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BREAN DOWN SAND CLIFF REVISITED: PLEISTOCENE STRATIFICATION, NEW FINDS AND THE DATE OF THE MARITIME BELL BEAKER

by

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ABSTRACT

Pleistocene and Holocene deposits at Brean Down, Somerset, England, span the period from the beginning of the Devensian, the last glacial stage, to the present day. The paper discusses additional evidence for the interpretation of the Pleistocene deposits, correlated now with Oxygen Isotope Stages 4 to 2. Supposed bone artifacts are discussed and concluded to be wholly naturally modified, not artifacts. The interpretation of the Maritime-style Bell Beaker find is discussed and it is concluded that the associated radiocarbon date cannot safely be used to date it. Additional information and finds bearing on the Bronze Age and later deposits are also presented.

INTRODUCTION

Brean Down is a narrow, roughly east-west inlier of Carboniferous Limestone on the eastern shore of the Bristol Channel, separated from the western end of the Mendip Hills by the mouth of the River Axe (location: NGR ST295587; Lat 50° 19' N, Long 3° 6' W). It is about 2 km in length and rises to a maximum height of 97 m above OD. Its northern face falls steeply to the south shore of Weston Bay, its southern face is formed by a multi-stage fossil sea-cliff, up to 50 m high, whose foot is only exposed at the western end of the Down, where it lies close to Ordnance Datum. The western two-thirds of this limestone cliff abuts upon Bridgwater Bay and Berrow Flats, the eastern third is abutted by the estuarine clay alluvium of the Somerset Levels, generally at or below 6 m OD. Banked against the limestone cliff are terrestrial slope and wind-blown deposits which have been progressively eroded by the advancing sea, forming the Sand Cliff. This is a westwards-facing, wedge-shaped sloping face, some 30 m high and 120 m long, roughly perpendicular to the line of the limestone cliff. The deposits extend below beach level and pass southwards to the deposits of the Somerset Levels. They contain evidence of Early and Late Neolithic, Bell Beaker and Early Bronze Age activity or occupation. Intercalated archaeological horizons and structures include Middle Bronze Age houses and a salt-making site, the earliest known in Britain, a Late Bronze Age midden, an Early Christian cemetery and a 16th Century warrener's lodge.

Stratigraphic observations and finds recovered from the Sand Cliff over many years, mainly by the late Dr Herbert Taylor and other members of the Society, were published in these Proceedings forty years ago (ApSimon, *et al.* 1961). More recently, the results of systematic investigation and large scale excavation undertaken from 1983 to 1987 in advance of the construction of sea-defences, have been published in a substantial monograph (Bell, 1990). Additional work by Bell in 1989 and 1991 has been published in summary form (Bell, 1991). A further paper, published in this number of the Proceedings (Allen and Ritchie, 2000), details the results of investigations below beach level to the south of the Sand Cliff, undertaken in 1995-97 in connection with the extension of the sea defences. Continued work by our members, Andrew Currant and Roger Jacobi, on bone-bearing Pleistocene deposits present beneath the beach to

the west of the Sand Cliff, will, it is hoped, be published in the near future.

The main purpose of this paper is to publish supplementary observations of the stratigraphy and reconsideration of the interpretation and dating of the part of the Sand Cliff section attributed to the Pleistocene; together with some additional finds and further details of previously known finds, including the supposed humanly worked bones of Pleistocene age; and a discussion of the dating of the well-known Maritime style Bell Beaker, found by Dr and Mrs Taylor in 1936, in a pit exposed in the beach west of the Sand Cliff (Taylor and Taylor, 1949). Some supplementary information on the post-Pleistocene deposits, together with comment on some aspects of their interpretation is also added.

Unit	Name	Description (Texture)
8A	Red Loam	fossil soil (sandy clay loam)
8B	Upper Breccia	breccia (sandy loam)
9a	Sandy Breccia	breccia (sand)
9	Main sand	dune (sand: loamy sand)
10	Silty Sand / Sandy Silt	
a	Breccia	breccia (loamy sand)
b	Silty sand	(sandy loam)
c	silt	(sandy loam)
11a	Bone Bed	fossil soil (loam)
11b	Middle Breccia	breccia (loam)
12	Stony (clayey) Silt	
a	Clayey silt	(loam; clay loam)
b	Silty clay	(silty clay)
c	Clayey silt	(silt loam)
13	Lower Breccia	breccia (heterogenous)
a	red stained horizon	
b	grey horizon	
c	red stained breccia	incipient fossil soil
14	Boulder Bed	limestone blocks with voids

Table 1. *Brean Down Sand Cliff (Site A): Pleistocene and earlier Holocene stratification, modified from ApSimon,* et al. *(1961, p72, pp74-81). Textures separated by ';' refer to samples in stratigraphic order; see also Macphail, in Bell, 1990 (pp187-91).*

PLEISTOCENE STRATIFICATION

The Pleistocene and early Holocene stratification of the Sand Cliff is shown in Table 1. While the general validity of this scheme as originally presented in 1961 is supported by subsequent work, it was not consistently based on lithostratigraphy. The amended scheme presented here follows the principle that units defined should be potentially mappable. In 1961 the stratigraphic units were called beds or layers; here following the archaeological convention used by Bell (1990), the stratigraphic divisions are called Units and subdivisions are distinguished by lower-case letter suffixes instead of the upper-case used in the 1961 report. For reasons noted below, upper-case suffixes are retained for Unit 8A and Unit 8B. Unit names have been amended, where necessary, and soil-texture names (cf. Findlay, 1965, pp184-5), obtained from laboratory analysis and field examination, have been added in parenthesis. A comparison between the stratigraphy of the upper part of the succession as reported in 1961, but not noted here, and that observed in 1985, is given by Bell (1990, p16, table 1).

Amendments

Red Loam, Unit 8A; *Upper Breccia*, Unit 8B: these units are potentially separable by detailed mapping; Unit 8A is a largely stone-free argillic fossil soil and Unit 8B a very stony breccia. The distinction is confirmed by Macphail's analysis (in Bell, 1990, pp187-96). This regards the Red Loam as having developed largely through complex 'pedogenic homogenisation' of colluviated relict soil material and wind-blown silt and sand deposited on the Upper Breccia. These units were correctly given separate numbers in Taylor's unpublished stratigraphic scheme (archive), but unfortunately, because of the hypothesis that the Red Loam was formed by weathering of the Upper Breccia, they were bracketed together in the report as 8A and 8B (cf. 1961, p98). They have not been re-numbered now because of the problems this would cause for the records of finds from Unit 8A and Units 10 to 13.

The matrix of Unit 8B was described in the 1961 report (p78) as tough, fine, reddish, clayey, sandy earth. Ross's textural classification of Macphail's thin section sample A is sandy loam, with 19% clay, 9% silt, 72% sand (in Bell, 1990, microfiche MF1:C13, sample M103b). Bell's fig. 20 locates this in Unit 8B, text references to '8a' may be wrong. Field descriptions were: reddish brown silty clay or dark reddish brown silty sand (soil pit XII, contexts 236, 235) and reddish brown silty loam (soil pit IV, contexts 209, 210) (Bell 1990, p96).

Sandy Breccia, Unit 9a, formerly 8c: the reasons for transferring this from the Upper Breccia unit to the Main Sand unit are:

a) its sandy matrix is identical with that of Unit 9;
b) the stratigraphic observations detailed below show that 9a is a facies within Unit 9;
c) the consistently sharp boundary between the sands of Unit 9 and the sandy loam matrix of the Upper Breccia, Unit 8B.

Boulder Bed, Unit 14, formerly 13d: this unit, consisting of large angular limestone boulders with unweathered sulphurous smelling faces and with voids between them, appears distinct from the Lower Breccia, Unit 13, which has a matrix with aeolian and colluvial components as well as the products of *in situ* freeze-and-thaw processes (Macphail, in Bell, 1990, pp187-8).

Supplementary observations

1. 1972

In February 1972, a 2 m long cutting sited 9.6 m south of the limestone cliff and 28 m southwest of the northern end of the Sand Cliff was opened to examine Pleistocene deposits exposed in the surface of the beach (NGR ST 2950 5875). This cutting exposed reddish stony loam dipping southwards from beach level at about 19-20°, covered by sand and a veneer of modern beach gravel. In recent years this area has been the site of ongoing investigations by Currant and Jacobi (see below).

2. 1976

In October 1976, two joining pieces of ivory, 20 cm long, from a tusk, presumably of mammoth, were found by the late Dr Allan Rogers in Unit 10a, the breccia at the top of Unit 10, the Silty Sand, about 5 m from the limestone cliff and 2 m or more above the Bone Bed. At the find spot, where the exposed face turned away eastwards, Unit 10a was about 0.5 m thick, thicker than the thin band of angular limestone clasts recorded in the upper part of the adjacent vertical north-south face in 1953-4 (ApSimon, *et al*, 1961, figure 16), although in 1976 it had been eroded from that face. This was the first recorded faunal find from Unit 10, the layer having been inaccessible except by wire caving ladder during the 1950s investigations.

Following this discovery, a cutting 1.5 m square was made in the adjacent beach, 10 m from the limestone cliff (NGR ST 2953 5878). This exposed silty sand, thought to represent Unit 10, covering a reddish clayey-sandy breccia containing bone fragments, thought at the time to represent the continuation of Unit 11, the Bone Bed and Middle Breccia. This breccia was dipping southward at about 30° between about 5.9 and 5.0 m OD (Figure 1).

Some further faunal finds believed to be from Unit 10b, found in 1984, are noted in Bell (1990, p221). They include horse and a tibia of red deer, apparently the first record of this species in the Pleistocene deposits of the Sand Cliff.

3. 1983-9

A. The upper, North-South, section face (Figure 2)

A detailed drawing of the part of this face north of the main excavation trench of 1985 is given by Bell (1990, figure 16). This extends up slope to just below 30 m OD, corresponding roughly to the northern end of detail sheet I of the 1961 section (Figure 1). The drawing includes the uppermost Pleistocene deposits which are conventionally differentiated as sands or breccia, with larger stones and blocks drawn individually, but because these deposits were outside the project brief the layers are not given context numbers or labelled or described. The layers can however be identified by comparison with sheet I of the 1954 section (ApSimon. *et al,* 1961, figure 17), despite the recession of the cliff by about 8 m in the intervening years. Figure 2 shows the northern part of this section.

As shown, the Upper Breccia, Unit 8B, is generally about 1 m thick, up to 1.4m, minimum 0.4 m. At the northern end it rests on up to 0.6 m of sand (Unit 9), containing isolated stones and blocks to 0.5 m long and a carbonate streak. This sand, which corresponds in its stratigraphic position to the sand beneath Unit 8B on the 1954 section, wedges out after 4-5 m, after which 8B rests directly on Unit 9a.

Unit 9a (ex 8c), the sandy breccia, is shown divided into two layers; the basis for this is not known. The upper layer is 0.35 m thick at the upper end of the section, increasing down

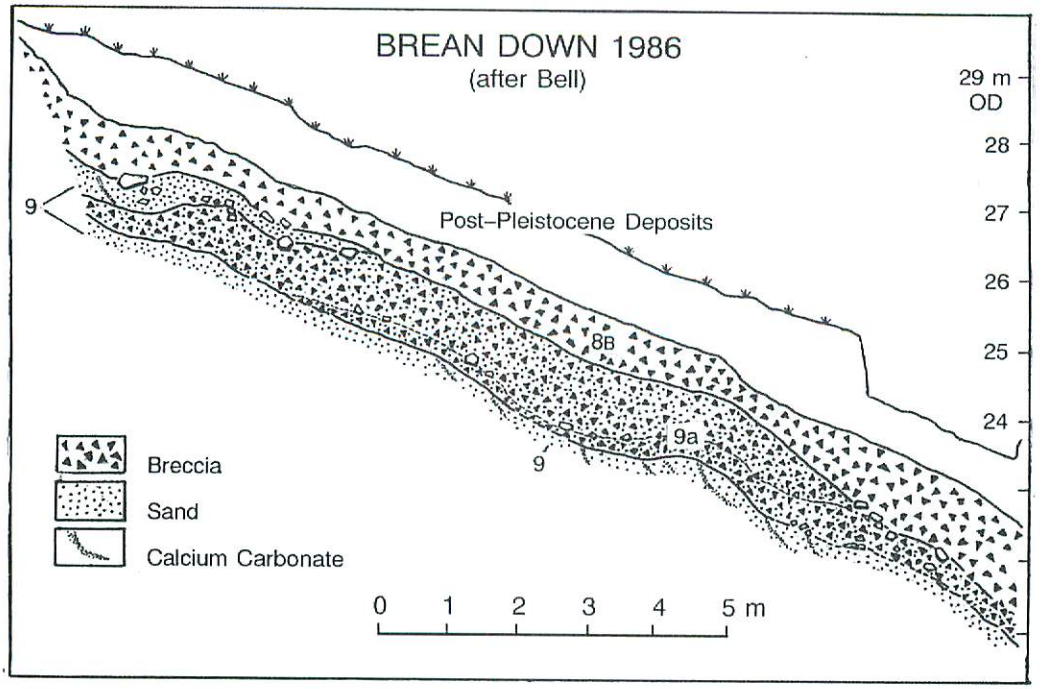

Figure 2. *Brean Down Sand Cliff: north-south section 19-34 m north of the 1985 excavation trench; redrawn from Bell, 1990, figure 16, A-B.*
By permission of English Heritage.

slope to 1.1 m, with larger blocks to 0.3 m at its top and isolated blocks at its base, wedging out after 12 m. It rests initially on Unit 9, down slope on the lower layer. This appears at 4 m down slope, continuing throughout, generally 0.3-0.4 m thick, maximum 0.6 m, locally with stones and limestone blocks. Both layers are shown as resting on the Main Sand, Unit 9, with a sharp boundary which appears to truncate the oblique streaks of calcium carbonate in the top of Unit 9, as observed in 1954-9. Conspicuous strings of small limestone blocks occur at the bases of 8B and the upper layer of 9a.

The thin zone of weathered limestones in red-brown sandy loam, Unit 8z, observed at the top of Unit 8B in 1954 (1961, 79-80, fig. 17), is not shown in Bell's drawing.

B. The East-West section face (Figure 3)

Accelerated erosion of the Sand Cliff, especially following the storm surge of December 1981 (Bell, 1990, pp5-8), resulted in the cutting through the Pleistocene deposits of an east - west trending section face, about 34 m long, roughly parallel to the limestone cliff and about 6-10 m south of it (Figure 3a). The eastern end of the section face (B), abutted against the main section face in which Unit 8B, the Upper Breccia, was exposed. Here its top was at about 27-28 m OD, its height was about 1-2 m, its foot hidden by slumped sand. At its midpoint, the section face was about 8 m high; at its western end (A), where it met the north-south section face in which Units 10-12 were exposed, its foot was at beach level and it was about 3-4 m high with its top at about 10-11 m OD.

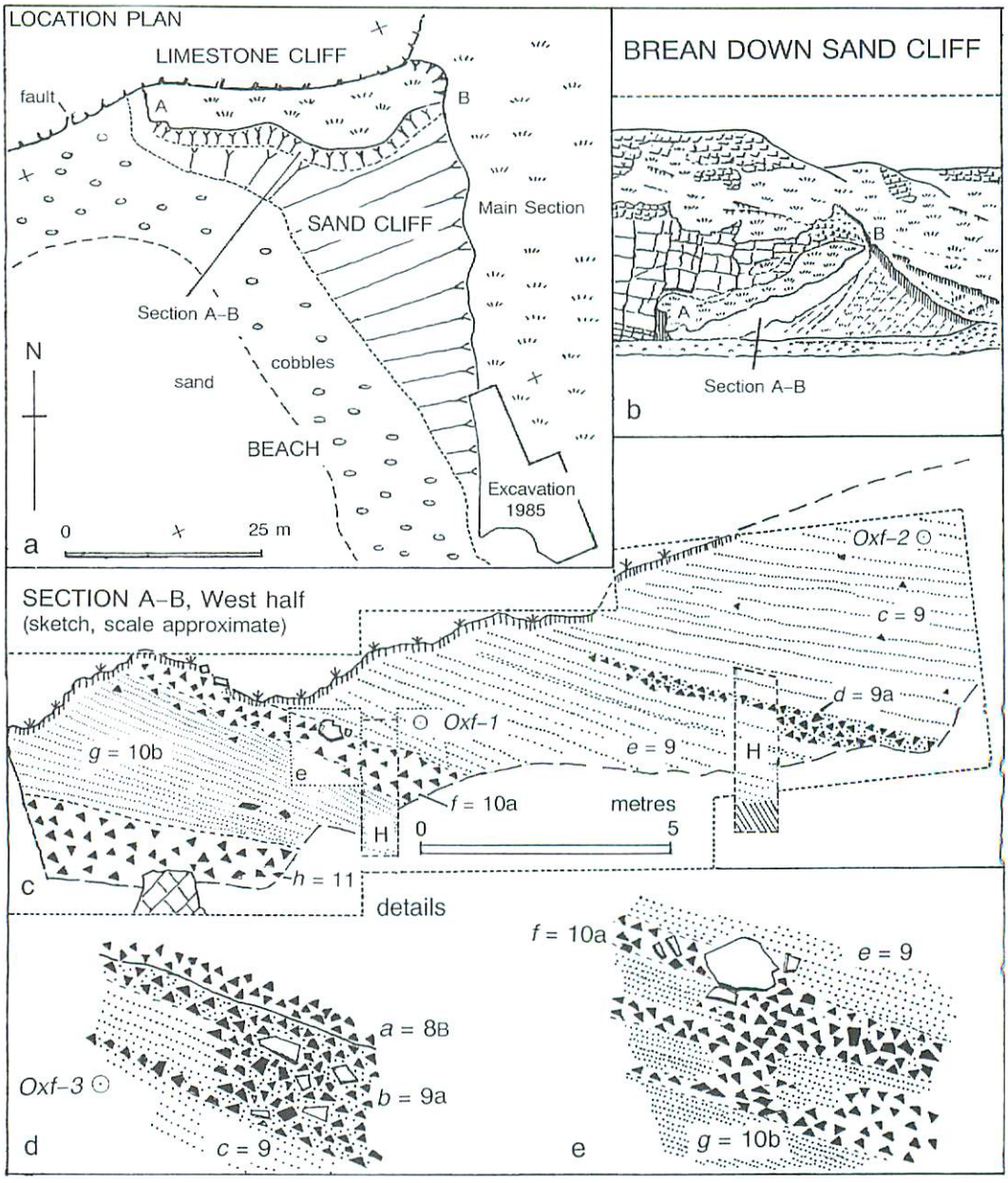

Figure 3. *Brean Down Sand Cliff:* **a.** *Location plan, +,+ = intersections of 50 m squares of Bell's metric site-grid;* **b.** *View of Sand Cliff and Down from the South, showing position of Section A-B;* **c.** *Sketch section of western half of Section A-B, scale approximate, H, H, = sampling transects by Dr Hunt, \\\\ = darker zone; Oxf. E.1-3, = Oxford Laboratory sample locations;* **d, e,** *section details, not to scale:* **d.** *at junction with main section, point B on a.*

a, after Bell 1990, with permission from English Heritage; b, c, from photographs.

This section face potentially provided a complete stratigraphic sequence between Unit 8b, the Upper Breccia, and Unit 11, the Bone Bed and Middle Breccia. This part of the sand cliff was relatively inaccessible in the 1950s and much more obscured by slumped sand and vegetation than the summary section drawing in the 1961 report suggests (ApSimon, *et al*, 1961, plate. 11; Bell, 1990, figure 4; here Figure 1). Although I visited the site on several occasions in 1983-9, I did not have the time or resources to record it. The sketch section of the western half of this face (Figure 3c) is based on photographs taken in 1989. The sands had been sampled for optically stimulated luminescence (OSL) dating by the Oxford Research Laboratory for Archaeology and the detail sketches and description are based on notes made about the sample locations (Oxf. E.1-3).

The deposits exposed had an apparent easterly dip of around 15°, less than the true southerly dip of about 25°. Five layers of limestone breccia were distinguished; the upper two, layers a and b, were present only in the main north-south section at point B (Figure 3d). The sequence, from top downwards, was:

a. Unit 8B, Breccia in sandy loam: as described, rests with sharp transition on Unit 9a.
b. Unit 9a (ex 8c), Sandy breccia: matrix as Unit 9; between the mid-point and the right hand side of the sketch, at about 1 m down slope from sample location Oxf. E.3, its thickness is c. 1 m or more; to the left of the mid-point, it is abruptly reduced to 2 leaves. The upper leaf, 10 cm or less in thickness, extends up slope immediately beneath the base of Unit 8B; the lower leaf, a single string of breccia 10-20 cm thick, continues the line of the base of the unit up slope (Figure 3d).
c. Unit 9, Main Sand: as described, apparent dip 11-15°, occasional angular limestone clasts up to 10 cm noted. Sample location, Oxf. E.3, was about 0.5-1.0 below the top of the Main Sand, a limestone boulder over 1.4 m long and isolated clusters of rock debris seen in face nearby. Sample location, Oxf. E.2,was about 5 m below Oxf. E.3, and 8 m above the base of the unit, locally 10 cm below a band of coarser sand 8 cm thick.
d. Unit 9a: breccia bed 10-20 cm thick, clasts mostly small, 1-2 cm, occasional 5-10 cm, one 20 x 30 cm seen, seems to have cf. Unit 9 matrix, layer petered out about 4 m west of the location noted.
e. Unit 9: laminated, buff to grey, very fine sand, little or no silt, 2 m or more, occasional pebbles and small lenses of breccia, coarser laminations with dark granules, stands in a vertical face. The texture suggests that this was the base of Unit 9, the Main Sand, though at the time it was thought to be Unit 10. Sample location Oxf. E.1 was at 0.6 m above the base of this, level with a prominent, harder, finer, whitish lens, barely scratchable with a fingernail.
f. Unit 10a: breccia band, up to about 1 m thick, apparent dip about 18°, interleaved with sand, with angular boulders up to c. 0.5 m visible (Figure 3e).
g. Unit 10b: less stony, sandy/silty loam, not described, 2-3 m.
h. Unit 11, the Middle Breccia: lowest breccia layer, more than 1 m thick, continuous with exposure in the north-south section face abutting the limestone cliff (cf. ApSimon, *et al.* 1961, figure 16).

In that north-south section face as seen in 1985, Unit 11 was overlain by 1-2 m of sandy loam of Unit 10b, decreasing in thickness southwards away from the cliff. The Unit 10a breccia overlying this was generally about 1 m thick but increased abruptly in thickness

downwards to about 1.5 m or more against the cliff, practically becoming confluent with Unit 11, as though filling a gully left by downward slumping of Unit 10b or by lateral erosion. A boulder about a metre in diameter was visible on top of it, covered by sand, not well exposed. The continuation of this breccia into section A-B was hidden by vegetation but is not in doubt. Colour photographs taken in 1985 confirm the identification of it as Unit 10a and of the overlying sand as Unit 9.

Figure 3c also marks the location of transects cleared by Dr. C.O. Hunt for sampling for pollen and spores (?) in 1985. The western transect cut layer f. The eastern transect cut layer d; two zones were marked in layer e, the upper marked *C1F*, the lower *C2F*. The base of the transect, which was 4-5 m high, showed a dark coloured zone about 0.6 m high above recent storm beach level; unfortunately a barbed wire fence prevented access to see whether this was a distinct layer or dampness due to retention of groundwater behind the modern beach.

Discussion

The 1961 report suggested a scheme of minimal ages for the deposits. The final formative erosion of the underlying Howe Rock shore platform and the limestone sea-cliff, with an inferred sea-level 5-6 m below present level, was attributed to an interstadial at around 23 ka BP; layer 13 (now Units 13 and 14) attributed to the last glacial maximum and the overlying layers to the Late Glacial; with layer 8B even attributed to the Pre-Boreal (ApSimon, *et al.* 1961, p102). The scheme arose from an attempt to relate the sequence to the framework of relatively dated sea-levels supposedly provided by the Eustatic theory espoused by Zeuner (cf. Donovan, 1990), combined with early results of the application of radiocarbon dating to Last Glacial chronology, suggesting a much shorter time span than that now known. The extension of the scope of radiocarbon dating and the absence of evidence for sea-levels anywhere near present during the Last Glaciation rapidly made the scheme untenable. By 1969 it seemed possible that the Howe Rock platform might date from the end of the Last Interglacial (ApSimon, 1969, p38); when bone samples from Unit 11a were submitted to the British Museum radiocarbon dating laboratory in 1973, the expectation was that their date would be greater than c. 20 ka BP; by 1979 an age in the range 25-35 ka BP was suggested for Unit 11a (ApSimon, 1979, p99). Most recently, it has been suggested in the revised correlation of Quaternary deposits in the British Isles (Bowen, 1999, p77), that the Pleistocene deposits of the Sand Cliff may, though undated, correlate with OIS (Oxygen Isotope Stages) 5d to 2, covering the later part of the last interglacial complex and the whole of the last, Devensian, cold stage.

The older limit of age is provided by the Howe Rock shore platform. Towards the west end of the Down, this emerges from beneath boulders presumed to be the lateral continuation of Unit 14; at the end of the Down the well-marked platform at 12-14 m OD (Whittaker and Green, 1983, p84) and also a possible intermediate platform at 9-10 m OD, are truncated by the cliff forming the landward end of the Howe Rock platform. ApSimon and others (1961, pp71-2) presumed from this that the Howe Rock platform was younger than the lower shore platform at Middle Hope and the overlying interglacial raised beach deposits, which are correlated with OIS 5e (Bowen, 1999, p77). Gilbert Green's inference from the great width of the Howe Rock platform, "that completion of its cutting may have occupied more than one period of low sea level ..." (Green, 1992, p160), is brought into question by Rhodes Fairbridge's observation (Fairbridge, 1977) that the 'wave-cut' shore platforms of mid-latitudes are restricted to areas formerly subjected to periglacial conditions and are homologous with arctic strand flats, with their formation due to a combination of cryogenic preparation, freezing sea-spray, ice-foot

erosion in storm wave conditions and shore-ice rafting of loosened debris. The implication would be that the Howe Rock platform was probably formed early in a cold stage when sea level was still relatively high, but when the combination outlined by Fairbridge would make its formation more rapid than by marine erosion alone. A final formative phase of its erosion early in OIS 4, which had a relatively smaller ice cap volume and thus relatively higher sea-levels than the last glacial maximum (cf. Gamble 1999, p186), would not preclude its initiation in the preceding cold stages 5d and 5b, in line with Green's suggestion.

Deposition of the Boulder Bed, Unit 14, probably took place at the same time; Migon's observation of recent marine cliffs and shore platforms in Spitzbergen suggested, "... that most surviving block talus deposits formed just after the beginning of emergence, when weathering was still powerful enough to generate rock failures, yet removal of fallen debris by wave action was no longer effective." (Migon, 1997, p14). Our original observations suggested that the accumulation of the Lower Breccia, Unit 13, began very soon after.

Macphail briefly reviewed the characteristics of Units 13-11 (in Bell, 1990, pp187-8), using Cornwall's microscopic thin sections, basically confirming and refining the original interpretations, and noting small indications of a temperate soil formation phase in Unit 13c and a moderate amount of soil formation in Unit 11a.

The results of Currant and Jacobi's excavations west of the sandcliff, noted above and kindly communicated to me by Currant, allow positive suggestions of the age of these lower deposits to be made. Close against the limestone cliff, their excavations produced a basal layer of red sandy loam with scattered limestone clasts, which yielded fragmentary remains attributable to bison and reindeer and scarcer remains of bear and wolf. They consider that this layer might equate with some part of Unit 13, although from their description, an equation with Unit 12c, the lower part of Unit 12, seems more likely. Slightly further away from the cliff, they observed horse remains, apparently in a higher unit of slightly different colouring and texture, with very high angle contacts between these units, suggestive of material being piled up against the cliff. The presence of horse suggests that this upper layer might equate with Unit 12a, the upper part of Unit 12, since although horse is not listed among the fauna from Unit 12 in the 1961 report, finds of horse from the upper part of Unit 12a have since been reported by Levitan (Bell, 1990, microfiche 1:F11).

Currant and Jacobi compare the faunal assemblage from their basal layer with that from unit 5 at Picken's Hole, which they assigned to their "Banwell Bone Cave mammal assemblage zone" (Currant and Jacobi, 1997, p2; in press), attributing it to the Early Devensian, OIS 4. They also suggest attribution of Unit 13 to this stage, since as well as elements of a similar fauna - reindeer, ox/bison and arctic fox, two teeth from it, described in the 1961 report as *"Microtus anglicus"*, have been identified by Currant as *Microtus oeconomus*, the northern or root vole, which appears to be the only vole species present in the rodent fauna of that zone in Britain. Their suggestion is that at Brean we may be seeing the same kind of sequence as at Wookey Hole Hyaena Den, with an OIS 4, bison - reindeer dominated fauna at the base of the succession, then incoming horses in Unit 12a, and then the beginnings of an OIS 3 fauna with more horse and rare mammoth in Unit 11. The identification now by Currant of collared lemming, *Dicrostonyx torquatus*, in Unit 11 further supports this suggestion.

Given the chronology suggested above, Currant and Jacobi's attribution of unit 5 at Picken's Hole, 10 km east of Brean Down (Tratman, 1964; ApSimon, 1986a), to OIS 4, raises problems since there is no comparable deposit in the Sand Cliff sequence with which it might be correlated and the only point at which the former presence of such a deposit might be hypothesized is at the interface between Units 12c and 13a. However, at Picken's Hole, unit 5 was

stratified beneath unit 4, a cryoclastic breccia up to 0.6 m thick, containing a fauna probably of 'Banwell' type, and thus attributable with reasonable probability to OIS 4, and this in turn beneath unit 3, a series of clayey, sandy and silty loams up to 0.8 m thick, with a 'Coygan' type fauna (Currant and Jacobi, 1997, p4), Middle Palaeolithic artifacts and radiocarbon dates of c. 34 ka and c. 27 ka BP, which can be attributed with reasonable confidence to OIS 3, the mid-Devensian Interpleniglacial. In contrast, unit 5 was a reddish brown stoneless clay loam, probably colluvially deposited but subjected to further weathering in situ, indicative of mild winters free from frost weathering. It yielded a mammalian fauna reflecting use by denning wolves and bears.

In his unpublished faunal report on Picken's Hole, Dr A.J. Stuart considered that the larger animals present in unit 5 could all have lived in boreal forest with July temperatures between about 10° and 16°, as in north-central Sweden today. The evidence from La Grande Pile (Vosges) and other continental sites, conveniently summarised by Gamble (1999, pp184-9), indicates the presence in Western Europe in OIS 5c and 5a of forests, mainly of conifers and birch trees. With this in mind and taking into account the stratigraphic position of unit 5 at Picken's Hole and its apparently fully temperate character, the simplest, though not necessarily correct assumption, would be that Unit 5 dates from one or both of those stages. The animal remains may have been intruded into unit 5 after its deposition, but still within the temperate phase, suggesting the possibility that 'Banwell' type faunas may already have appeared before the end of OIS 5a.

At Brean, the coincidence between faunal changes suggestive of a shift from cold maritime to cold continental conditions and the commencement of silt-rich sedimentary deposition is explicable in terms of topographic change. In OIS 5a the limestone cliff would have fronted a wide marine embayment; in the Early Devensian of OIS 4, emergence left it facing an undulating landscape of unconsolidated marine, littoral, alluvial and wind-blown sediments. Progressive environmental change as the shoreline of the Bristol Channel withdrew ever further west and the climate became more continental, is reflected by the progressive secular shift in the composition of Units 12 to 9 from clay/silt-dominated to sand-dominated (ApSimon, *et al.* 1961, figure 24).

Macphail's identification of a phase of soil formation in Unit 13c, correlated with OIS 4, and confirmation of a more pronounced one in Unit 11a, correlated with OIS 3, is compatible with current knowledge and with a broad correlation with OIS 4 and OIS 3 for Units 13 to 10. The known complexity of climatic oscillations in the early Devensian Pleniglacial and the Interpleniglacial (summary in Gamble, 1999, pp280-2) is such that it would be unprofitable to attempt closer correlation without specific dating evidence.

The apparently consistent southerly dip of the Main Sand suggests that this was a shadow dune formed in the lee of the Down. Its texture, very well sorted quartz sand, with 60-65% fine sand, characteristic of wind-blown dunes, and abundant marine shell fragments, suggested that it was freshly derived either from back-shore dunes or from estuarine sand banks. However, since Heyworth and Kidson (1976) and Devoy (1979) agree that sea-level later in the Devensian was around 30 to 47 m below OD, the shore line of the Bristol Channel during that time will have lain nearly 200 km to the west of Brean. There is no question of even a Late Glacial shoreline close at hand; Pirazzoli (1991, pp77-8; 1996, plate iv, figure 50) maps the shore line in the period 12-9 ka, as lying west of a line from the Gower to Hartland Point, 100 km west of Brean, thus ruling out contemporary back-shore dunes or sandbanks as the source, since transport over such distances would have led to significant contamination from other sediment sources. One possible source would be local fossil back-shore dunes (Whittow, 1992),

left on a regression surface in what is now Weston Bay, analogous to the recent blown sand 3-4.5 m thick, found in boreholes in central Weston-super-Mare (Whittaker and Green, 1983, p83). Such dunes could have formed in OIS 5c and 5a, when sea level was probably close to or a little below present level. Dr Donovan, however, suggests to me that the most likely source would be in the Burtle Beds. These rather clean marine sands, with a "warm" fauna, which occur south of the Mendips at around OD, are of last interglacial, OIS 5, age, or earlier (Kidson, *et al.* 1978). An area of these in Weston Bay would fit the bill precisely and would account for the abundant shell fragments in Unit 9 far better than dune sands in which the sand is already reworked.

If the deposit was thick, vegetation on it would have been wholly dependent on precipitation, making it likely that under extremely dry cold conditions vegetation cover would break down, allowing the sand to be deflated by prevailing northerly winds which drove it over the Brean Down ridge. Such conditions may have been present particularly during the Heinrich iceberg-discharge events 2 and 3 of ca 20 and 23 ka BP (Zahn, *et al.* 1997), or more broadly at the time of the Last Glacial Maximum when from around 22 ka BP the front of the Devensian ice sheet stood in Cardiff Bay (Bowen, 1970), less than 20 km from Brean Down. The prevalence of northerly winds during Pleniglacial conditions in southern Britain is suggested by the differential distribution and thickness of Last Glaciation loess to the north and south of the English Channel. At that time, because of the high limestone cliff unencumbered by slope deposits, Brean Down was unique locally as a sediment trap, though once the trap was full, further sediment accruing could have been removed by erosion. In other locations the episode may be represented by no more than a thin coversand, easily eroded or weathered through.

The lack of evidence for vegetation cover in the lower part of the Main Sand suggests that either deposition was too rapid or the climate was still too dry, or perhaps both were true. The root or rhizome systems observed in the upper part of the Main Sand, made visible by the deposition of calcium carbonate leached as bicarbonate from the surface of the dune, were probably those of Marram grass (*Ammophila arenaria*), which tolerates high rates of sand accretion, and perhaps Sand twitch (*Agropyron junceiforme*) (Ranwell, 1972). By then deposition may have slowed down and/or precipitation may have increased allowing vegetation to become established on the dune.

The 1961 report suggested that frost weathering of the limestone was not active during the deposition of Unit 9. The scattered clasts observed in it and the interpolated breccia bed (Figure 3c, layer d), show that this was not the case. Accretion of cryoclastic scree may have been continuous at the foot of the slope, now buried beneath later deposits or the recent beach, extending up slope in sheets to cover the surface of the dune when the supply of cryoclastic debris exceeded that of sand. Figure 3d shows the converse situation, when the supply of gelifracts sliding down the slope of the dune while this was accumulating did not keep pace with the accretion of sand.

During this phase there is no apparent macroscopic sign of colluvial washing of sediment from the broken slope above the head of the limestone cliff, possibly because precipitation was very scanty, falling mainly as snow and lost by evaporation rather than by melting. A less likely alternative is that the slope was bare rock, implying that the cryoclastic debris and sandy loam matrix of the overlying Upper Breccia were the product of later erosion and wind transport, mixed with relict soil material eroded from the summit of the Down.

The conclusion in the 1961 report that, except for some gravity sorting indicated by small boulders deposited on top of the Main Sand close to the limestone cliff, the matrix supported Upper Breccia, Unit 8B, was deposited by mass flow, carries the corollary of erosion

having taken place at the consistently sharp boundary separating Units 8B and 9. Without an exposed section aligned away from the direction of dip it is difficult to quantify this, but it presumably involved at least the leached upper layer of the dune implied by the translocated carbonate deposited along root systems in the dune sand.

OIS	Stages, etc.		Brean Down Units, etc	Other Sites
1	Holocene		1 - 8A	Somerset Levels Glamorgan-Gwent levels
2	DEVENSIAN GLACIAL	Late Glacial	8B	Picken's Hole Unit 2
		Pleniglacial (Last Glacial Maximum)	9a & 9	
			10a	
3		Interpleniglacial	10b, 10c	
			11a, 11b	Picken's Hole Unit 3 Coygan Cave Wookey Hole Hyaena Den
			12a 12b 12c	
4		Pleniglacial	13	Wookey Hole Hyaena Den Picken's Hole Unit 4 Banwell Bone Cave
			14	
			Howe Rock Platform	
5a	(temperate)			Picken's Hole Unit 5
5b	(cold)			
5c	(temperate)			
5d	(cold)			
5	Ipswichian (warm)			Swallow Cliff raised beach Burtle Beds

Table 2. *Suggested correlation of the Pleistocene and Holocene deposits of Brean Down Sand Cliff. Oxygen Isotope Stages (OIS) 5a-d are often regarded as Early Devensian. For detailed correlation of Pleistocene deposits in Somerset, see Bowen (1999).*

Units 9 and 8B can reasonably be correlated with OIS 2. No certain signs of frost wedges or other permafrost phenomena have been observed in Units 9 to 13, probably because the deposits were too pervious ever to become water-saturated. The same was not necessarily true of the broken slope above the head of the limestone cliff, where mass transport of Unit 8B may have been due to solifluction in the period from around 18 ka BP, when rapid rise of sea-level due to melting ice-caps began and precipitation increased markedly. If evidence of the Late Glacial Interstadial and other climatic fluctuations was present in Unit 8b, it was perhaps destroyed in the cold Younger Dryas stage at the end of the Late Glacial, or remains to be detected. Once the limestone cliff was buried by the accumulating dune the site was no longer of interest to wolves and foxes or to raptors, and the accumulation of bone ceased, hence the Upper Breccia contains no faunal material and there is no sign of human interest in the site before the Neolithic.

A final cautionary reflection comes from comparison with the stratification of the Holocene units. In these, layers tend to be thinner or missing at the upper end of the slope; hence the exposure of the Pleistocene stratification, which is essentially at the top of a steep slope against the cliff, probably presents a very incomplete sequence, while the lower parts of the slope, with a probably much more complete sequence with weathering soils and colluvial deposits, are inaccessible beneath the beach and recent deposits. The correlations suggested in this discussion are summarised in Table 2.

SUPPOSED WORKED BONES FROM THE BONE BED

Three bones, two innominate bones of horse and a specimen thought to be giant deer, were identified in the 1961 report as worked by man. A fourth, part of a tibia of horse, was recognised subsequently. No. 2 was found by Taylor on the beach in May 1938. It was about 10 yds (9.2 m) south of the limestone cliff and 10 yds (9.2 m) west of the Sand Cliff. He concluded that its condition indicated recent derivation from the Bone Bed. The others were collected in excavation by Savage and Donovan in 1954-5.

Details (Figure 4)

1. Part of right innominate of horse (*Equus ferus*), mentioned but not described or illustrated by Savage. The three broken ends of the dorsal surface of the bone have been ground in a plane parallel to the surface, this is diffusely polished; fine transverse scorings, some parallel, similar to following, also deep wedge-shaped impact scars [M.11.157].

   (Not illustrated): part of right innominate of horse, smaller than 1, described and illustrated by Savage (ApSimon, *et al.* 1961, p131, figure 13). The ischial tuberosity and symphysis and the lateral and medial borders of the acetabulum have been ground off on two nearly parallel longitudinal planes at right angles to the plane of the acetabulum; lateral surface is diffusely polished, solid bone parts of the ground surfaces show fine scrape and scratch marks transverse to the long axis of the bone; possible cut mark 13 mm long at the edge of the ground surface on the lateral border of the acetabulum [M.11, no no.].

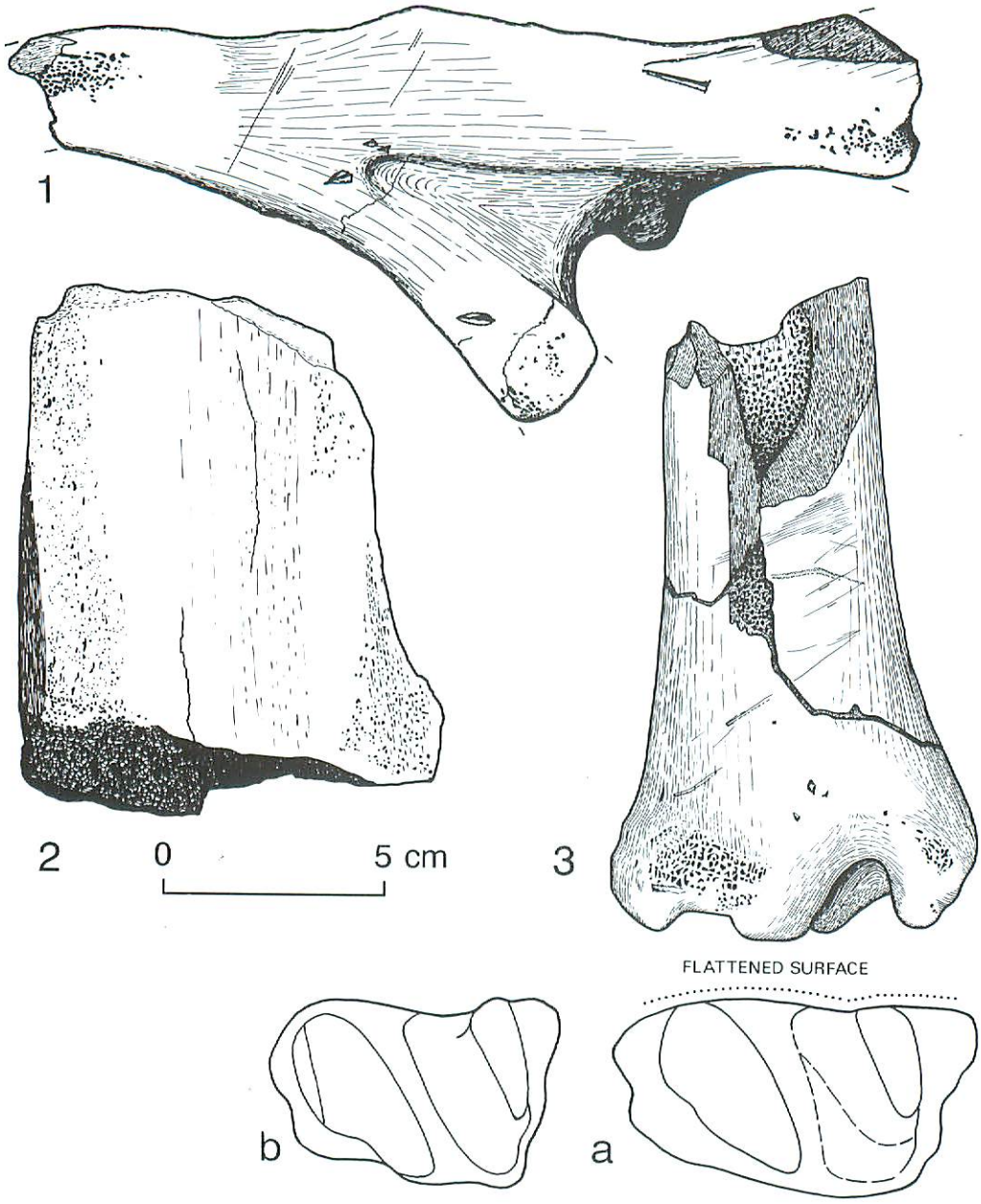

Figure 4. *Brean Down Sand Cliff: modified animal bones from the Bone Bed, Unit 11a: 1. Right innominate bone of horse (part, dorsal view); 2. Left scapula of mammoth (part, lateral view); 3. Right tibia of horse (distal end, anterior view); a. Distal articular surface from below, showing anterior flattening; b. Similar view of un-modified tibia of recent horse.*
Drawings, Chris Webster, Kathryn Knowles.

2. Portion of blade of left scapula of Mammoth (*Mammuthus primigenius*), immediately proximal to the main nutrient foramen on the lateral (dorsal) surface. The spinous process has been cut or broken away and remaining bone ground level with the surface of the blade, caudal (posterior) edge of blade also removed, cut surface shows distinct polish; another well marked area of polish extends over distal strongly curved portion ('the neck') of medial surface, fine parallel transverse scratches visible in polished area. The cranial (anterior) edge is damaged; fracture at distal end also appears ancient, specimen more weathered than others [M.11.2/82].
3. Distal end of right tibia of horse, not previously noted. On the anterior surface the tuberosities have been ground down to a level plane, exposing cancellous bone; surface is diffusely polished, some possible cut marks, light obliquely transverse scoring of surface includes parallel bundle all made at the same time; more substantial scoring may be due to differential movement of limestone clasts [M.11/137].

Comments

The breaks on these bones appear natural, due to pressure within the deposit and the impact of limestone clasts; no certain tooth marks or signs of gnawing observed. Search among the other, generally smaller, broken fragments of bone from Unit 11a in the U.B.S.S. collection, did not produce any other pieces with similar grinding or polishing.

Savage identified no. 2 as a piece of palmation of antler of giant deer (*Megaloceros*); the present identification as mammoth is due to Andrew Currant (Natural History Museum). The specimen was compared with a L scapula of *Mammuthus primigenius* from Escholtz Bay, Alaska (BM (NH) Old Catalogue, 296; Lyddeker, 1886, plate IV, p205). Stratified remains of Mammoth from Unit 11a comprise pieces of rib from a mature animal and part of a molar of a young one; the find of a piece of tusk in Unit 10a is noted above.

Human or Natural modification?

Savage suggested that the modification of these bones was by humans, by grinding or rubbing against a flat stone; the circumstances do not support this suggestion. In the first place, the possible cuts and fine scorings or scratch marks, transverse to the long axis on the polished areas of the bones, are all are made through the polished surface and postdate it, and there are no unequivocal cut marks or other certain indications of human modification. Notably absent from the two innominate bones are the cut marks around the acetabulum which result from cuts made in detaching the head of the femur during butchery.

The location, towards the upper end of a steep talus slope, subject to limestone clasts falling from the cliff, seems unlikely for human activity or discard, and no stone tools have ever been found in Unit 11. The composition and character of the faunal remains and evidence of gnawing marks suggests that the bone assemblage was accumulated mainly by wolves and foxes and by raptors perching on the cliff. The pieces of bone found are all of a size which could have been carried by a scavenging wolf and the cliff, with boulders tumbled at its foot, could have provided secure den sites for wolves. Wolves might scavenge an abandoned human kill site or camp site, but if so, why were no bones showing signs of human butchery brought back?

Conclusions

There are no parallels among accepted Palaeolithic bone artifacts and exhibition of these specimens at the 1986 World Archaeological Conference in Southampton (ApSimon, 1986b), produced no suggestions of possible function. The weight of evidence seems against the hypothesis of human modification. It seems more probable that these larger pieces of bone were trapped between limestone clasts and subjected to grinding and polishing under pressure by differential sheer movement of overlying sediment within the steeply sloping unconsolidated deposit, with the fine scratches perhaps produced by angular quartz grains of silt or fine-sand grade.

This discussion, though negative in its conclusions, was necessary to avoid future misconceptions, the Sand Cliff having already been cited as an Early Upper Palaeolithic site, the 'Brean Down shelter', on the evidence of these bones (Campbell, 1977, v.2, p99, p354, map 26).

THE MARITIME BEAKER FIND - DATING AND INTERPRETATION

This find was made in September 1936, in a pit, 0.95 m by 0.6 m by 0.08-0.2 m deep in the eroded surface of the Red Loam, which was temporarily exposed on the beach west of the Sand Cliff, following a gale (Taylor and Taylor, 1949, figure 22; location, Bell, 1990, figure 72, VIIb). It contained the upper half of a Maritime style Bell Beaker, the lower half of which had probably been swept away by the tide before Taylor found it, plus a substantial piece of a large finger-nail decorated Beaker. Wood charcoal from the filling of the pit was submitted for radiocarbon dating in 1986-8, as part of the radiocarbon dating programme for the Brean Down project. The date obtained was 3460±80 BP (HAR-8547). Calibration gave the following ranges of date (Walker, in Bell, 1990, pp107-12, Tables 3 and 4):

Confidence level	Calibrated date range	Probability of date in range
1 σ (68% confidence)	1890-1685 Cal BC	82% : 1885-1730 Cal BC
2 σ (93% confidence)	2020-1540 Cal BC	97% : 1985-1605 Cal BC

Revised calibration (Kinnes, *et al.* 1991) changes the date ranges by at most 5 years.

Discussion

There are no radiocarbon dates for any of the comparatively few other British examples of this most truly international of early Beaker styles (map: Harrison, 1980, figure 6). The expected date for a Maritime style Bell Beaker would be much earlier, in the Final Neolithic or Copper Age (Harrison, 1980), from around 2500 Cal BC, whereas this date falls within the Early Bronze Age as conventionally defined, in which Food Urn pottery styles replaced Beakers. This date is in fact younger than the six dates (BM-1086-1091) for late style Beaker pottery at Gorsey Bigbury, 20 km away (Jones, *et al.* 1938; ApSimon, *et al.* 1976), with only a slight overlap at the 68% confidence level (1 σ) between the earlier end of the calibrated range for it and the later end of the calibrated range for the four younger dates from Gorsey Bigbury (BM-1086, 1087, 1090, 1091); although there is more substantial overlap at the 93% confidence level (2 σ).

The Gorsey Bigbury assemblage and the very similar assemblage from Bos Swallet, Burrington, nearby (Taylor and ApSimon, 1964; ApSimon, 1998), together representing about

125 pots, show no reminiscences of the Maritime style; nor do the groups of earlier style Beaker pottery from the Chew Valley Lake sites (Rahtz and Greenfield, 1977), and further afield from Downton (Wilts; Rahtz, 1962). Only occasionally do early beakers in the region, such as that from the Wick barrow, Stogursey (Gray, 1909; Clarke, 1970. E 818), 15 km across Bridgwater Bay from Brean, with its line of cord impressions inside the rim, show features that place them in the 'Epi-maritime' series of Lanting and van der Waals (1976), confirming that the Maritime style lies earlier still in the British sequence.

Regrettably, no secure interpretation of this pit can be offered. It was large enough to have held a crouched burial laid on its side, as Taylor suggested, but was really too shallow for a grave, even allowing for recent erosion of the Red Loam by perhaps 10-30 cm (see Bell, 1990, p19, p260; ApSimon, *et al.* 1961, figure 19), unless it had been covered by a small mound as early Beaker burials often are. In favour of its being a grave is the deposition of a (probably) complete Beaker; against this is the absence of any trace of bone, which as Bell has argued (1990, 220), is not safely attributable to decalcification. Waterlogging by high tides was probably not a factor; the pit, at about 5.3 m OD (Bell, 1990, p103), was probably above the level of even high spring tides in prehistoric and early historic time and it is unlikely that the eastwards retreat of the Sand Cliff had reached the site before the storm surge of 1606-7 or even that of 1703 (Bell, 1990, pp257-8, Table 25).

Pits associated with Beaker occupation generally show some internal stratification of the filling, apparently absent here; deposition of a complete pot would be very unusual. A clue is however given by a sample of the pit filling (M.11.4/7; not radiocarbon dated), which contained fragmentary brushwood/twig charcoal in a matrix of fine carbon stained sand. This suggests scrub clearance or casual burning rather than occupation, the sandy matrix suggesting that it was washed or blown into a hole or an animal burrow, like those observed penetrating from Unit 6b right through the Beaker Sand into the surface of the Red Loam (ApSimon, *et al.* 1961, p81). The irregular, patchy character of the filling (Taylor and Taylor, 1949, p90) certainly suggests disturbance which might explain the mouth down inclination of the Maritime Beaker. The small flat-bottomed hole in the middle of the pit (Taylor and Taylor, 1949, figure 22, C), could have been a burrow or the bottom of a small posthole; the heap of charcoal found in it and described as fairly large pieces of wood with growth rings up to 7.5 cm diameter, might have been from a burnt post, perhaps oak. This charcoal was destroyed in the war, contra Bell (p. 26); the mistake was mine.

A referee has suggested that the discrepancy in date might be due to the pots having been kept in some special place during the intervening period, noting the apparently contemporaneous deposition of Peterborough, Grooved Ware and Beaker style pottery in the secondary filling of the chambered tomb at West Kennet (Piggott, 1962), as one of several examples for which this explanation has been invoked. The writer has reservations about this interpretation of the deposits at West Kennet and because of the 600 year or longer timespan involved is reluctant to invoke it at Brean. In his view, the balance of probability favours an early Beaker age date for the digging of the pit and deposition of the pottery, with subsequent disturbance in the Early Bronze Age, perhaps by burrowing animals.

The observed stratification of the nearby sandcliff implies that by then the site of the pit would have been covered by 2-3 m of unconsolidated yellow Beaker Sand, only traces of which were found in it. For such disturbance to be possible, however caused, the site would presumably have to have been re-exposed, perhaps in a dune 'slack' following a 'blow-out'. A likely cause would be disturbance of vegetation covering the 'Beaker' sand dunes during the

episode of cultivation associated with formation of the Early Bronze Age colluvium, Unit 6b (Bell, 1990, p261).

Descriptive Notes

(Figure 5)

1. Maritime style Bell Beaker, type 2^{la} of the continental classification (cf. Harrison, 1980, p16, figure 3). The horizontal lines are twisted cord, the 'herringbone' lines made with a finely pointed comb, presumably of bone. Five or six zones of herringbone are normal on these beakers. Illustrations (and description) are given by Taylor and Taylor (1949) and ApSimon and others (1961, p109, figure 25, 7), and by Clarke (1970, p292, no. 112, E 778), among others. It is redrawn here because previous illustrations are either formalised or do not show the full extent of the decoration.
2. Fragmented rim sherd, decorated with rows of fingernail impressions which do not roughen the surface; the lower edge of the sherd had been ground or rubbed smooth before deposition. Decoration of this type descends from Beakers of 'Protruding foot' (PF) type, type 1^{d}, and is one of the characteristic decorative modes of earlier Beakers in Britain. Illustrations and descriptions in Taylor and Taylor (1949), and ApSimon and others (1961, p109, figure 26, 8).

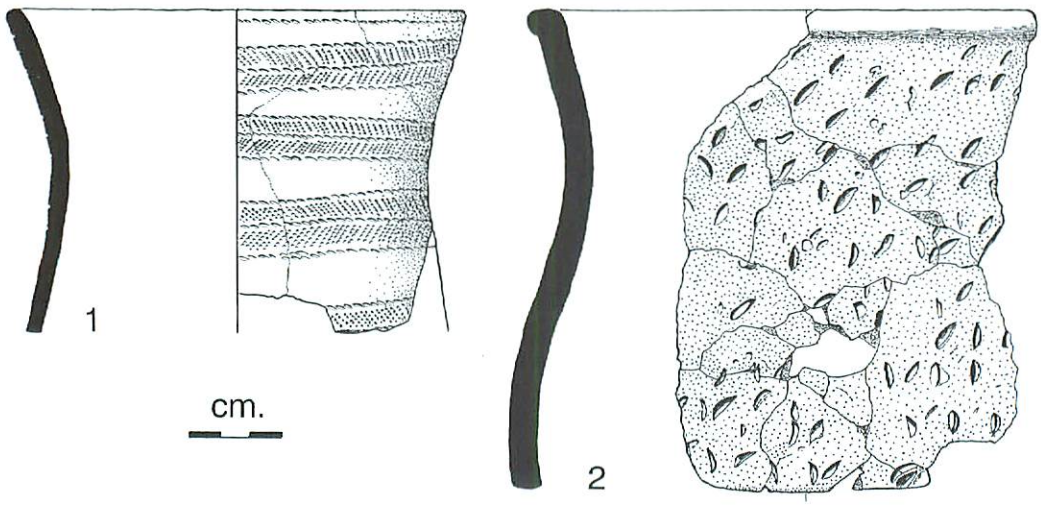

Figure 5. *Brean Down Sand Cliff: Bell Beaker pottery from pit dug into Red Loam, Unit 8A, on the beach. 1. Maritime style Beaker; 2. Finger-nail decorated Beaker.*
Drawings, ApSimon, based on photographs by H. Taylor.

Surviving sherds of these beakers were thin-sectioned in 1983 by Mr M.J.G. Russell. Russell's examination showed that both beakers were finely tempered with grog and were rather similar in texture, groundmass of no. 1 has angular silt-grade quartzes, voids suggests

inadequate preparation. There was nothing to suggest that either was other than locally made (archive).

THE LATER DEPOSITS

The accessible parts of these deposits, from the Red Loam, Unit 8A, upwards, were comprehensively investigated and published by Bell and his team. Unfortunately the part of the Sand Cliff south of the mid-point of sheet III of the 1961 section drawing (Figure 1), had already been destroyed, without any archaeological recording, by the construction of a new concrete sea-defence wall in February 1983. This was doubly unfortunate, because in 1953-9 obscuring vegetation had prevented us from recording or drawing most of the 35 m length of section face between sheets III and V. The only exposures in this part were in the sides of two narrow paths made by visitors climbing up from the beach. These were respectively 3 m (no. 1) and 7-8 m (no. 2) north of the fence on the northern side of the gardens.

The detailed stratification as recorded in 1959 (ApSimon, *et al.* 1961, pp81-5) was:

layer	*description*	*thickness*	*height OD*
	Exposure 1, 3 m north of fence		
i.	Sand, thickness unknown, Unit 5 ?		? m -8.43 m
ii.	Grey horizon flecked with charcoal, Unit 6a	0.10 m	8.43-8.33 m
iii.	Fine yellow sand,	0.13 m	8.33-8.20 m
iv.	Grey brown sand with charcoal flecks and stones, thickness unknown, Unit 6b		8.20- ? m
	Exposure 2, 7-8 m north of fence		
a.	Dark stained sand, with stones at top, Unit 4	0.38 m	9.65-9.27 m
b.	Yellow sand, Unit 5	0.41 m	9.27-8.86 m
c.	Stony sand, Unit 6a	0.25 m	8.86-8.61 m
d.	Reddish brown loamy sand, Unit 6b	0.46 m	8.61-8.15 m
e.	Beaker sand, Unit 7, base not exposed, seen to,	0.30 m	8.15-7.85 m

Additional information is provided by colour photographs taken in May 1968 (AMA 68D.14-16), recording the location of the chance find of a bronze strip (Figure 6, 2), found in the Early Bronze Age colluvium, Unit 6b. By then, increased use of this area for access to the Down had broken down the vegetation covering the face and the photographs show a continuous exposure of Unit 6b, extending from where 6b became separated from Unit 8a by an increasingly thick wedge of Beaker sand, Unit 7, southwards nearly to the fence (Figure 1).

At a point possibly a little north of exposure 2 of 1959, the sequence appears to be (photo. 68D.14):

layer	*description*	*thickness*
u.	Turf	
v.	brown sand with rabbit burrows	ca 0.6 m
-.	(sloping surface with stones, obscured)	ca 1.5-2 m ?
w.	Pale, olive-brown sand	ca 0.5 m ?

x.	Yellowish sand, Unit 5 ?	ca 0.5 m
y.	Darker, reddish brown sand with stones, dipping gently southwards, base about 1 m above the beach, Unit 6b	0.6 m or more
z.	Yellowish sand, Unit 7, base not visible	

Unit 6a may be present but is not distinguishable. At the southern end of the exposure, Unit 6b is still about 1 m above beach level. Unfortunately no descriptive notes about this exposure have been traced.

Discussion

The attribution to Unit 6b of layers *y, d,* and *iv*, is assured by the visual continuity in the 1968 photographs. Similarly, layers *x, b,* and *iii*, can be assigned to some part of Unit 5. However, layer *w* does not look like the 'dirty sand' of Unit 4, and may really be the down-slope continuation of Unit 5b or 5a, with Unit 4 hidden on the talus slope above. Should layer *a* also be correlated with Unit 5b? Layer *a* of exposure 2, at between 9.27 and 9.65 m OD, was only about 5 m relatively further down-slope from the southern end of Bell's 1985 trench, in which Unit 5b was at about 9.9 m to 10.4 m OD (Bell, 1990, figs. 15, 17). This suggest that the correlation is probable. Both layer *a* and layer *ii* may represent the down-slope spread of material derived from the major Middle Bronze Age occupation of Unit 5b, which was unknown prior to Bell's investigations. If so, then layers *x, b,* and *iii*, would be attributable to Unit 5d, the lower part of the Bronze Age blown sand, and layer *i* to Unit 5a, its upper part (Bell, 1990, p16, p37). It should however be emphasized that the attribution of the layers in these exposures depends on their relative position and their description and appearance, since no pottery or other artifacts were recovered from them.

The most southerly exposure of these pre-Unit 4 deposits was in the test pit in area V, some 20 m further south than exposure 1. That pit, dug below beach level to around 4.3 m OD (ApSimon, *et al.* 1961, figure 21), was open only briefly before its sides fell in around the investigator; too briefly to allow sampling or to characterise the depositional environment of the layers in the 2.7 m of sands exposed by it beneath Unit 4j. The evidential basis for the identification of Units 5, 6, and 7, was thus rather slender. While the attribution to Unit 5 of the yellow sand below Unit 4j was reasonable, the recognition of Unit 6 on the basis of the presence of stones and green staining was more questionable, since similar staining has since been shown to occur in Units 5a and 5b (Bell, 1990, p94), as well as in Unit 6a, and the stones might have been derived from the Middle Bronze Age structures in Unit 5b. Finally, identification of the lowest layer of sand as Unit 7, the Beaker sand, was based solely on stratigraphic position, not on character or finds - there were none; that sand might simply have represented the lower part of Unit 5.

Support for the original attributions is now however provided by trench 1 of 1997, reported by Allen and Ritchie (2000, figure 1c, figure 2). In that area, only about 10 m further south, Beaker sherds were found at about the same level as the bottom of the test pit, while a complex succession of clayey, silty, and sandy deposits at 4.3-4.8 m OD, some compared by Allen and Ritchie to Units 5d and 6a in the Sand Cliff, included a stony horizon with a potsherd of Early - Middle Bronze Age type. Some caution is still probably required in connecting these separate exposures, Crabtree discerns probable fluvial deposition in one context and Allen and

Ritchie note that the area will have lain on the 'wetland' margin, hence rapid lateral as well as vertical change in deposition and erosion is to be expected.

The main section presented here (Figure 1), has been modified to reflect the above discussion and notably the statement by Taylor (archive, 29 July 1954), that he had "a section connecting the muddy sand under the gardens on the flats [Unit 4j], with the dirty sand [Unit 4] on the sand slope". Though there is no other supporting evidence for this in the archive, his sketch diagram and label, "land surface with stones (not pebbles)", are quite explicit.

The Bronze Age sand blow

Evidence that during this episode, represented in the Sand Cliff by Units 5d and 5a (Bell, 1990, p37), blowing sand reached the summit of the down at 79 m OD, was noted by ApSimon and others (1961, p103). There, beneath the Roman temple (ApSimon, 1965, p198, p211, section 2), was found a 0.3 m thick layer of blown sand; beneath that an old soil similar to Unit 8A, which yielded a sherd of Neolithic Peterborough style pottery; above it a thin old soil, in which was found a calcite tempered sherd, exactly like the pottery from the Late Bronze Age midden in Unit 4 of the Sand Cliff. Further blown sand was found alongside the tumulus immediately south of the temple, possibly filling a buried ditch.

At this time, the sandcliff deposits masking the face of the limestone cliff probably extended nearly a kilometre further west than today. An exposed face there cut by the rising sea seems a more likely source for the mammoth bone found in Unit 5b than the infilled fault known as the 'Reindeer rift' (site B, NGR ST 2945 5877), only 100 m west of the present sandcliff. This cannot have been exposed until much later, and could not have been the source of the scattered human bone found in the Bronze Age layers (Bell, 1990, p257).

The Sixteenth-Seventeenth-Century Building.

The traces of this building exposed in the face of the sandcliff were described by ApSimon and others (1961, pp86-7), where it was suggested that it was of late 17th- to early 18th-Century date. Reassessment of the dating of the associated pottery and use of documentary evidence enabled Bell and O'Mahoney (Bell, 1990, pp84-9) to identify it as the warrener's lodge of 16th and earlier 17th-Century date. Re-examination of Taylor's records (archive) suggests that the traces seen in 1959 were of the same building as those seen in 1935-7 and that it had been observed in the eroding face at least as early as the nineteen-twenties. Taylor's observations of April-May 1959 record the presence, at the north side of its plaster floor, of a feature 59 cm wide, 33 cm deep, filled with stone-free, 'slightly blackish' sand, suggestive of a trench for the base plate of a timber-framed building. Taylor had earlier recorded what may have been a stone-filled bedding trench for a base plate at the south side of the floor and a possible layer of burnt thatch overlying the floor (archive, 21-6-35). Features exposed in the face of the sandcliff in July 1937, which Prof. Leo Palmer and Dr Dina Dobson took for the ditches of a small tumulus (archive, 22-7-37), were probably really a pair of similar trenches north and south of that floor. The indications, maintained during a period of over 30 years, of a single range aligned west-east along the slope, and the observation in later years of plaster flooring, suggest that the warrener's lodge may have been a small hall-and-cross-passage type house, with a floored parlour at its east end. Though not explicitly stated in the report (ApSimon, *et al.* 1961, p86), the window glass found in the debris was identified by D.B. Harden as cylinder-blown sheet glass (Harden, 1961).

ADDITIONAL FINDS

Figure 6

1. Convex scraper, grey flint, fresh and un-patinated, fine chipping round the edge due to use. Found August 1962, Area III, in situ in top of Beaker Sand, Unit 7, immediately below Unit 6b, at a point where Unit 7 was about 0.45 m thick, hence about 6 m south of point where Unit 7 appears; a sherd of biconical urn found in Unit 6b at the same time. Finder Mr Blundell, formerly of Bolton Museum; present location unknown.
2. Copper alloy strip, length 47 mm, width 3.8-4.2 mm, thickness 1.02 mm, thinning at left hand end to 0.51 mm. Strip is bent sinuously lengthwise, right hand end bent more sharply, snapped, fracture is ancient, at a point where strip was notched laterally and locally thickened; thinning and widening of left hand end due to deliberate hammering. Found 12-5-68, Area III, in Unit 6b, the Early Bronze Age colluvium, lying horizontally, the bent end down-slope, 30 cm below top of layer, 5-7 cm above the top of the ill-defined transition from Unit 6b to Unit 7. Colour transparency (AMA 68D.15) shows find in situ; finder A.M.A. [UBSS Cat. M.11.8/101].
3. Broken cylindrical weight of fired clay with central perforation, diameter about 100 mm, height 72 mm, diameter of perforation 18-20 mm. Broken across the perforation, weight of remaining part 365 gms, original weight probably 700-800 gms. Pale brown, slightly reduced core shows greyish tinge, no mineral inclusions visible, occasional voids and impressions suggest inclusions of vegetable matter, appearance suggests use of local estuarine clay alluvium as raw material. Exterior is very worn and abraded, with possible rabbit claw marks, a tongue of clay curves round the exposed part of the perforation, coiled structure clearly visible in broken surface and abraded base. The weight seems to have been made by taking a double-handful of clay, beating it into a flat strip, then coiling the end round a former, finishing by shaping, perhaps on a flat board with the help of a wooden paddle. Found 20-3-83, unstratified on slumped material, below level of Unit 6, close to new access steps at foot of slope (Bell, 1990, fig. 13, coordinates, c. 6 m W, 25 m S). Lacks the greenish staining found on material from Units 5b and 6a, adherent fine brown sand suggests that it may have been derived from Unit 4; finder A.M.A. [UBSS Cat. M.11.7/414].
   (Not illustrated): sherd of fired clay, no inclusions noted, reddish grey, possibly burnt, from basal angle of probable loom weight, vegetable impressions on base, probably chaff. Found 28-5-71, Area III, Unit 6b, 10 cm above top of Unit 7, 20 cm below base of Unit 6a, with body sherd of biconical urn; finder A.M.A. [UBSS Cat M.11.7/405-6].

Comments

The scraper fits well into the late Beaker context present in the upper part of the Beaker Sand. Saville (in Bell, 1990, p152) notes that surviving cortex provides evidence that the larger flint artifacts were made from imported 'chalk-type' flint. No. 2 is the only metal find from Unit 6b and might be linked to the occupation associated with Biconical Urn pottery, or since it was found in colluvially deposited soil, might be derived from the late Beaker occupation in Unit 7. Its purpose is unknown, it may perhaps be part of a fastening, the thinning of the unbroken end suggesting that it was designed to be inserted through a slit in some material. It may alternatively have been part of an ornament, the analogy between it and the tangs of gold 'basket-earrings', of about half its size, which have associations with earlier style Beakers (Russel, 1990, pp164-6, figure 7), suggests this as a possibility.

Fragments of fired-clay objects with chaff and other vegetable impressions, including possible loomweights, though none certainly of the same type as no. 3, were found in Units 4 and Unit 5b by Bell (1990, pp174-5, figure 121). Clay weights similar to this occur widely in Middle to Late Bronze Age settlements in southern England. Middle Bronze Age sites include Itford Hill (Burstow and Holleyman, 1957) and Black Patch (Drewett, 1982), in Sussex, and St Eval (ApSimon and Greenfield, 1972), in Cornwall; Late Bronze Age sites include Aldermaston Wharf and Knight's Farm, Burghfield (Bradley, *et al.* 1980), in Berkshire. Paired post-holes, believed to be for upright warp-weighted looms, have been found on several of these sites, including Black Patch and St Eval, and what may have been a burnt wooden loom-frame was found with a line of 10 clay weights in a pit at the Middle Bronze Age settlement on Cock Hill, Patching, Sussex (Ratcliffe-Densham, 1961). Such weights seem to have been often left to dry on chaff covered surfaces.

CONCLUSIONS

The major advance in the knowledge and interpretation of the Sand Cliff since 1961 has come from the work by Martin Bell and his colleagues, together with that reported in this volume by Allen and Ritchie. This paper has attempted to provide some supplementary information and to refine some aspects of interpretation, with the following conclusions.

1. Lithostratigraphic principles suggest: distinction of the Boulder Bed as Unit 14 (ex-13d), separate from the Lower Breccia, Unit 13; recognition of the Sandy breccia, Unit 9a (ex-8c), as a facies of the Main Sand, Unit 9, distinct from the Upper Breccia, Unit 8B; separation of 8B and the Red Loam, Unit 8A, as distinct units, though the numbering is retained for administrative convenience.

2. The Pleistocene deposits, Units 14-8B, are correlated with OIS stages 4-2, the whole of the Devensian, the last glacial stage, and thus cover a longer period than was thought in 1961, from c. 70 ka to c. 10 ka BP. These deposits still have the potential for further enhancement of our knowledge. What is needed now is absolute dating or objective evidence bearing on that dating.

3. The modified bones from the Bone Bed, Unit 11a, are not artifacts; their modification was post-depositional, due to natural processes within the deposits.

4. The deposition of the Main Sand, Unit 9, took place in a cold, very dry phase, perhaps c. 20,000 BP, at around the Last Glacial Maximum, through remobilisation of vegetated marine/estuarine Burtle Bed sands. This phase was succeeded by less dry conditions in which vegetation, probably Marram grass, grew on the surface of the Main Sand and then by cold, wetter conditions in which the Upper Breccia was deposited probably by solifluction.

5. It remains uncertain whether or not the Beaker pit on the beach originally contained a burial, but the balance of evidence suggests that it probably did not, though the precise circumstances were probably irrecoverable at the time of discovery. Disturbance in the Early Bronze Age, possibly by burrowing animals is suspected. While the charcoal dated can be considered representative of the pit filling, there is no necessary evidential connection with the Bell Beaker

pottery. It would be unsafe therefore to use it to date the Beaker pottery or Maritime Beakers generally in Britain.

6. Reappraisal of old records adds some detail to the recorded stratification of the Bronze Age deposits of the southern end of the Sand Cliff and generally supports the correlation made by Allen and Ritchie (2000) with deposits beneath beach level to the south, though some intervening disjunction, due to the possible presence of stream channels, is not ruled out. The Bronze Age blown sand episode is shown to have reached the summit of the Down.

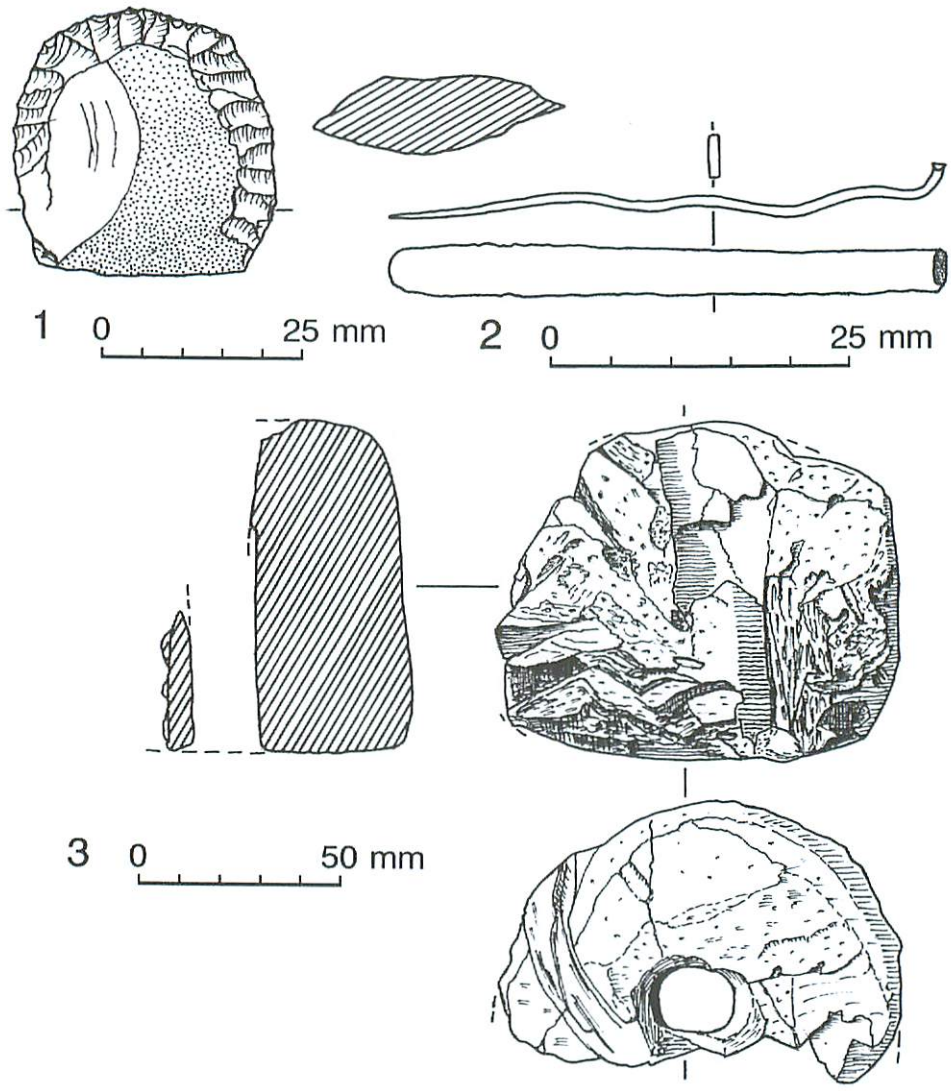

Figure 6. *Brean Down Sand Cliff: 1. Flint scraper from Beaker Sand, Unit 7; 2. Copper alloy strip from Early Bronze Age colluvium, Unit 6b; 3. Broken fired-clay weight, probably a loom-weight, unstratified but probably from Late Bronze Age occupation.*
Drawings, ApSimon.

7. Discovery in Unit 6b of a fragment of a fired-clay loomweight with basal vegetable impressions, adds to finds from Units 5b and 4 and provides evidence of continuity of craft practice over several hundred years in the Early, Middle and Late Bronze Age. A bronze fragment from this unit is the first metal find from it.

8. The evidence suggests the 16th to early 17th-Century building stratified in Unit 3b1 (ApSimon, *et al.* 1961, pp86-8; Bell, 1990, p84) was a substantial timber-framed structure, possibly of hall-type, with amenities including a plaster-floored parlour, window glass and flooring or boarding of sweet chestnut, appropriate to the status of the Keeper of the warren.

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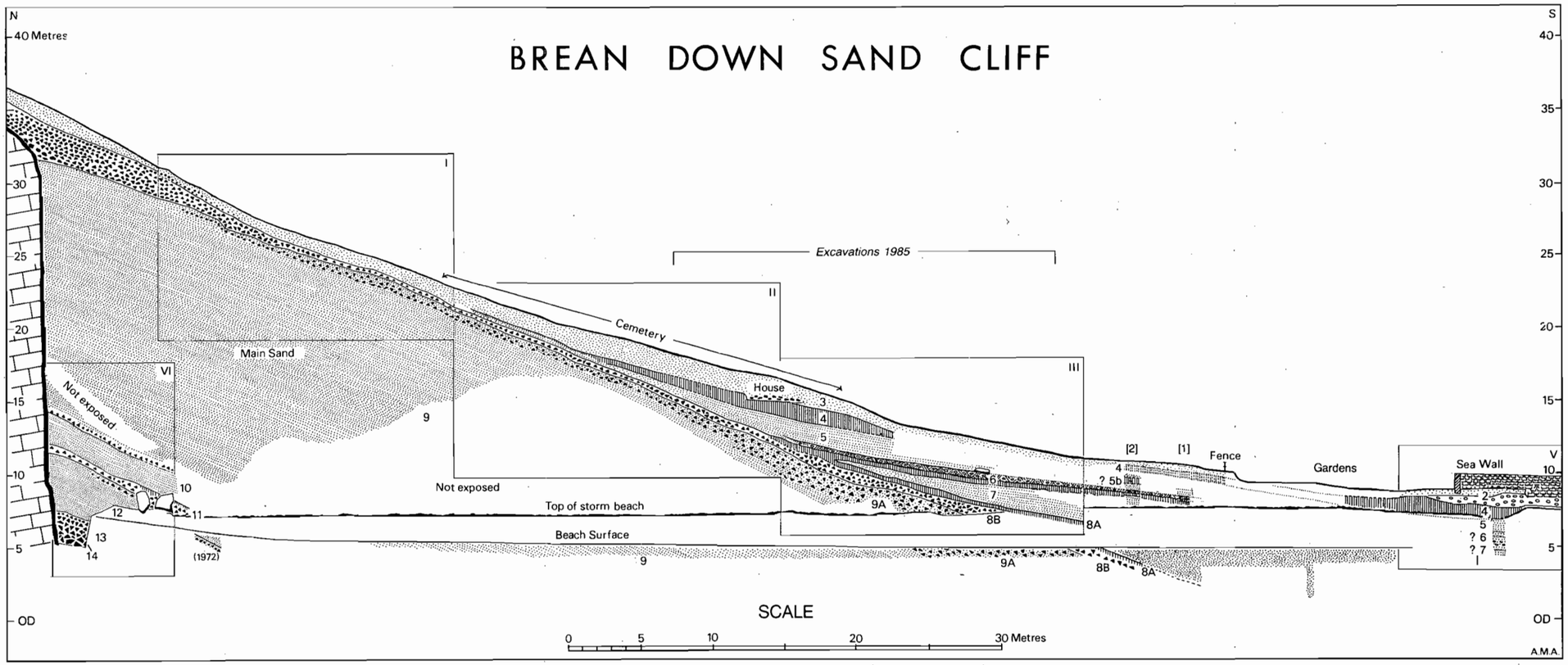

Figure 1. *Brean Down Sand Cliff (site A): projected section perpendicular to the line of the limestone cliff, modified from ApSimon,* et al. *1961, Plate 11. The rectangles indicate the incidence of sections I-III, V-VI, drawn at 1:48 scale, published in the original report. The cemetery is sub-Roman, the house probably the 16th-Century warrener's house (Bell, 1990); new discoveries resulting from the 1980s excavations are not shown.*