant may have a brown appearance.

- A. Solitary flowers on long pedicels in open cymes 1. *L. wahlenbergii*
- A. Flowers tightly grouped in inflorescences
 - B. Inflorescences with few flowers on distinctly curved pedicels; narrow leaves 2. *L. arcuata*
 - B. Many flowers tightly grouped in distinct inflorescence
 - C. Leaves narrow and cuspidate apically 3. *L. confusa*
 - C. Leaves flat and glabrous; one inflorescence 4. *L. arctica*

1. *L. wahlenbergii* RUPR. Reindeer Wood-rush* (Reinfrytle) Fig. 39c

Erect, 10–15 cm, with flat, wide (3–4 mm) leaves, which have long hairs along their margins. Leaf margins somewhat involute, making the leaf seem long and pointed. Uppermost stem leaf much narrower and shorter than the others. Tepals have wide membranous margin. Capsule is dark and apiculate. Flowers are in open cymes on thin pedicels.

Grows in wet localities with moss and grass.

Found only in Isfjorden, Bellsund and Van Mijenfjorden.

2. *L. arcuata* Sw. Curved Wood-rush (Buefrytle) Fig. 38a

Erect, 10–15 cm, with filiform, apically cuspidate leaves, almost lacking hairs. Grows in loose tufts and the lowermost, brown leaves are in compact sheaths. Flowers are in inflorescences on long, thin, curved pedicels. Tepals are light brown and capsule is round.

Grows in dry localities in exposed places.

Common on Bjørnøya. Typical forms not found on Spitsbergen, but forms that are intermediate between species 2 and 3 are found, particularly along the west coast.

3. *L. confusa* (HARTM.) LINDEB. Northern Wood-rush (Vardefrytle) Fig. 38b

Erect, 10–15 cm, with narrow, slightly keel-shaped leaves, 1–2 mm wide. Grows in loose tufts. Stem has dark-brown sheaths lowermost. Flowers in inflorescences, a sessile one lowermost and above it 1–2 slightly smaller ones on straight or slightly curved pedicels. These may be missing so that the plant has one inflorescence and can then be confused with *L. arctica*.



Fig. 38. a. *Luzula arcuata*. b. *L. confusa*. c. *L. arctica*.

Tepals are pointed and brown. Capsule is round. Grows on dry localities. Widespread and common throughout Svalbard.

The species is also referred to as *L. arcuata* (WAHLENB.) SW. subsp. *confusa* (LINDEB.).

4. *L. arctica* BLYTT Arctic Wood-rush (Snøfrytle) Fig. 38c

Short plant, 2–10 cm, growing in compact tufts with 2–4 mm wide, flat, glabrous, greyish leaves carrying a few hairs on their margins. Flowers grouped in 1–2 small, close-set, inflorescences located apically on the erect stem. Stem often short with inflorescences placed down among the leaves (var. *nana* SCHOL.). Tepals and capsule brown.

Grows in dry places. Widespread and very common throughout Svalbard.

CYPERACEAE – SEDGE FAMILY

Perennials with three rows of long, narrow leaves. Culms are filled with pith and lack nodes. Flowers small and inconspicuous, uni- or bisexual with a glume as a bract. Perianth is lacking or is hair-like. 3 stamens and 2–3 stigmas. Fruit is a nut. Flowers narrow on spikes. Genera with unisexual flowers have separately located male and female flowers.

- A. Bisexual flowers; hair-like perianth, membranous glume 1. *Eriophorum*
- A. Unisexual flowers in distinct spikes
 - B. Female flowers enclosed in a fused glume (fruit sheath, perigynium) 3. *Carex*
 - B. Male flowers partially enclosed in a glume which is not fused; hard, somewhat woody base 2. *Kobresia*

1. *Eriophorum* L. Cottongrasses (Myrull)

Perennials, growing in wet places. Creeping, deeply buried rhizomes. One or more spikes terminally on stem, but many flowers and spike scales near base. Perianth transformed to long, white hairs which assist dispersal of a 3-sided nut.

- A. Solitary, terminal spike 1. *E. scheuchzeri*
- A. Several, more or less pedicellate spikes at apex of stem 2. *E. triste*

1. *E. scheuchzeri* HOPPE. Arctic Cottongrass (Snøull) Fig. 39a

Stiffly erect, 5–20 cm, with deeply buried rhizome and single terminal spike. Stem has leaves at base. Culm has inflated sheath without, or with a very short stem leaf. Leaves erect and grooved. Spike wide, almost bullet-like with long, sharp, nearly lanceolate, spike scales, dark with a slightly lighter margin outermost. Autumnal fruit has long, white, glossy, cottony hairs.

Grows in moist places, particularly along streams and on ground with flowing water.

Common on the west coast, less so on eastern and northern coasts.

2. *E. triste* (TH. FR.) A. HADAČ & D. LØVE. Black Cottongrass* (Svartull) Fig. 39b

Erect, often curved stems, 5–10 cm tall, from deeply buried rhizome. 2–3 slightly pedicellate spikes terminally. Lower leaves flat and often rough on margins. Leaf midway up the culm has inflated sheath and tapers abruptly to a narrow, 2–3 cm long leaf. Spike cluster has erect bract. Glume relatively wide and ovate. Bract and glume dark, almost black. Fruit has cottony hairs, but significantly shorter than in *E. scheuchzeri*. Grows in moist places with stagnant water in coastal and fjord areas on the west coast of Spitsbergen.

A hybrid between this and the previous species has been reported from



Fig. 39. a. *Eriphorum scheuchzeri*. b. *E. triste*. c. *Luzula wahlenbergii*.

several places in Svalbard. The species is also referred to as *E. angustifolium* HONCK. subsp. *triste* (TH. FR.) HULT.

2. *Kobresia* WILLD. False Sedge (Myrtust)

K. simpliciuscula (WAHLENB.) MACK. False Sedge (Myrtust) Fig. 40a

Densely tufted perennial, 5–20 cm tall. Leaves and culm stiffly erect. Leaves only at base. Stem is 3-sided, glabrous and extends above the leaves. Spike cluster is 1–2 cm long, brownish and composed of several, close-set spikelets. Glumes are brown and slightly pointed. Each glume contains a female and a male flower. Uppermost spike has only one male flower in each glume. Plant resembles a sedge.

Grows on damp calcareous soils.

On Spitsbergen, found only in inner Isfjorden and Kongsfjorden.



Fig. 40. a. *Kobresia simpliciuscula*. b. *Carex rupestris*.

3. *Carex* L. Sedges

Perennials, generally with 3-sided culms (stems) and narrow, grooved leaves. The flower is unisexual; either male and female flowers on separate plants or located separately on the same plant. In the latter case, the flowers are on the same spike or on separate male and female spikes. Male spikes are then always placed uppermost and female spikes below them. The nut is concealed in a perigynium called a fruit. Below each perigynium is a scale-like leaf, the glume.

- A. Single, terminal spike on each stem
 - B. In dense tufts
 - C. Small species, growing near the sea in dense tufts; spike with male flowers at base 4. *C. ursina*
 - C. Ovate spike; large tufts, leaves often unilaterally curved; male flowers at top of spike; perigynium narrower than glume 2. *C. nardina*
 - B. With short or long runners
 - D. Separate male and female plants; erect leaves; grows under damp conditions in dense vegetation 1. *C. parallela*
 - D. Spikes have male and female flowers; male flowers at top 3. *C. rupestris*
- A. Several spikes on each stem
 - E. Spikes sessile or very short-pedicellate.
 - F. Male and female spikes close together 15. *C. glacialis*

- F. Plants with spikes that look identical, round and with male flower lowermost on spike
- G. Long, procumbent rhizomes; spikelets grouped in dense round inflorescence with male flowers uppermost 5. *C. maritima*
- G. Tuft-like with outward-curved stems 3–4 spikes in cluster; dark glumes; male flowers lowermost on spike
- H. All spikes have male and female flowers
 - I. Pointed fruit, obtuse glumes 6. *C. lachenalii*
 - I. Rounded fruit, without or with very short beak 7. *C. amblyrhyncha*
 - H. Only uppermost spike has male and female flowers; pointed glumes: decumbent shore plant 8. *C. glareosa*
- E. Spikes distinctly pedicellate, often pendent and usually unisexual
 - I. Fruit without or with short beak; with runners or rhizome
 - J. Bract beside lowest spike short, not exceeding the spikes; 1–2 compact, black, cylindrical spikes, erect or slightly nodding; fruit has short, clearly bifid beak; 2 or 3 stigmas 12. *C. saxatilis*
 - J. Bract near lowest spike equal in length to spikes, or clearly exceeds these
 - K. Erect plants; lowest bract longer than spikes; flat leaves; in tufts
 - L. Large plant, 15–25 cm tall, with leaves nearly same length as spike cluster; 2 stigmas 9. *C. stans*
 - L. Small plant, 5–10 cm, with pendent spikes; 3 stigmas 13. *C. capillaris*
 - K. Small creeping plant; lowest glume much longer than spikes and has a broad base often enclosing part of lowermost spike 10. *C. subspathacea*
 - I. Fruit has long beak; in dense tufts; spike dark and pendent; uppermost spike has male flowers at base 11. *C. misandra*

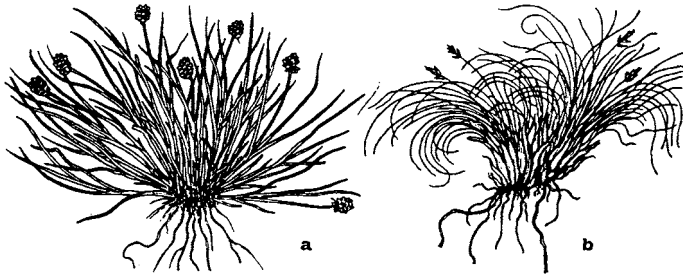


Fig. 41. a. *Carex ursina*. b. *C. nardina*.

1. *C. parallela* (LÆST.) SOMMERF. Narrow-leaved Sedge (Smalstarr) Fig. 42a
Erect stem, 10–15 cm tall, bent near the ground. Short, arcuate branch shoots. Male and female flowers on separate plants. Leaves narrow. Male plant has narrow, pale-coloured spikes; female plant has dark spikes with slightly protruding fruit and glabrous beak. Glumes round and with membranous margins. Grows in moist places, solitarily or in loose tufts in mossy mats. Widespread in central parts of Svalbard, especially fjord areas.

A closely related species, *C. gynocrates* WORMSK. has been reported from Svalbard (Isfjorden). It resembles this species, but is said to have a spike with both male and female flowers.

2. *C. nardina* FR. Cushion Sedge (Skjeggstarr) Fig. 41b

Forms dense, compact cushions, 5–10 cm tall. Leaves usually curved to one side. Short, curved leaves with numerous, brown sheaths. Stem curved and somewhat shorter than leaves. Spike short and ovate, with few flowers. Glume rounded and dark brown. Fruit 3 mm long, elliptical, distinctly apiculate, the point being sharp-edged and fairly rough. 2 stigmas. Grows on decidedly dry and stony ground, ridges and extremely windy places. Widespread on western and northern coasts of Spitsbergen.

The closely related species *C. hepburnii* BOOTT has also been reported from Svalbard. It is distinguished by being larger and more erect than *C. nardina*. If it is to be separated, it must be as a variety, var. *hepburnii* BOOTT.

3. *C. rupestris* ALL. Rock Sedge (Bergstarr) Fig. 40b

Large rhizome. 5–10 cm tall with erect, strong, arcuate stems that are acutely 3-sided. Leaves involute and often curled. Single, apical spike, with a few female flowers lowermost and many male flowers uppermost. Glumes



Fig. 42. a. *Carex parallela*. b. *C. glareosa*. c. *C. amblyrhyncha*. d. *C. lachenalii*.

ovate and brown, with pale-coloured membranous margins. Perigynium long and elliptical with a short point. 3 stigmas.

Grows in dry places, especially on calcareous soils, generally in dense vegetation. Widespread in most of Svalbard.

4. *C. ursina* DEW. Polar Bear Sedge* (Isbjørnstarr) Fig. 41a

Low, compact, tuft-forming plant with short, erect stems, 4–6 cm long. Leaves narrow and grooved, rough on their margins and generally longer than the stems. Single, apical spike, almost as broad as long and with male flowers near the base. Glumes somewhat shorter than perigynium which is broadly rounded, yellowish and lacks distinct beak. 2 stigmas.

Grows on shores near the sea and on saltmarshes.

Widespread throughout Svalbard, but not common.

5. *C. maritima* GUNN. Curved Sedge (Buestarr) Fig. 43b

Small species with creeping rhizome and a row of stems. Curved stems about 5 cm tall, identical in length or a little longer than the leaves. Several small spikes so close together that they look like a single, apical spike. Male flowers uppermost. Glumes small, brown, rounded apically and with broad, light-coloured membranous margins. Fruit is brown to dark brown

with distinct, rough beak. 2 stigmas. Grows on sand and gravel on shores and beside rivers near the sea. Widespread in fjord districts on the west coast and in Wijdefjorden, but not common.

The hybrid *C. maritima* x *C. parallela* has been described as a separate species, *C. lidii* HADAČ. It is found in several places on Spitsbergen and Edgeøya.

6. *C. lachenalii* SCHKUHR. Arctic Hare's-foot Sedge (Rypestarr) Fig. 42d

Loosely tufted with outward-curved and often procumbent, stiff stems, 5–20 cm long. Leaves short and wide. 3–5 spikes grouped in a long, narrow cluster. Uppermost spike often somewhat pointed and has mostly male flowers at its base. Glumes are dark with light-coloured median stripe. Perigynium relatively long and gradually tapering, golden brown when ripe. 2 stigmas. Grows on wet sand and gravel, among stones and moss beside streams and lakes. Widespread in most parts of Svalbard, but not common.

7. *C. amblyrhyncha* KREZ. Obtuse Sedge* (Buttstarr) Fig. 42c

10–15 cm tall, stiff, slightly rough stems, longer than leaves. Usually 3 spikes, the uppermost being largest. Lowest bract is small or filiform. Perigynium is ovate and obtuse, with short or inconspicuous beak. Glumes are rounded with broad membranous margins and somewhat smaller than the fruits. Grows in wet places in moss and on gravelly shores. Reported from some localities in inner Isfjorden and Liefdefjorden.

8. *C. glareosa* WAHLENB. Saltmarsh Sedge (Grusstarr) Fig. 42b

Tufted, with 10–25 cm long, limp stems which are usually completely recumbent. Leaves narrow and grooved, and significantly shorter than stems. 2–4 spikes densely clustered apically, the uppermost one extended and with female flowers lowermost, the others round. Fruit is striped, tapering towards a comparatively short beak. 2 stigmas. Grows on moist sand and gravel near the sea. Occurs on the west coast of Spitsbergen, particularly in the Bellsund and the Isfjorden areas.

A closely related species, *C. marina* DEW (Maritime Sedge*), has been reported as occurring in Svalbard, but is difficult to distinguish from this one.

9. *C. stans* DREJ. Tundra Sedge* (Tundrastarr) Fig. 44b

Stiff, erect, 15–25 cm long stems. Sturdy, creeping runners and glabrous or slightly rough stems. Flat leaves. Stiff, erect spike cluster with 1 male spike

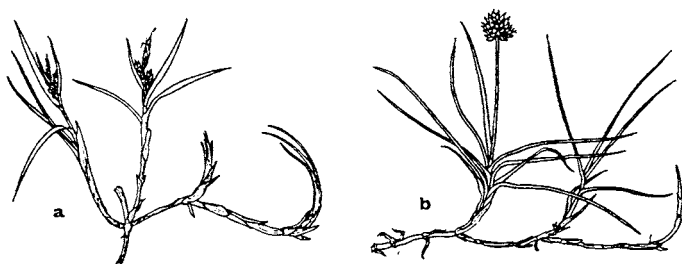


Fig. 43. a. *Carex subspathacea*. b. *C. maritima*.

and 2–3 erect, short-pedicellate female spikes. Lower bract is wide and extends above the spike cluster. Glumes ovate, dark, but with lighter-coloured median stripe. Fruit is elliptical and has a very short beak. 2 stigmas. Grows in moist places with constant seepage of water. Only found in a few localities.

Often looked upon as a subspecies, *C. aquatilis* WAHLENB. subsp. *stans* (DREJ.) HULT. (Tundra Water Sedge*)

10. *C. subspathacea* WORMSK. Arctic Saltmarsh Sedge (Ishavsstarr) Fig. 43a
 Small, low plant, 4–10 cm, with long, creeping runners and arcuate ascending stems, somewhat shorter than leaves. Leaves curved, grooved or convolute. Spike cluster partially concealed among leaves, with a male spike above and 1–3 female spikes with few flowers below, the uppermost generally sessile and lower ones short-pedicellate. Lowermost bract is long, extending far above the spike cluster and widened at the base, more or less enclosing the lowermost spike. Glumes are ovate, somewhat pointed, brown with broad, lighter-coloured median stripe. Perigynium has small beak. 2 stigmas. Grows on saltmarshes near the sea. Widespread throughout Svalbard, but not common.

11. *C. misandra* R. BR. Nodding Sedge* (Dubbestarr) Fig. 45c

Compact, tufted plant with 5–10 cm tall stems which hang limply in upper part where the spikes occur and are much longer than the leaves. Leaves are flat and short, about 1/3 the length of the stem. Spikes are dark and hang limply on thin pedicels. Bracts short, but wide at the base and clasp the stems. Glumes are dark with distinct membranous margins. Fruit is narrow with prominent, long, bifid beak. 3 stigmas. Grows in dry places, often in dense vegetation; also on gravel and rock. Widespread in coastal districts of western and northern Spitsbergen where it is quite common.

Also called *C. fuliginosa* SCHKUHR. subsp. *misandra* (R. BR.) NYMAN.



Fig. 44. a. *Carex bigelowii*. b. *C. stans*.

12. *C. saxatilis* L. Russet Sedge (Blankstarr) Fig. 45a

Creeping rhizome. 5–20 cm tall stems with brownish-red sheaths. Stems generally glabrous on lower parts and rough distally, and somewhat longer than leaves. Leaves flat or slightly grooved, and rough. 1 distinctly erect male spike above 2 cylindrical female spikes. Uppermost ones almost sessile and lowest one short-pedicellate and somewhat pendulous. Lowermost bracts shorter than spike cluster. Long, dark glumes with light-coloured median stripe and membranous margins. Perigynium black and has very short beak. Usually 2 stigmas, very seldom 3. Grows in wet places, along lake shores and gently flowing streams. Widespread in some places in coastal and fjord districts on the west coast of Svalbard, rarer on the north coast. Uncommon.



Fig. 45. a. *Carex saxatilis*. b. *C. capillaris*. c. *C. misandra*.

13. *C. capillaris* L. Hair Sedge (Hårstarr) Fig. 45b

Erect plant in small, dense tufts. Spikes on erect stems extending above the leaves. Leaves short, flat and pale yellowish green. Male spike erect, but female spikes pendent on thin, fine pedicels. Glumes obtuse and perigynium light brown.

Grows in wet places in dense vegetation. On Spitsbergen, found only in Bockfjorden.

14. *C. glacialis* MACK. Ridge Sedge* (Rabbestarr)

Small tufts of stiff stems, 3–5 cm tall. Stems have a terminal male spike above a female spike with few flowers. Spikes so close together that they may seem like a single spike. Leaves keel shaped, often somewhat curved

and a little shorter than the stems. Glumes rounded, with a light-coloured median stripe. Perigynium round, with short beak. 3 stigmas. Grows in dry places on gravel and stones in a few localities in the Kongsfjorden area.

POACEAE – GRASS FAMILY

Grasses have hollow stems with nodes. Their leaves are evenly wide and linear veined. At the junction between the leaf blade and the leaf sheath is a thin, transparent flap (ligule). The flower is naked, i.e. it lacks sepals and petals. Figure 46 shows that the flowers (florets) are organised in spikelets. A spikelet may contain one or more flowers (1–4). Each spikelet has two scales (glumes) at its base, the lower and upper glumes (n and ø). The flowers are in two rows above these. Each flower has two more scales, the lower one is called the lemma (i) and the upper one the palea (f). The back or end of the lemma may have an awn (bristle). The spikelets themselves are grouped in inflorescences or flowerheads called spikes when the spikelets are unbranched and panicles when they are branched.

The shape and structure of the spikelets and the appearance of the awns are important diagnostic characters. The differentiation and reliable identification of grass species depend upon careful examination of these characters.

Some grasses have a viviparous panicle, i.e. instead of a fruit, tiny, green plantlets are developed.

Grass species are often sterile and are then difficult to identify. Some species flower normally, but do not always develop mature seeds.

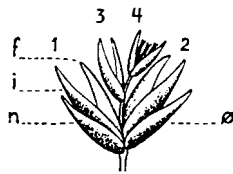


Fig. 46. Fireblomstret småaks hos gras.

- A. Spikelets have only one flower
- B. Lemmas shorter than paleae
 - C. With subterranean runners, strong, solitary stems 4. *Arctagrostis*
 - C. Without subterranean runners, tufted; glumes easily fall off 3. *Phippsia*
- B. Glumes equal in length or longer than lemmas
 - D. Inflorescence an open panicle
 - E. Lemmas have long, white hairs

- at base; glumes lack membranous margin 5. *Calamagrostis*
- E. Lemmas lack hairs; glumes longer than spikelet, distinct membranous margin 12. *Dupontia*
- D. Inflorescence a short, broad spike; lemmas have awns 2. *Alopecurus*
- A. Spikelets have two or more flowers
- F. Spikelets have bisexual flower in middle and two male flowers; compact panicle; pleasant scent 1. *Hierochloë*
- F. Spikelets have 2 or more bisexual flowers
- G. Glumes about equal in length or longer than spikelet
- H. With subterranean runners; apical awn 12. *Dupontia*
- H. In tufts; glumes thin and somewhat glossy 6. *Deschampsia*
- G. Glumes distinctly shorter than spikelet;
- I. Lemmas lack cusp and awn;
- K. Lemmas distinctly keel shaped; dense spikelets 8. *Poa*
- K. Lemmas obtuse with rounded back and 5 distinct veins
- L. In tufts with variable panicles
- M. Junction between stem and spikelet (rachilla) clearly expanded to a flat surface; glumes reach about midway up spikelet 11. *Colpodium*
- M. Glumes clearly shorter than middle of spikelet; rachilla not expanded 13. *Puccinellia*
- L. Subterranean runners
- N. Panicle variable; leaves in two rows; spikelets often open 10. *Arctophila*
- N. Panicle one-sided, 2–4 branches, each with long spikelet 9. *Pleurpogon*
- I. Lemmas cuspidate or with awn
- O. Compact, dark inflorescence; lemma has long awn 7. *Trisetum*
- O. Open panicle, usually brown or violet; veins on lemma converge apically 14. *Festuca*

Key for panicle-germinating (viviparous) species

- A. Leaves folded together lengthwise
 - B. Rough leaves; long ligule; glumes about equally long, have membranous margin 6. *Deschampsia*
 - B. Short ligule; glumes lack membranous margin 14. *Festuca*
- A. Flat leaves, shaped like the bow of a boat apically 8. *Poa*

1. *Hierochloë* R. BR. Holy Grass (Marigras)

H. alpina (WILLD.) ROEM. & SCH. Arctic Holy Grass (Fjellmarigras) Fig. 47b
20–30 cm tall, perennial grass with nodes near the ground. Short, tightly compressed panicle with 3-flowered spikelets, 5–6 mm long, ultimately becoming dark purple. Two male flowers separated by a bisexual flower. All flowers have awns of different lengths. Awn on uppermost male flower is placed below the middle of the lemma. Leaves pubescent on upper side.



Fig. 47. a. *Alopecurus borealis*. b. *Hierochloë alpina*.

Pleasant scent, especially during flowering. Grows on dry soils and ridges where snow blows away. Found in the Isfjorden and Bellsund areas in Svalbard.

2. *Alopecurus* L. Foxtail (Reverumpe)

A. borealis TRIN. Polar Foxtail* (Polarreverumpe) Fig. 47a

15–25 cm tall, perennial grass with 1-flowered spikelet in soft, short, keel-shaped spike, dark coloured. Glumes lack cusp and have soft, white hairs. Stems solitary, but with runners relatively deep in the ground. Leaf sheaths somewhat inflated. Leaves rough on upper side.

Grows in moist places, particularly along rivers and small lakes and at the foot of bird cliffs. Common throughout Svalbard, often occurring densely; Bjørnøya.

3. *Phippsia* R. BR. Snow-grasses (Snøgras)

Tufted, perennial grass. Spikelets 1-flowered, about 1 mm long. Glumes very small and easily fall off. Fruit ovate and longer than lemmas.

- | | |
|---|-----------------------|
| A. Panicle pyramidal during flowering, 3–4 cm, with
outspread branches | 1. <i>P. concinna</i> |
| A. Narrow panicle, about 2 cm, not outspread
branches | 2. <i>P. algida</i> |

1. *P. concinna* (TH. FR.) LINDEB. Outspread Snow-grass* (Sprikesnøgras) Fig. 48b

15–20 cm tall, tufted. Leaves obtuse and flat. Panicle 3–4 cm long, dark violet and with outspread branches which often turn down after flowering. Usually only one stamen. Glumes easily fall off. Lower parts of lemmas and paleae have stiff hairs. Fruit is widest below middle. Grows on damp grass and tundra with strongly active frost heaving. Widespread over most of Svalbard; Bjørnøya.

2. *P. algida* (SOL.) R. BR. Spiked Snow-grass* (Snøgras) Fig. 48a

5–10 cm tall, tufted, often with prostrate stem. Leaves obtuse and flat. Panicle about 2 cm long, narrow, yellowish green and finally compressed, generally prostrate. Frequently 2 stamens. Lemmas and paleae have stiff hairs on lower part. Fruit is widest above middle. Grows beside streams and rivers on moist gravel, and beside snow patches. Near bird cliffs and on other nitrophilous soils, often in large quantities. Common throughout Svalbard; Bjørnøya.



Fig. 48. a. *Phippsia algida*. b. *P. concinna*. c. *Arctagrostis latifolia*.

4. *Arctagrostis* GRISEB. Russian Grass (Russegras)

A. latifolia (R. BR.) GRISEB. Russian Grass* (Russegras) Fig. 48c

15–35 cm tall, with stiff, erect stems and subterranean runners. Leaves flat, very short and wide. Leaves and leaf sheaths have numerous furrows. Leaf sheath 5 mm long and has apical fringe. Large panicle, compressed after flowering. Spikelets 1-flowered. Glumes little shorter than spikelets.

Grows in wet places, mostly moss, in fjord areas on western Spitsbergen and Edgeøya.



Fig. 49. a. *Deschampsia alpina*. b. *Calamagrostis stricta*. c. *Festuca rubra*.

5. *Calamagrostis* ADAMS. Small-reed (Rørkvein)

C. stricta (TIMM.) KOELER Narrow Small-reed (Smårørkvein) Fig. 49b

15–40 cm tall, stiffly erect stems. Panicle contracted and has 1-flowered spikelets. Lemmas and paleae almost membranous and surrounded at base by relatively long, fine hairs. Awn about midway or less below the back of the lemma. Leaves enrolled so as to appear as thin as a thread; stem leaves protrude laterally, are rough and have scattered hairs on upperside. Grows in moist places along streams and in damp moss in coastal and fjord areas on northern and western coasts of Spitsbergen; Bjørnøya. Previously called *C. neglecta* (EHRH.) GAERTN.

6. *Deschampsia* BEAUV. Hair-grasses (Bunkegras)

Perennial, tufted grasses. Spikelets generally 2-flowered. Glumes glossy, about equal in length, completely enclosing flowers. Lemmas thin, fringed apically and have an awn which extends beyond spikelet.

- | | |
|---|------------------------|
| A. Viviparous panicle | 3. <i>D. alpina</i> |
| A. Normal panicle | |
| B. Sturdy plants in large, compact tufts,
flat leaves | 1. <i>D. cespitosa</i> |
| B. Smaller plants with short panicle;
leaves somewhat enrolled | 2. <i>D. borealis</i> |

1. *D. cespitosa* (L.) BEAUV. Tufted Hair-grass (Sølvbunke) Fig. 50b
40–60 cm tall, in large, compact tufts. Long, stiff, flat and very rough leaves. Leaf sheath open uppermost, exposing sheath membrane. Open panicle with spikelets on long, thin branches. Lemmas with awns which do not extend beyond spikelet.



Fig. 50. a. *Deschampsia borealis*. b. *D. cespitosa*.

Grows near abandoned or present-day settlements. Introduced to Spitsbergen and Bjørnøya.

2. *D. borealis* (TRAUT.) ROSH. Tundra Hair-grass* (Tundrabunke) Fig. 50a
Compact, tufted, 10–25 cm tall. Leaves short and somewhat enrolled with prominent veins on upperside. Compact inflorescence with many flowers. Lemmas have awns which are equally long or a little longer than spikelet. Spikelets small, pale violet or brown.

Grows in moist, sandy and gravelly places, especially on calcareous substrates.

Widespread in fjord areas on western and northern coasts of Spitsbergen. Previously called *D. brevifolia* R. BR.

3. *D. alpina* (L.) ROEM. SCH. Alpine Hair-grass (Fjellbunke) Fig. 49a
Sturdy, 20–30 cm tall, in compact tufts. Leaves somewhat enrolled, rough on upperside; distinct sheath membrane, 5–6 mm long. Large, sturdy panicle with glabrous branches. Viviparous. Does not seed, but flowers germinate in spikelet, leaving plant with green panicle.

Grows on moist, stony ground. Very characteristic, conspicuous tufts. Very common and widespread throughout Svalbard.

7. *Trisetum* PERS. Oat-Grass (Svartaks)

T. spicatum (L.) RICHT. Northern Oat-grass (Svartaks) Fig. 51a

20 cm tall, tufted. Stems and leaves grey owing to dense cover of soft, short hairs. Spike dark and compact. Spikelet generally 3-flowered. Palea has about 4 mm long awn, which is somewhat curved. Dry places with open gravel, especially calcareous substrates. Common on west coast of Spitsbergen, rarer on northern and eastern coasts.

8. *Poa* L. Meadow-grasses (Rapp)

Perennials with narrow or open panicles. Evenly broad leaves, apically compressed, resembling the bow of a boat. Many-flowered spikelets with glumes and lemmas lacking awns. *P. alpigena*, *P. alpina* and *P. arctica* may have viviparous spikelets. The species in this genus are very form-rich and may be difficult to identify, particularly the viviparous (panicle-germinating) plants.

- A. With subterranean runners or loosely tufted
- B. Panicle extended, compressed with relatively short branches of roughly equal length; 3–7 spikelets on each branch



Fig. 51. a. *Trisetum spicatum*. b. *Poa hartzii*. c. *P. abbreviata*.

- | | | |
|----|---|--|
| C. | Not in tufts; glumes 1-veined; narrow panicle | 1. <i>P. alpigena</i> |
| C. | Loose tufts; glumes 1-veined; wide panicle | 2. <i>P. pratensis</i> |
| B. | Panicle outspread, pyramidal and open; branches thin with 1-2, generally dark spikelets | 3. <i>P. arctica</i> |
| A. | In dense tufts, without runners | |
| D. | Base has short, wide, obtuse leaves and dense light-grey ligule with numerous leaf remains | 4. <i>P. alpina</i> |
| D. | Base has narrow leaves, evenly tapering; no leaf remains | |
| E. | Flat leaves or slightly folded; pyramidal panicle; thin branches with 2-3, generally dark spikelets | 3. <i>P. arctica</i> var. <i>cespitans</i> |

- E. Short, stiff, folded leaves
 - F. Spikelet pedicels extremely rough; uppermost stem leaves fastened midway; leaves and stem bluish grey 5. *P. glauca*
 - F. Spikelet pedicels glabrous; lower leaf sheaths greyish white, slightly inflated; glumes and bracts have membranous margins
 - G. Narrow panicle, about twice as long as wide; sheath membrane short; leaf relatively stiff; small species 6. *P. abbreviata*
 - G. Narrow panicle, 3–4 times longer than wide; sheath membrane much longer than wide; leaf relatively short, stiff and pricks the skin; larger species 7. *P. hartzii*

1. *P. alpigena* (Fr.) LINDM. Northern Meadow-grass (Seterrapp) Fig. 52d

Single stems, 20–30 cm tall, longer than the leaves and growing from creeping, subterranean runners, or in loose tufts. Leaves narrow, flat at base, otherwise folded. Narrow panicle with short pedicels. Spikelets 2- or 3-flowered; glumes about equally long, extending far up the spikelet. Lemma has wavy hairs near base. Grows in moist places. Widespread throughout Svalbard; Bjørnøya.

Variable species occurring in several forms. The two most important ones are var. *vivipara* (MALMG.) SCHOL. (Viviparous Northern Meadow-grass*) which is illustrated in Figure 53 where the viviparous panicle and pubescent lemmas are distinct, and var. *colpodea* (FR.) SCHOL. (Polar Meadow-grass*) which has wider leaves, is shorter, has distinct runners and a more northerly distribution. The species is often looked upon as a subspecies of *P. pratensis* L.

2. *P. pratensis* L. Smooth Meadow-grass (Engrapp) Fig. 52a

Greatly resembles the previous species, but has wider leaves and larger, more compact panicles. Tufts are relatively loose and very leafy. Grows near settlements on the west coast of Spitsbergen. Introduced and probably succeeds in overwintering.

3. *P. arctica* R. BR. Arctic Meadow-grass (Jervrapp) Fig. 52c

Stems solitary, 15–20 cm tall, connected underground by a network of runners. Leaves short, flat at base. Stem has 2 leaves. Whole plant seems delicate and graceful. Panicle outspread and pyramidal. Pedicels often rather wavy and have 1–2 dark-violet to dark-brown spikelets. Base of lemma has long, straight and regular hairs.



Fig. 52. a. *Poa pratensis*. b. *P. arctica* var. *vivipara*. c. *P. arctica*. d. *P. alpigena*.

Often viviparous (Fig. 52b). Viviparous forms are difficult to distinguish from each other and the species is most conveniently divided into viviparous and non-viviparous forms. Grows on hummocky ground, often in mosses. Widespread throughout Svalbard.

Subsp. *cespitans* (SIMM.) NANNF. grows in loose tufts without long runners, but with curved, erect shoots, open panicle and thread-like leaves. It is a characteristic form, clearly distinguished from the main one.



Fig. 53. a. *Poa alpigena* var *vivipara*. b. *P. glauca*. c. *P. alpina* var. *vivipara*.

4. *P. alpina* L. Alpine Meadow-grass (Fjellrapp) Fig. 53c

Erect stems, 15–20 cm tall, in dense tufts. Leaves short and parallel-sided almost to their apex. Panicle short and wide with two pedicels in lower verticil. Spikelets many-flowered and reddish violet, with broadly rounded glumes. Compact ligule of numerous, light-grey leaf sheaths and leaf remains at base of stem. Whole plant seems sturdy. The principal form grows in rather dry places, on stony ground and slopes. It is not widespread, and is often found near settlements; may have been introduced. Occurrence on Bjørnøya is uncertain.

Var. *vivipara* L. with viviparous spikelets is the common form and grows in moist places, preferably on solifluction soils and near snow patches. Very common throughout Svalbard; Bjørnøya.

5. *P. glauca* VAHL. Glaucous Meadow-grass (Blårapp) Fig. 53b

Stiff, erect stems, 15–25 cm tall, in dense tufts. Stems and leaves bluish grey (glaucous). Leaves long, narrow and stiff. Stem leaves oblique, uppermost one placed just below midway. Spikelets narrow and pointed. Upper part of stem and spikelet pedicels are particularly rough. Very variable species. The whole plant seems stiff and may be glaucous and rather glossy.

Grows on dry stony ground and steep, rocky slopes. Widespread along the west coast of Svalbard, but especially so in the Isfjorden area.

6. *P. abbreviata* R. BR. Cushioned Meadow-grass* (Puterapp) Fig. 51c

Low-growing, 5–15 cm, in very compact cushions. Lower parts of leaf sheaths greyish white and rather inflated. Leaves slightly curved, folded and stiff, usually reaching more than midway up the stem. Sheath membrane very short, equally long and wide. Panicle short, about twice as long as wide, with short spikelet pedicels. Glumes and bracts wide, and with membranous margins.

Grows on dry stony ground, preferably calcareous. Widespread over most of Svalbard, but uncommon. Absent from the granitic areas in the northwest.

7. *P. hartzii* GAND. Wiry Meadow-grass* (Strirapp) Fig. 51b

Densely tufted, 15–25 cm tall. Leaves straight and very stiff, almost prickly and shorter than stem. Greyish-white, inflated leaf sheaths on lower stem. Sheath membrane 3-sided with two equally long sides, about twice as long as wide. Panicle 3–4 times as long as wide. Glumes and bracts have broad membranous margins. Resembles a large *P. abbreviata*, but chiefly distinguished by size, long sheath membrane and longer spike.

Usually grows on gravel. Widespread, especially in the calcareous central parts of Svalbard, but not common.

9. *Pleuropogon* R. BR. Sabine's Grass

P. sabinii R. BR. Sabine's Grass* (Sabinegras) Fig. 54b

15–20 cm tall, with short stem leaves. Sterile shoots with long, limp leaves that float, especially in flowing water. Leaves flat. Panicle one-sided, with 1–3 spikelets. Spike dark violet, very long with 5–10 flowers and pendulous on relatively short pedicels. Glumes short and inconspicuous, unequally long. Lemmas long, cut off squarely and with long brushes near base.

Found in small lakes and streams, often in flowing water. Rare. Found a few times in Isfjorden, Wijdefjorden and Liefdefjorden.



Fig. 54. a. *Arctophila fulva*. b. *Pleuropogon sabinii*.

10. *Arctophila* RUPR. Marsh Grass (Hengegras)

A. fulva (TRIN.) ANDERSS. Arctic Marsh Grass (Hengegras) Fig. 54a

20–40 cm tall, with long, subterranean runners. Flat, wide leaves in two distinct rows, causing leaf sheaths to overlap. Leaves have many ribs and taper gradually. Panicle large and open with long, few-flowered pedicels, and located among the opposite leaves. Usually 2–3 flowering spikelets, but number may vary. Flowers late, rarely producing mature seeds. Generally sterile and reproduces vegetatively.

Grows in swamps, small lakes and alongside streams, mostly in deep, wet moss. Widespread in many parts of Svalbard, but uncommon; Bjørnøya.

11. *Colpodium* TRIN. Arctic Saltmarsh Grasses (Fimbulgras)

Perennial grasses growing in tufts. Spikelets have 2 or more flowers. Distinct glumes of unequal size. Often included in the *Puccinellia* genus (no. 13).

- A. Bluish, glossy panicle with glumes midway up spikelet 1. *C. vablianum*
A. Brown panicle; glumes shorter than half the spikelet 2. *C. vacillans*

1. *C. vablianum* (LIEBM.) NEVSKI. Vahl's Arctic Saltmarsh Grass* (Fimbulgras) Fig. 55c

Tufted, 10–20 cm tall, with erect or prostrate stems. Leaves flat and prostrate. Inflorescence somewhat compressed. Spikelets glossy, bluish, relatively large, with 3–5 flowers. Whole plant has stiff appearance. Glumes large, reaching halfway or more up the spikelet. Lemmas distinctly pubescent. Spikelet pedicels thin and have distinct swelling where spikelet is attached. Grows in moist places on sand and clay. Widespread throughout Svalbard.



Fig. 55. a. *Festuca vivipara*. b. *Colpodium vacillans*. c. *C. vablianum*.

2. *C. vacillans* (TH. FR.) POLUNIN. Svalbard Arctic Saltmarsh Grass* (Svalbardfimbulgras) Fig. 55b

Tufted, 10–15 cm tall, with round stem and compressed inflorescence, outspread during flowering. Leaves glabrous, somewhat folded and usually yellowish green. Stem and leaf may be rather reddish. Spikelets have 2–3 flowers. Glumes unequal in size, upper one much larger than lower one; both remain in place after flowering. Lemmas distinctly pubescent at base. Grows in moist places with clay, particularly on patches that are thawing. Widespread in Svalbard, especially on western and northern coasts.

Often considered to be a hybrid between the *Phippsia* and *Colpodium* genera and is then called *Pucciphippsia vacillans* (TH. FR.) TZVELEV.

12. *Dupontia* R. BR. Tundra Grasses (Tundragras)

10–25 cm tall, with long runners and stiffly erect stems with open or narrow panicles. Leaves long and pointed.

A. Compressed panicle, erect pedicels; glumes cut off squarely; lemmas have long hairs near their base and short hairs all over their flat parts; no awn or cusp

1. *D. pelligera*

A. Panicle open, with outspread pedicels, pyramidal; glumes pointed or lanceolate; lemmas have long hairs, often awned

2. *D. psilosantha*

1. *D. pelligera* (RUPR.) A. LØVE & RITCHIE. Tundra Grass* (Tundragras) Fig. 56b

10–20 cm tall, stiffly erect, parallel-stemmed right to panicle. Bent at base and with runners. Panicle 4–8 cm long, compressed, but outspread during flowering. Spikelets brownish and membranous. Glumes shorter than spikelets and cut off squarely. Lemmas pubescent, with long hairs at base, short ones higher up, and lacking awn or cusp. Grows in moist places, generally densely in moss beside streams and small lakes. Found throughout Spitsbergen.

2. *D. psilosantha* (RUPR.) GRISEB. Outspread Tundra Grass* (Spriketundra-gras) Fig. 56a

Distinguished from previous species by being somewhat taller, 15–20 cm, and having an outspread panicle. Stem thinner uppermost. Glumes long and pointed and equally long or somewhat longer than spikelet. Lemmas long-pubescent at base, and often but not always with short awns. Usually with fertile flower. Grows in wet places, generally in moss; occasionally in



Fig. 56. a. *Dupontia psilosantha*. b. *D. pelligera*. c. *Puccinellia angustata*.

open water. Precise distribution unknown, because it has not always been distinguished from the previous species, but probably occurs throughout Svalbard.

13. *Puccinellia* PARL. Saltmarsh Grasses (Saltgras)

Perennials, tufted and often with runners. Spikelets long and with several flowers. Glumes much shorter than spikelet. Lemmas generally slightly pubescent at base, with membranous margin uppermost. Spikelets in panicle.

- A. Creeping, aerial runners; on shores; seldom flowers 2. *P. phryganodes*
- A. Compact tufts
 - B. Erect stem, panicle extends above leaves and is tightly compressed
 - C. Leaves flat 1. *P. angustata*
 - C. Leaves folded 4. *P. capillaris*
 - B. Prostrate stem, panicle does not outreach leaves 3. *P. svalbardensis*

1. *P. angustata* (R. BR.) RAND. & REDF. Polar Saltmarsh Grass* (Polarsaltgras) Fig. 56c

Densely tufted with stiff, erect stems which are often somewhat violet or bluish. Leaves flat and comparatively wide. Panicle far outreaches the leaves and is 4–6 cm long. Spikelets generally violet and have 3–5 flowers. Glumes have transverse apex, are much shorter than spikelet and unequal in length. Mainly grows on moist sandy and clayey substrates, often on thawing patches. Quite common throughout Svalbard.

A related species, *Puccinellia palibinii* SØRENS. is also found in Svalbard, but has been published as *P. angustata* subsp. *palibinii* (SØRENS) TZVELEV. Found only in Bockfjorden.

2. *P. phryganodes* (TRIN.) SCRIBN. & MERR. Creeping Saltmarsh Grass* (Teppesaltgras) Fig. 57a

Flat cushions with long, creeping, aerial runners. Leaves short and rolled. Whole plant is usually rather reddish brown. Does not normally flower,



Fig. 57. a. *Puccinellia phryganodes*. b. *P. svalbardensis*.

but may do so in relatively dry localities; stem is then somewhat ascending and has a few-flowered panicle bearing spikelets with 3–5 flowers. Rarely produces fruit, but reproduces using fragments of shoot.

Grows on clayey and stony seashores, forming the outermost zone towards the sea. Occurs solitarily or in dense stands, usually right out near the seaweed belt, but also far from the sea.

Widespread throughout Svalbard; Bjørnøya.

3. *P. svalbardensis* RØNNING. Svalbard Saltmarsh Grass* (Svalbardsaltgras) Fig. 57b

Low, tufted plant with prostrate leaves and stems. Entire plant is characteristically pale grey, often slightly pink on the stem and then has a soft appearance. Upper stem leaves reach to midway on the panicle. Spikelets have 3–5 flowers with short glumes, 1.4–1.8 mm.

Grows on clay-rich moraines.

Very rare, only found at a couple of localities in Kongsfjorden and Wijdefjorden.

4. *P. capillaris* (LILJEBL.) JANSEN. Northern Saltmarsh Grass (Taresaltgras)

Low tufts with erect stems. Leaves folded, generally bluish green, 1–3 mm wide. Panicle has stiff pedicels, 2–3 in lower verticil. Sharply pointed glumes and lemmas.

Grows on shores and rocks. Found only on Bjørnøya.

The individuals observed belong to a northerly form of a species often called *P. coarctata* FERN & WEATH.

14. *Festuca* L. Fescues (Svingel)

Perennial grasses with 4–10-flowered spikelets. Glumes unequal in length and much shorter than spikelet. Bracts with cusps or awns, shorter than spikelet. A few species may have germinating panicles (viviparous). Panicle is one-sided.

- | | |
|--|------------------------|
| A. Viviparous spikelets which do not produce seed | 3. <i>F. vivipara</i> |
| A. Normally developed spikelets | |
| B. Solitary stems with runners, or loose tufts with curved branch shoots | |
| C. Spikelets glabrous or with scattered small hairs | 1. <i>F. rubra</i> |
| C. Spikelets densely pubescent | 2. <i>F. cryophila</i> |
| B. Without runners, in dense tufts | |

- D. Uppermost part of stem densely short-pubescent 6. *F. baffinensis*
- D. Whole stem glabrous
 - E. Panicle 2–6 cm long; glabrous, glossy stem; straight leaves; glumes almost equally long and glabrous 4. *F. brachyphylla*
 - E. Panicle 1–2 cm; whole plant matt and has bluish sheen; bent leaves; glumes unequal in length and with scattered short hairs 5. *F. hyperborea*

1. *F. rubra* L. Red Fescue (Rødsvingel) Fig. 49c

Solitary stems or loose tufts, 20–50 cm tall with curved branch shoots. Lower leaf sheaths dark or dark red. Leaves brush-like and narrow; stem leaves wide. Spikelets 6–10 mm long. Variable species with many forms.

Occurs in Svalbard only as an introduced species and then on waste dumps or similar places as well as on sunny slopes close to bird cliffs.

2. *F. cryophila* KREZ & BOBR. Arctic Fescue* (Arktisk svingel)

Stiffly erect stems growing solitarily from a highly branching network of subterranean runners, curved near base. Leaves brush-like and narrow, stem leaves flat. Panicle outspread and erect, not pendulous. Spikelets comparatively sturdy and the entire spikelet is distinctly white-pubescent. Grows in slightly moist places, with runners extending into other vegetation. Widespread throughout Svalbard and quite common. Over the years, the species has been given a number of names, mostly *F. richardsonii* HOOK, *F. rubra* var. *mutica* HARTM. and *F. rubra* subsp. *arctica* (HACK.) GOVOR..

3. *F. vivipara* (L.) SM. Viviparous Fescue (Geitsvingel) Fig. 55a

In dense tufts, 10–25 cm tall, thin, straight stems and dark viviparous panicle. Spikelet pedicels often slightly pubescent. Glumes and paleae lack awn and are glabrous or slightly pubescent. Common on dry stony slopes, but also near snow patches and other moist places. Widespread throughout Svalbard; Bjørnøya.

Var. *hirsuta* (LGE.) SCHOL. (Hairy Viviparous Fescue) has densely pubescent spikelets and stiff, glabrous, somewhat curved leaves. Stem is glabrous. Rare on Spitsbergen and has a southerly distribution.

4. *F. brachyphylla* SCHULTES. Rock Fescue* (Bergsvingel) Fig. 58b

Densely tufted, 15–25 cm tall. Leaves stiff, tapering evenly to a point. Stem glossy, extending far above the leafy tuft. Spike panicle 2–6 cm, its colour

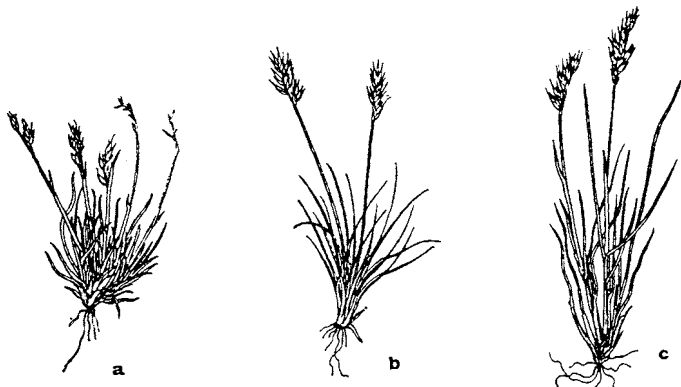


Fig. 58. a. *Festuca hyperborea*. b. *F. brachyphylla*. c. *F. baffinensis*.

varying from green to violet. Spikelets 4–8-flowered, narrow and pointed. Glumes almost equally long, glabrous. Lemmas glabrous and tapering evenly to a protruding awn. Grows on stony and sandy ridges and in rocky places. Rare species with uncertain distribution.

5. *F. hyperborea* HOLMEN. Polar Fescue* (Polarvingel) Fig. 58a

Densely tufted, 7–15 cm tall. Entire plant is matt and has a blue sheen; narrow, dark spike panicle. Leaves shorter and thicker than in *F. vivipara*, and somewhat curved. Spikelets 4–6-flowered. Glumes unequal in length and with scattered short hairs. Lemma relatively wide apically, with awn just below apex.

Grows in moist places on slopes and solifluction soils, and near snow patches. Overlooked and little-known species. So far known from fjord areas on western and northern coasts of Spitsbergen and adjacent to Hinlopenstretet.

6. *F. baffinensis* POLUNIN. Hairy Fescue* (Hårsvingel) Fig. 58c

Densely tufted, 10–15 cm tall. Stems stiff, a little dark and densely pubescent (short hairs) on upper part. Leaves thin and brush-like, equal in height to stem or shorter. Compact panicle with violet spikelets, generally one-sided. Spikelets slightly pubescent, with lemma tapering evenly to an awn.

Grows on sand, gravel and rocks, generally on moist substrates. So far found in a few places in Isfjorden, Wijdefjorden and adjacent to Hinlopenstretet.

APPENDIX TIL FLORA

Changes in nomenclature and a list showing differences in Latin names between this and the 1979 edition of the Flora of Svalbard and the 1994 edition of the Flora of Norway.

Equisetum arvense L. var. *alpestre* WAHLENBERG =
E. arvense subsp. *alpestre* (WALENBERG) RØNNING comb.n.

Equisetum arvense L. var. *riparium* Fr. =
E. arvense subsp. *riparium* (FR.) RØNNING comb.n.

Saxifraga cespitosa L. var. *aurea* HADAČ=
S. aurea (HADAČ) RØNNING comb.n.
S. aurea var. *apetala* (ANDERSS. & HESS) RØNNING comb.n.

Saxifraga oppositifolia L. f. *reptans* ANDERSS. & HESS (1900) =
S. oppositifolia L. subsp. *reptans* (ANDERSS. & HESS) RØNNING comb.n.

Saxifraga oppositifolia L. f. *pulvinata* ANDERSS. & HESS (1900) =
S. oppositifolia L. subsp. *pulvinata* (ANDERSS. & HESS) RØNNING comb.n.

Svalbard flora 1979	Svalbard flora 1996	Norwegian flora 1994
<i>Cystopteris fragilis</i>	<i>Cystopteris dickieana</i>	<i>C. fragilis</i> var. <i>dickieana</i> subsp. <i>dickieana</i>
<i>Equisetum</i> subsp.	<i>Equisetum arvense</i> subsp. <i>alpestre</i> subsp. <i>riparium</i>	<i>Equisetum arvense</i> subsp. <i>arvense</i> subsp. <i>boreale</i>
<i>Lycopodium selago</i>	<i>Huperzia selago</i> subsp. <i>arctica</i>	<i>Huperzia selago</i> subsp. <i>arctica</i>
<i>Salix glauca</i>	<i>Salix arctica</i>	<i>Salix arctica</i> subsp. <i>callicarpaea</i>
<i>Sagina intermedia</i>	<i>Sagina nivalis</i>	<i>Sagina nivalis</i>

<i>Sagina caespitosa</i>	<i>Sagina cespitosa</i>	<i>Sagina cespitosa</i>
<i>Arenaria pseudofrigida</i>	<i>Arenaria pseudofrigida</i>	<i>Arenaria ciliata</i> subsp. <i>pseudofrigida</i>
<i>Stellaria crassipes</i>	<i>Stellaris crassipes</i>	<i>Stellaria longipes</i> coll
<i>Melandrium apetalum</i>	<i>Silene uralensis</i>	<i>Silene uralensis</i>
<i>Melandrium angustiflorum</i>	<i>Silene furcata</i>	<i>Silene furcata</i> subsp. <i>furcata</i>
<i>Ranunculus spetsbergensis</i>	<i>Ranunculus spetsbergensis</i>	<i>Ranunculus spetsbergensis</i>
<i>Ranunculus hyperboreus</i>	<i>Ranunculus hyperboreus</i> subsp. <i>arnellii</i>	<i>Ranunculus hyperboreus</i> subsp. <i>arnellii</i>
	<i>Ranunculus hyperboreus</i> subsp. <i>hyperboreus</i>	<i>Ranunculus hyperboreus</i> subsp. <i>hyperboreus</i>
<i>Ranunculus pedatifidus</i> & <i>R. auricomus</i>	<i>Ranunculus affinis</i> & <i>Ranunculus wilanderi</i>	<i>Ranunculus affinis</i> & <i>Ranunculus wilanderi</i>
<i>Cochlearia officinalis</i>	<i>Cochlearia groenlandica</i>	<i>Cochlearia groenlandica</i>
<i>Draba adamsii</i>	<i>Draba micropetala</i>	<i>Draba micropetala</i>
<i>Draba micropetala</i>	<i>Draba pauciflora</i>	<i>Draba pauciflora</i>
<i>Draba cineria</i>	<i>Draba arctica</i>	<i>Draba arctica</i>
<i>Cakile maritima</i>	<i>Cakile arctica</i>	<i>Cakile maritima</i> subsp. <i>arctica</i>
<i>Sedum arcticum</i>	<i>Rhodiola arctica</i>	<i>Rhodiola rosea</i> subsp. <i>arctica</i>
—	<i>Saxifra aurea</i>	—
—	<i>Saxifraga aurea</i> var. <i>apetala</i>	—

<i>Saxifraga oppositifolia</i>	<i>Saxifraga oppositifolia</i> subsp. <i>reptans</i> subsp. <i>pulvinata</i>	<i>Saxifraga oppositifolia</i>
<i>Saxifraga flagellaris</i>	<i>Saxifraga platysepala</i>	<i>Saxifraga flagellaris</i> subsp. <i>platysepala</i>
<i>Potentilla rubricaulis</i>	<i>Potentilla rubricaulis</i>	<i>Potentilla chamissonis</i> x <i>pulchella</i> = <i>P. insularis</i> SOJAK
<i>Dryas octopetala</i>	<i>Dryas octopetala</i> subsp. <i>octopetala</i> subsp. <i>punctata</i>	<i>Dryas octopetala</i>
<i>Pedicularis dasyantha</i>	<i>Pedicularis dasyantha</i>	<i>Pedicularis lanata</i> subsp. <i>dasyantha</i>
<i>Vaccinium uliginosum</i>	<i>Vaccinium gaultherioides</i>	<i>Vaccinium uliginosum</i> subsp. <i>microphyllum</i>
<i>Empetrum</i> <i>hermaphroditum</i>	<i>Empetrum</i> <i>hermaphroditum</i>	<i>Empetrum nigrum</i> subsp. <i>hermaphroditum</i>
<i>Campanula rotundifolia</i>	<i>Campanula gieseckiana</i>	<i>Campanula</i> <i>rotundifolia</i> subsp. <i>gieseckiana</i>
<i>Erigeron eriocephalus</i>	<i>Erigeron eriocephalus</i>	<i>Erigeron uniflorus</i> subsp. <i>eriocephalus</i>
<i>Arnica alpina</i>	<i>Arnica angustifolia</i>	<i>Arnica angustifolia</i> subsp. <i>angustifolia</i>
<i>Juncus triglumis</i>	<i>Juncus albescens</i>	<i>Juncus triglumis</i> subsp. <i>albescens</i>
<i>Luzula confusa</i>	<i>Luzula confusa</i>	<i>Luzula arcuata</i> subsp. <i>confusa</i>
<i>Eriophorum triste</i>	<i>Eriophorum triste</i>	<i>Eriophorum</i> <i>angustifolium</i> subsp. <i>triste</i>

<i>Carex misandra</i>	<i>Carex misandra</i>	<i>Carex fuliginosa</i> subsp. <i>misandra</i>
<i>Carex stans</i>	<i>Carex stans</i>	<i>Carex aquatilis</i> subsp. <i>stans</i>
<i>Alopecurus alpinus</i>	<i>Alopecurus borealis</i>	<i>Alopecurus borealis</i>
<i>Calamagrostis neglecta</i>	<i>Calamagrostis stricta</i>	<i>Calamagrostis stricta</i>
<i>Deschampsia alpina</i>	<i>Deschampsia alpina</i>	<i>Deschampsia cespitosa</i> subsp. <i>alpina</i>
<i>Deschampsia brevifolia</i>	<i>Deschampsia borealis</i>	<i>Deschampsia borealis</i>
<i>Poa alpigena</i>	<i>Poa alpigena</i>	<i>Poa pratensis</i> subsp. <i>alpigena</i>
<i>Colpodium vahlianum</i> <i>Colpodium vacillans</i>	<i>Colpodium vahlianum</i> <i>Colpodium vacillans</i>	<i>Puccinellia vahlianum</i> x <i>Pucciphippsia</i> <i>vacillans</i>
<i>Festuca rubra</i> var. <i>mutica</i>	<i>Festuca cryophila</i>	<i>Festuca rubra</i> subsp. <i>arctica</i>

CONSERVATION REGULATIONS

The Conservation Regulations for the National Parks and Nature Reserves in Svalbard (see the map earlier in the book) include the following:

Plants and fossils must not be removed and are protected against all forms of damage and destruction that do not result from traffic of an ordinary nature. New plant species must not be introduced.

Exception: The Governor may, in consultation with the Ministry, issue permission for scientific investigations, provided these will not come into conflict with the objective of having nature reserves.

The following are extracts from the regulations concerning the protection of plants within certain areas of Svalbard (hatched areas on the map earlier in the book) laid down by Royal Decree of 26 February 1932:

Pursuant to § 4 of the Svalbard Act of 17 July 1925 it has been decided that:

§ 1

Within the parts of Svalbard mentioned in this section, all plants shall be protected from collection and destruction.

Boundary definitions for areas of Svalbard (Spitsbergen) where plants are fully protected.

Area no. 1. North and east of Dicksonfjorden and Sassenfjorden

The area is defined by the following lines:

From a promontory on the south side of Sassenfjorden about 3 km west of the mouth of Sassenelva, latitude 78°20', longitude 16°43', a straight line bearing east 55° south to a cairn on the low ridge south of the outlet of Sassendalen 258 metres above sea level, latitude 78°18'7" longitude, 16°47'. Thence a straight line bearing east 58° south to a cairn on the corner mountain between Sassendalen and Eskerdalen 699 metres above sea level, latitude 78°15'4" longitude 16°57'. Thence a straight line across Eskerdalen bearing east 32° south to a cairn on the westernmost summit of Trehøgdene 681 metres above sea level, latitude 78°13'8" longitude 17°08'. Thence a straight line bearing north 30° east to the summit of Hampusfjellet on the right side of Van Postbreen, about 470 metres above sea level, latitude 78°26'3" longitude 17°44'. Thence a straight line bearing north 17° west to the summit of Terrierfjellet, about 1200 metres above sea level, latitude 78°41'0" longitude 17°20'. Thence a straight line bearing north 60° west to

the summit of Sfinksen, latitude 78°45'5 longitude 16°36'. Thence a straight line bearing north 27° west to the western corner of the head of Austfjorden, latitude 78°54'3 longitude 16°22'. From there the boundary follows the west coast of Austfjorden around Kapp Petermann, and further along the east coast of Vestfjorden to its head, latitude 79°06'3 longitude 15°33'. Thence the boundary follows the centre line of Universitetsbreen, across Mariaskardet, along the main river in Dicksondalen to the head of Dicksonfjorden, latitude 78°50'0 longitude 15°22'. Thence the boundary follows the coastline on the east side of Dicksonfjorden, around Kapp Wijk, along the coast of Isfjorden, around Kapp Thorsen, the coastline of Billefjorden, the north side of Sassenfjorden, and around Tempelfjorden back to the starting point, the promontory west of the mouth of Sassenelva.

Area no. 2. Between Colesdalen and Adventdalen

The area is defined by the following lines:

From the mouth of Coleselva, latitude 78°06'0 longitude 15°00', the boundary follows the main course of Coleselva upwards to the point where it is joined by the river from Faradalen, latitude 78°05'0 longitude 15°17'0. Thence the boundary follows the river in Faradalen to the pass leading to valley no. 1 east of Longyeardalen, latitude 78°09'5 longitude 15°28'. Thence the boundary follows the river in valley no. 1 east of Longyeardalen to its confluence with Adventelva, latitude 78°11'7 longitude 15°51'. Thence the boundary follows the west side of Adventelva to its outlet into Adventfjorden and then follows the coastline back to the starting point in Colesbukta.

§ 2

The present regulations do not prevent mining operations or other industrial activity, although in such cases an attempt must be made to avoid destroying plant species in so far as this is feasible without particular difficulty or expense. If such destruction caused by the progress of the work cannot be avoided, the Ministry shall be notified of the circumstances in good time in advance.

§ 3

The Ministry may grant dispensation from the above regulations for special purposes of scientific research.

§ 4

Violation of the above-mentioned conservation regulations is punishable.

§ 5

This Decree enters into force on 1 April 1932.

Please also consult the Environmental Regulations for Svalbard, published by the Ministry of the Environment in 1995.

COLOUR PLATES

With this special selection of 65 colour photographs the author wishes to draw attention to plants that never or very rarely are being photographed in Svalbard. The more spectacular species seen in tourist brochures, on posters, etc. are known to most Svalbard visitors, and are therefore not included here. All photographs were taken in Svalbard, at the natural localities of the plants in the period 1990-94, by Tommy Præstø, Museum of Natural History and Archaeology, Norwegian University of Science and Technology, Trondheim. Norway.

Arctic plants are generally small. Because they have been photographed at varying distances, it is impossible to judge their true sizes from the photos. The size of the individual plants is given in more detail in the general description of each species.



1. *Equisetum arvense* L. - Polar Horsetail (Polarsnelle).



2. *Salix reticulata* L. - Net-leaved Willow (Rynkevier).



3. *Sagina nivalis* (LINDB) FR. – Snow Pearlwort (Jøkellarve).
Leaves of Mountain Sorrel (Fjellsyre) in upper left corner.



4. *Minuartia rossi* (R. BR.) GRAEBN. – Cushioned Sandwort (Putearve).



5. *Minuartia stricta* (Sw.) HIERN. – Teesdale Sandwort (Grannarve).



6. *Minuartia biflora* (L.) SCHINZ & THELL – Tufted Sandwort (Tuearve).



7. *Honkenya peploides* (L.) EHRH. – Sea Sandwort (Strandarve).



8. *Arenaria pseudofrigida* (OSTF. & DAHL) JUZ. – Fringed Sandwort (Kalkarve).



9. *Minuartia rubella* (WAHLENB.) HIERN. – Mountain Sandwort (Nålearve).



10. *Stellaria humifusa* ROTTB. – Arctic Chickweed (Ishavsstjerneblom).



11. *Cerastium regelii* OSTENF. – Polar Mouse-ear (Polararve)



12. *Cerastium arcticum* LGE. – Arctic Mouse-ear (Snøarve).



13. *Silene uralensis* (RUPR.) BOCQ. – Polar Campion (Polarblindurt).



14. *Ranunculus spetsbergensis* (NATH.) HADAČ – Svalbard Buttercup (Svalbardsoleie).



15. *Ranunculus hyperboreus* ROTTB. – Tundra Buttercup (Tundrasoleie).



16. *Ranunculus nivalis* L. – Snow Buttercup (Snøsoleie).



17. *Ranunculus pygmaeus* WALENB. – Pygmy Buttercup (Dvergssoleie).



18. *Ranunculus affinis* R. BR. – Lobe-leaved Buttercup (Flikbladssoleie).
Elegant Ortage Lichen (Rauberglav) on rock to the right.



19. *Braya purpurascens* (R. BR.) BGE. – Purplish Braya (Purpurkarse).



20. *Entrema edwardsii* R. BR. – Polar Radish (Polarreddik) in fruit.



21. *Draba micropetala* HOOK – Polar Whitlow-grass (Polarrublom).



22. *Draba pauciflora* R. BR. – Tundra Whitlow-grass (Tundrarublom).



23. *Draba subcapitata* SIMM. – Hemispherical Whitlow-grass (Halvkulerubloom).



24. *Draba alpina* L. – Golden Whitlow-grass (Gullrubloom).



25. *Draba norvegica* GUNN. – Rock Whitlow-grass (Bergrubloom).



26. *Draba arctica* J. VAHL. – Mealy Whitlow-grass (Mjølrubloom).



27. *Saxifraga hieracifolia* WALDST. & KIT. – Hawkweed-leaved Saxifrage (Stivsildre).



28. *Saxifraga rivularis* L. – Highland Saxifrage (Bekkesildre).



29. *Saxifraga hirculus* L. – Yellow Marsh Saxifrage (Myrsildre).



30. *Saxifraga hyperborea* R. BR. – Polar Saxifrage (Polarsildre).



31. *Saxifraga foliolosa* R. BR. – Foliose Saxifrage (Grynsildre).



32. *Saxifraga platysepala* (TRAUTV.) TOLM. – Polar Stolonerous Saxifrage (Polartrådsildre).



33. *Potentilla hyparctica* MALTE – Arctic Cinquefoil (Raggmure).



34. *Potentilla pulchella* R. BR. – Tufted Cinquefoil (Tuemure).



35. *Cassiope hypnoides* (L.) D. DON. – Mossy Mountain Heather (Moselyng).
Polar Willow (Polarvier) in foreground..



36. *Gentianella tenella* (ROTTB.) BØRNER – Diminutive Gentian (Småsoete).



37. *Mertensia maritima* (L.) S. F. GRAY – Oysterplant (Østersurt).



38. *Pedicularis dasyantha* (TRAUT.) HADAC – Woolly Lousewort (Ullmyrklegg).
Rock Sedge (Bergstarr) and Polar Fir Clubmoss (Polarlusegras) also seen in photo.



39. *Campanula uniflora* L. – High Alpine Hairbell (Høgfjellsklokke).



40. *Petasites frigidus* (L.) FR. – Lapland Butterbur (Fjellpestrot). Only leaves are shown in photo. Other leaves mostly of Polar Foxtail (Polarreverumpe).



41. *Taraxacum arcticum* (TRAUTV.) DAHLST. – Arctic Dandelion – white (Arktisløvetann).
Polar Dandelion – yellow (Polarløvetann).
Also leaves of Dickie's Bladder-fern (Berglok) and a Cinquefoil species (mure).



42. *Juncus biglumis* L. – Two-flowered Rush (Tvillingsiv).



43. *Luzula wahlenbergii* RUPR. – Reindeer Wood-rush (Reinfrytyle).



44. *Luzula confusa* (HARTM.) LINDEB. – Northern Wood-rush (Vardefrytyle).



45. *Eriophorum triste* (Th. Fr.) HADAČ / LØVE – Black Cottongrass (Svartull).



46. *Carex glacialis* MACK. – Ridge Sedge (Rabbestarr).



47. *Carex saxatilis* L. – Russet Sedge (Blankstarr).
Polar Horsetail (Polarsnelle) also seen in photo.



48. *Carex misandra* R. BR. – Nodding Sedge (Dubbestarr).



49. *Carex glareosa* WAHLENB. – Saltmarsh Sedge (Grusstarr).



50. *Carex rupestris* ALL. – Rock Sedge (Bergstarr).



51. *Carex nardina* FR. – Cushion Sedge (Skjeggstarr).



52. *Alopecurus borealis* TRIN. – Polar Foxtail (Polarreverumpe).



53. Left: *Phippsia concinna* (Th. Fr.) Lindeb. – Outspread Snow-grass (Sprikesnøgras).
Small, far right: *Phippsia algida* (Sol.) R. Br. – Spiked Snow-grass (Snøgras).



54. *Deschampsia alpina* (L.) Roem. & Sch. – Alpine Hair-grass (Fjellbunke).



55. *Deschampsia borealis* (TRAUT.) ROSH. – Tundra Hair-grass (Tundrabunke)



56. *Trisetum spicatum* (L:) RICHT. – Northern Oat-grass (Svartaks).



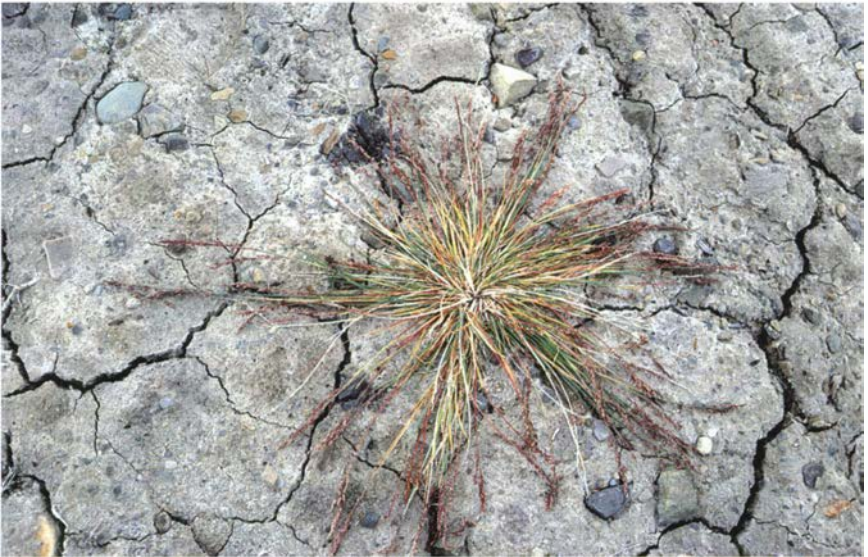
57. *Poa arctica* R. BR. – Arctic Meadow-grass (Jervrapp).



58. *Poa alpina* var. *vivipara* L. – Alpine Meadow-grass (Fjellrapp).
Alpine Bistort (Harerug) also seen in photo.



59. *Poa abbreviata* R. BR. – Cushioned Meadow-grass (Puterapp).



60. *Colpodium vablianum* (LIEBM.) NEVSKI – Vahl's Arctic Saltmarsh Grass (Fimbulgras).



61. *Colpodium vacillans* (TH. FR.) POLUNIN – Svalbard Arctic Saltmarsh Grass (Svalbardfimbulgras).



62. *Puccinellia angustata* (R. BR.) RAND & REDF. – Polar Saltmarsh Grass (Polar-saltgras).



63. *Hierochloë alpina* (WILLD.) ROEM. & SCH. – Arctic Holy Grass (Fjellmarigras).



64. *Puccinellia phryganodes* (TRIN.) SCRIBN./ MERR. – Creeping Saltmarsh Grass (Teppesaltgras).



65. *Festuca cryophila* KRECX & BOBR. – Arctic Fescue (Arktisk svingel).

Introduction

The individual species were described in the first part of this book, along with brief notes on their distribution in Svalbard. This chapter presents an illustrated overview of the vegetation types and their division into plant communities. Communities are composed of species that are usually not closely related but occur together, growing under the same ecological conditions. It must be stressed that only the main types are mentioned. They are described in a way that should enable them to be recognised. Ecological conditions, topographical variations, and so on, lead to the occurrence of intermediate types and transitional forms. These variations may be very subtle, particularly in Arctic regions, but they lead to relatively marked changes in vegetation. Variations in the depth of the snow cover and the hydrological conditions are examples of this. Consequently, the treatment cannot be sufficiently comprehensive to permit all the intermediate types to be easily recognised in the field. This is also emphasised by geographical differences, such as the distance from south to north and the distribution of the vascular plants.

In many places the vegetation has a mosaic character. Thus, over a few square metres it may alternate between tussocks with vegetation typical of mounds and ridges, such as Mountain Avens and White Arctic Bell-heather, and a wetland vegetation of grasses and mosses in depressions. This is particularly common where streams and seeps make the ground wet, frost action and solifluction forming the tussocks. Mosaic vegetation may be quite common, partly because the permafrost readily leads to structural changes on the surface and the groundwater always drains close to the surface.

Numerous scientific papers give detailed descriptions of the vegetation in small areas. These are not explicitly mentioned here, but form the basis for this account. Several are from the turn of the century, whereas the most recent ones date from the last few years and are the work of vegetation specialists from Norway and abroad; they include a number of university theses. Several vegetation maps have been prepared in connection with these and other research projects. A map of the whole of Svalbard on a scale of 1:1 million has been published by the Norwegian Mapping Authority. Several other smaller maps on larger scales have also been prepared, including eight sheets on a scale of 1:10,000 covering Brøggerhalvøya, a peninsula in Kongsfjorden. The Norwegian Polar Institute has published a set of maps, mostly on a scale of 1:20,000, covering parts of Adventdalen, Lågnesflya, Reinsdyrflya, and Gipsdalen. A few smaller, detailed maps can be found in specialised scientific publications.

The English names used in the preceding flora are used in the description that follows. As with some of the vascular plants, many moss and

lichen names have been specially coined. The first time such names appear they are followed by an asterisk (*), and in the case of mosses and lichens the Latin name is added in brackets.

Some ecological relationships

The ecological factors in Svalbard that are important for the vegetation are largely identical with those at high altitudes in the Norwegian mountains. There are, however, some characteristic differences.

The climate in Svalbard differs from that found elsewhere in the Arctic at a corresponding latitude. As is usual in Arctic regions, there is little precipitation, only 100–300 mm. The summer temperature is not particularly high, 5 to 8°C, nor is the winter temperature specially low, -15 to -20°C. This demonstrates a special feature of the Svalbard climate. The weather is dominated by depressions which have a track that takes them far north, especially in winter. Because they carry a great deal of moist air, even winter precipitation may fall as rain or damp fog. When low temperatures follow, a thick layer of ice may form on the ground, making it difficult for life, particularly animals, to survive. Such layers of ice may also protect the vegetation from being intensively grazed by reindeer in winter. These shifts in the weather, notably in winter, give Svalbard an oceanic arctic climate characterised by moderate temperatures in summer and winter alike.

Another effect of the Arctic climate is permafrost. An average annual temperature of only -5 to -7°C forms the basis for permafrost. In Svalbard, permafrost extends to a depth of 150–300 m. The uppermost layer, which thaws each year, varies in depth from 30 to 150 cm. This layer, the active layer, is what makes it possible for plants to grow here.

A special ecological effect of the active layer is that during the spring thaw meltwater remains standing on the surface or drains away across it, above the permafrost. Consequently, the ground in spring is moist or wet, but gradually as the depth of the thaw increases, drainage becomes easier and the ground dries out. One effect of this is that two variants of the plant communities often occur, one moist and the other dry. If the water remains on the surface, wetlands and Arctic mires develop. The distribution of water on the surface and the supply of nutrients, for instance from nesting sites of birds, are important ecological factors for the distribution of some communities.

The meltwater has a special effect on slopes when the soil becomes saturated with water and starts sliding over the frozen layer beneath forming solifluction rolls, or drapes. They have little vegetation on their surface, but more along their margins. A corresponding phenomenon is where frost movement close to the surface of thawing ground leads to the formation of stone rings, or polygons of tussocky vegetation.

The climatic conditions also result in the vegetative period being short. Even though there is no lack of light, the first spring plants do not flower

before mid-June and the growing period is largely over around mid-August, i.e. it lasts 40–70 days. During this short period, the plants must develop, flower and, preferably, produce mature seeds.

Where reindeer occur in Svalbard, their grazing and trampling are important ecological factors. The impact is particularly great on plant communities which have little snow cover in winter, i.e. ridge communities, and which consequently become exposed to severe grazing pressure in winter. This especially affects the lichen flora and associated vascular plants, which have to tolerate wear and tear from both grazing and trampling; the lichen mats, however, rapidly disappear and their absence is a characteristic feature of places where reindeer graze in winter. Trampling causes serious damage, both in winter on ridges and in summer on wetlands and heath communities. Trampling both by people and reindeer readily leads to wind erosion of the soil in dry localities and erosion by water and frost in wet ones.

Reindeer grazing also affects plant communities in other ways. Reindeer are selective in their choice of grazing plants, and during the flowering season they graze heavily on the flowers. Plants which are particularly favoured are Polar Willow*, Purple Saxifrage and Field Horsetail in spring, whereas in summer they chiefly graze on Mountain Sorrel, Polar Foxtail* and other grasses, along with the flowers of most of the higher plants. However, in general, it can be said that reindeer in winter graze on ridge vegetation and bird-cliff communities, and in spring and summer on heath communities, especially those containing large quantities of Polar Willow, and moss tundra communities. In late summer and autumn, the Purple Saxifrage-Icelandmoss Lichen* (*Cetraria delisei*) community and snow-bed vegetation are grazed most.

The effect of differences in bedrock is less marked than in the Scandinavian mountains. Little soil derived from weathering is washed away by precipitation and the soil therefore has quite a high content of mineral substances. Consequently, the great differences in the distribution of the plant communities are not primarily caused by differences in geology.

The snow cover is another ecological factor that is important for vegetation development. Generally speaking, Svalbard has little snow in winter, but the wind distributes what there is in more or less the same manner from year to year. The snow gathers on valley floors and the lee side of ridges. This means that places with a deep snow cover, snow patches, thaw late, whereas wind-blown ridges with little snow are snow free early. There is therefore a considerable contrast in the length of the growing period between ridges and the vicinity of snow patches.

All told, it is these factors which first and foremost determine the differences in the composition of the vegetation and the variations in the plant communities.

Vegetation

Over the years, quite a number of works dealing with the flora and vegetation of Svalbard have been published, but only a few concern themselves with plant communities. Early authors were content to publish species lists from individual localities; there were certainly no phytosociological tables as such. The first classification of Svalbard vegetation was published by Nathorst as early as 1883. He drew three divisions based on where the vegetation grew, «shore plants proper» (shore-meadow vegetation), «mire plants» (wetland vegetation) and «hillside plants» (ridge and heath vegetation).

In 1913, Resvoll-Holmsen distinguished five groups, shore vegetation, wetland vegetation, alpine meadows, dwarf-shrub heaths and, finally, vegetation growing on fertilised localities, i.e. chiefly bird-cliff vegetation. Subsequently, in the years since 1930 some works have appeared based on phytosociological principles, but only a few contain analyses from several different, or relatively large, areas in Svalbard. Most confine themselves to investigations in specific valleys or along single fjords. Summerhayes and Elton made important contributions in 1923 and 1928 when they divided Svalbard into four climatic zones, the barren zone, the Mountain Avens zone, the White Arctic Bell-heather zone and the inner fjord zone. The most favourable climatic conditions and the best localities for growth are to be found in inner fjord districts, and it is here we find the most species-rich flora and the richest vegetation. From this centre, the vegetation becomes poorer and less productive in all directions, especially towards east and northeast, and towards southern Spitsbergen.

The map drawn by Summerhayes and Elton was not superseded before 1986, when one prepared by Ingvar Brattbakk was published as part of the National Atlas for Norway. This map appears as pastedown in the front and at the back of this book. It retained a corresponding division into four vegetation regions, but was entirely based on the occurrence of characteristic types of vegetation, the White Arctic Bell-heather zone, the Mountain Avens zone, the Polar Willow zone and the Svalbard Poppy zone.

Another subdivision, which will be followed here, is really based on the adaptation of plants to particular habitats and ecological conditions, i.e. the life-forms of the plants. If the principal emphasis is placed on the life-forms, the vegetation can be grouped into formations or series. Here, we recognise the traditional popular names, meadow, woodland, bog and heath, and, at the same time, these tell us the ecological conditions which exist at the site. It also means that communities with different species compositions can be placed in one and the same series or formation.

For the description that follows, the vegetation of Svalbard has been divided into six such series, or *vegetations*. The term *community* is used for subdivisions of these. In addition, a number of special *vegetation types* are mentioned which denote places where plants are so widely dispersed in their occurrence that it is debatable whether they actually form communities.

The grouping used here is a simplified one which does not fully comply with scientific nomenclature. It is as follows;

Ridge vegetation

- Mountain Avens communities
- White Arctic Bell-heather communities

Wetland vegetation

- Moss tundra communities
- Damp grass communities
- Arctic mire communities

Snow-bed (snow-patch) vegetation

- Mossy snow-bed community
- Mountain Sorrel communities
- Alpine Hair-grass communities

Shore-meadow vegetation

- Creeping Saltmarsh Grass* communities
- Polar Bear Sedge* communities

Heath vegetation

- Purple Saxifrage-Icelandmoss
- Lichen communities
- Northern Wood-rush communities

Fertilised vegetation

- Bird-cliff communities

Other communities

- Polar desert
- Screes
- Sandy and gravelly sites
- Moraines and block fields (felsenmeer)



Fig. 59. Ridge vegetation with the most exposed community, the Cushion Sedge-Mountain Avens community. This is confined to exposed ridges with little snow cover in winter and greatly exposed to erosion and drying out. The photograph shows the wavy tufts of Cushion Sedge and Mountain Avens, but also particularly large quantities of drought-tolerant (brown) mosses and much grey crustose lichen.



Fig. 60. Ridge vegetation comprising the Rock Sedge-Mountain Avens community, In addition to these two species, Purple Saxifrage, Polar Willow and Alpine Knotgrass grow alongside several other vascular plants and drought-tolerant mosses and, especially, lichens.



Fig. 61. Ridge vegetation with Polar Willow-Mountain Avens communities. Such communities are less exposed and require some snow protection in winter. In addition to Polar Willows and Mountain Avens, the photograph shows yellowish-brown mosses, dark Icelandmoss Lichen and a great deal of grey lichen.



Fig. 62. Ridge vegetation with White Arctic Bell-heather communities. These are the least extreme ridge communities and are best developed on lee slopes of ridges and on valley sides. The stands of White Arctic Bell-heather are generally larger and more continuous than the photograph shows and they then form characteristic, dark belts across the terrain. The photograph depicts White Arctic Bell-heather and Mountain Avens in bloom, along with Alpine Knotgrass, Northern Wood-rush, Polar Willow and several other species.

Ridge vegetation

Ridge vegetation is found in localities exposed to the weather and is particularly well developed on mounds and ridges that rise well above the surrounding terrain. Such localities have a thin snow cover in winter. They are therefore exposed to strong erosion from wind and blowing snow and the surface consists of gravel and stones. They also experience strong irradiance from the sun in the light months of late winter. The plants are therefore greatly exposed to drought in winter.

They enjoy the advantage of becoming free of snow in early spring and the species growing there are among those that flower first. Along a gradient from the most exposed localities to those that are more protected, which occur on the lower parts of slopes where there is stable snow protection in winter, there are certain differences in the species composition. Based on these differences, it is natural to divide ridge vegetation into two communities, which are interlinked principally because Mountain Avens is the species they have in common and is the dominating species. Two features of ridge vegetation dominated by Mountain Avens and White Arctic Bell-heather are that its distribution is circumpolar and it is quite homogeneous in its development.

Mountain Avens communities

The most exposed community is differentiated by the occurrence of Cushion Sedge. Rock Sedge may occur along with Mountain Avens and Cushion Sedge, but it is particularly drought-tolerant mosses and lichens that grow among stems and stones. Generally, not more than 20–30% of the ground is covered by vegetation, the remainder being stones and gravel (Fig. 59).

The Rock Sedge-Mountain Avens community occurs in somewhat less exposed localities. It grows on substrates that are slightly damper, especially in spring. It is also richer in species than the Cushion Sedge community. In addition to Rock Sedge, Alpine Bistort, Purple Saxifrage and Polar Willow are common. Drought-tolerant mosses such as Claw Braided Moss* (*Hypnum bambergeri*) and Stepped Moss* (*Hylocomium splendens*), along with lichens such as Icelandmoss Lichen* (*Cetraria delisei*) and Ochrlil Lichens* (*Ochrolechia* subsp.) occur (Fig. 60).

The Polar Willow-Mountain Avens community is found in still less exposed places. It requires some snow cover in winter and the ground, especially in spring, is somewhat damper, although it dries out as the summer progresses. It may also occur on soil that is exposed to frost movement. Because Polar Willow may occur in all the Mountain Avens communities, this community is to some extent characterised by the species that are lacking. There are also some differences in the species composition in certain places (Fig. 61).



Fig. 63. Heath vegetation belonging to the Heath Grey Moss community. This is chiefly found on the west coast of Spitsbergen where more precipitation falls and acidic rocks are more common. Where it dominates, the Heath Grey Moss paints the landscape grey-green.



Fig. 64. Heath vegetation. This is a transitional community between the Mountain Avens and Northern Wood-rush communities. Polar Willow and Purple Saxifrage dominate here, along with several mosses and lichens.

White Arctic Bell-heather community

The second principal division of ridge vegetation communities is characterised by White Arctic Bell-heather. It is chiefly found on the lee side of ridges and on valley slopes which have an abundant snow cover in winter. In winters with little snow, the community, and not least the White Arctic Bell-heather itself, is exposed to drying out. It is relatively rich in species, particularly mosses such as Mountain Groove Moss* (*Aulacomnium turgidum*), Stepped Moss (*Hylocomium splendens*), Fringed Moss* (*Ptilidium ciliare*), etc. The community is quite homogeneous and dense, and plant remains readily collect on the surface to form a layer of humus. The White Arctic Bell-heather community stands out prominently in the terrain as dark belts. White Arctic Bell-heather itself flowers profusely, producing white, bell-shaped flowers, making the community an attractive element in the landscape (Fig. 62).

Heath vegetation

Heath vegetation embraces groups of plant communities that grow on extensive, open plains with a moderate snow cover in winter. They are seasonally hygrophilous and are intermediate communities between snow-bed and ridge communities. They are often rich in species, and are also characterised by their content of mosses and lichens. The composition of species varies according to whether localities are moist or dry. In areas with

many reindeer, heath vegetation is severely exposed to grazing; this particularly affects the lichens which are greatly reduced quantitatively, whereas the floristic composition is less affected. Heath vegetation also has a circumpolar distribution, especially the Northern Wood-rush communities. In the other types, some species may be replaced by others, or the mutual proportions of the species may differ. These communities are less exposed to winter drought than ridge communities, and the species which occur have broader leaves; some, such as Purple Saxifrage, also have wintergreen leaves. Two communities of this type will be described here.

Purple Saxifrage-Icelandmoss Lichen (Cetraria delisei) community

This community covers large areas in Svalbard, particularly on the west coast and along fjords. In addition to Purple Saxifrage, common species are Moss Champion, Arctic Mouse-ear and Polar Mouse-ear*, but other Mouse-ear species and the Whitlow-grasses also frequently occur. In its really typical form it is only found in areas lacking reindeer and the biomass of the species varies greatly, particularly the amount of lichen, between localities with and without reindeer grazing. Areas where reindeer graze lack the substantial mats of lichen that otherwise occur where reindeer are absent.

Along a dry-wet gradient, the community in dry places will be located between Mountain Avens communities and snow-bed communities. It is frequently found on low parts of the strandflat where a little water and snow collect in winter perhaps forming hard ice layers that prevent the winter grazing of reindeer. The Purple Saxifrage-Icelandmoss Lichen community can be subdivided into lichen-rich and moss-rich types, which largely correspond to dry and moist ground (Fig. 1).

The dry variety may begin to resemble the Mountain Avens communities, as shown by the occurrence of such species as Nodding Sedge* and Hairy Lousewort. The moist variety is chiefly characterised by the quantity of mosses (e.g. Claw Mosses* (*Drepanocladus* spp.)) and plants such as Polar Mouse-ear, Drooping Saxifrage, Tufted Saxifrage and Polar Scurvy-grass*. This is a typically Arctic community and is not known from alpine tracts, for example in Scandinavia.

Northern Wood-rush communities

Floristically, this type of vegetation is characterised by the dominance of Northern Wood-rush (Fig. 5). Mountain Sorrel, Purple Saxifrage, Polar Foxtail and Alpine Meadow-grass are among the other species which frequently occur. Several varieties of these communities, too, occur along the dry-wet gradient. In drier areas, the number of lichen species is significantly greater and the community may begin to resemble the Purple Saxifrage-Icelandmoss Lichen community if lichen mats are present.

An intermediate position is occupied by a community dominated by Polar Willow and Northern Wood-rush. Here, lichens are sparse, but mos-



Fig. 65. Snow-bed vegetation with a mossy snow-bed community, but, along with the mosses, characterised here by the yellow Pygmy Buttercup. Mountain Sorrel and various grasses are also seen.



Fig. 66. Snow-bed vegetation with Alpine Hair-grass communities. Polar Willows occur in addition to the yellowish-brown Alpine Hair-grass plants, but it is particularly the brown Pale Claw Moss that dominates.

ses are common and dominant. This community may have features in common with the Polar Willow-Mountain Avens communities. It has been referred to as Polar Willow heath (Fig. 64), but here it is included with the Northern Wood-rush heaths. The content of mosses increases in moist places, where the element that is rich in lichens is characterised by Iceland-moss Lichen and Mountain Ochrl Lichen*, whereas the characteristic moss is Brown Claw Moss* (*Drepanocladus revolvens*). The moss-rich element is characterised by Stepped Moss (*Hylocomium splendens*), Silk Moss* species (*Tomenthypnum* spp.), Hair-cap Mosses* (*Polytrichum* spp.) and Pale Claw Moss* (*Drepanocladus uncinatus*), etc.

This vegetation has a moderate snow cover in winter, but cushions and tufts often remain snow free and are then covered by crustose lichens, other fortuitously occurring species being found on their lee sides. On the west coast, and particularly where the bedrock is somewhat acidic and poor in nutrients, extensive mats of Heath Grey Moss* (*Racomitrium lanuginosum*) may completely dominate and characterise the vegetation, partly because of their grey-green colour (Fig. 63).

Snow-bed (snow-patch) vegetation

Snow-bed vegetation occurs in localities where snow collects in large amounts, creating snow patches which thaw late (and perhaps incompletely) in spring and where snow returns early in the autumn. In consequence, the growing period is short and the ground is moist, often with water standing on the surface because of the presence of meltwater for much of the summer. At the same time, the snow provides protection from the cold, drought and mechanical wear and tear. Snow patches are found on the lee side of stony and bedrock ridges and in hollows where snow collects. The term snow-bed vegetation is used here in a comparatively broad sense. A characteristic feature of snow-bed communities is large quantities of blue-green algae in the ground layer. These dry out during dry periods to form cracked sheets on the surface, but when it is wet they are jelly like. Depending on its floristic composition, snow-bed vegetation can be divided into three main types.

Mossy snow-bed community

This community (Fig. 65) is the most extreme type of snow-bed vegetation and is chiefly dominated by dense mosses, especially Pale Claw Moss. However, depending on the conditions, several herbs may also be present, including Pygmy Buttercup, Mountain Sorrel and Drooping Saxifrage, and the community may be quite rich in species. It is chiefly found in steep terrain with knolls and large boulders. It needs moisture throughout the growing period and an abundant snow cover in winter.

Mountain Sorrel community

This snow-bed community occupies hollows in the terrain where snow

collects and which have water on their surface for most of the growing period. Several species characterise it. The principal one is Mountain Sorrel, a beautiful plant growing in dense cushions which make this type of community easy to recognise, but other species, such as Drooping Saxifrage, Polar Mouse-ear and Alpine Meadow-grass, along with a dense occurrence of several mosses, including Slender-stemmed Hair Moss* (*Ditrichum flexicaule*), Swollen Worm Moss* (*Scorpidium turgescens*), Flat mosses* (*Distichium* spp.) and Brown Claw Moss. The moss flora varies somewhat depending on access to water. In the wettest places, such mosses as Swollen Worm Moss, Bryum* mosses (*Bryum* spp.) and Claw mosses are found, whereas species such as Golden Silk Moss* (*Tomenthypnum nitens*) and Golden Autumn Moss* (*Orthothecium chryseon*) occur in drier localities. A few lichen species may also appear in the driest places, but species which grow there have broad, succulent leaves and prefer stable moisture throughout the growing period.

Alpine Hair-grass communities

These communities (Fig. 66) are found in places having ecological conditions resembling those of the Mountain Sorrel community, but, in addition, there is generally considerable frost movement in the ground resulting in frost polygons and other solifluction features. It is chiefly Alpine Hair-grass that makes these communities easy to recognise, and with its powerful roots and tufted form this plant survives the frost movements well. The



Fig. 67. Wetland with moss-tundra communities. The bright yellow and green colours are largely produced by Golden Silk Moss, Bog Groove Moss and Grassy Sickie Moss. Several herbs, including Saxifrages and Buttercups, may grow among the mosses.



Fig. 68. Wetland with damp grass communities. The water table is so high here that pools are formed. The photograph is dominated by the white pappi of Cottongrass fruits. Dry Northern Wood-rush heath occupies the foreground.



Fig. 69. Wetland vegetation of a somewhat drier type dominated by the Field Horsetail (green areas). In addition to this, rich occurrences of Alpine Knotgrass (white) and Northern Wood-rush can be seen.

tufts of Alpine Hair-grass are fairly widely spaced and are separated by mossy mats. There may be 2–4 tufts per square metre.

Here, too, variations are found between places where there are almost only tufts of Alpine Hair-grass interspersed with open gravel and stones, a moss-rich Alpine Hair-grass community, a lichen-rich one, especially on solifluction terrain, and a herb-rich one. The first type is dominated by Alpine Hair-grass tufts around which grow some mosses, including Bog Star Moss* (*Campylium stellatum*) and Brown Claw Moss. The moss-rich community requires a regular supply of water and is found near wetlands or snow patches which thaw late. It has a thick mossy mat consisting of Brown Claw Moss, Bog Star Moss and Bryum species, etc., along with Two-flowered Rush, Polar Mouse-ear and Arctic Marsh Grass, etc.

The community that is rich in lichens is chiefly found in localities having frost polygons and which dry out during the summer, or have good drainage. Icelandmoss Lichen and Dish Lichen* (*Lecidea ramulosa*) are the most important lichens.

The last type is a somewhat drier variety of the previous one and is commonly associated with snow patches where the ground quickly dries up in spring because there is not a particularly thick depth of snow in winter. This community carries more species of vascular plants than the others. The most common ones include Polar Mouse-ear, Two-flowered Rush, Alpine Knotgrass and Sulphur-coloured Buttercup, and Brown Claw Moss and Slender-stemmed Hair Moss are the commonest mosses.

Wetland vegetation

Three groups of wetland plant communities will be described here, the moss tundra, damp grass and Arctic mire communities. These are characterised by a great predominance and thickness of mosses with bright yellow and green colours, and they have a varying content of grasses and herbs. It is often difficult to differentiate clearly between them as several transitional types occur. They are found where there is considerable seepage of water in the soil, often water rich in nutrients. Because of the thick layer of mosses and its insulating effect, the permafrost ceiling is high, often only 20–30 cm beneath the surface, thus further contributing to the rich supply of water on the surface. Together with the permafrost, the abundance of water also helps to conserve the underlying layer of humus, thus preserving developments that resemble mire. Occurrences of peat mosses in Svalbard are limited to localities in wetlands.

Moss tundra communities

Moss tundra communities are differentiated from wetlands proper by being largely associated with valley floors and having a moderate, though stable, snow cover. They also depend upon a supply of fresh water that is flowing, and are consequently most typically found on sloping ground. Several varieties of moss tundra communities are found, but it is primarily large,



Fig. 70. Shore meadow where the effect of tidal water has led to distinct zonations in the vegetation. The orange-coloured belt is Creeping Saltmarsh Grass, which is particularly bright orange in autumn. Mainly Arctic Saltmarsh Sedge with some mosses occur in the foreground.



Fig. 71. Shore meadow with Arctic Chickweed flowering profusely on periodically inundated ground. The light brown and white areas in the centre show this, but the white stripe in the upper half is a result of precipitation of salt.



Fig. 72. A stretch of shore meadow largely covered by Polar Bear Sedge. Its characteristic round tufts make it easy to recognise. Zones carrying Polar Bear Sedge occur somewhat higher up than those with Creeping Saltmarsh Grass and Arctic Saltmarsh Sedge.

colourful moss species, Golden Silk Moss, Grassy Sickle Moss* (*Dicranum angustum*) and Bog Groove Moss* (*Aulacomnium palustre*), etc. that dominate (Fig. 67).

The least moist part of the moss tundra is characterised by Polar Willow and Field Horsetail whose creeping branches and underground runners help to hold the community together and stabilise it. The Polar Willow-Field Horsetail community is a good name for this community (Fig. 69). It forms valuable summer grazing for reindeer. The remaining moss tundra communities can be grouped together as Golden Silk Moss communities, the varieties of which are distinguished by the additional occurrence of various mosses and vascular plants. One example is a community rich in Yellow Marsh Saxifrage*, easily recognised when this is in bloom.

Damp grass communities

These communities require a great deal of moisture in the soil and long periods with an abundant supply of water, or the presence of standing water. Access to oxygen is therefore reduced and the range of species is more specialised than otherwise. These wetlands are the wettest plant communities in Svalbard and also need appreciable snow cover in winter. Among the mosses, it is particularly Tarn Mosses* (*Calliergon* spp.) and Claw Mosses which dominate, along with Curved Swan-necked Moss* (*Meesia tri-*



Fig. 73. Shore ridges onto which seaweed and kelp are thrown provide a substrate rich in nutrients. The photograph shows Oysterplant, Sea Sandwort and Curved Sedge, along with Creeping Saltmarsh Grass and several other species. Shore ridges like this are found in central and western parts of Svalbard.

quetra), Swollen Worm Moss, Mountain Groove Moss (*Aulacomnium turgidum*) and others. The variations mostly reveal themselves through the occurrence of vascular plants. Broadly speaking, the damp grass communities can be subdivided according to the most frequently occurring grass species. One community, found where the water table remains high for most of the summer, is dominated by Polar Foxtail. Another, distinguished by Tundra Grass, occurs in depressions containing almost stationary water. A third has Arctic Marsh Grass and is associated with open water, occurring chiefly on sloping ground over which nutrient-rich water flows. Finally, there is a pure moss community containing Tarn Mosses and Claw Mosses. Arctic Cottongrass, a readily visible and attractive species which helps to underline the beauty of the Arctic landscape, occurs frequently in the communities dominated by Tundra Grass and Arctic Marsh Grass (Fig. 68).

Arctic mire communities

Damp grass communities accumulate large quantities of humus, or peat, from the mosses. This will be deposited in water and be conserved there because of lack of air, as is normal in the formation of mire elsewhere. However, because the wetland grows in height, permafrost takes over as the conserving factor and halts the decomposition. The plant remains occur in a little altered state and can be identified. This is a difference from ordinary

mire formation and the term Arctic mire has been used. An Arctic mire can grow in depth or thickness at a rate of a couple of millimetres each year. Stratigraphically, it can be said that Arctic mires have an uppermost layer of about 20–25 cm which thaws during the summer and which stands in water above a permafrost layer consisting of frozen plant remains, particularly mosses, but solid ice also occurs. Arctic mires are differentiated by largely lacking sedges, whereas peat mosses, which are otherwise uncommon in Svalbard, may occur in considerable quantities. Mire-like vegetation is often found at the foot of bird cliffs where the humus layer, because of high production, can be very thick. This is a special mode of formation, where moisture, for example, plays a subordinate role

Shore-meadow vegetation

Extensive areas of beautifully developed shore meadows are found on flat shores that are regularly flooded by high tides, and particularly near river mouths where deltas are developed. Typical shore meadows are characterised by a low, dense and unbroken vegetation cover. A feature of most shore-meadow communities is that blue-green algae form an important part of the ground surface, ensuring a supply of nitrogen. Mostly grass and sedge species predominate, but in some places, especially on the upper portions of the shores, there may be a substantial number of herbs.



Fig. 74. Mire-like vegetation at the foot of a bird cliff. The humus layer may be thick enough to warrant using the term mire. On the extreme right, the bright green vegetation consists of Polar Scurvygrass, Mountain Sorrel and several other herbs and grasses. Yellow and brown parts are dominated by mosses, but many other species also occur there.

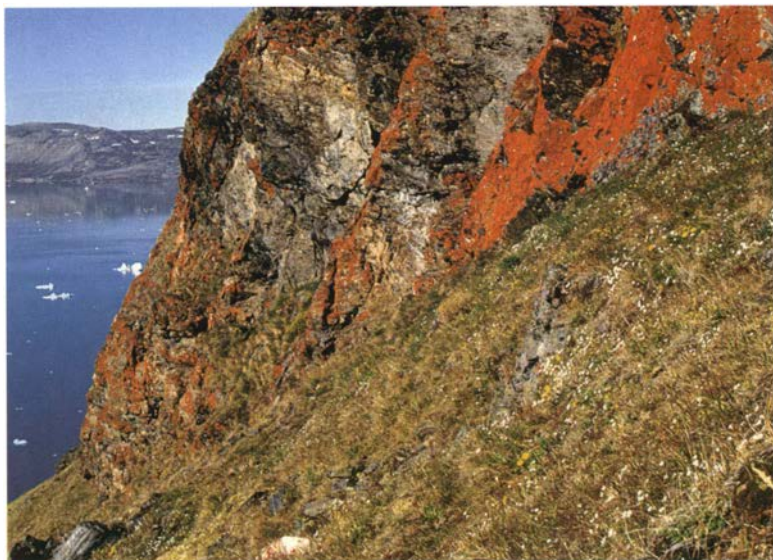


Fig. 75. Bird-cliff vegetation which, in addition to the most common species, Polar Scurvygrass and Mountain Sorrel, also includes a large number of other species, such as Arctic Mouse-ear, Cinquefoils and grasses. Large quantities of Elegant Orange Lichen are seen on the rock.

Tidal water has a strong influence on these areas, along with flood water from rivers and streams. These shifts in the water level give rise to characteristic zonations, often with sharp boundaries between the zones (Fig. 70). Plants which grow here have to tolerate salt water and substantial changes in the water level. The soil is frequently dominated by clay, but some localities have a significant sand content. In late summer and autumn, shore-meadow vegetation takes on bright autumn colouring dominated by yellows and rusty brown, and the meadows become a magnificent sight, painting the landscape.

Shore-meadow vegetation is divided into many units of lower rank, and only a few principal types are described here.

Creeping Saltmarsh Grass communities

Creeping Saltmarsh Grass* forms a typical and well-defined belt closest to the water on sheltered, clayey seashores. The plants are low and creeping, have a characteristic grey to reddish-brown colour and, particularly in late summer and autumn, are beautifully bright yellow and orange. There are many variations, ranging from pure stands of Creeping Saltmarsh Grass to types having various occurrences of mosses. In some places in deltas, snow



Fig. 76. Polar desert environment with scattered Svalbard Poppies.
Photo: Arve Elvebakk.

drifts leave their impression on the shore, giving a snow bed effect. A very characteristic and beautiful community is dominated by Arctic Chickweed* which, particularly when its white flowers are in bloom, is a splendid sight (Fig. 71).

Polar Bear Sedge communities

A very characteristic shore-meadow community is dominated by the distinctive species, Polar Bear Sedge. It grows in compact, round tufts and distinct zones, but relatively high up the shore and consequently avoids being inundated by every high tide (Fig. 72). Another closely related community is dominated by Arctic Saltmarsh Sedge. It generally occurs between Creeping Saltmarsh Grass and Polar Bear Sedge communities. The Arctic Saltmarsh Sedge community is frequently influenced by fresh water, too.

There are also several other types of shore-meadow communities or shore vegetation. Tundra Grass may form shore meadows along the coast, and in such cases it occurs densely. Quite a rich flora may develop on shore ridges where seaweed and kelp are thrown up. Depending on the conditions, for instance varying amounts of sand and pebbles, Saltmarsh Sedge and Curved Sedge may occur. Figure 73 shows a shore ridge with Oysterplant and Sea Sandwort.

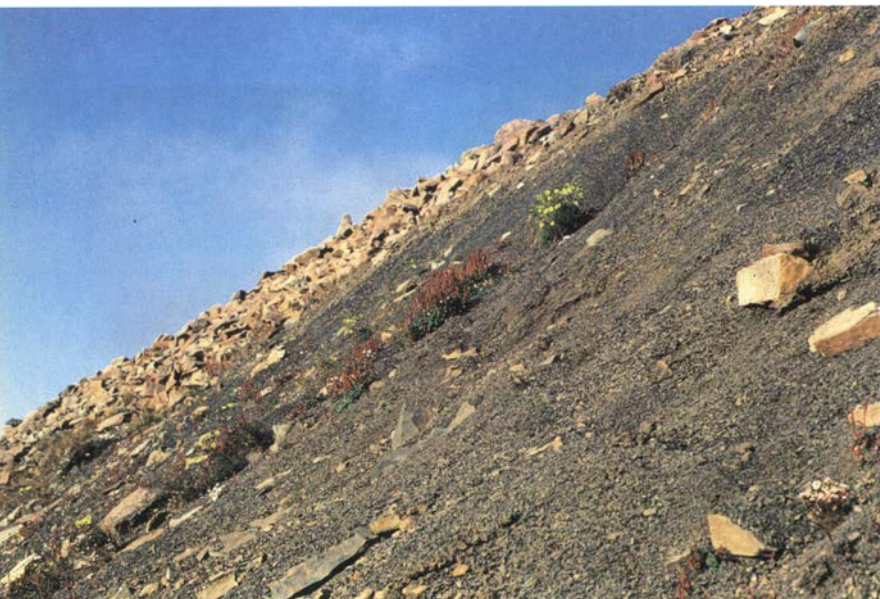


Fig. 77. A scree slope consisting of unstable sand and gravel. A continuous vegetation cover is absent, only isolated patches of mosses and herbs being found where the substrate is relatively stable. Tufts of Svalbard Poppy and Mountain Sorrel can be seen, and smaller tufts of Saxifrages and Arctic Mouse-ear also occur.

Fertilised vegetation

Bird-cliff vegetation

This is a type of vegetation that is exceptionally rich and lush. It is chiefly found on steep slopes beneath bird cliffs where droppings (guano) from the birds provide abundant access to mineral nutrients, particularly nitrogen and phosphorus. A rich flora of higher plants and mosses is found in such sites (Fig. 3). The cliffs generally face southwards. The aspect and the ready availability of nutrients mean that the vegetation is continuous and forms very thick mats. Species that withstand the competition here flower profusely.

The vegetation is a luxuriant mixture of mosses, herbs and grasses. The number of species is large. Species which profit from the rich fertilisation are chiefly mosses such as Claw Mosses and vascular plants such as Spiked Snow-grass*, Meadow-grasses, Saxifrages, Mouse-ears and, not least, large, sturdy examples of Polar Scurvygrass and Mountain Sorrel (Fig. 74). Considerable quantities of large lichens are also found here,

particularly Pelt Lichens (*Peltigera* spp.), which compete for space among all the other species.

Large amounts of the bright orange crustose lichen, Elegant Orange Lichen* (*Xanthoria elegans*), often grow on steep cliffs and large boulders and together with white stripes and green vegetation make the bird-cliff communities conspicuous in the terrain (Fig. 75).

Similar effects of excrements from birds are also found in many other places where birds nest. This chiefly applies to islets and shores, or the surroundings of small lakes where geese congregate, as well as «bird mounds» and near the nests of certain species. The flora found there is correspondingly rich in species which grow tall among the mats of mosses on damp ground. Abandoned settlements stand out in the terrain because of the more lush vegetation near the houses.

Other plant communities

Several types of vegetation and plant communities occur in addition to those mentioned above. A feature these have in common is that they mostly occur on gravel, block fields (felsenmeer) and rock. The plants in such localities generally grow so widely dispersed and in special ecological niches that it is difficult to speak of plant communities in the true sense of the term. In fact, it is these communities that are distributed across the largest areas, and usually only as widely scattered patches of vegetation consisting of some moss and a few flowering plants in the shelter of stones, knolls and the like. On wet gravel near glaciers and moraines, the surface is often covered with blue-green algae which lie as a film or slimy mass on the surface, consequently forming the first pioneer vegetation in such places (Fig. 104). Other pioneer plants on open, gravelly and stony surfaces are principally species which produce abundant quantities of seed, or have other efficient modes of dispersal. Purple Saxifrage, Mouse-ear species and Tufted Saxifrage, etc., along with small mosses, are examples of these.

Polar desert

The term polar desert is now commonly applied to areas with an extremely sparse plant cover (Fig. 76). They are generally exposed to the weather, and desiccation in summer and winter alike also leaves its mark on them. The snow cover is very thin, or completely lacking. Gravel and stones, with scattered patches of sand, form the substrate. Most people would no doubt characterise these areas as being free of vegetation, and if there is any plant cover, it will scarcely exceed 10% if mosses and flowering plants alone are considered.

A characteristic feature of the polar desert is that the Svalbard Poppy is a preferred species and some botanists have used this species as the collective term for plant communities of this kind. The Northern Wood-rush is another species which occurs frequently, along with patches of moss and crustose lichen. Otherwise, it must be said that the polar desert is best typified by nega-

tive characteristics, i.e. lack of vegetation and, particularly, woody plants. The varieties of polar desert found in Svalbard belong to the northerly or Arctic type, which is found on both mountains and flat shores close to sea level.

Screes

These are open communities with herbs and grasses found on steep slopes with sand, gravel and stones which are weathering products from the hillside above (Fig. 77). Their vegetation cover is generally no more than 10–15%. They have little snow cover in winter, and desiccation in spring and summer is common. The substrate is very unstable and contains practically no humus. A little soil and a limited plant cover can only collect in small depressions and in the shelter of relatively large stones. The Svalbard Poppy is the principal species that shows preference for such areas, but also other species with a taproot or an elastic root system, as well as tufts of grass species survive here. Examples include Whitlow-grasses, Saxifrages, Mouse-ears and Wood-rushes. All told, the number of species may be quite large, but individual plants are widely dispersed and do not form typical communities.

Sandy and gravelly sites

An open vegetation that is relatively rich in species may occur in places with open gravel, sand and clay, such as flat areas along rivers and beside deltas with extensive fluvial deposits (Fig. 2). Several species of grass, such as Red Fescue, Polar Foxtail, Alpine Hair-grass and several Meadow-grasses, along with Svalbard Chickweed, Whitlow-grasses, etc., may be common on gravel and sand.

The ecological conditions here are reminiscent of screes, but the substrate is more stable. Several other species grow on clayey soils and areas that are periodically inundated, because their runners or sturdy roots are sufficiently well-fixed to tolerate such conditions. Dwarf individuals of Tundra Grass along with Two-flowered Rush and Bryum mosses are examples of species that can survive these conditions.

Moraines and block fields (felsenmeer)

Some scattered plant communities may occur on rocky knolls, ridges and moraines where sufficient soil is present. These are extremely heterogeneous, varying according to access to water. They sometimes begin to resemble ridge communities, but elsewhere, particularly on block fields, mosses, such as Grey Mosses* (*Racomitrium* spp.), occur that tolerate drying out. Otherwise, a wide selection of species occurs, depending on how the ecological conditions vary. Polar Willow, Northern Wood-rush and Cinquefoils may occur, and of the mosses, Hair-cap Mosses (*Pogonatum* spp.) and Nodding Mosses* (*Poblia* spp.) are common. Some lichens, especially crustose lichens, are common. A feature of these communities is that the vegetation is more compact and richer on lee slopes and south-facing sides of moraines, and otherwise where stability is at its best.

List of English names of mosses mentioned in the vegetation chapter:

Mountain Ochrlil Lichen (Fjellkorkje)	<i>Ochrolechia frigida</i>
Ochrlil Lichens (Korkje-arter)	<i>Ochrolechia</i> spp.
Elegant Ortange Lichen (Raudberglav)	<i>Xanthoria elegans</i>
Icelandmoss Lichen (Snøskjerpe)	<i>Cetraria delisei</i>
Pelt lichen (Årenever)	<i>Peltigera</i>
Dish Lichen	<i>Lecidea ramulosa</i>
Fringed Moss (Bakkefrynse)	<i>Ptilidium ciliare</i>
Pale Claw Moss (Bleikklo)	<i>Drepanocladus uncinatus</i>
Brown Claw Moss (Brunklo)	<i>Drepanocladus revolvens</i>
Stepped Moss (Etasjehusmose)	<i>Hylocomium splendens</i>
Hair-cap Moss (Fjellbjørnemose)	<i>Polytrichum alpinum</i>
Mountain Groove Moss (Fjellfiltmose)	<i>Aulacomnium turgidum</i>
Grassy Sickle Moss (Grassigd)	<i>Dicranum angustum</i>
Golden Autumn Moss (Gullhøstmose)	<i>Orthotrichum chryseon</i>
Golden silk Moss (Gullsilkemose)	<i>Tomenthypnum nitens</i>
Heath Grey moss Heigråmose)	<i>Racomitrium Lanuginosum</i>
Claw braided moss (Kløflette)	<i>Hypnum bambergeri</i>
Claw Mosses (Klomose-arter)	<i>Drepanocladus</i> spp.
Swollen Worm Moss (Kvapmakkmose)	<i>Scorpidium turgescens</i>
Hair-cap mosses (Krukkemose-arter)	<i>Pogonatum</i> spp.
Bog Groove Moss (Myrfiltmose)	<i>Aulacomnium palustre</i>
Bog Star Moss (Myrstjernemose)	<i>Campylium stellatum</i>
Nodding mosses (Nikkemose)	<i>Pohlia</i> spp.
Flat Mosses (Planmose-art)	<i>Distichium</i> spp.
Curved Swan-necked Moss (Skruesvanemose)	<i>Meesia triquetra</i>
Slender-stemmed Hair Moss (Storbust)	<i>Ditrichum flexicaule</i>
Tarn Mosses (Tjønnmose-arter)	<i>Calliergon</i> spp.
Bryum Mosses (Vrangmose-arter)	<i>Bryum</i> spp.

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ENGLISH NAMES OF SPECIES

Alpine Arnica	75	Curved Wood-rush	82
Alpine Bistort	23	Cushion Sedge	88
Alpine Cinquefoil	65	Cushioned Meadow-grass* . .	106
Alpine Hair-grass	101	Cushioned Sandwort*	28
Alpine Meadow-grass	105	Cushioned Whitlow-grass* .	48
Alpine Mouse-ear	33		
Alpine Rock-cress	46	Dickie's Bladder-fern	20
Alpine Saw-wort	75	Diminutive Gentian*	70
Alpine Saxifrage	56	Drooping Saxifrage	58
Arctic Chickweed*	32	Dwarf Birch	23
Arctic Cinquefoil*	64	Dwarf Golden-saxifrage* . . .	60
Arctic Cottongrass	84	Dwarf Horsetail*	18
Arctic Dandelion	78	Dwarf Saxifrage*	56
Arctic Fescue*	113	Dwarf Willow	21
Arctic Hairbell	73		
Arctic Hare's-foot Sedge	90	False Sedge	85
Arctic Holy Grass	96	Field Horsetail	
Arctic Marsh Grass	107	(Polar Horsetail)	17
Arctic Meadow-grass	103	Foliolose Saxifrage	57
Arctic Mouse-ear	33	Fringed Sandwort	30
Arctic Roseroot*	53		
Arctic Rush	81	Glacier Buttercup	37
Arctic Saltmarsh Sedge	91	Glaucous Meadow-grass . . .	106
Arctic Saxifrage*	60	Glossy Buttercup*	38
Arctic Sea Rocket*	52	Golden Whitlow-grass*	50
Arctic White Champion*	34		
Arctic Wood-rush	83	Hair Sedge	93
		Hairy Fescue*	114
Bear Island Dandelion*	78	Hairy Lousewort	72
Black Cottongrass*	84	Hawkweed-leaved	
Black Fleabane*	74	Saxifrage	56
Bluff Cinquefoil	63	Hemispherical	
Boreal Jacob's-ladder	70	Whitlow-grass*	51
		High Alpine Cress*	43
Chestnut Rush	81	High Alpine Hairbell*	73
Cloudberry	65	Highland Saxifrage	58
Common Chickweed	31		
Common Sorrel	25	Iceland-purslane	24
Creeping Saltmarsh Grass* . .	111		
Curved Sedge	89	Lady's-mantle	67

Lapland Butterbur	75	Polar Mouse-ear*	33
Lapland Buttercup	39	Polar Radish*	45
Lapland Whitlow-grass	50	Polar Saltmarsh Grass*	111
Lobe-leafed Buttercup*	40	Polar Saxifrage*	59
Low Sandwort	30	Polar Scurvygrass*	44
		Polar Stoloniferous	
Mare's-tail	67	Saxifrage*	60
Maritime Sedge*	90	Polar Whitlow-grass*	49
Meadow Buttercup	41	Polar Willow*	21
Mealy Whitlow-grass	52	Purple Saxifrage	55
Moonwort	20	Purplish Braya	44
Moss Champion	35	Pygmy Buttercup	40
Mossy Mountain-heather	68		
Mountain Avens	66	Red Fescue	113
Mountain Crowberry	69	Red-stemmed Cinquefoil*	63
Mountain Eyebright	71	Reindeer Wood-rush*	82
Mountain Sorrel	25	Ridge Sedge*	93
Mountain Sandwort	28	Rock Fescue*	113
		Rock Sedge	88
Narrow-leaved Sedge	88	Rock Whitlow-grass	51
Narrow Small-reed	99	Russet Sedge	92
Net-leaved Willow	22	Russian Grass*	98
Nodding Sedge*	91		
Northern Meadow-grass	103	Sabine's grass*	106
Northern Moonwort	20	Saltmarsh Sedge	90
Northern Oat-grass	101	Sea Sandwort	29
Northern Saltmarsh Grass	112	Scottish Asphodel	79
Northern Wood-rush	82	Scree Whitlow-grass*	52
		Sheep's Sorrel	25
Obtuse Sedge*	90	Shepherd's-purse	52
Outspread Snow-grass*	97	Sibbaldia	66
Outspread Tundra Grass*	109	Smooth Meadow-grass	103
Oysterplant	70	Smooth Woodsia	20
		Snow Buttercup	39
Pale Whitlow-grass*	48	Snow Pearlwort	26
Polar Bear Sedge*	89	Snow Whitlow-grass	51
Polar Bilberry	69	Spiked Snow-grass	97
Polar Champion*	34	Starwort Mouse-ear	32
Polar Cress	43	Sulphur-coloured	
Polar Dandelion	78	Buttercup	39
Polar Fescue*	114	Svalbard Arctic Saltmarsh	
Polar Fir Clubmoss*	19	Grass*	109
Polar Foxtail*	97	Svalbard Buttercup*	38
Polar Horsetail	17	Svalbard Poppy	41
Polar Meadow-grass*	103	Svalbard Saltmarsh Grass*	112

Svalbard Saxifrage*	58	Vahl's Arctic Saltmarsh	
Svalbard Snow Cinquefoil* ..	64	Grass*	108
Teesdale Sandwort	28	Variigated Horsetail	18
Tufted Hair-grass	100	Viviparous Fescue	113
Tufted Cinquefoil	62	Viviparous Northern	
Tufted Pearlwort*	27	Meadow-grass*	103
Tufted Sandwort*	28	White Arctic Bell-heather ...	68
Tufted Saxifrage	59	White Arctic	
Tundra Buttercup*	39	Whitlow-grass	51
Tundra Chickweed*	31	Winter-ress	53
Tundra Grass*	109	Wiry Meadow-grass*	106
Tundra Hair-grass*	101	Woolly Fleabane*	75
Tundra Rush*	81	Woolly Lousewort	72
Tundra Sedge*	90	Yellow Marsh Saxifrage*	58
Tundra Water Sedge*	91	Yellow Mountain Saxifrage ..	57
Tundra Whitlow-grass*	50		
Tundra Willow*	22		
Two-flowered Rush	81		









FAMILY NAMES IN LATIN

<i>Alchemilla</i>	67	<i>Honkenya</i>	29
<i>Alopecurus</i>	97	<i>Huperzia</i>	19
<i>Arabis</i>	46	<i>Juncus</i>	79
<i>Arctagrostis</i>	98	<i>Kobresia</i>	85
<i>Arctophila</i>	107	<i>Koenigia</i>	24
<i>Arenaria</i>	29	<i>Luzula</i>	82
<i>Arnica</i>	75	<i>Mertensia</i>	70
<i>Barbarea</i>	53	<i>Minuartia</i>	27
<i>Betula</i>	23	<i>Oxyria</i>	25
<i>Botrychium</i>	19	<i>Papaver</i>	41
<i>Braya</i>	44	<i>Pedicularis</i>	72
<i>Cakile</i>	52	<i>Petasites</i>	75
<i>Calamagrostis</i>	99	<i>Phippisia</i>	97
<i>Campanula</i>	72	<i>Pleuropogon</i>	70
<i>Capsella</i>	52	<i>Poa</i>	102
<i>Cardamine</i>	43	<i>Polemonium</i>	70
<i>Carex</i>	86	<i>Polygonum</i>	23
<i>Cassiope</i>	68	<i>Potentilla</i>	62
<i>Cerastium</i>	32	<i>Puccinellia</i>	110
<i>Chrysosplenium</i>	60	<i>Ranunculus</i>	36
<i>Cochlearia</i>	44	<i>Rhodiola</i>	53
<i>Colpodium</i>	108	<i>Rubus</i>	65
<i>Cystopteris</i>	20	<i>Rumex</i>	25
<i>Deschampsia</i>	100	<i>Sagina</i>	26
<i>Draba</i>	46	<i>Salix</i>	21
<i>Dryas</i>	66	<i>Saussurea</i>	75
<i>Dupontia</i>	109	<i>Saxifraga</i>	53
<i>Empetrum</i>	69	<i>Sibbaldia</i>	66
<i>Equisetum</i>	17	<i>Silene</i>	34
<i>Erigeron</i>	74	<i>Stellaria</i>	30
<i>Eriophorum</i>	84	<i>Taraxacum</i>	76
<i>Euphrasia</i>	71	<i>Tofieldia</i>	79
<i>Eutrema</i>	45	<i>Trisetum</i>	101
<i>Festuca</i>	112	<i>Vaccinium</i>	69
<i>Gentianella</i>	70	<i>Woodsia</i>	20
<i>Hierochloë</i>	96		
<i>Hippuris</i>	67		



REGION (Region)	MELLOMARKTIS (Mid region)	HØYARKTIS (High region)	m a s l t (m a s l t)
HØYDEBELTE (no- belt)			900
			600
			300
	SONE (zone)		

Fargenøk for regioner, zoner og høydebelter.
- Colours used for regions, zones and orographic belts.

- MELLOMARKTIS/MID ARCTIC**
-  Kartlyngsone (oro-kartlyngbelte)
 -  Cassiope tetragona zone (oro-Cassiope tetragona belt)
 -  Reinrossone (oro-reinrossbelte)
 -  Dryas octopetala zone (oro-Dryas octopetala belt)
- HØYARKTIS/HIGH ARCTIC**
-  Polarierisone (oro-polarierbelte)
 -  Salix polaris zone (oro-Salix polaris belt)
 -  Svalbardvalmuesone (oro-svalbardvalmuebelte)
 -  Papaver dahliarum zone (oro-Papaver dahliarum belt)

VEGETASJONSREGIONER - SVALBARD OG JAN MAYEN

VEGETATION REGIONS - SVALBARD AND JAN MAYEN

UTARBEIDET AV L. BRATTTAKK
NORSK POLARINSTITUTT/MAB - SVALBARDPROSJEKTER

Målestokk 1:1 000 000

