Nightingale Valley

C.O. Hunt

Highlights

Nightingale Valley contains unequivocal *in situ* glacial material and thus provides clear evidence for a glacial incursion in the Avon coastlands and the overriding of the Portishead–Clevedon ridge by ice from the Bristol Channel.

Introduction

Portishead Down is part of the Clevedon–Portishead ridge, a Carboniferous Limestone horst which separates the Vale of Gordano from the Bristol Channel. Near the summit of Portishead Down, overlooking the Vale of Gordano at above 85 m OD, up to 4 m of glacigenic deposits are exposed at the top of the old Black Rocks Quarry towards the head of Nightingale Valley. The deposits include boulders, imbricated coarse gravels, sands and silty clays. Some of these deposits have a substantial erratic content.

The earliest mention of drift deposits on the coastal ridge between Clevedon and Portishead was the observation that on Walton Down ' … the rabbits have thrown up a quantity of fine flint gravel. 250–270-ft. O.D.' (Davies and Fry, 1929; p. 164). These authors suggested a fluvial origin for the gravels as part of their Avon 'High Terrace'. Hawkins and Kellaway (1971) record that the site was visited by a British Association field excursion from the Bristol Meeting in 1955, when opinion on the 'cannon-shot gravels was divided between glacial and marine Tertiary origins. Deposits at the site were mapped by Welch (1955) and considered to be of glacial origin by Hawkins and Kellaway (1971). The site has recently been re-described by Hunt (in prep.).

Description

Eroded remnants of glacial deposits cap the limestone plateau of Portishead Down. *In situ* deposits lie above *c.* 85 m at Nightingale Valley GCR site [ST 450 752] and are well exposed at the south-eastern side of the site, at the top of the abandoned Black Rocks Quarry. The deposits overlie an erosion surface cut across sharply dipping Carboniferous Limestone. In general, this surface has a smoothly undulating relief of 2–3 m, though localized steep-sided depressions occur over fault-planes in the limestone below.

The deposits are up to 4 m thick and extremely variable in lithology. They show a complex stratigraphy (Figure 10.4), and can be summarized as follows (maximum bed thicknesses in parentheses).

5. The section is capped by extremely coarse, mostly angular, clast- and matrix-supported gravel. Clasts with B-axes between 0.05 and 0.1 m are very common. The largest limestone clast had a B-axis of 0.2 m and the largest erratic, a well-rounded brown quartzite clast, had a B-axis of 0.09 m. The matrix of the gravels varies between whitish-brown angular fine gravels and whitish-brown gritty sands. The gravels are imbricated, with A-axes typically orientated towards 140°. (2.6 m)

4. Fine gravel, imbricated and clast-supported, with a reddish-brown sandy clay matrix. About 61% of this gravel is made up of angular Carboniferous Limestone clasts; most of the rest are erratics including, in descending order of abundance, flint, sandstone, vein calcite, quartzite, vein quartz, siltstone, basalt, haematite (vein-fill) and coal. (0.6 m)

3. Reddish-brown slightly clayey sand with rare rounded quartzite and flint pebbles. At the north-east extremity of the exposure, occasional lines of well-rounded pebbles, mostly of quartzite, flint and brown sandstone lie towards the base of the unit. The largest clast exposed was of limestone and had an A-axis of 0.72 m and a B-axis of 0.3 m, but limestone clasts are comparatively rare in this bed. (3 m)

2. Reddish-brown silty clay with occasional quartzite and flint pebbles. A sample from near the base of this bed yielded a sparse assemblage of palynomorphs of Carboniferous, Mesozoic and Quaternary age. (0.6 m)

1. Extremely coarse openwork gravels. The typical clast has a B-axis of around 0.05–0.1 m and the gravels consist almost exclusively of angular fragments of the local Carboniferous Limestone. (1 m)

Interpretation

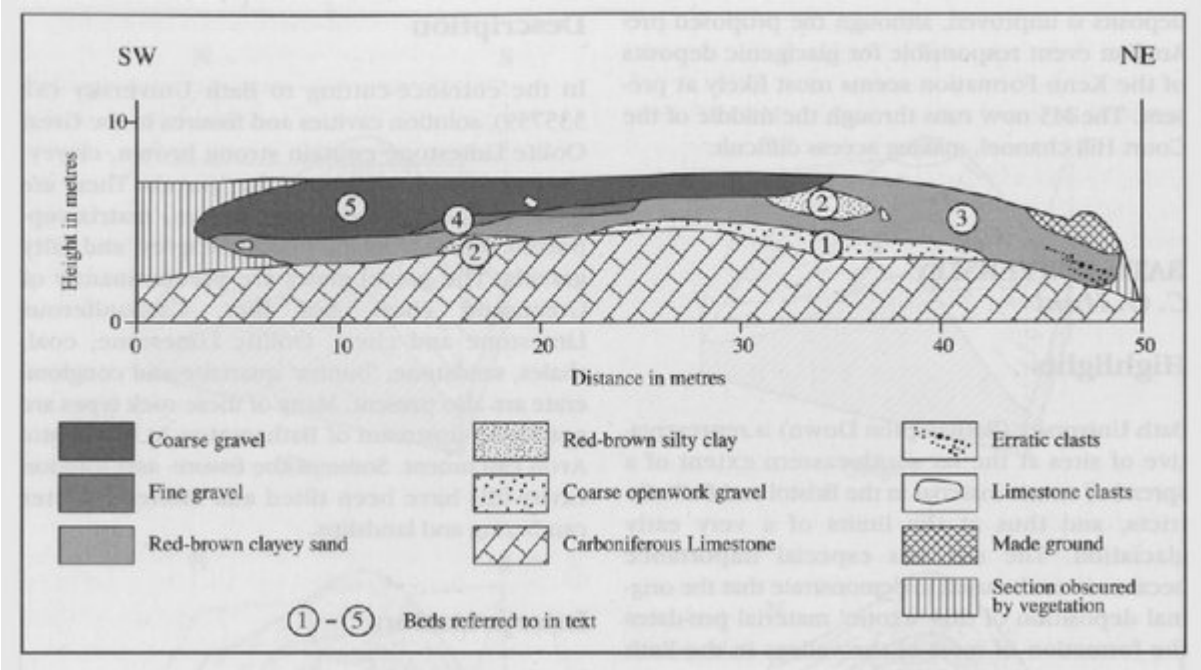
The clast size, erratic content and stratigraphy of the deposits are inconsistent with a marine or flu vial origin, but are consistent with a glacial origin. The gravels and sands (beds 5, 4, 3 and 1) are most probably glaciofluvial in origin, though the reddish-brown silty clay (bed 2) may be a flow till. The presence of glaciofluvial deposits on the summit of Portishead Down and their south-eastward imbrication is not completely consistent with the suggestion (Hawkins, 1977) that glacial incursion was from the west. Neither is it fully consistent with Hawkins' (1977) suggestion that the Nightingale Valley to the south-east of the site originated as a glacial meltwater channel. Most of Nightingale Valley in fact drains south-westwards and therefore is unlikely to have been cut by meltwaters flowing south-eastwards. It is perhaps more probable that Nightingale Valley was cut by sub-aerial processes, probably in much the same way that the chalk combes were excavated under periglacial conditions (Kerney, 1963).

Some of the clast lithologies, such as the red sandstones, the brown sandstones and the coal, are erratic on Portishead Down but may be derived from nearby outcrops of Devonian, Triassic and Carboniferous age in the Bristol Coalfield, or possibly from the South Wales Coalfield. Other lithologies, principally the flint and the quartzites, are probably derived from farther afield, though the durability of these rocks and the roundness of the clasts is suggestive of an extremely long transportational history prior to their incorporation into the drift. A slightly disconcerting feature is the absence of Greensand chert, which is a common erratic lithology in glacial deposits elsewhere in Avon. The presence of erratic palynomorphs, including Rhaetic and Quaternary marine taxa, can be taken as evidence for the derivation of these sediments from the Bristol Channel.

Conclusion

The site is an important component in a network of sites which contains clear evidence for the glaciation of the Avon coastlands. Nightingale Valley is important because it contains evidence for the advance of ice inland from the Bristol Channel. The deposits are well preserved and rich in rocks that can only have been transported to the summit of Portishead Down by a glacier. The age of the glacial episode is unproven and the subject of considerable controversy. Nightingale Valley therefore has considerable potential for future research into the glacial history of the Avon coastlands.

References



(Figure 10.4) The Pleistocene sequence at Nightingale Valley, adapted from Hunt (in prep.).