Abermawr

Highlights

This site shows unrivalled evidence of two periglacial episodes and an intervening glacial event; all assigned to the Devensian Stage. These sediments lie within what may be a pre-Devensian meltwater channel.

Introduction

Make another test edit

Abermawr [SM 883 346] shows one of the most detailed sequences of surface deposits in southwest Wales, and provides important information for changing environmental conditions in the region during the Late Pleistocene. The site has a long history of research commencing with the work of Jehu (1904). It has featured in studies by Synge (1963, 1969, 1970), John (1967, 1970a, 1971a, 1973), John and Ellis-Gruffydd (1970), Bowen (1971b, 1973a, 1973b, 1974, 1977a, 1977b, 1982, 1984) and Peake *et al.* (1973).

Description

Exposures of Pleistocene sediments extend for about 300m at the northern end of Abermawr Bay. The following sequence can be given from the descriptions by John (1970a) and Bowen (1977a, 1977b, 1984) (maximum bed thickness in parenthesis) -

9 Sandy loam (0.6m)

8 Upper head — Jehu's (1904) 'rubble drift' (2m)

7 Fluvioglacial sands and gravels (4.5m)

6 Irish Sea till — Abermawr Till (2.4m)

5 Upper blocky head with scattered erratics (3.6m)

4 Water-worn gravels (3.6m)

3 Lower blocky head with scattered erratics (1.5m)

2 Green-grey clay — weathering horizon

1 Shale head (1–3m)

Raised beach sediments have not been recorded from Abermawr, but because the base of the succession has not been proved these may lie concealed beneath the modern shingle beach (Bowen 197 lb, 1977a, 1977b). A further small section mainly through periglacial head, with intraformational fossil ice-wedge casts, is recorded at the southern end of the bay (John 1973). of the Upper Boulder Clay (bed 8) of his tripartite classification. Although this unit was taken to be primarily glacial in origin, Jehu noted that the deposit showed traces of bedding and contained many angular and subangular rocks derived from the local area. He concluded that the Upper Boulder Clay or 'rubble drift' might, therefore, represent a glacial deposit modified by subaerial agencies, rearranged and partially sorted by meltwater.

Jehu's Lower Boulder Clay is also present at Abermawr (bed 6), and he recognised a variety of rock types in the modern beach probably derived from it. These included Ailsa Craig microgranite, granite from Kirkcudbrightshire, and a variety of other igneous rocks from southern Scotland and the Lake District. Such an assemblage, together with marine shell fragments found in the till, provided strong evidence for the incursion of ice from the Irish Sea Basin into north Pembrokeshire (Jehu 1904).

Synge (1963, 1969 1970) also recognised the upper till at Abermawr, and further noted that the lower head deposits (bed 3) contained reworked glacial erratics. From this evidence, Synge postulated that the area had been glaciated on three separate occasions: he considered the redistributed glacial material in the lower head facies to be of Elster age, with the shelly Irish Sea till, and the more stony upper till being Saalian and Weichselian, respectively.

In contrast, other workers (for example, John 1970a; Bowen 1971b, 1974, 1977a, 1984) placed the entire sequence in the Devensian Stage, recognising only a single till (bed 6); the upper till of Jehu and Synge, being regarded as a head deposit, a mixture of local slope deposits and reworked glacial material (bed 8). John (1970a, 1971a) considered that the only true glacial deposits at Abermawr were therefore the Irish Sea till and its associated outwash (beds 6 and 7). These were underlain by a thick sequence of periglacial slope deposits (John 1973) and overlain by a thinner head which he suggested demonstrated that the Irish Sea glaciation had been preceded by a prolonged periglacial phase and succeeded by a shorter one. He noted a weathering horizon in the lower head, and suggested that it represented an amelioration of climatic conditions, possibly during an interstadial in the Devensian Stage. Complex bedding structures in the outwash sands and gravels showed they had been deposited in a dead-ice (stagnating) environment. The lower head and Irish Sea till were considered equivalent to corresponding horizons at Poppit (John 1970a).

John (1967, 1970a) and John and Ellis-Gruffydd (1970) noted abundant fragments of marine mollusca and pieces of carbonised wood in the till at Abermawr. Although *Pinus* was found, other fragments examined at Kew Gardens came from coniferous species not currently growing in North-West Europe. Radiocarbon dates from samples of the wood of >40,300 BP (NPL-98) and >54,300 BP (GrN-5281) (John and Ellis-Gruffydd 1970) plus the presence in the samples of reworked pre-Pleistocene pollen and spores suggested that the wood was possibly Tertiary in age. The radiocarbon dates were therefore not taken to be significant for the development of a Late

Pleistocene chronology at Abermawr (John and Ellis-Gruffydd 1970), but a Late Devensian age for the till was favoured on the basis of a radiocarbon timescale developed at other sites in Pembrokeshire (John 1965b, 1967, 1968c, 1970a; John and Ellis-Gruffydd 1970). It was, however, admitted that the Abermawr Till (bed 6) and associated fluvioglacial sediments (bed 7) could represent a pre-Devensian glaciation in north Pembrokeshire, as postulated by Wirtz (1953).

Bowen (1974) supported the single glaciation hypothesis for the Abermawr sequence (John 1970a). Both Bowen (1971b, 1974) and John, however, noted that erratic pebbles found in the lower head (bed 3) had been derived from a glaciation that pre-dated the Devensian Stage. Like John, Bowen considered that beds 1–5 were periglacial slope deposits, and suggested that although the significance of the gravels (bed 4) was unclear, they might have been deposited by fluvial action under conditions of climatic amelioration (Bowen 1977a, 1977b, 1982). Bowen also noted a weathering horizon (unit 2) in the lower head deposits. This was considered to be a seepage weathering horizon in which the shale had locally decomposed to a green-grey clay. The environmental and chronological significance of this horizon, however, was not discussed, although beds 1–5 were considered to have been deposited during periglacial conditions in Early and Middle Devensian times (Bowen 1973a).

In addition to the mixed assemblage of cold and warm molluscs recorded by John (1970a) from the Abermawr Till, Bowen (1982) further noted that it also contained a cold fauna of foraminifera, including *Elphidiella arctica* Parker & Jones. Amino acid epimerization studies of marine molluscs from Abermawr (Bowen 1984) showed that the derived shells in the till ranged in age from Early Pleistocene to Devensian. The youngest faunal elements present in the Abermawr Till, therefore, indicated that the shells had been derived from sediments deposited during a marine transgression in the Devensian, and transported to Abermawr by the Late Devensian ice-sheet.

The sands and gravels (bed 7) overlying the shelly till were regarded by Bowen (1971b, 1982) as the products of deglaciation of the Late Devensian ice-sheet, while the upper head was a periglacial scree deposit, representing cold

conditions after melting of the ice (Bowen 1982).

The location of the Pleistocene deposits at Abermawr significantly enhances the geomorphological interest of the site: "the thick lower head shows every indication of being banked against the steep wall of a meltwater channel, and the rest of the drift fill similarly marks the channel wall for some hundreds of metres inland" (John 1970a). This evidence may therefore indicate that the channel, and perhaps others in the remarkable Gwaun-Jordanston system of channels, were probably first cut in pre-Devensian times. Bowen (1971b), however, regarded the 'channel' as a pre-diversion valley of the Western Cleddau. The sequence of deposits at Abermawr provides a key stratigraphic record of environmental and geomorphological changes in northern Preseli during the Late Pleistocene. It may occupy a meltwater channel possibly cut in pre-Devensian times, and provides evidence for the incursion of an ice-sheet from the Irish Sea Basin into northern Preseli. The sequence further demonstrates that periglacial conditions were prevalent both before and after the Irish Sea glaciation of the area. The sands and gravels are thought to represent outwash from the melting of the Irish Sea ice-sheet. Amino acid dating of the included fauna within the Irish Sea till provides evidence to suggest that the Irish Sea glaciation of northern Preseli occurred during the Late Devensian, and the site therefore helps to place constraints on the extent of the Late Devensian ice-sheet in south-west Wales. Raised beach sediments (such as those at Poppit Sands) are not exposed at Abermawr, but the glacial and periglacial sediments are better exposed than elsewhere in south-west Wales.

Abermawr has one of the most detailed stratigraphical sequences in south-west Wales. The Abermawr Till clearly demonstrates that northern Preseli was glaciated by Irish Sea ice, and amino acid ratios from the till provide convincing evidence that the glacial event was Late Devensian in age. The sequence also records important evidence for melting of the Late Devensian Irish Sea ice, and shows that periglacial conditions affected the area both before and after the glacial episode. The location of the sequence in a possible meltwater channel could have geomorphological and chronological implications for the interpretation and relative dating of similar landform features elsewhere in the region.

Conclusions

Abermawr provides one of the most detailed sequences of ice age deposits in south-west Wales. The sequence spans most of the last glacial cycle and shows evidence for an earlier period when scree accumulated under cold climatic conditions. Shell bearing clay deposits at Abermawr have been traditionally interpreted as the products of a land-based ice-sheet. It has recently been suggested that they are marine sediments, deposited in the ocean as the ice-sheets retreated towards the north.

References