FUGLA NESS

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Highlights

The sequence of deposits in the coastal section at Fugla Ness includes two tills and an interglacial peat, ascribed to the Hoxnian. These deposits provide critical evidence for interpreting the Quaternary history of Scotland in an area peripheral to the main centres of glaciation.

Introduction

Fugla Ness is a promontory on the north-west coast of North Roe on the Mainland of Shetland. A broad platform slopes gently from about 30 m OD at the base of the Beorgs of Uyea to form a small sea-cliff about 10 m high. A drift-filled geo (at HU 312913) within this marine-eroded cliff reveals a succession of Pleistocene deposits. These are of great scientific interest, particularly since they include one of the oldest known interglacial peat deposits in Scotland. The stratigraphy of the succession is described by Chapelhowe (1965), and the vegetation history has been reconstructed by Birks and Ransom (1969) on the basis of the fossil assemblages of pollen and plant macrofossil remains in the peat.

Description

The following sequence of deposits is revealed in the cliff section (Figure 3.2) (Chapelhowe, 1965; Birks and Ransom, 1969):

Figure 3.2: Sediment sequence at Fugla Ness, Shetland, showing interglacial peat (lower left) overlain by slope deposits, with till at the top. (Photo: J. E. Gordon.)

6.	Sandy, slightly organic topsoil	0.14 m
5.	Reddish till containing granite pebbles average size 0.12 m, and some boulders of 0.9 m with long axes orientated parallel to local striations	2.05 m
4.	Grey-brown till, horizontally stratified; clasts mainly of local origin with some granite; average size of clasts 0.005–0.03 m	3.17 m
3.	Compacted, structureless peat, with much compressed wood and pine cones and frequent lenses of silt and clasts	0.50 m
2.	Compacted, structureless peat with some wood and large clasts	1.05 m
1.	Grey, cemented till similar to bed 4.	

The peat (beds 2 and 3), which is exposed over a distance of at least 20 m, thins and becomes discontinuous towards its edges. In places it is slightly distorted, probably by the weight of the overlying deposits. The peat beds dip at about 20° towards the sea and may have been formed on a sloping surface. Alternatively, the peat may be an erratic block and not be *in situ*. Seven finite radiocarbon dates ranging in age from 34,800 +900/-800 BP (T-1092) to 47,500 +2900/-2100 BP (GrN-7634) and one infinite age (>33,300 BP SRR-666) have been obtained from the peat (Page, 1972; Harkness and Wilson, 1979; Harkness, 1981). The finite dates, like finite radiocarbon dates obtained from several English interglacial deposits (see also Kirkhill), are probably erroneous owing to sample contamination (Sissons, 1981b).

There have been no detailed sedimentological studies of beds 1, 4 and 5. However, work in progress (A. M. Hall and J. E. Gordon, unpublished data) suggests that bed 4 is a head deposit and contains bands of reworked peat.

Interpretation

The organic deposit appears to have formed at the edge of a small oligotrophic pond and consists of plant debris derived from the surrounds of the pond mixed with both *in situ* material and drift material. The deposit probably formed within a Juncus-dominated shoreline community with a variety of fen and damp-ground herbs and ferns. The occasional pollen and macrofossils of floating-leaved and submerged aquatic plants probably originate from aquatics in the pool. On the better-drained areas around the site the vegetation represented in the lower pollen zone (F-1, Figure 3.3) appears to have been dominated by ericaceous dwarf-shrub heaths with *Bruckenthalia spiculifolia* (originally identified as the extinct taxon *Erica scoparia* var. *macrosperma* by Birks and Ransom, 1969), a plant now confined to the mountains of the Balkans and Asia Minor. *Juniperus*, *Lycopodium annotinum* and *Jasione montana* probably grew in these heaths, and *Betula*, *Pinus*, *Abies*, *Picea*, *Ilex* and *Sorbus* may have occurred locally in sheltered areas.

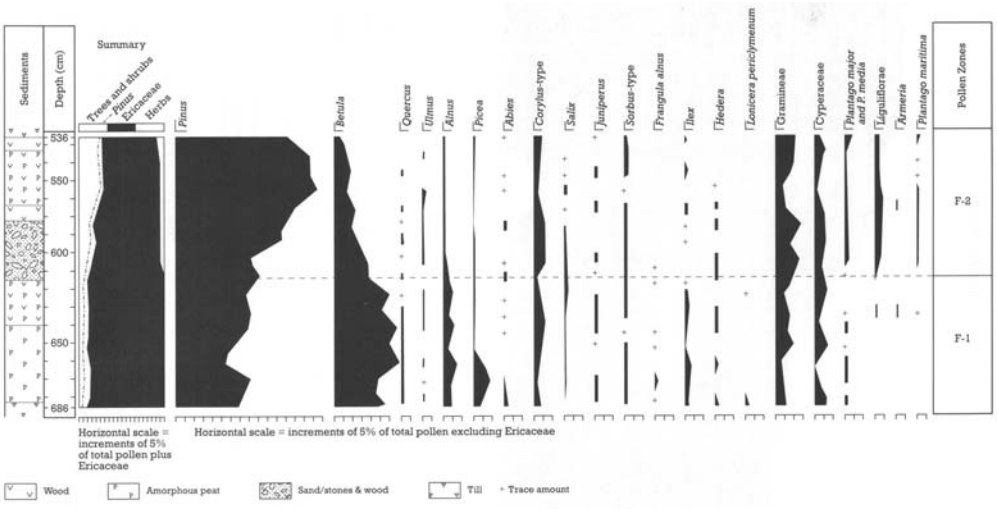

Figure 3.3: Fugla Ness: relative pollen diagram showing selected taxa based on sum of total pollen excluding Ericaceae (from Birks and Ransom, 1969; Lowe, 1984).

In the succeeding pollen zone (F-2, Figure 3.3) the composition of the heaths changed, with an expansion of *Erica tetralix*, E. mackaiana (now confined in the British Isles to Connemara and Donegal), *Empetrum nigrum* and *Daboecia cantabrica* (now restricted in the British Isles to Connemara), and of grassland communities rich in herbs such as *Jasione montana*, Centaurium erythraea and *Plantago* spp. Plants of biogeographical interest present in this zone include the "peat-alpines' Rubus chamaemorus and Chamaepericlymenum suecicum, both of which are absent from Shetland today.

The change in vegetation from zone F-1 to zone F-2 (Figure 3.3) was interpreted by Birks and Ransom (1969) to be the result of climatic deterioration, with a decrease in annual temperature and an increased frequency of frosts.

If the Holocene pollen spectra from Murraster (Johansen, 1975) are viewed as representative of present "interglacial' conditions on Shetland mainland, it is clear that the low values of tree pollen and the high frequencies of dwarf-shrub pollen at Fugla Ness are of interglacial character (sensu Jessen and Milthers, 1928). The strongly calcifuge character of the plant assemblages at Fugla Ness suggests that the sequence reflects the oligocratic phase of an interglacial cycle (sensu Andersen, 1966, 1969) when acid, humus-rich soils and peats were widespread. Given the proximity of the site to present sea level, the absence of obvious "littoral' pollen is noteworthy.

The age of the organic deposits at Fugla Ness cannot be established by radiocarbon dating. However, several features of the plant assemblages suggest correlation with the Hoxnian or Gortian (Birks and Ransom, 1969). These are:

1. the complete absence of so-called "Tertiary' pollen types such as Tsuga and *Pterocarya*, suggesting that the deposits are not of Early Pleistocene age (West, 1980);

2. the absence of any pollen of *Carpinus betulus*, the abundance of which is considered by some to be characteristic of the later phases of the Ipswichian in England at sites at least as far north as County Durham (Beaumont *et al.*, 1969; Phillips, 1974; West, 1977, 1980);

3. the presence of *Abies* pollen, suggesting a Middle Pleistocene age (West, 1977, 1980);

4. the presence of the heaths *Daboecia cantabrica*, *Erica mackaiana* and *Bruckenthalia spiculifolia*, suggesting close floristic affinities with the closing phases of the Gortian in Ireland (Watts, 1967).

The plant assemblages from the Fugla Ness deposits may thus reflect a northern, oceanic variation of the vegetation of the Hoxnian and Gortian (but see Lowe, 1984). The mild climate implied by the reconstructed plant assemblages at Fugla Ness invites comparison with the palaeoclimatic record of the deep-sea sediments (Ruddiman and McIntyre, 1976). Only two

periods are apparent in the deep-sea record of the last 600,000 years when the north-east Atlantic oceanic climate was as mild as, or milder than, at present. These were 125 ka (the Ipswichian) and 380 ka. Given the likely Middle Pleistocene age of the Fugla Ness peat, then a correlation with the oceanic event at 380 ka in Oxygen Isotope Stage 11 seems most likely (Sutherland, 1984a).

There are two possible interpretations of the glacial history represented in the deposits at Fugla Ness (Sutherland, 1991b). On present information, it is possible that the till units (beds 1 and 4) that enclose the interglacial deposits are from the same glaciation, with the peat occurring as an erratic block (see Birks and Ransom, 1969). If this is so, then the site indicates only two periods of glaciation, both post-dating the peat and represented by beds 1–4 and bed 5, respectively. Alternatively, if the tills in beds 1 and 4 are from separate glacial events, then three periods of glaciation are recorded at this site, the earliest of which pre-dates the interglacial peat and hence is possibly of Middle or Early Pleistocene age. If bed 4 is a head, as proposed by Hall and Gordon (unpublished data), then possibly three cold episodes, including two periods of glaciation, are represented at the site. The uppermost till unit (bed 5) contains granite erratics and is apparently derived from the south-east (Chapelhowe, 1965), which conforms with the direction of movement of the last local ice-cap glaciation of probable Late Devensian age. Fugla Ness therefore has significant potential for further research to amplify knowledge of the glacial sequence in Shetland.

Fugla Ness is of considerable scientific importance, not only because of its remarkable fossil flora, but also because it represents perhaps the oldest interglacial deposit known in Scotland and the northernmost known interglacial sequence in the British Isles. Although its implications in terms of glacial history remain to be elucidated in detail, it is a site of great potential importance.

Conclusions

The sequence at Fugla Ness includes the most northerly and one of the oldest known interglacial deposits in Scotland. Analysis of the pollen and larger plant remains preserved in the interglacial peat indicates a period of mild, oceanic climate and the occurrence of trees, including pine and fir, in sheltered areas. The interglacial deposits have been ascribed to the Hoxnian Stage of the Pleistocene (about 380,000 years ago), but they have not been dated directly. The sediments at Fugla Ness also provide evidence for at least two separate periods of glaciation in Shetland.

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