A Review of Plant Communities of the Faroe Islands

Eitt yvirlit yvir føroysk plantusamfeløg

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Úrtak

Gróðurin í Føroyum er sera nógv ávirkaður av seyðabiti og torvskurði. Soleiðis ber neyvan til at tosa um "natúrligan" gróður nakrastaðni uttan á støðum, ið ikki eru atkomulig hjá seyði. Fjallagróðurin er fyrst og fremst grámosi, nakað av kavadeldargróðri, har kavin verður liggjandi leingi, og eyrslættagróðri. Heiðalyngur er vanligur á láglendi í flestu oyggjunum. Heiðagróðurin er sera blandaður – við mongum grøsum, urtum og mosum. Nógv tann vanligasti vøksturin í Føroyum er graslendi, ið er at finna frá sjóvarmála til fjallatind. Trý sløg av mýrulendi eru í Føroyum; hesi eru lendisgjørd mýra, tilrenningarmýra og regnmýra. Hámosar eru eingir. Størsti parturin av strondini er berg við fáum sandstrondum og síðlendum. Mølheyggjar eru bara á einum stað.

Abstract

The vegetation of the Faroe Islands is heavily grazed by sheep and affected by peat cutting. So-called "natural" vegetation, therefore, can only be found in inaccessible places. *Racomitrium* heaths, some snow-bed vegetation in areas with late-lying snow, and fell-field vegetation dominate the alpine vegetation. *Calluna* heaths are common in the lowlands on most of the islands. The heath vegetation is very mixed with many grasses, herbs and mosses. The most dominant vegetation in the Faroe Islands is grassland vegetation, found from sea level to mountaintop. Three types of mires are found in the Faroe Islands, topogenic, soligenic, and ombrogenic. Raised bogs are not found. Most parts of the Faroese coastline consist of more or less vertical cliffs with a few sand beaches and salt marshes. Sand dunes are found in only one place.

Introduction

The vegetation of the Faroe Islands has been of interest to botanists since the 18th century and is relatively well documented. Most of the investigations, however, are restricted to qualitative descriptions and lists of species from various vegetation types and localities (Svabo, 1781-1782; Landt, 1800; Trevelyan 1837; Rostrup, 1870; Børgesen and Ostenfeld, 1896; Ostenfeld, 1897; 1899; 1902). Warming (1901-1908) edited the publication *Botany of the Faeroes I-III*, which contains the results of botanical investigations made in the Faroe Islands during 1895-1900. Among other contributors to this work are Ostenfeld, who described phanerogams, pteridophytes and phytoplankton; Jensen, who described bryophytes (see also Jensen, 1896); Rostrup, who described fungi; Deichmann Branth, who described lichens; Dahlstedt, who dealt with the genus *Hieracium*; and Warming, who summarised biological investigations and ecological perspectives.

In 1934, Ostenfeld and Gröntved published a flora from Iceland and the Faroe Islands, and, in 1936, Rasmussen published the first Faroese flora and a second revised

edition with new records in 1952. In order to get more accurate information on frequency and distribution of vascular plants, a comprehensive field study was made in 1960-1961. These investigations also gave information about the zonation of the vegetation in the Faroe Islands, and the native and introduced plants with regards to their taxonomy, distribution and ecology (Hansen, 1964; 1966; 1972). In 2000, a new flora from the Faroe Islands (Jóhansen, 2000) and an updated overview of the distribution of vascular plants (Fosaa, 2000) were published.

Ostenfeld (1906; 1905-1908) made the first investigation of Faroese plant communities. He gave a comprehensive description of plant communities throughout the islands. He also studied human influence on the vegetation, phenology, functional aspects (Raunkiær life form system), and the altitudinal distribution of species. Böcher (1937; 1940) made later studies of plant communities in which he described the alpine vegetation – especially fell-fields, *Racomitrium* heaths, snow-bed vegetation, and other types of mountain vegetation. He also studied the heath land flora and its phytogeographical affinities. The phytogeography of the Faroese flora was also studied by Jensen (1901), Warming (1888), and Tukhanen (1987). Rasmussen (1946) studied the effect of guano on plants on bird cliffs. Later investigations of plant communities were made by Hansen (1967), Tomlinson (1981), Dierssen (1982; 1996), Hobbs and Averis (1991), and Tannhauser (1995).

In the present paper, a review is given of what is known about the plant communities in the Faroe Islands. Only publications with comprehensive descriptions of plant communities and publications using quantitative methods to sample the vegetation are considered here.

Summary of the Geology, Climate, and Soil Types

The Faroe Islands is a treeless archipelago situated between 61°20' and 62°24' N and between 6°15' and 7°41' W in the warm North Atlantic Current. The nearest neighbour, the Shetland Islands, is 345 km to the southeast. The Faroe Islands consists of 18 islands separated by narrow sounds with a total land area of 1,400 km^2. The distance from north to south is 113 km and from east to west is 75 km. The highest mountain peak is 882 m a.s.l. During the last ice age, the Faroe Islands was covered with its own ice cap, distinct from the ice cap covering continental northern Europe. Possibly only the highest mountain peaks protruded from the ice, forming nunataks. These nunataks are thought to be refugia for some arctic plants, which were able to survive there. The majority of the present plant species invaded the islands after the ice disappeared about 10,000 years ago through the action of wind, ocean currents, birds, and later, by man.

The Faroe Islands was formed by volcanic activity during the Tertiary, about 50-60 million years ago. From a geological point of view, the islands belong to the North Atlantic Basalt Area. Part of this area occurs in north-east Ireland, the west coast of Scotland, in south-east and north-

west Iceland, on Jan Mayen, in parts of east and west Greenland, and on Baffin Island. The total thickness of the Faroese basalt is 3,000 m and consists of three basaltic series, characterised by alternating layers of basalt, lava, and tuff. In some places, carboniferous strata with identifiable fossils of *Metasequoia occidentalis* have been found (Rasmussen and Koch, 1963). The layered structure of the bedrock gives the landscape its characteristic look of more or less sloping surfaces truncated by vertical cliffs. The basalt horizon dips slightly in a northeast direction in the southern part of the islands and in a south-east direction in the northern part of the islands. The northern and western sides of the islands have steep cliffs, while the eastern side of the islands slopes gently into the sea. In some places, especially on the eastern side of the islands, peat bogs are found below sea level, indicating a recent submergence of the land to the east. These peat horizons are seldom thicker than 1-1.5 m on average.

The climate is highly oceanic with cool summers and mild winters. It is greatly influenced by the warm North Atlantic Current and by proximity to the common cyclone track in the North Atlantic region. Consequently, the climate is humid, variable, and windy. The warmest months are July and August with a mean temperature of 11°C (lowland) and the coldest month is February, with a mean temperature of 4°C (lowland). Precipitation reflects the topography of the islands. The coastal areas receive around 1,000 mm per year increasing to more than 3,000 mm in the central regions. Wind is one of the main factors affecting the vegetation both directly and by salt spray, which is carried inland.

The soils are developed from fairly homogeneous, basalt parent material under humid and cool conditions. The time the processes have had to function is short on a geological timescale – about 10,000 years. The soils are continuously wet or moist and generally have a thick organic horizon. They are strongly acidic with high cation exchange capacities and low base saturation. The soils higher up are more minerogenic because of much stronger erosion. The soil here is less acidic and the vegetation forms grassland and grassy moors. These constitute the most important pastures for the thousands of grazing sheep. The islands are heavily grazed, thus, "natural" vegetation is rare. In the bottom of valleys, in depressions and other wet areas, mires have developed. The basis for the marsh vegetation is peat, which has played an important role for the Faroese population right up to the present time. The cutting of peat was very common and artificial depressions have been formed in the terrain, which have promoted even larger areas of marsh vegetation.

Vegetation Classification and Plant Communities

Due to the extreme oceanic climate, it is difficult to delimit plant associations. The differences are small compared to other countries and it is necessary to indicate a gradual transition from one association to another.

Various methods and terms have been used to classify the vegetation of the Faroe

Islands. Ostenfeld (1905-1908) made a comprehensive description of the vegetation into associations based on observations. Böcher (1937; 1940) and Hansen (1972) used the method developed by the Danish botanist, Raunkiær, to sample vegetation. They also registered frequencies of species' occurrence. Böcher (1937; 1940) also used the Hult-Sernander five-degree scale to measure the cover of vegetation. Both of the scientists used the term sociation to describe the plant communities, based on dominant species. The term sociation is used mostly in Scandinavia and fits into the Braun-Blanquet system of association. Dierssen (1982) and Tannhauser (1995) used the Braun-Blanquet system to define the associations.

Hobbs and Averis (1991) used the National Vegetation Classification (Rodwell, 1991-1995). In their system, a community is roughly equivalent to a Braun-Blanquet association.

In this paper the term association is used and a summary is given in Appendix I.

Alpine Vegetation

Snow cover is very important in alpine areas, protecting the soil surface from frost penetration in winter. Due to mild, subzero winter temperatures, plants must be able to withstand a snow-free winter, which is liable to disturb the winter period of inactivity. Only limited information on the duration of the snow cover in the alpine areas is available from the Faroe Islands. Ostenfeld (1905-1908) made some observations in a two-year period and Böcher (1937) had some information from local people. Meteorological information on the duration of snow cover in Tórshavn in the period 1961-1991 shows that January had the maximum number of days of snow cover (10.8 days), while the period from May to October had no snow cover (Cappelen and Laursen, 1998).

The most distinctive features in the alpine zone are the flat mountaintops forming "fell fields", described for the first time in Greenland by Warming (1888). These flat pastures are formed as a result of erosion and one finds them from an elevation of a few hundred metres up to the highest mountaintop (882 m). Such plateau-like areas are exposed to strong winds, and the substrate freezes and thaws repeatedly. Most of these areas consist of a mosaic of cliff surfaces with moss and lichens, and a few higher plants. The vegetation is very distinctive, though sparse. It is the instability of the ground and its constant movement that causes the scarcity of flora.

The most common plants in the alpine zone are *Koenigia islandica*, *Silene acaulis, Luzula spicata, Alchemilla alpina, Bistorta vivipara, Juncus trifidus, Deschampsia alpina*, *Saxifraga rosacea, Loiseleuria procumbens, Sibbaldia procumbens,* and *Salix herbacea. Ranunculus glacialis, Papaver radicatum,* and *Omalotheca supina* occur on the highest mountain peaks only. In the fell fields, a *Koenigia – Ranunculus glacialis* association has been described at 730 m a.s.l. This association is strongly influenced by species like *Salix herbacea*, *Racomitrium lanuginosum,* and *R. fasciculare* (Böcher, 1937). In two places, at altitudes of 200 and 350 m.a.s.l., respectively,

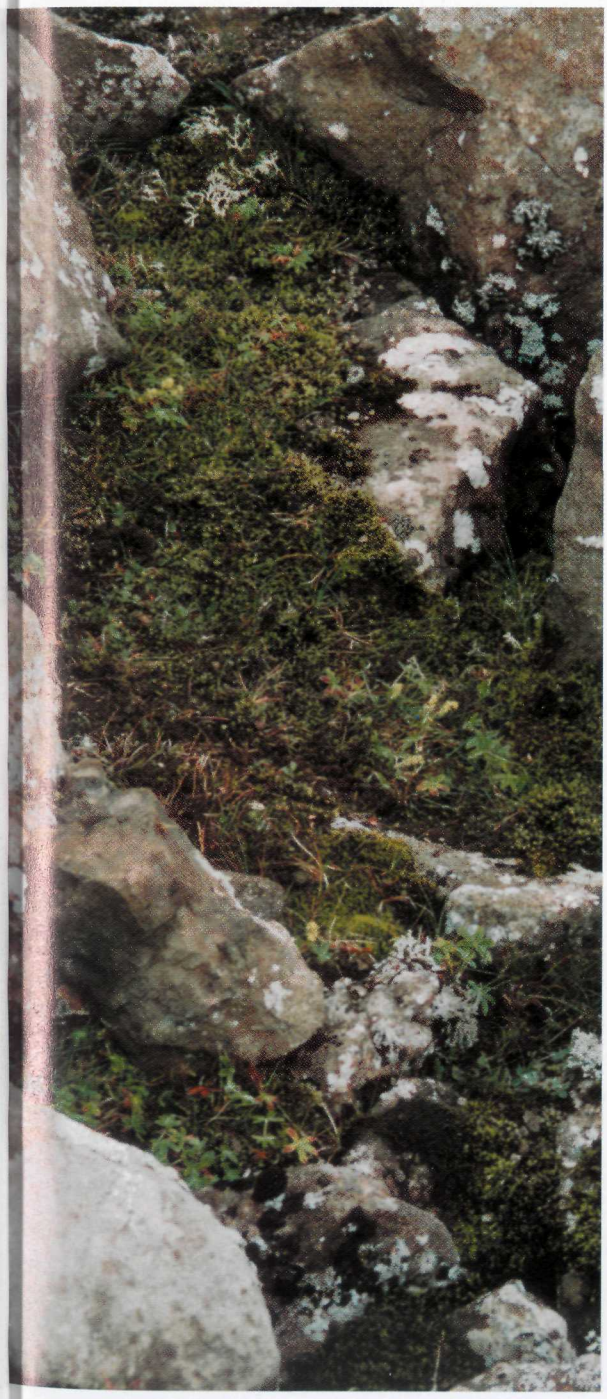

Fig. 1. Alpine community with Alchemilla alpina, Sibbaldia procumbens, and Racomitrium from Villingardalsfjall on Viðoy.
Mynd 1. Mikilskøra og krykin fjallasmæra í fjallaplantusamfelagi á Villingardalsfjalli á Viðoynni.

Hobbs and Averis (1991) described a *Koenigia islandica – Racomitrium ellipticum* association. In one of the stands, *Festuca vivipara* was frequent in the association. In the other stand, *Racomitrium lanuginosum* and *R. fasciculare* were frequent.

Depressions on flat mountaintops receive water from the surroundings and small tarns or alpine mires are formed due to poor drainage. Ostenfeld (1905-1908) described an *Eriophorum – Carex saxatilis* association on such alpine mires. Alpine mires are rare compared to lowland mires. The difference between alpine mires and lowland mires is the dominance of *Carex saxatilis* in the highlands. Species like *Nardus stricta, Juncus squarrosus*, and, in places, *Scirpus caespitosus* are frequent in both associations.

Due to their shape, some of the pointed mountaintops are not as exposed to wind as are the flat mountains. On these pointed peaks, wind passage past the mountain leaves a relatively calm area on top. These mountaintops have an almost 100% cover of *Racomitrium* species dominated by *Racomitrium lanuginosum,* but also mixed in with other *Racomitrium* species such as *R. canescens* and *R. fasciculare*. This vegetation covers the top and 100 m below where the mountain is again exposed to strong winds and the vegetation is sparse.

The *Racomitrium lanuginosum* heath is described by Ostenfeld (1905-1908) as a vegetation type found on sloping terrain on relatively dry soil protected from wind.

Racomitrium lanuginosum is widely distributed at all elevations, while *R. canescens* is only found at altitudes above 300 m.a.s.l. (Jensen 1901). Böcher (1937) divided *Racomitrium* vegetation into two main types: *Racomitrium lanuginosum* rich vegetation and *Racomitrium canesces* rich vegetation. He found that the *R. canescens* associations are typical snow-bed associations with *Sibbaldia procumbens* and *Veronica alpina*. The *Racomitrium canescens* association was dominated by *Bistorta vivipara*, *Agrostis canina*, *Sibbaldia procumbens*, and *Salix herbacea*. Two snow-bed associations were described: (1) the *Alchemilla alpina – Sibbaldia* association with considerable amounts of *Racomitrium canescens*; and (2) the *Salix herbacea – Carex bigelowii* association, with considerable amounts of *Bistorta vivipara, Agrostis canina, Thalictrum alpinum*, and *Anthelia nivalis*. Hobbs and Averis (1991) described one snow-bed association where snow was found in late July. This association is similar to the British *Salix herbacea – Racomitrium heterostichum* association, with *Kiaria starkei, Salix herbacea, Anastrepta orcadencis,* and *Barbilophozia lycopodoides*. These associations usually make transitions to *Nardus – Racomitrium* associations (Ostenfeld, 1905-1908), which usually are found in snow-free areas on the edge of snow-bed vegetation.

Böcher (1937) found one species-rich *Racomitrium lanuginosum* heath at lower altitudes (400-600 m.a.s.l.) where *Festuca vivipara* was the dominating species, and one species-poor *Racomitrium lanuginosum* heath from higher altitudes (600-882 m.a.s.l.) where *Salix herbacea* was the dominating species. In the species-rich *R. lanuginosum* heath, he defined two associations, one *Festuca vivipara – Racomitrium lanuginosum* association and one *Empetrum – Festuca vivipara – Vaccinium myrtillus – Racomitrium lanuginosum* association. The first association had a considerable amount of *Thymus praecox, Alchemilla alpina,* and *Agrostis canina,* while the second had *Galium saxatilis* in addition to the three mentioned from the first association. In the species-poor *R. lanuginosum* heath, Böcher (1937) defined three associations, the first is a *Salix herbacea – Racomitrium lanuginosum* association, the second is a *Bistorta vivipara – Racomitrium lanuginosum* association, and a third is a *Carex bieglowii – Racomitrium lanuginosum* association. A *Salix herbacea – Bistorta vivipara* association was described by Hansen (1967). Hobbs and Averis (1991) compared the *Racomitrium* heath with the equivalent in Britain, the *Carex bigelowii – Racomitrium lanuginosum* association *Silene acaulis* sub-association. They found that the Faroese type is more extensive and descends to a lower altitude. On alpine slopes, Böcher (1937) described a *Nardus – Hylocomium* association with *Agrostis canina, A. cappilaris*, and *Festuca vivipara*. Dominating mosses in this association were *Rhytidiadelphus loreus* and *R. triquetrus*.

Heath Vegetation

Heath vegetation is common throughout the Faroe Islands. The dominant dwarf-shrubs are *Calluna vulgaris*, which is common up to 400 m, *Empetrum nigrum* ssp. *nigrum* and *Empetrum nigrum* ssp. *hermaphroditum*, which may occur even higher, and *Erica cinerea*, which is less common and occurs only below 300 m.

Other dwarf-shrubs commonly found are *Vaccinium myrtillus*, which is very common, while *V. uliginosum* and *V. vitis-idaea* are less frequent. The common herbaceous plants in the dwarf-shrub heaths are *Narthecium ossifragum*, *Juncus squarrosus* at wetter sites, and *Potentilla erecta, Nardus stricta, Carex pilulifera*, *Galium saxatilis, Hypericum pulcrum*, and *Cornus suecica* at drier sites.

The heath has primarily been studied by Ostenfeld (1905-1908), Böcher (1940), Hansen (1967), and Hobbs and Averis (1991). Large areas with true heath, dominated by *Calluna* and *Erica* are not found in the Faroe Islands, since herbs and mosses are numerous in the heaths. Due to the moisture of the heath, the name "heather-moor" would be more suitable. The nearest equivalent to these *Calluna* heaths is to be seen in the Shetland Islands, in western Norway, and in Scotland (Böcher, 1940). The Faroese heath has a more oceanic character than these. In addition, the Faroese heaths are heavily grazed. When grazing becomes particularly intensive, *Nardus stricta* dominates the heath entirely.

Heaths occur primarily in the southern, lower parts of the larger islands. Smaller patches also appear on most of the islands, where the valleys are broad enough to allow the sun to shine on the fairly dry slopes with a southerly exposure.

The driest of the heaths is the *Calluna vulgaris – Erica cinerea* association. It is exclusively found on south and west facing sites. The fact that it tends to be confined to the microclimatically most favourable sites indicates that this vegetation type has its northern limit of distribution in the Faroe Islands. It never extends above 300 m and *Erica cinerea* has its northern limit of distribution here. This association is characterised by species like *Potentilla erecta, Agrostis canina*, and *Scirpus caespitosus.*

Hobbs and Averis (1991) found that these plant communities had much in common with the British *Calluna vulgaris – Erica cinerea* association. Comparing this vegetation to equivalent vegetation in the Nordic area, it is observed that some characteristic species are missing in the Faroe Islands, *i.e. Arctostaphylos uva-ursi* and *Erica tetralix*. A general difference between these vegetation types in the Faroe Islands and similar vegetation types elsewhere is the sparse representation of lichens and the ubiquitous presence of *Potentilla erecta* and *Nardus stricta* in the Faroe Islands. This is probably due to heavy grazing or a combination of grazing and the wet climate.

With an increase in humidity, there is a characteristic transition between the *Calluna vulgaris – Erica cinerea* association and the *Calluna vulgaris* association and the *Empetrum – Vaccinium* association (Böcher, 1940). Hobbs and Averis (1991) found that the moist heath had similarities to the

Fig. 2. *Calluna vulgaris heath above Gróthúsvatn on Sandoy*
Mynd 2. Heiðalendi við Gróthúsvatn á Sandoynni

Mastigophora woodsii – Herbertus aduncus sub-association of the British *Calluna – Vaccineum – Sphagnum* damp heath.

The *Empetrum – Racomitrium lanuginosum* association, the *Calluna – Racomitrium lanuginosum* association, and the *Empetrum – Hylocomium* association are transitions between the lowland heath and the alpine *Racomitrium* heath, as is the *Nardus-Hylocomium* association from the grassland vegetation. The *Empetrum – Vaccinium uliginosum* association with considerable amounts of *Dryas octopetala* is very rare and is only found in few places (Böcher, 1940).

Grass Vegetation

The predominant vegetation in the Faroe Islands is grassland. It is found from sea level up to the mountaintops. The most characteristic grass species are *Anthoxanthum odoratum, Deschampsia flexuosa, Agrostis capillaris, Festuca rubra, F. vivipara,* together with herbs such as *Bellis perennis, Prunella vulgaris, Ranunculus repens, R. acer, Plantago lanceolata,* and *Lychnis flos-cuculi.* In lower regions, the grass vegetation is frequently found on north-facing slopes, while heather-moor is found on southern slopes, if they are not too steep. At higher elevations, the grass vegetation occurs both on south- and north-fac-

ing slopes. These areas are heavily grazed. Plant species have found shelter in steep areas inaccessible to sheep where they are not grazed.

The grass slopes occur both in heather-moor and grass-moor. The alpine association, *Carex binervis – Luzula silvatica*, has a close affinity to heather-moor and also to the steep cliff vegetation on grass slopes, with *Eriophorum angustifolium* as the dominant species, in addition to the two mentioned above. This association is rich in the common grass slope species and has a ground carpet rich in mosses like *Polytrichum commune* and *Rhytidiadelphus loreus*. For the true grassland association, called *Anthoxanthum – Agrostis capillaris,* Ostenfeld (1905-1908) described two facies, the *Agrostis cappilaris* facies and the *Anthoxanthum odoratum* facies.

Hobbs and Averis (1991) also studied Faroese lowland grass vegetation and found that it was similar to the British *Festuca – Agrostis – Galium* association, the *Holcus – Trifolium* (sub-association), and the *Anthoxantum odoratum – Geranium sylvaticum* association in hay meadow.

Hobbs and Averis (1991) divided the grassland into two main types, one species-poor type and one species-rich grassland. They found the Faroese grassland variable and difficult to classify. For the species-poor grassland, they found similarities to the British *Festuca – Agrostis – Galium* association, *Luzula – Rhydodiadelphus* sub-association. For the species-rich grassland, they found that the following British associations were similar to what they found in the Faroe Islands: *Festuca ovina – Agrostis capillaris – Thymus praecox* association and the *Festuca ovina – Alchemilla alpina – Silene acaulis* association. Hansen (1967) also described the last two associations. In the Faroe Islands, *Festuca vivipara* is dominant instead of *Festuca ovina*, which is not found in the Faroe Islands. The difference between the British and the Faroese associations is that the Faroese associations have more mosses, fewer vascular plants, and more oceanic species. Grass-moor vegetation is found on humic, peaty soil, which contains a moderate proportion of water. The soil here varies between relatively dry, saturated, and flooded. The dominant species are *Nardus stricta, Juncus squarrosus,* and *Scirpus caespitosus.* Ostenfeld (1905-1908) and Hansen (1967) described the *Nardus – Scirpus – Juncus – Hylocomium* association with three facies, described by Ostenfeld (1905-1908), *Nardus* facies, *Scirpus caespitosus* facies, and *Juncus squarrosus* facies. He also described the *Nardus-Racomitrium* association, which is a transition zone between the grass-moor and the *Racomitrium* heath. Hobbs and Averis (1991) found that the Faroese vegetation was similar to the montane *Nardus stricta – Carex bigelowii* association, *Nardus – Racomitrium* sub-association, except that the Faroese association has more oceanic bryophytes like *Mastigophora woodsii, Campylopus atrovirens*, and *Breutelia chrysocomae*.

Mire Vegetation

With increasing moisture, the dominating species change from *Nardus stricta, Juncus squarrosus,* and *Scirpus cespitosus* to

Carex spp. and *Eriophorum* species. Ostenfeld (1905-1908) described the association *Cyperacae – Sphagnum* with considerable amounts of mosses and higher plants such as *Eriophorum angustifolium, E. vaginatum, Narthecium ossifragum, Carex panicea, Carex nigra,* and *Pinguicula vulgaris*. Three types of mires are found in the Faroe Islands, topogenic, soligenic, and ombrogenic. Raised bogs are not found in the islands. Topogenic mires are overgrown lakes, soligenic mires are found on hill slopes, and ombrogenic mires are found in valleys and are the so-called "blanket mires". In ombrogenic mires, Hobbs and Averis (1991) found that the vegetation was similar to the British *Scirpus – Eriophorum* blanket-bog *Juncus squarrosus – Rhytidiadelphus loreus* sub-association. In soligenic mires, the *Carex dioica – Pinguicula vulgaris* association was found.

Dierssen (1982) compared the mire vegetation in Iceland, Norway, the British Isles, and the Faroe Islands. He described the following three facies of the Campylio – Caricetum dioiciae association in the Faroe Islands: facies *Carex tumidicarpa*, facies *Carex pulicaris*, and facies *Carex dioica.* He described the following three associations: Caricetum nigeria association, Triglochino – Juncetum triglumis association, and Scapanio – Narthecium ossifragi association.

In springs, Hobbs and Averis (1991) found the *Philonotis fontana – Saxifraga stellaris* association rich in *Carex nigra, Drepanocladus fluvitans,* and *Dicranella palustris*. A *Philonotis* association was also described by Ostenfeld (1905-1908).

Fresh Water Vegetation

Swamp vegetation has a very limited distribution in the Faroe Islands and is only found at the margin of natural lakes, small ponds, and ponds formed as a result of the cutting of peat. Larger areas with swamp vegetation play a minor role. Associations found in freshwater are the *Eleocharis* association, with character species *Carex salina* and *Equisetum fluviatile*; the *Menyanthes – Potamogeton* association, with *Menyanthes trifoliata*, *Potamogeton polygonifolius*, and other plants, such as *Ranunculus flammula* (Ostenfeld, 1905-1908). Freshwater in the Faroe Islands is poor in nutrients. The most common plants in freshwater with gravel bottom are *Isoëtes echinospora, I. lacustris, Littorella uniflora, Ranunculus flammula, Subularia aquatica,* and *Juncus bulbosus*. On soft bottom, the common species are *Sparganium angustifolium* and *Myriophyllum alterniflorum,* and species of *Potamogeton*, such as *P. natans, P.gramineus,* and *P. perfoliatus.* Ostenfeld (1905-1908) described a *Littorella* association and a *Sparganium – Potamogeton* association.

Coastal Vegetation

Most of the coasts in the Faroe Islands are more or less vertical cliffs, commonly up to several hundred metres. These rocky shores present a characteristic pattern of horizontal vegetation zones composed primarily of lichen species. Lichen species in these horizontal zones occupy habitats according to their tolerance of the influence of seawater. *Verrucaria maura* and *Lichina confinis* form the zone closest to the sea,

whereas *Caloplaca marina, Xanthoria parietina, Anaptychia fusca,* and *Ramalina siliquosa* are character species in the zones farther away from the sea (Fosaa, 1989). Mosses like *Schistidium maritimum* and *Weissia maritima* are common on rocky shores. Ostenfeld (1905-1908) described one *Ramalina siliquosa* association and one *Schistidium – Weissia* association.

In crevices where rocks have eroded, soils are formed and make it possible for higher plants to establish themselves. The most common of the species that can tolerate the salt spray are *Matricaria maritima, Plantago maritima, Cochlearia officinalis,* and *Ligusticum scoticum.* Ostenfeld (1905-1908) described the *Ligusticum scoticum* association. The Martensietum maritimae association from rocky shores was described by Tannhauser (1995).

In bays where sand beaches are formed, *Cakile arctica* and *Honckenya peploides* are the most common species closest to the sea, whereas *Leymus arenarius*, *Atriplex glabriuscula,* and *Potentilla anserina* are more common at slightly higher sites. Ostenfeld (1905-1908) described the *Honkenya* association dominated by *Honkenya peploides, Cakile arctica,* and *Atriplex glabriuscula*, and the *Leymus* association dominated by *Potentilla crantzii, Carex maritima,* and *Leymus arenarius* in several places in the Faroe Islands. At the littoral fringe, Tannhauser (1995) described the Matricario ambiguae – Atriplicetum glabriuscula association with *Matricaria maritima* and *Atrilplex glabriuscula* as character species.

Sand dunes are only found in one place in the Faroe Islands, on the island Sandoy. The dominant plants here are *Ammophila arenaria* together with *Agropyron junceiforme* and *Agrostis stolonifera*, and other species commonly found on sand beaches. Starting from the high tide zone and moving inland, Tannhauser (1995) described four associations: the Cakiletum arctica association with *Matricaria maritima, Atriplex glabriuscla,* and *Cakile arctica* as character species closest to the sea; the Leymo – Agropyretum boreoatlanticum association; the *Honcenya diffusae – Leymo arenariae* association farther inland; and, on the tops of the dunes, the Leymo – Ammophiletum association. This last association is equivalent to the *Ammophila arenaria* association with character species such as *Ligusticum scoticum*, *Leymus arenarius, Agropyron repens,* and *Cakile maritima* (Ostenfeld, 1905-1908).

Shore meadows are formed in the protected areas in the innermost region of the fjords. They occur on clay soils, which are waterlogged and salty due to frequent inundation by seawater. Here, species like *Plantago maritima, P. coronopus, Triglochin maritima, Cochlearia officinalis,* and *Armeria maritima* are common. Ostenfeld (1905-1908) defined three associations in salt marshes, the Glycerietum – Glycera maritima association, the *Carex salina* association, and the *Plantago maritima* association. The Glycerietum – Glycera maritima association has species such as *Glyceria maritima, Plantago maritima, Festuca rubra,* and *Triglochin palustre* that dominate. This association forms a continuous carpet only interrupted by the *Carex*

lyngbyii association. The *Carex lyngbyii* association is dominated by *Eleocaris palustris, Carex lyngbyii* and *Carex salina*. The *Plantago maritima* association is closely allied to salt marshes, with character species like *Plantago maritima, P. coronopus, P. lanceolata, Silene acaulis, Festuca rubra, Agrostis stolonifera*, and others. This association was also described by Tannhauser (1995) who found the following five associations from the coastal marshes: the Puccinellietum association, the Puccinellietum maritimae association, the Potentillietum egedi association, the Festucetum littoralis association, and the Plantaginetum maritimae association.

Outlook

The vegetation in the Faroe Islands has been poorly investigated to date. Only by using the sparse literature available, which is summarised here, is it possible to present an overview of the plant communities in the Faroe Islands. A three-year project entitled *Vegetation Zones in Relation to Climatic Parameters in Some Faroese Mountains and Ecological Behaviour of Selected Plant Species* is in progress. The project, which is a co-operative effort between the Faroese Museum of Natural History, Aarhus University, and Lund University, will hopefully fill in some of the gaps. The aim of the project is to study the floristic and vegetation changes along altitudinal gradients in the Faroe Islands. The vegetation zones in the Faroe Islands will be investigated according to their aspect with the aim of determining and using the zones as parameters for measuring temporal vegetation changes as a consequence of climate change.

The project will also give a detailed description of the plant communities, based on quantitative measures in a selected study area. The relationships of the plant communities to environmental variation and climatic parameters will be investigated.

Acknowledgements:

Special thanks to Martin T. Sykes and Pehr H. Enckell, Lund University; Jonas E. Lawesson, Århus University; Kjeld Hansen, Copenhagen, Magnus Gaard, Faroese Museum of Natural History and Sigga Rasmussen, Faroe Islands. This paper is a part of the project: *Vegetation Zones in Relation to Climatic Parameters in Some Faroese Mountains and Ecological Behaviour of Selected Plant Species,* which is partly funded by the Danish Research Councils and the Faroese Museum of Natural History.

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Appendix 1: Summary of Plant Communities

Alpine vegetation

Koenigia-Ranunculus glacialis association (Böcher, 1937)
Koenigia islandica-Racomitrium ellipticum association (Hobbs and Averis, 1991)
Racomitrium canescens association (Ostenfeld, 1905-1908; Böcher, 1937)
Racomitrium lanuginosum association (Ostenfeld, 1905-1908; Böcher, 1937).
Salix herbacea-Racomitrium heterostichum association (Hobbs and Averis, 1991)
Salix herbacea-Carex bigelowii association (Ostenfeld, 1905-1908)
Salix herbacea-Racomitrium lanuginosum association (Böcher, 1937)
Salix herbacea-Bistorta vivipara association (Hansen, 1967)
Alchemilla alpina-Sibbaldia association (Ostenfeld, 1905-1908)
Festuca vivipara-Racomitrium lanuginosum association (Böcher, 1937)
Empetrum-Festuca vivipara-Vaccinium myrtillus-Racomitrium lanuginosum association (Böcher, 1937)
Bistorta vivipara-Racomitrium-lanuginosum association (Böcher, 1937)
Carex bieglowii-Racomitrium lanuginosum association (Böcher, 1937)
Carex bigelowii-Racomitrium lanuginosum association (Hobbs and Averis, 1991)
Silene acaulis sub-association.
Nardus-Hylocomium association (Böcher, 1937)
Eriophorum-Carex saxatilis association (Ostenfeld, 1905-1908; Hobbs and Averis, 1991)

Heath vegetation

Calluna vulgaris-Erica cinerea association (Ostenfeld, 1905-1908; Böcher, 1940; Hobbs and Averis, 1991)
Calluna vulgaris association (Ostenfeld, 1905-1908; Böcher, 1940; Hobbs and Averis, 1991)
Calluna-Vaccinium-Sphagnum association (Hobbs and Averis, 1991)
Mastigophora woodsii-Herbertus aduncus sub-association
Calluna vulgaris-Empetrum nigrum-Vaccinium myrtillus association (Böcher, 1940)
Calluna-Racomitrium lanuginosum association (Böcher, 1940)
Empetrum-Racomitrium lanuginosum association (Böcher, 1940; Hobbs and Averis, 1991)
Empetrum-Hylocomium association (Böcher, 1940)
Empetrum-Vaccinium uliginosum association (Böcher, 1940)
Vaccinium myrtillus assosiation (Böcher, 1940)
Erica cinerea-Calluna-Racomitrium lanuginosum association (Böcher, 1940)

Grass vegetation

Carex binervis-Luzula silvatica association (Ostenfeld, 1905-1908)
Anthoxanthum-Agrostis capillaris association (Ostenfeld, 1905-1908)
Agrostis cappilaris facies
Athoxanthum odoratum facies.
Festuca-Agrostis-Galium association (Hobbs and Averis, 1991)
Holcus-Trifolium sub-association
Anthoxantum odoratum-Geranium sylvaticum association (Hobbs and Averis, 1991)
Festuca-Agrostis-Galium association (Hobbs and Averis, 1991)
Luzula Rhydodiadelphus sub-association.
Festuca ovina-Agrostis capillaris-Thymus praecox association (Hansen, 1967; Hobbs and Averis, 1991)
Festuca ovina-Alchemilla alpina-Silene acaulis association (Hansen, 1967; Hobbs and Averis, 1991)
Nardus-Scirpus-Juncus-Hylocomium association (Ostenfeld, 1905-1908)
Nardus facies
Scirpus caespitosus facies
Juncus squarrosus facies.
Nardus-Racomitrium association (Ostenfeld, 1905-1908; Hobbs and Averis, 1991)
Nardus stricta-Carex bigelowii association (Hobbs and Averis, 1991)
Nardus-Racomitrium sub-association

Mires vegetation

Cyperace-Sphagnum association (Ostenfeld, 1905-1908).
Scirpus-Eriophorum association (Hobbs and Averis, 1991)
Juncus squarrosus-Rhytidiadelphus loreus sub-association
Carex dioica-Pinguicula vulgaris association (Hobbs and Averis, 1991)
Campylio-Caricetum dioiciae association (Dierssen, 1982)
Carex tumidicarpa facies
Carex pulicaris facies
Carex dioica facies
Caricetum nigeria association (Dierssen, 1982)
Triglochino-Juncetum triglumis association (Dierssen, 1982)
Scapanio-Narthecium ossifragi association (Dierssen, 1982)
Philonotis fontana-Saxifraga stellaris association (Hobbs and Averis, 1991)
Philonotis association (Ostenfeld 1905-1908).

Freshwater vegetation

Eleocharis association (Ostenfeld, 1905-1908)
Menyanthes-Potamogeton association (Ostenfeld, 1905-1908)
Littorella association (Ostenfeld, 1905-1908)
Sparganium-Potamogeton association (Ostenfeld, 1905-1908)

Coastal vegetation

Ligusticum scoticum association (Ostenfeld, 1905-1908)
Martensietum maritimae association (Tannhauser, 1995)
Honkenya association (Ostenfeld, 1905-1908)
Leymus association
Matricario ambiguae-Atriplicetum glabriuscula association (Tannhauser, 1995)
Cakiletum arctica association (Tannhauser, 1995)
Leymo-Agropyretum boreoatlanticum association (Tannhauser, 1995)
Honcenya diffusae-Leymo arenariae association (Tannhauser, 1995)
Leymo-ammophiletum association is found (Tannhauser, 1995)
Ammophila arenaria association (Ostenfeld, 1905-1908)
Glycerietum-Glycera maritima-association (Ostenfeld, 1905-1908)
"*Carex salina*"association,
Plantago maritima association.
Carex lyngbyii association
Plantago maritima association (Ostenfeld, 1905-1908; Tannhauser, 1995)
Puccinellietum association (Tannhauser, 1995)
Puccinellietum maritimae association(Tannhauser, 1995)
Potentillietum egedi association (Tannhauser, 1995)
Festucetum littoralis association (Tannhauser, 1995)