2.
Survey of geology, climate, and vegetational history
Yvirlit yvir jarðfrøði, veðurlag og gróðrarsøgu

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Abstract

First there is a short survey of geology, soil, and climate of the Faroe Islands. The Faroes are of volcanic origin from the Tertiary period. The climate is illustrated in fig. 2.1 which shows temperature and precipitation.

The vegetational history from 10000 years ago to the present is described. A remarkable feature is the total lack of forest or even larger trees during the postglacial period. A shrub vegetation of first *Betula nana* and later *Juniperus* and *Salix* (*glauca* and *phylicifolia*) together with tall herbs evolved. The arrival of people with sheep about AD 600-650 affected and destroyed the shrub and the tall herb communities, so they are only found in places not accessible to sheep. One year ago remains of *Betula pubescens* have been found in one place in the Faroes. Age about 2300 BC.

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The Faroe Islands are situated between 61°20' and 62°24'N and between 6°15' and 7°41'W. The distance from the southernmost to the northernmost point is about 113 km and the west-east distance about 75 km. Their total area is about 1400 km^2. There are 18 islands, 17 of which are inhabited. The highest mountain, Slættaratindur, is 882 m a.s.l.

Pre-Quaternary geology

The Faroe Islands consist of basalt plateaus of Tertiary age. The series above sea-level has a thickness of about 3000 m (Rasmussen & Noe-Nygaard 1969). Recent drillings in Suðuroy show that the basalt series continues down to at least 2200 m below sea-level (Berthelsen, Noe-Nygaard & Rasmussen 1984). Intercalated sediments consist of layers of tuff, fluviatile conglomerates, clay, and sandstone. Coal and clay strata occur on Suðuroy, Mykines, and the western part of Vágar.

Plant macrofossils have been found in the coal and clay beds. Hartz (1903), Rasmussen (1925), and Noe-Nygaard (1940) reported plant remains in the interbasaltic layers. Only one has been identified, *Metasequoia occidentalis* (Rasmussen & Koch 1963).

Laufeld (1965) found a rich pollen and spore flora in the clay of the coal-bearing sequence. Spores of Polypodiaceae, Lycopodiaceae, Sphagnaceae, and pollen of Ginkgoaceae, Taxodiaceae, Cupressaceae, and/or Taxaceae, Palmae, and *Pinus*

haploxylon. Laufeld suggested that the flora is of Eocene age, whereas Lund (1981, 1983) concluded, that the flora is from the Upper Palaeocene (Landenian).

Interglacial deposits

At Borðoyarvík, south east of Klaksvík a possible interglacial deposit is known. It is described by Geikie (1880) and Rasmussen (1972). It consists of clay gyttja lying between two moraines. A trunk of *Larix* or *Picea* in the clay gyttja has been radiocarbon dated to > 38,000 years BP (BP = before present) (Rasmussen 1972). A small piece of *Pinus* wood has the age > 38,000 BP (Jóhansen, unpublished).

Preliminary pollen investigations have shown a flora distinctly different from the Postglacial. Taxa as *Buxus, Betula, Pinus, Lonicera, Plantago lanceolata,* and *Nymphaea* are present as well as Poaceae, Cyperaceae, and Ericales (Jóhansen, unpublished). *Plantago lanceolata* suggests that the deposit is from the Eemian i.e. the last interglacial (Edwards et al. 1976).

The last glaciation and deglaciation

The Faroe Islands had their own ice cap during the last glaciation (Geikie 1880). No foreign erratics have been found and the glacial striae radiate out in all directions.

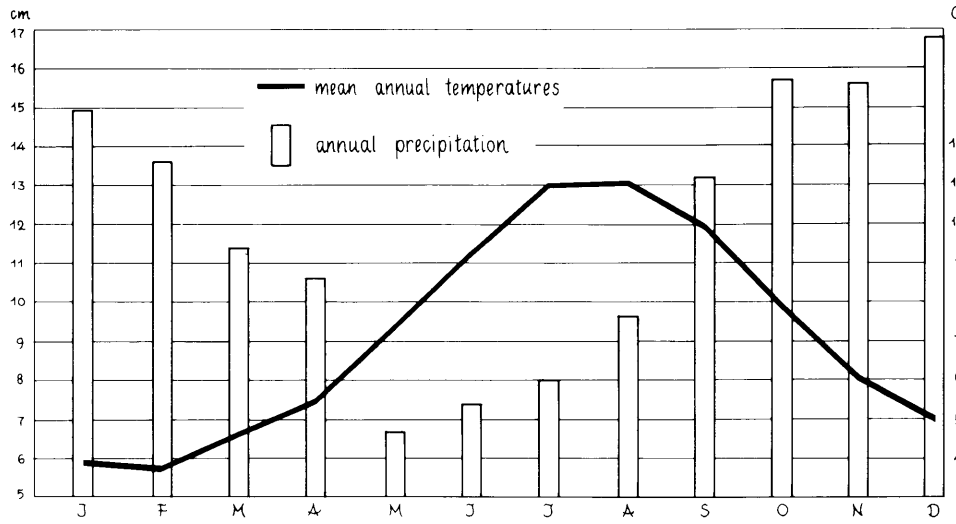
It is not known when the Faroes became ice-free. The oldest relevant radiocarbon date so far obtained is from Hoydalar and has the age 9660±150 BP (K-1920). This sample is from a layer 10–20 cm above the actual bottom, so about 10,000 BP will probably be the age of the oldest organic deposit formed after the last glaciation so far found.

Soils

The soils are developed from fairly homogenous basalt parent materials under humid and cool to cold conditions. The time the processes have functioned is short in geological scales, about 10,000 years. The soils are continuously wet or moist. They are strongly acid with high cation exchange capacities and low base saturations. The mineral portion is high in silt (from 0.05 to 0.005 mm) and low in clay-sized (<0.005 mm) particles.

The peat deposits are generally thin, less than 1–1½ m. They cover most of the lowlands and may extend several hundred meters upwards. The plant remains in the peat are mostly grasses and sedges, but also other herbs.

While the lowlands are mostly covered with organic soils, the soils higher up are more minerogenic because of much stronger erosion.



2.1 Miðalhiti og -avfall í tíðarskeiðinum 1931–60.
Mean monthly temperatures and precipitation for the period 1931–60 (Jóhansen 1985).

Climate

(Fig. 2.1). The Faroes are lying in the Gulf Stream and the climate is oceanic with cool summers and mild winters. Mean for warmest month is at Hoyvík 11.1°C (Aug.), and for coldest month 3.7°C (Febr.). Lowest temperature measured at Hoyvík is ÷10.4°C which was in February, highest is 22.1°C (July). The precipitation is high, 150 cm annually. The weather is very windy. As the Faroes lie on the route of cyclones, depressions are very common and cause rain and wind. There is also much salt in the air. This is a climate very unfavourable to trees. The normally unstable springs with periods of very mild weather alternating with periods of frost and drought are very damaging to the tree sprouts.

The local climate is of great importance for tree-planting. There will be large variations in temperature and precipitation according to situation, exposition, and height.

Postglacial vegetational history

The vegetational development is seen in the simplified pollen diagram, (colour plate). As mentioned, the oldest organic layers after last glaciation which have so far been found are 10,000 years old, (Preboreal). The Preboreal vegetation was a typical pioneer vegetation: *Sedum* (incl. *Rhodiola), Oxyria digyna, Salix herbacea, Cerastium* cf. *arcticum, and Huperzia selago* were widespread.

These plants indicate that open, gravelly ground with solifluction prevailed. The climate was no doubt subarctic, continental.

Betula nana immigrated about 9500 BP, spread quickly and disappeared after some hundred years. The disappearance of dwarf birch reflects a change towards an oceanic climate, which *B. nana* does not tolerate. Some hundred years later a long stable period began. *Juniperus* and *Salix* increased (the time of immigration is not known) and in the following thousands of years *Juniperus communis, Salix glauca,* and *S. phylicifolia* covered the lowlands up to about 300 m all over the islands, except the smallest ones. Leaves, needles, and twigs of the bushes mentioned have been found in many places. Especially numerous are the findings of Juniper stems and branches in the peat bogs. The diameter of the stems might be up to 10 cm, but generally it is less. The stems which are found show that *Juniperus* had a prostrate growth. Together with these shrubs there existed a grass – sedge and a tall-herb vegetation. As can be seen from the pollen diagram, grasses and sedges were all the time the most important plant groups except in the beginning. Unfortunately the pollen of these plants can not be identified to species or genus except in a few cases, as e.g. *Cerealia.* The tall-herbs were *Angelica archangelica, A. silvestris, Rhodiola rosea, Geranium silvaticum, Filipendula ulmaria, Caltha palustris, Ranunculus acris.* Also ferns were very important; we can mention *Dryopteris filix-mas, Athyrium filix-femina, Blechnum spicant. Polypodium* was also common.

Because of leaching, the soil became more poor and peat bogs developed. *Juniperus* decreased and *Calluna* became widespread as a sign of acidification. Also *Potentilla erecta* increased.

About AD 650 there was an abrupt change in the vegetation: Cereals as well as weeds were introduced. In Mykines it has been stated that the first cereal was *Avena* and later – not dated – it was *Hordeum.* At the same time – about AD 650 – *Rumex obtusifolius* and *R. longifolius* were introduced. Pollen and also fruits of these plants have been found in Tjørnuvík. The landnam had profound effect on the original vegetation. *Juniperus* and *Salix* which already were decreasing because of peat formation almost completely disappeared. *Salix* was reduced by grazing and *Juniperus* was used as fuel, smoking meat and the young twigs were used for ropes, hoops, etc. *Salix* might also be used as ropes. Together with the shrub the herb vegetation disappeared from the open land, it was bit down by the sheep. Today we can find the remnants of the original vegetation in places which are inaccessible to sheep: gorges, steep cliffs, ravines, and bird cliffs.

In the summer 1986 stems and twigs of *Betula pubescens* were found at Eiðisvatn, Eysturoy. The remains have been dated and the age is about 2300 BC. The birches might have persisted up to the land occupation phase. One of the stems has a diameter of 13 cm. The other twigs found are all thinner. Stems of *Betula* in the peat have been recorded by Geikie (1880) from this very place. So far, it is the only indication that tree birches have grown in the Faroes postglacially. It seems to be a quite local stand not producing much pollen.

Føroyskt úrtak

Í greinini er fyrst stutt yvirlit yvir Føroya jarðfrøði, jørðildi og veðurlag. Føroyar eru vorðnar til av eldgosum í tertiertíðini. Veðurlagið verður lýst a mynd 2.2, sum vísir hita og avfall.

Gróðrarsøga Føroya frá 10000 árum síðani og til nútíðina verður lýst. Eitt sermerki fyri Føroyar er tað, at ongar skógir ella stór trø hava vaksið her síðan seinastu ísøld. Kjarrvøkstur av fyrst dvørgabjørk, seinni einiberi (baraldi) og píli (grápíli og pálmapíli) og stórum urtum, vaks í mong túsund ár. Tá fólk og seyður kom til Føroya 600–650 e.Kr., ávirkaði hetta upprunagróðurin og oyðilegði runnavøksturin og tær stóru planturnar, so vit í dag bert finna henda gróðurin í gjáum og homrum, har seyður ikki sleppur til. Fyri einum ári síðani vórðu funnar leivdir av stórari bjørk við Eiðisvatn, aldur umleið 2300 f.Kr.

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