

TREES IN SHETLAND? A PALYNOLOGICAL EXPLORATION

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Introduction

In 1774, the Reverend George Low undertook a perambulation through the 'Islands of Orkney and Schetland'. He kept a journal of his tour but it had to wait a century before being published. He approached Mainland from the south and made the following observation:

... a clear view of the whole south part of the country, which indeed affords no very prepossessing appearance, the whole vista of ranges of dreary wilds, black and dismal mountains, whose tops are covered with almost perpetual fogs, their sides swampy bogs, without either good heath or shrub; the rocks in most places being the only support the eye has under the general dusk, which sticking thro' the sides of the hills is a sort of variety in this wretched prospect (Low 1879: 65).

He certainly pre-dated the romantic view of mountains purveyed by Walter Scott. He was not as caustic, however, about the appearance of trees as Johnson, who commented :

A tree might be a show in Scotland, as a horse in Venice. At St Andrews Mr Boswell found only one, and recommended it to my notice; I told him, that it was rough and low, or looked, as I thought, so. This said he 'is nothing to another a few miles off' (Johnson 1775: 6).

Low left arboreal comment with:

Busta, a large house with a good garden, planted with different sorts of wood but all stunted as soon as it comes above the garden wall. I observed Common Elder, Rowan and Plane Trees, grow highest, but even these could not stand the climate (Low 1879: 129).

Low was making his visit during the Little Ice Age when European temperatures were greatly depressed, so much so that glaciers re-advanced in The Alps and Scandinavia. It can be asked, therefore, if Low's views on the vegetational appearance of Shetland were aberrant due to the timing of his visit. Are things different today and were they different in the distant past? This paper will examine these questions with the main emphasis being on woodland.

Present-day Shetland

Today, Shetland's vegetation differs to no great extent from the descriptions presented by Low in his journal. Blanket bog provides a peat cover over most of the islands and is almost continuous over Yell, the western part of Unst and central and western Mainland. In general, it is about 1.5m deep but can be 6-

7m in some places. An area which nourishes such deposits is unlikely to be propitious for tree growth and Spence has pointed out that 'there are no native trees, only planted ones in Shetland' (Spence 1960: 73). He does correct that statement by pointing out that there is one, a solitary *Populus tremula* (aspen), growing at sea level and reaching 4m in height (Spence 1969: 91).

The Shetland Crofting, Farming and Wildlife Advisory group does, however, encourage the planting of trees and yet all the evidence advanced so far suggests that it would be a forlorn task. Can these views be reconciled and what are the grounds for suggesting any investment in silviculture?

The peat cover of Shetland has already been referred to and it preserves evidence of former woodland in the islands which, according to legend, was destroyed by men from Lewis and by the Vikings. Near the kirk of 'Scalsta', Low records the remains of an extensive woodland under 3m of peat, apparently of *Corylus avellana* (hazel) and other species which he called 'Aquatick woods' (Low 1879: 146). A further example comes from Foula where peat cutting was yielding trunks and branches (Low 1879: 103).

It would appear, therefore, that at some time in the past Low would have been greeted by a rather different landscape from the one which actually confronted him. The possibility of looking at the nature and timing of any vegetation changes which have occurred on Shetland is made feasible by the application of pollen analysis (Moore *et al.* 1991). The existence of peat deposits is especially important for the exploitation of this technique so Shetland's vegetational history ought to be readily explored. Figure 1 shows the location of sites which have been subjected to pollen analysis (for site names and analysts see Appendix 1).

The earliest evidence

Two sites, Fugla Ness in North Roe (Hall *et al.* 1993) and Sel Ayre (Hall *et al.* 1993) in the Walls peninsula provide the earliest information on vegetational history. The latter site revealed three vegetational regimes; the first and last had Poaceae (grass) as their dominant constituent while the central period was characterised by Ericaceae (heaths). Trees and shrubs were rarities; some *Betula* (birch), *Pinus* (pine), *Alnus* (alder) and *Quercus* (oak) pollen was recovered but it is quite feasible that this was windborne to Shetland from a non-local source.

Fugla Ness presents a different picture. The vegetation was dominated by Ericaceae but the peat contains cones, needles and wood fragments of *Pinus*, providing unequivocal evidence for tree growth on Shetland at that

1. The printed version of Low's writings has mistranscribed the name of the place to which he is referring; it should be Scatsta. Since the time of Low's journey there has been considerable erosion of the coast at Scatsta and the deposits to which he referred are no longer preserved.

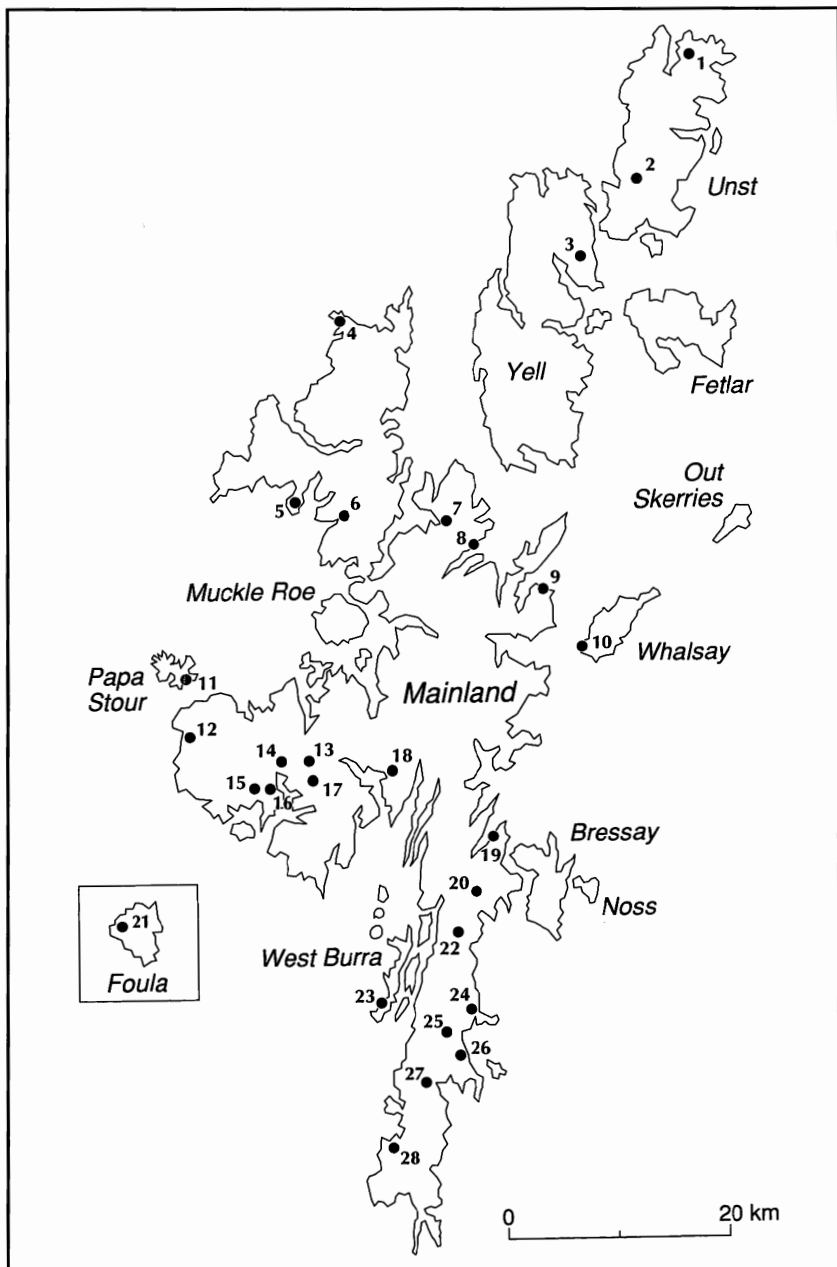


Fig. 1. The location of sites in Shetland which have been subjected to pollen analysis.

time. The period to which Sel Ayre and Fugla Ness belong is uncertain. Claims for an interglacial age, which would mean at least 100 Kyr BP (thousand years before present), have been made and Fugla Ness, at least, does seem to warrant such an attribution. With woodland existing at Fugla Ness, it would seem probable that it also occurred elsewhere in Shetland.

The Devensian Ice Age

From c.100 000 to c.10 000 BP Scotland witnessed the waxing and waning of the Devensian glaciation. As yet, virtually no evidence has been forthcoming as to the nature of vegetation on Shetland during possible ice free periods which are known to have existed elsewhere in Scotland during this period. Only one site, at Tresta, west Mainland (Hall & Whittington 1993) has allowed a glimpse of conditions around 11 000 BP. Shetland, as might be expected during a period of extremely low temperatures, supported a very restricted flora; only dwarf willow provided variety in a landscape which was dominated by sedges and grasses. This may not be a complete representation of Shetland's vegetation at this time but, until more sites offering organic deposits belonging to this period are found, nothing more can be established.

The Holocene period

With the removal of permanent ice from Shetland came climatic amelioration and with it a marked change in the flora. The pollen of *Juniperus communis* (juniper), *Salix* spp. (willows), *Empetrum* (crowberry), *Armeria maritima* (thrift) and *Thalictrum* (meadow-rue), among others, is found in the deposits at Murraster (Jóhansen 1975) and Lang Lochs (Hulme & Durno 1980).

a) *The establishment of woodland*

In the Holocene, by about 10 000 BP, recent research has shown that temperatures rose rapidly and had reached a level higher than those of today (Birks 1990). On the Scottish mainland, the vegetational response was one of colonisation by arboreal species. *Betula* was established in the eastern and central areas by 10 000 BP and in the north and west by 9500 BP. *Corylus avellana* was present in western Scotland at 9500 BP, *Ulmus* (elm) had appeared over virtually the whole country by 8500 BP and *Quercus* was north of the Forth-Clyde lowlands by the same date.

The evidence of tree trunks and root systems in the peat on Shetland (Lewis 1907; 1911) suggests that this colonisation also affected the islands, although the view is still held (Lowe 1993) that both the Outer Hebrides and Shetland remained treeless. The first substantial pollen-based evidence to refute this idea came from the work of Jóhansen at Murraster on the Walls peninsula. (In 1924 Erdtman examined 20 sites in Shetland and showed that tree pollen existed but his analyses were rudimentary by today's standards.) Jóhansen showed that, at its peak, tree and shrub pollen provided 40-50% of

the total pollen and, in keeping with the evidence from the peat, this was mainly derived from *Betula* and *Corylus*. Three other important investigations have not only confirmed this finding but have taken it further. Keith-Lucas (1986), working at Scord of Brouster, has shown the local importance of birch and hazel, and at even higher levels than at Murraster. Bennett *et al.* (1992) examined lake muds from Dallican Water at Catta Ness. Their results revealed that from 9350 BP until about the beginning of the fifth millennium BP, tree and shrub pollen was consistently about 40%. More recently, pollen analysis from Loch of Brunatwatt (Edwards and Moss unpubl.), on the Walls peninsula, has shown that tree pollen alone reached 70% [Fig. 2]. The investigations at Dallican Water and Loch of Brunatwatt have, however, gone further than merely putting the existence of extensive woodland on Shetland on a firm footing. At both sites, the pollen of *Pinus*, *Ulmus*, *Quercus* and *Alnus* has been recovered, perhaps indicating that a wide range of woodland species was present.

In the face of this evidence, why has there been reluctance to accept that Shetland was once wooded? Part of the answer lies in the difficulty of avoiding present day perceptions of Shetland when trying to evaluate its past because of its stormy, salt-laden climate and bog-ridden surface. There is, however, a more deep-seated problem, one that faces all palynological investigation. The fact that much pollen relies on wind for its dispersal always raises the question of the provenance of any that is recovered at a site; this is especially the case where *Pinus* is involved, because it is specially adapted for aerial dispersal. As no fossil root or wood evidence of *Pinus*, apart from the very old deposits at Fugla Ness, has been found on Shetland, it is reasonable to deduce that the pine pollen found at Dallican and Brunatwatt has resulted from long distance wind transport. Studies have been undertaken (Tyldelsley 1973) of the modern windborne introduction of tree pollen into Shetland. It is calculated to be somewhere of the order of 15% (Birnle 1981; cf. Hawksworth 1970). The high levels of *Betula* and *Corylus* pollen and their remains in peat deposits, however, put their presence in Shetland beyond doubt. *Quercus* pollen reaches nearly 10% at Brunatwatt and 14% at Dallican, making its presence on Shetland a strong possibility. The status of *Alnus* and *Ulmus* has to be less certain as their values do not exceed about 5%, although in the case of *Alnus*, macroscopic remains have been recovered from Foula (Hawksworth 1970) and Mainland (Lewis 1911). There is every indication, therefore, that for a very long period following the recovery from the depressed temperatures of the Devensian Ice Age that Shetland not only supported an extensive woodland cover but that it was varied, perhaps even containing *Ulmus* and *Fraxinus excelsior* (ash).

b) The demise of the woodland

The contrast between the vegetational conditions revealed by the palynological investigations discussed above and the situation today, or even

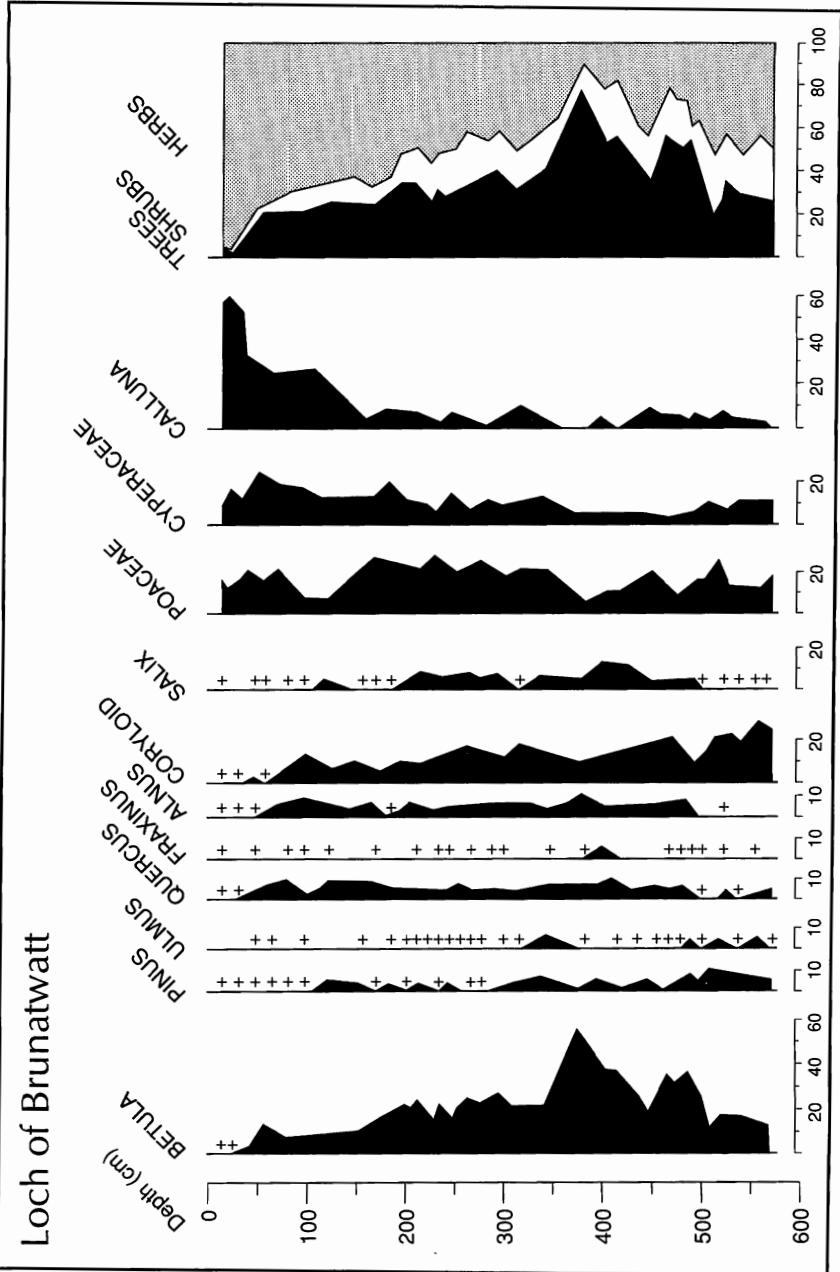


Fig. 2. A percentage pollen diagram for selected pollen taxa from the Loch of Brunatwatt.

that described by Low for 1774, is very striking. The hand of humans is seen in the demise of the woodland according to the myths concerning the activities of Lewis men and Vikings. The pollen analyses show that the disappearance of woodland pre-dates such activity, if it occurred, by several thousand years. It is noticeable in the pollen diagrams, particularly those from Murraster and Dallican that the change in the woodland status came very suddenly. This has been linked to the arrival in Shetland of Neolithic farmers who cleared the woodland to pasture animals and cultivate crops. Such a suggestion has been given weight by the start of a continuous pollen curve for *Plantago lanceolata* (ribwort plantain) at 4680 BP (Jóhansen 1978), a plant which is associated with soil disturbance. The remains of enclosure walls, as on Shurton Hill, near Lerwick, is also dated to this same period (Whittington 1980). The palynological investigations undertaken at Scord of Brouster and those currently occurring at Brunatwatt and Troni Shun in the Walls peninsula are also in areas where considerable Neolithic activity occurred. The Scord of Brouster pollen record (Keith-Lucas 1986) shows that *Betula-Corylus* woodland was cleared by Neolithic people.

Such woodland clearance took place generally over north west Europe, but in most areas, including mainland Scotland, regeneration of woodland followed, to be succeeded by further clearance and regeneration episodes (see e.g. Whittington *et al.* 1991). This did not happen on Shetland although it is now becoming clear that clearance and regeneration had occurred before the Neolithic settlement. *Betula* and *Corylus* pollen percentages had already fallen at Murraster before the Neolithic period. The woodland pollen frequencies also show a fall and then a rise prior to the Neolithic at Brunatwatt and Scord of Brouster. This phenomenon has been explored more fully at Dallican. Vegetational and erosional changes occurred there at about 7500 BP which has led the investigators (Bennett *et al.* 1992) to suggest that there was a Mesolithic hunter-gatherer presence, for which there is as yet no archaeological evidence, on Shetland. The vegetational changes, which seem to be equivocal (Hirons & Edwards 1990), or to go unrecorded (see e.g. Whittington *et al.* 1991) in other areas where Mesolithic peoples are known to have lived, are, at Dallican Water, laid at the door of red deer which could have been brought in by the settlers. By about 5400 BP, woodland regenerated at Dallican and remained intact until the Neolithic clearance, a fact attributed to the extinction of the deer by over-hunting or natural population crash (Bennett *et al.* 1992: 267).

Whether the Mesolithic-deer suggestion is true or not, there is proof at Dallican Water that woodland could regenerate on Shetland. This leads to the question as to why it did not occur at any time in the post-Neolithic period. It is possible to put forward several reasons which may have operated singly or in unison.

First, it should be pointed out that the Mesolithic period clearance and that of the Neolithic took place under very different circumstances. The

Mesolithic clearance was, if red deer were involved, an unintentional act; it would have been consequent upon animal rather than human population pressure. Furthermore, the land area of Shetland had become increasingly circumscribed by the Neolithic period due to a rising sea level (Flinn 1974). That factor, together with the increasing population pressure which might be expected in the transition from hunter-gathering to farming economies, would have strained the land resources of Shetland even further, preventing woodland regeneration. There would, however, have been woodland areas that were unsuitable for arable agriculture and so might be expected to have escaped clearance. The browsing activities of animals would have conspired against that. In his investigation of present-day remnant scrub in Shetland, Spence found native *Betula* bushes on an island in a lochan near Sandy Water, North Roe. He noted that in August 1953 they were readily apparent, due to the bright green of their leaves, but could not be seen the following summer; close examination showed them to have been cropped and sheep's wool tangled in the branches (Spence 1960: 77). Such predations had been noted over a century earlier. Bryden, writing on the parishes of Sandsting and Aithsting, had noted that 'mountain ash, hazel, honeysuckle, the hip-brier and willow are native in many islets in freshwater lochs'. He concluded that it was only their insular position that saved them, 'for horses, cows and sheep browse upon and destroy everything that comes in their path when hard pressed for food' (Bryden 1845).

To these factors must be added a consideration of climatic change. It is generally held that northwest Europe has undergone a series of climatic shifts (Lamb 1977), two of which, the so-called Atlantic and sub-Atlantic periods, were believed to have witnessed great increases in wetness and storminess. The consequent development of peat and the possibility of increased exposure to strong westerly, salt-laden winds would provide conditions which were not conducive to tree growth. The current status of research on climatic change suggests that no such widespread alterations have taken place since 10 000 BP (Birks 1990). That, however, does not preclude local or regional changes brought about by such features as latitude, oceanicity or altitude. Where areas are at the margin of tree growth even a slight shift in temperature would have repercussions, unmarked in the vegetation of more favoured areas. This combined with the continued assault by humans and animals would ensure that woodland regeneration would be a most unlikely event. Whether the human or the climatic factor is the more important, it is difficult to judge. An assessment of the present scrub and tall-herb vegetation on Shetland shows it to be related to communities which have an altitudinal range from sea-level in south west Greenland to 640 m in the Cairngorms of mainland Scotland (Spence, 1974: 86). On the other hand, tree growth is possible on Shetland, as is demonstrated by the frequent occurrence of *Acer pseudoplatanus* (sycamore) and the now rather neglected *Picea sitchensis* (sitka spruce) plantation at Kergord in Weisdale.

Conclusion

The existence of extensive and in some cases spectacular prehistoric settlements in Shetland, especially with regard to their associated field systems, can clash with our perceptions of the conditions and resources of the areas in which they are found. To ignore the fact that environmental changes of considerable magnitude may occur, but are concealed from us, can lead to misapprehensions about life in earlier times. The employing of pollen analysis has shown that the vegetational landscape of Shetland was once very different. On arrival any Neolithic immigrants would have found a verdant and wooded prospect which would have gladdened the heart of the Reverend George Low, but it was one which they most probably unwittingly destroyed.

Acknowledgements

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Appendix 1

The location of sites in Shetland used for pollen analysis and the names of the investigator(s). The numbers refer to the sites shown on Figure 1. Sites investigated by Erdtman are not listed.

	Site	National Grid Reference	Investigator(s)
1.	Saxa Vord	HP 631165	Edwards
2.	Watlee	HP 590054	Mitchell
3.	Sandwater Hill	HU 535984	Edwards & Leese
4.	Fugla Ness	HU 311912	Birks & Ransom Hall <i>et al.</i>
5.	Hillswick	HU 279756	Birnie
6.	Gunnister Water	HU 325746	Hill
7.	Garths Voe	HU 409733	Birnie
8.	The Houb	HU 449723	Birnie
9.	Dallican Water	HU 498674	Bennett <i>et al.</i>
10.	Symbister	HU 538632	Hoppe
11.	Papa Stour	HU 188602	Whittington & Edwards
12.	Sel Ayre	HU 177541	Birks & Peglar Hall <i>et al.</i>
13.	Unnamed	HU 275540	Wakefield
14.	Scord of Brouster	HU 256517	Keith-Lucas
15.	Loch of Brunatwatt	HU 252512	Edwards & Moss
16.	Troni Shun	HU 251506	Edwards & Moss
17.	Murraster	HU 275518	Jóhansen
18.	Tresta	HU 363510	Hall & Whittington
19.	Kebister	HU 455445	Butler
20.	Shurton Hill	HU 442402	Whittington
21.	Foula	HT 949401	Hawksworth
22.	Lang Lochs	HU 430378	Hulme & Durno
23.	Clettnadal	HU 359301	Hall & Whittington
24.	Aith Voe	HU 440290	Birnie
25.	Ward of Veester	HU 413268	Birnie
26.	Leebotten	HU 430248	Birnie
27.	Channerwick	HU 404230	Hall & Whittington
28.	Spiggie	HU 370170	Birnie