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# Bincombe Down, Dorset

[SY 676 856]

## Highlights

The gravels of this site provide information on the palaeogeography of the area to the west of the main Palaeogene depositional basin of southern Britain. Their coarseness and composition suggest high-energy fluvial conditions within alluvial fans associated with intra-Eocene movement on the Ridgeway fault.

## Introduction

The site comprises overgrown disused gravel pits near the summit of Bincombe Down (grid reference [SY 676 856]) within a small outlier south of Dorchester and some 5 km west of the main outcrop of the Hampshire Basin Palaeogene (Figure 7.1). The sediments present comprise gravels, sands and silty muds, equivalent to what were formerly called the 'Bagshot Sands' further to the east. They were later assigned to the Poole Formation of the Bournemouth Group of Edwards and Freshney (1987b), although the latter is now subsumed into the Bracklesham Group. The pebble suite is the significant feature of the site because of its implications for provenance and contemporaneous earth movements.

The Eocene sediments capping Bincombe Down were apparently first noticed in 1855 by Fisher (1896) who described vertically bedded coarse sands, clays and gravels exposed some 200 m north of the Ridgeway fault. Bincombe was figured by Prestwich (1875) in cross-sections illustrating the structure of the Weymouth district, and also by Strahan (1895) in his detailed account of tectonic disturbances in Dorset. Strahan considered that the complex geology of the area around Bincombe Village was the result of the southward overthrusting of Middle Jurassic over Upper Jurassic beds. The most important early study of the area was that of Reid (1896), who devoted particular attention to the composition of the gravels, their sources and implication for interpreting the regional structure, palaeogeography and drainage pattern. He also noted their importance (together with those of Blackdown) as sources of the Pleistocene gravels of Dorset, Hampshire and Sussex. References to the Tertiary strata at Bincombe in the Purbeck Memoir by Strahan (1898) are mainly based on Reid (1896) and Fisher (1896). Similarly, Reid reiterated much of his earlier work (1896) in his Dorchester Sheet Memoir (1899).

Later work by Arkell (1936) suggested that Strahan's explanation of the structural geology was at variance with the evidence and thus untenable. He proposed a multi-phase history of movement on the parallel and closely spaced Abbotsbury and Ridgeway faults involving southerly downthrow during the Cretaceous and northerly downthrow during the Tertiary. He argued (Arkell, 1947) that the locally derived Eocene gravels at Bincombe provided important evidence for dating the post-Cretaceous movement on the Ridgeway fault. More recent work by Plint (1982, 1983d) is considered below.

## Description

The deposits comprise crudely bedded sands, gravels and silty muds. Their thickness is difficult to determine, particularly at the present time, since exposures are very poor. Fisher (1896) noted 30 m of vertically bedded sands and gravels, although strata on the northern side of the outlier are horizontal (Strahan, 1898).

Like the pebble suite at Blackdown, a variety of clast types are present. About 50% are large, poorly rounded flints, whilst a smaller proportion comprises Upper Greensand chert clasts, some up to 30 cm in diameter. Small pebbles of vein quartz are common, and were considered by Reid (1896) to have been derived from the Wealden. In addition to these principal components, there are pebbles of chert and silicified limestone of Purbeck age, 'veined grits', quartzites, radiolarian chert and red and green jasper (Reid, 1896).

## **Interpretation and evaluation**

The importance of the Bincombe outlier is principally that it provides (with similar gravels at Blackdown) evidence of intra-Eocene syn-sedimentary movement on the Ridgeway fault.

### **Stratigraphical affinities**

Stratigraphically, gravels such as those at Bincombe and Blackdown have been included in the Poole Formation of Edwards and Freshney (1987b). There may, however, be a case for giving them separate formation status, since they are likely to be a separately mappable unit. The Bincombe gravels can be traced eastwards into the 'Bagshot Sands' of Warmwell [SY 752 881] where the underlying strata are Reading Beds and London Clay. Since the Bincombe gravels rest on the Chalk, a westward overstepping relationship is apparent.

### **Depositional environment and palaeogeography**

Plint (1982) suggested that the texturally immature, locally derived Chalk flints, Upper Greensand and Purbeck cherts in the gravels indicate the contemporaneous exposure of such rocks to erosion and that this occurred immediately to the south of the Ridgeway fault. He suggested (Plint, 1982, 1983d) that the coarseness of these clasts may support a conclusion that alluvial fans had developed at this time adjacent to a fault scarp produced by intra-Eocene movement. The coarseness of the Bincombe gravels is in sharp contrast with their more easterly equivalents at Warmwell and Povington [SY 892 824] where exotic pebbles are much smaller and comprise only a minor constituent of the sediment. Since such a clast size distribution provides an index of stream power and gradient, it seems that alluvial fan sedimentation was replaced eastwards from the Bincombe area by a less energetic fluvial regime.

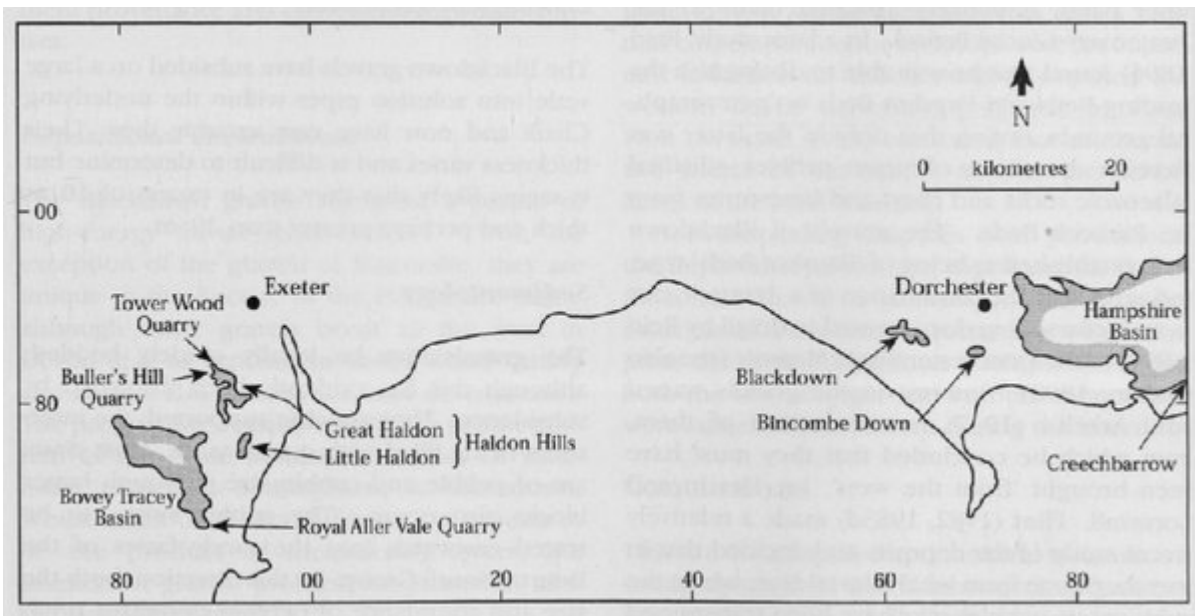
### **Provenance**

Plint (1982) concluded that in contrast with the pebbles of Mesozoic age derived by local erosion, the origin of the 'exotic' pebbles was more problematical. He postulated that they might have been introduced from parent rocks to the west by easterly flowing streams, a suggestion disputed by Isaac (1983). An alternative is that such pebbles were reworked from Mesozoic gravels such as those of the Wealden strata of Dorset or even from earlier Palaeogene sediments, possibly those from the southern, uplifted side of the Ridgeway fault.

### **Conclusions**

The gravels at Bincombe, like those of Blackdown, provide evidence of considerable contemporaneous uplift and erosion. High-energy deposition of coarse elastics in alluvial fans adjacent to the Ridgeway fault has been inferred. With Blackdown, Bincombe provides clear evidence of intra-Eocene tectonism and is therefore an important national site.

### **[References](#)**



(Figure 7.1) Map to show the distribution of Palaeogene outliers in Dorset and Devon.