Weston-in-Gordano

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Highlights

Weston-in-Gordano is important because it contains a complex of fossiliferous marine and non-marine interglacial deposits which post-date, and thus offer a minimum age for, the glaciation of the valley. The site is of considerable importance for reconstructing ancient sea levels because it contains evidence for as many as three interglacial marine transgressions. The site is the type-locality of the Weston Member.

Introduction

Weston-in-Gordano contains slope deposits overlying a complex of marine and freshwater interglacial deposits, interbedded with stony clays of possible glacial origin and lying against the steep face of the limestone massif of Portishead Down. The site lies almost immediately downslope of the glacigenic sediments of Nightingale Valley (this chapter).

The site was found by ApSimon and Donovan (1956), who recorded marine gravels and sands with *M. balthica,* overlain by stony clays, further marine gravels with *Macoma,* then subtidal sands, all overlain by cryoturbated sandy breccias of sub-aerial origin (Figure 10.8). The highest marine deposit was at 13.6 m OD. The gravels contained fragments of Old Red Sandstone, Carboniferous Limestone, Triassic breccias, flint and Greensand chert.

Spoil from the 1982 excavations for drains at a new police headquarters, yielded fine gravel and grey silts with the interglacial freshwater mollusc *C. fluminalis* (Hunt, in prep.). In 1992, two auger holes were drilled to relocate the freshwater interglacial deposits and establish their relationship with the published stratigraphy (Hunt, in prep.). Colluvial breccias and silts were found to overlie laminated silts, sands and gravel of probable intertidal origin. These in turn overlay laminated sands with freshwater molluscs, most probably the lateral equivalents of the silts with *Corbicula,* and then gravels with occasional marine shells similar to those described by ApSimon and Donovan (1956). The site was proposed as the type-locality of the Weston Member by Campbell *et al.* (in prep.), who assigned its marine and freshwater interglacial deposits to Oxygen Isotope Stage 7 and earlier.

Description

At Woodside, near Weston-in-Gordano [ST 456 754], complex Quaternary deposits underlie a gentle slope beneath the steep Carboniferous Limestone of Portishead Down and above the Holocene alluvium and peats of Clapton Moor. The stratigraphy of the site is most complete on the north-west side of the B3124 and is taken here from the work of ApSimon and Donovan (1956) and Hunt (in prep.). Junctions between beds are sharp unless otherwise stated and maximum bed thicknesses are given in parentheses (Figure 10.8).

12. Reddish-brown sandy clayey silt with occasional Carboniferous Limestone fragments. This bed has a transitional junction with bed 11. (0.6 m)

11. Reddish-brown breccia of angular Carboniferous Limestone, dark red sandstone and green-grey and pink marl fragments in a matrix of sandy clayey silt. (0.25 m)

10. Dark red, slightly silty coarse sand. (0.05 m)

9. Dark reddish-brown, mottled black, laminated clayey silts and occasional sands, passing gradually into bed 8. (0.15 m)

8. Yellow-brown clayey silts with occasional manganese nodules at the top, passing gradually into bed 7. (0.95 m)

7. Yellow-brown laminated coarse silt and very fine sand. (0.4 m)

6. Yellow-brown fine gravel, rich in flint. (0.05 m)

5. Reddish-grey fine silty sand with *L. peregra, Trichia* cf. *hispida* and freshwater mollusc fragments. (0.10 m)

4. Strong brown coarse gravel with a matrix of very coarse sand. The gravel is point-contact cemented with calcite. Clasts include flint and Greensand chert, Jurassic micrite, oolitic limestone, ironstone, oysters and belemnites, Carboniferous Limestone, coal, Coal Measures and Old Red sandstones. The bed contains occasional shells of *M. balthica* and *Littorina* sp. (0.95 m)

3. Red clay with a few pebbles. (0.2 m)

2. Grey, mottled red and black coarse sand, patchily cemented at the top. (0.5 m)

1. Sands and gravels with angular fragments of Carboniferous Limestone. Clasts include flint, Old Red Sandstone and Triassic rocks. Occasional shells of *M. balthica* are present. (0.2 m)

Palynological analysis of a coal clast from bed 4 yielded a small, very weathered assemblage including species of *Lycospora, Florinites, Triquitrites, Crassispora, Densosporites* and *Dictyotriletes.* These indicate a Westphalian age. A very small mud lens in this bed yielded single specimens of the marine dinoflagellate cysts *A. andalousiense* and *Bitectatodinium tepikense,* a foram cast and grains of Cyperaceae and Poaceae. Analyses of samples from beds 5 and 7 were largely unsuccessful, only two grains of Poaceae and one Filicales spore being found in bed 7.

Interpretation

The basal gravels (bed 1) contain a variety of erratics and thus are likely to post-date a glaciation of the Avon coastlands. The presence of *M. balthica* indicates that this is a marine deposit. ApSimon and Donovan (1956) suggest that this is an 'upper' beach deposit and note that it reaches 11.2 m OD, consistent with a mean sea level of 4.5–6.0 m OD. The overlying sands (bed 2) probably also have a marine origin, having been laid down below High Water of Mean Ordinary Tides (ApSimon and Donovan, 1956). It reaches 11.77 m OD and may indicate a sea level of over 8 m OD.

The red clay (bed 3) was suggested by ApSimon and Donovan (1956) to be derived by weathering from local Triassic rocks, but the presence of flint in this bed is inconsistent with such an origin. It may be a very weathered slope deposit containing erratics from the underlying marine gravel, or it could be till, or partially derived from till, since it is apparently similar to the tills on Portishead Down, though whether it lies *in situ* is not established. Because erratics are present in the underlying (probably marine) deposits, two hypotheses are tenable. First, there may have been two glaciations in the Vale of Gordano, separated by an interglacial marine incursion. Second, and perhaps more likely, there was one glaciation, pre-dating the lower marine deposits, and this bed was soliflucted to its present position after sea level fell following deposition of the basal gravel and sand.

The roundness of the gravels overlying the red clay (bed 4) and the presence of *M. balthica* and *Littorina* sp. and perhaps *B. undatum* (ApSimon and Donovan, 1956) and marine dinoflagellate cysts is consistent with a shallow-marine origin, possibly as upper beach deposits. This gravel reached 12.6 m OD (ApSimon and Donovan, 1956), consistent with a mean sea level of 6.0–7.5 m OD. The presence of a substantial component of Mesozoic rocks in this gravel most probably implies an input of erratic material, possibly from the erratic-rich drifts on nearby Portishead Down (Nightingale Valley; this chapter).

Overlying what is probably the eroded surface of bed 4 are sands and silts with freshwater shells (bed 5). This unit is the probable source of the *Corbicula* shells seen in the temporary excavation. *C. fluminalis* is regarded as a species of clean running water, while *L. peregra* is a generalist species. *T. bispida* is typically found in damp herbaceous vegetation. *Corbicula* has not been found in sites of demonstrable last interglacial age (Bridgland, 1994), and it is therefore likely that this horizon dates from Oxygen Isotope Stage 7 or earlier (Campbell *et al.,* in prep.).

Overlying these sediments are sandy silts (beds 7–9) which were most probably laid down on inter tidal flats. The deposits are sufficiently weathered and decalcified to be barren of calcareous fossils and virtually barren of palynomorphs. These deposits most probably reflect a third marine transgression. They reach 13.6 m OD and ApSimon and Donovan (1956) suggest that this is evidence for a mean sea level not lower than 14.0 m OD. This is higher than has been suggested for the Oxygen Isotope Stage 5e transgression recorded in the Burtle Formation (Kidson *et al.,* 1978; Chapter 9) and for Stage 7 sites in Somerset (Hunt and Bowen, in prep.; Chapter 9) or elsewhere in South-West England (Mottershead *et al.,* 1987; Chapter 6). It may be more compatible with the sea levels suggested in Stage 9 (reviewed in Jones and Keen, 1993).

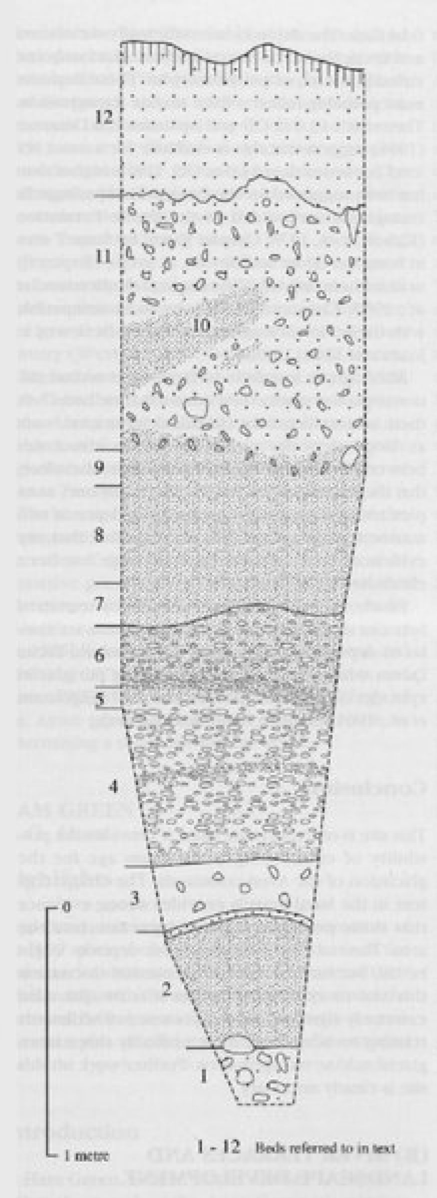
Although an interlude of freshwater sedimentation separates marine bed 4 from marine beds 7–9, there is no evidence for climatic deterioration, such as slope deposits or cryoturbation structures between bed 4 and bed 9. It is possible, therefore, that the deposits of beds 4–9 reflect only one, complex temperate period, containing evidence of two marine transgressions. It is also possible that any evidence for an intervening cold stage has been eliminated by erosion.

Finally, these deposits are overlain by terrestrial breccias and silts (beds 11 and 12). These are similar to deposits at Holly Lane, Clevedon and Brean Down which were laid down during periglacial episodes (Gilbertson and Hawkins, 1974; ApSimon *et al.,* 1961; Chapter 9 and this chapter).

Conclusion

This site is of importance since it provides the possibility of establishing a minimum age for the glaciation of the Avon coastlands. The erratic content in the basal gravels provides strong evidence that these post-date a glacial incursion into the area. The red clay overlying these deposits might be till, but further research is needed to confirm this and to establish whether it is *in situ.* Also extremely significant is the presence of sediments relating to what were most probably three interglacial marine transgressions. Further work on this site is clearly necessary.

References



(Figure 10.8) The Quaternary sequence at Weston-in-Gordano. (Adapted from ApSimon and Donovan, 1956.)