

Hinton Charterhouse, Somerset

[ST 772 572]

B.M. Cox

Introduction

The disused sand pit at Hinton Charterhouse, c. 6 km south of Bath, is the type locality of the Hinton Sand, a distinctive, arenaceous unit within the clays and limestones of the Forest Marble Formation of which it may be considered a member. Sandy beds in the middle to upper part of this formation have been recorded as far south as the Sherborne area of Dorset (Woodward, 1894; Torrens, 1980b) and as far north as the Oxford area (Arkell, 1933, 1947b), but they are by no means continuous and are generally not sufficiently well defined to warrant differentiation as separate lithostratigraphical units. The name 'Hinton Sand' originated with William Smith who, in 1799, produced a geological map of the Bath area as well as a manuscript table of the different stratal units.

The latter referred to a unit of 'Sand and Stone', which later became the Hinton Sands and 'Sandstones' (Townsend, 1813; Judd, 1897). At Hinton Charterhouse, the Hinton Sand Member occurs as a lenticular body, up to about 10 m thick, just above the middle of the Forest Marble Formation succession (Penn and Wyatt, 1979). Its lateral extent is not well constrained but Holloway (1981) believed that it extended eastwards for at least 1.5 km. Penn and Wyatt (1979) reported similar lenses at approximately the same stratigraphical level between Hinton Charterhouse and Frome, which appears to be the area of their maximum development.

Description

The pit at Hinton Charterhouse has been described by Cox (1941) who reported about 6 m of pale-buff, fine-grained sands and sandstones with discontinuous beds (c. 0.6 m thick) and sporadic doggers (up to 1.2 m x 3.5 m) of hard, concretionary sandstone (Figure 2.50). Clay lenses and galls occurred in thin bands towards the base, and lignite fragments, annelid tracks and a sparse bivalve fauna including *Catinula* cf. *ancliffensis* Cox and Arkell, *Gervillella* sp., *Pseudolimea* cf. *duplicata* J. de C. Sowerby and *Placunopsis socialis* Morris and Lycett were also noted. At the top of the section, Cox (1941) reported slabs of hard, calcareous sandstone with many oysters on their upper surface, together with *Placunopsis* and ooids. Hawkins' (1977) later description reported only 3 m of exposed beds but in 1978, the Nature Conservancy Council re-excavated the section to a thickness of nearly 8 m. The north face of this excavation was described by Holloway (1981) on which the following section, including bed numbers, is largely based.

	Thickness (m)
Forest Marble Formation	
<i>Hinton Sand Member</i>	
1: Sandstone, hard, concretionary, showing fine parallel-lamination	seen to 0.31
2: Sand, structureless, and sandstone	1.83
3: Sandstone, concretionary	0.21
4: Sand, structureless, and sandstone	1.41
5: Mud-flake conglomerate; basal erosion surface	0.21
6: Sand, structureless	0.04
7: Mud-flake conglomerate; basal erosion surface	0.32
8: Sand, structureless	0.03
9: Mud-flake conglomerate; basal erosion surface	0.10
10: Sand, structureless, and sandstone	0.52
11: Mud-flake conglomerate; basal erosion surface	0.18
12: Sand, structureless, and sandstone	0.17

13: Mud-flake conglomerate	0.08
14: Sand, structureless	0.04
15: Mud-flake conglomerate; basal erosion surface with 0.11-m deep channel into underlying bed	0.08–0.19
16: Sand, structureless	0.03–0.14
17: Sandstone, hard, concretionary	0.21
18: Sand and sandstone; small-scale trough cross-bedding	0.28
19: Sand and sandstone; thin bands showing parallel lamination; thin lenses of mud-flake conglomerate towards base	seen to 1.72

The mud-flake conglomerates comprise flat, brown-weathering intraclasts of clay and finely interlayered clay and sand set in a fine sand matrix. The clasts are typically 15 mm long and 3 mm thick, and are grain-supported. Occasional coarser clasts may be obliquely imbricated. Most of the conglomerate horizons were continuous across the cleared face (Holloway, 1981).

Interpretation

Although the Hinton Sand Member had been included in the Forest Marble Formation by Townsend (1813), Lonsdale (1832) and Woodward (1894), Buckman (1927b) raised the possibility that it might rather be equivalent to certain sandy beds of the overlying Cornbrash Formation. He associated the two by combining the Hinton Sand Member of Hinton and the Cornbrash Formation of Corscombe, Dorset, in a stratal unit called the 'Hintonian', giving the Upper Cornbrash brachiopod *Ornithella arenaria* S.S. Buckman as a characteristic fossil. Arkell (1931) recommended that the term 'Hintonian' should be dropped because of Buckman's miscorrelation that he described as an 'unfortunate muddle'. Arkell (1933) and all subsequent authors have affirmed that the Hinton Sand Member belongs in the Forest Marble Formation. According to Cox (1941), the loose slabs of hard calcareous sandstone with abundant oysters on their upper surface, which he reported at the top of the section, suggest the incoming of the more typical Forest Marble Formation facies. Cox (1941) compared the facies of the Hinton Sand Member with that of the Aalenian or Lower Bajocian Collyweston Slate (see Collyweston GCR site report, this volume) and the Middle Bathonian Stonesfield Slate (see Stonesfield GCR site report, this volume).

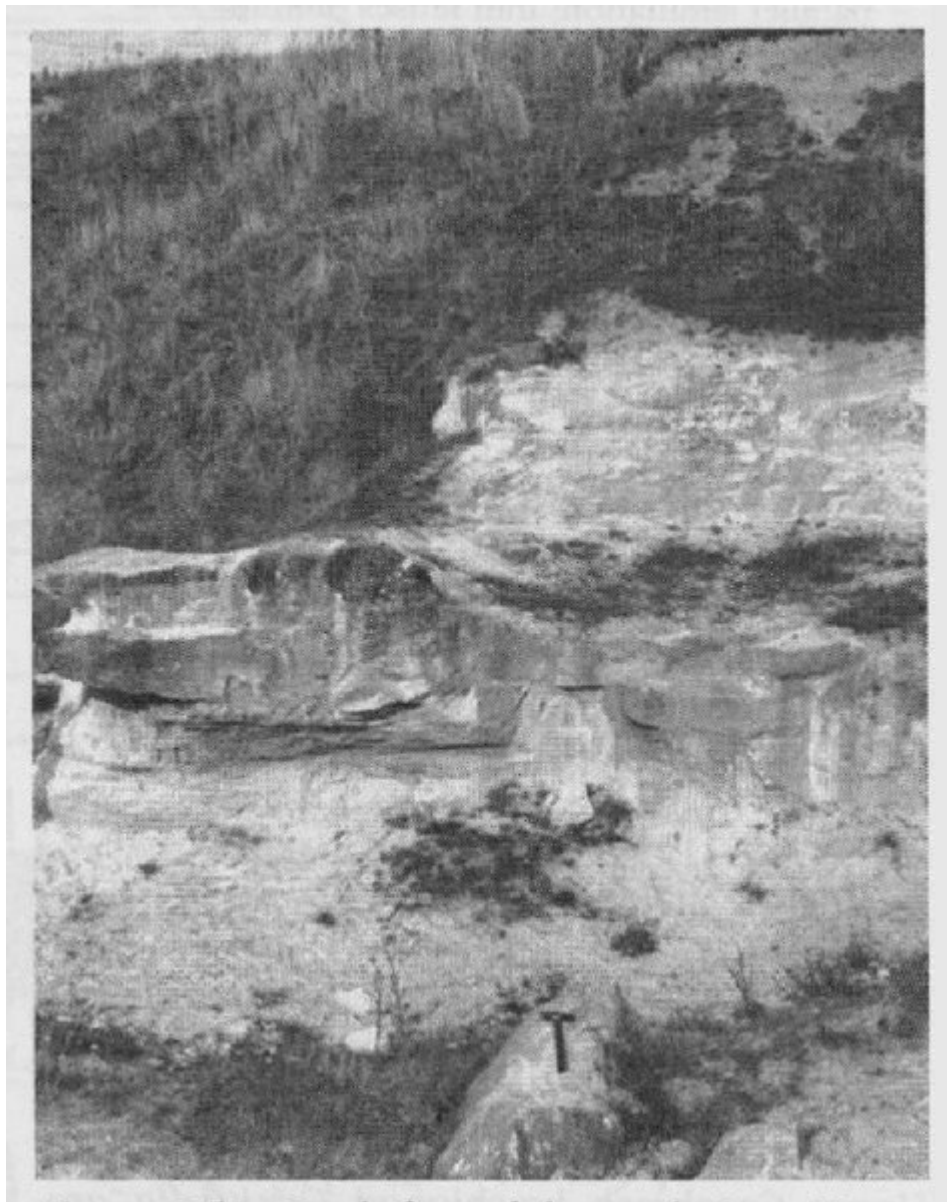
According to Holloway (1981), the structureless sands at Hinton Charterhouse have almost certainly had their original sedimentary structures, such as ripple marks and lenticular bedding, destroyed by diagenesis whereas some of the concretionary, cemented sandstones still show some parallel lamination. These sedimentary structures, together with the limited fauna of bivalves, indicate a shallow-water, marine depositional environment. The sands are well sorted, which led Penn and Wyatt (1979) to suggest that they had experienced lengthy winnowing in moderate currents. At times, these were sufficiently vigorous to erode clays deposited in adjacent areas of quieter-water deposition as evidenced by the mud-flake conglomerates. The erosive bases of the latter may indicate washover processes operating upon some kind of shallow marine shoals (Holloway, 1981). The Hinton Sand Member was deposited in a number of elongate sand bodies, the known distribution of which suggested to Penn and Wyatt (1979) that the member represents extensive sand banks rather than linear sand-bars or channel deposits.

Conclusions

Although sandy lithologies are fairly widespread in the middle to upper part of the Forest Marble Formation, well-developed sands and sandstones are unusual. These latter lithologies reach their maximum development in the Hinton Charterhouse area, south of Bath, where they occur as lenticular bodies up to 10 m thick. Known as the 'Hinton Sand', a name that originated with William Smith who mapped the Bath area in the late 18th century, the sands here constitute a member of the Forest Marble Formation. The sand pit at Hinton Charterhouse is the member's type locality. The known distribution of the Hinton Sand Member, its sedimentary structures and its limited fossil fauna suggest that it probably represents extensive sand banks that accumulated in shallow marine waters. The site thus shows a rather rare facies of the Forest Marble Formation and presents interesting insights into the formation's depositional history as well as

the Late Bathonian palaeogeography of southern England.

References



(Figure 2.50) North face of the sand pit at Hinton Charterhouse showing sandstone doggers in the Hinton Sand Member. (Photo: British Geological Survey, No. A9739; reproduced with the permission of the Director, British Geological Survey, © NERC, 1961.)