Westward Ho!

S. Campbell

Highlights

Westward Ho! is a classic site for studies of the Quaternary in South-West England. It provides both an important Pleistocene stratigraphic record and detailed evidence, in the form of submerged forest and associated beds, for the Holocene evolution of the Barnstaple Bay area.

Introduction

The submerged forest beds at Westward Ho! have featured in numerous studies (e.g. De la Beche, 1839; Ellis, 1866, 1867; Pengelly, 1867, 1868a; Hall, 1870, 1879a; Rogers, 1908; Worth, 1934; Rogers, 1946; Churchill, 1965; Churchill and Wymer, 1965; Stephens, 1970a, 1973, 1974; Jacobi, 1975, 1979; Kidson and Heyworth, 1977). The definitive account of the Holocene sequence, however, is that of Balaam *et al.* (1987) which integrates detailed archaeological and palaeoenvironmental evidence. The Pleistocene features, including a spectacular cobble raised beach, have been referred to by Ussher (1878), Dewey (1913), Rogers (1946), Everard *et al.* (1964), Stephens (1966a, 1970a, 1973), Kidson (1974), Kidson and Heyworth (1977) and Campbell *et al.* (*in* prep.).

Description

The Pleistocene sequence

Raised beach deposits were first described in the area by De la Beche (1839) and Sedgwick and Murchison (1840), who noted that they extended along much of the Appledore coastline and Taw Estuary. They are particularly well developed between [SS 420 291] and [SS 422 291]. The Pleistocene sediments (mainly raised beach and head deposits) overlie a cliffed and elevated rock shore platform (at 8–9 m OD) cut in near-vertically bedded Carboniferous sediments, and with a surface lying approximately 6 m above the present tidal platform (*c.* 2–3 m OD) (Stephens, 1970a; Kidson and Heyworth, 1977). The old wave-cut notch at the back of the elevated platform lies at an estimated 12.2–13.7 m OD.

The most detailed description of the sequence was given by Stephens (1966a, 1970a) who recorded:

9. Soil

8. Sandy clay with stones, including flint and granite erratics

7. Angular head in sandy matrix

6. Head

5. Sand

4. Frost-shattered boulders and cobbles

3. Massive boulder/cobble beach

2. Head and shattered bedrock

1. Rock platform

The Pleistocene sequence averages 6–7 m in thickness and forms a terrace which slopes gently seawards and buries the fossil coastline. At the eastern end of the sections, the sediments comprise mostly head (beds 6–7) up to 4 m in thickness, but to the west, the raised beach deposits thicken to *c.* 2.5–3 m. The latter comprise mostly well-rounded boulders and cobbles of Carboniferous grit, with some clasts up to 0.3 m in diameter; apparently no erratic lithologies are present (Kidson and Heyworth, 1977).

Most workers have recognized a sequence of head deposits overlying the raised beach. Stephens (1970a) divided the head deposits into a number of beds, some with erratics (Figure 7.14). He also recognized a thin development of head in places beneath the raised beach cobbles. The head deposits are highly variable and include beds of fine shale head, blocky head, head with more rounded clasts and erratics, layers of sand and gravel, and silt and clay lenses. The sequence is capped in places by a sandy silt, possibly loess, from which microliths and flints have been recorded (Rogers, 1946).

The Holocene sequence

The submerged forest and associated beds in Barnstaple Bay were recognized over 300 years ago by Ridson (Rogers, 1946), who described a 9 m-long oak trunk embedded in them at Braunton Burrows. Those at Westward Ho! are justly the most famous and have been described by numerous workers (e.g. Hall, 1879a; Rogers, 1946; Churchill, 1965; Churchill and Wymer, 1965). Considerable problems exist, however, in relating the earlier descriptions to more recent surveys; the seaward exposures are now much more limited in extent due to coastal erosion, and the precise locations of earlier finds and descriptions are often extremely unclear. Two descriptions of the Holocene sequence are given here: Stephens' (1966a, 1970a) representation of the sequence is useful in showing the relationship of the main Holocene deposits both to the Pleistocene succession and to more recent landforms (Figure 7.14); the description given by Balaam *et al.* (1987) is by far the most comprehensive and up-to-date.

Stephens follows Rogers' (1946) account by illustrating two main exposures of Holocene sediment, the so-called 'inner' and 'outer' peats (Figure 7.14), and describes the following succession from the outer peat:

6. Modern beach sand

5. Peat and peaty clay

4. Sandy blue-grey clay (with pollen)

3. Blue clay (unfossiliferous)

2. Beach pebbles, cobbles and boulders

1. Head

Intertidal rock platform

Stephens noted that clasts in the head and cobbles in the beach were frequently arranged with their long-axes vertical; in plan, some sorting of the deposits into polygonal patterns had also occurred. A kitchen midden found between beds 4 and 5 was noted by Rogers (1946) and was analysed in some detail by Churchill and Wymer (1965), who recorded worked flints, vertebrate remains (including hedgehog, fallow deer, red deer, pig and wild boar), molluscs, pollen and seeds. Numerous similar finds were made by earlier workers although their stratigraphic context is not always clear. A sample from the top of the peat (bed 5) was radiocarbon dated to 6585 ± 130 BP (Q–672) (Churchill and Wymer, 1965), and a date from the same bed of 4995 ± 105 BP was subsequently recorded by Kidson (1977).

Balaam *et al.* (1987) surveyed the site during 1983 and 1984, and confirmed the presence of the inner and outer peats. In addition, they mapped an extensive area of estuarine silt ((Figure 7.15); Area 4) running north-east from the inner peat. The distribution of the main Holocene sediments is shown in (Figure 7.15) and two cross-sections of the midden, which is found on the west edge of the outer peat, are shown in (Figure 7.16). The full succession is not superposed in any single section and must be pieced together from the separate outliers.

Areas 2 and 3

Area 3 corresponds approximately with the outer peat described by earlier workers, but in fact comprises a fourfold sequence (maximum bed thicknroses in parentheses):

4. Upper clay (0.7 m)

3. Outer peat (0.8 m)

2. Mesolithic midden (*c.* 0.2 m)

1. Lower blue clay (1.1 m)

According to Balaam *et al.* (1987), the lower blue clay (bed 1) rests on 'drift', pebbles and rock presumably the head, 'raised beach' deposits and wave-cut platform described by Stephens (1970a; (Figure 7.14)). It contains a small amount of organic matter, mainly roots and stems of monocotyledonous plants. Flint artefacts and charcoal fragments are evenly distributed throughout its upper layers (Figure 7.16) which lie at *c.* –2.5 m OD, but there is no evidence of stratification. Charcoal from the upper layers of the deposit has yielded radiocarbon dates of 6250 ± 120 BP (HAR– 6215), 6770 ± 120 BP (HAR–5644) and 8180 ± 150 BP (HAR–5643), while archaeomagnetic dating suggests an age of around 8400 to 7800 cal BP. The deposit contains no molluscs, forams, diatoms or ostracods (Balaam *et al.,* 1987).

The midden (bed 2) is restricted to Area 3 and survives only as an isolated remnant, just west of the outer peat (Figure 7.15). It occupies a gentle hollow in the surface of the clay and comprises fragmented shell material (mostly of mussel, *Mytilus* sp., and peppery furrow shell, *Scrobicularia Plana* (da Costa)), mineral matter (mainly silt), humified organic matter and, occasionally, substantial roots, presumably the remnants of trees and shrubs which grew in the overlying peat and which rooted in a more stable substrate (Balaam *et al.,* 1987). The bed contains pollen, insect remains, charcoal, flint artefacts and bone and is much bioturbated (Figure 7.16). Charcoal from the midden has yielded radiocarbon dates of 6100 ± 200 BP (HAR–5632) and 6320 ± 90 BP (HAR–5645) (Balaam *et al.,* 1987).

The outer peat (bed 3) overlies both the midden and, elsewhere, the lower blue clay (Figure 7.15) and (Figure 7.16). It comprises humified monocotyledonous material with wood, occasional hazelnuts and leaves of common sallow. Substantial remains of trunks and stools of oak and willow survive locally on the peat, contradicting Rogers' (1946) assertion that the last of these remains had been washed out of the peat in 1935; their roots are found throughout the peat, which also contains fine laminations of both inorganic and organic material, abundant pollen and insect remains. The outer peat is only a few centimetres thick where it overlies the midden (bed 2), but thickens a few metres away where its upper surface is sealed by the upper clay (bed 4). Balaam *et al.* (1987) provided six radiocarbon dates from the outer peat in Areas 2 and 3 ((Figure 7.15); Table 7.1).

These dates complement those provided earlier from materials in the same bed by Churchill and Wymer (1965) (6585 ± 130 BP; Q–672), Jacobi (1975) (6680 ± 120 BP; Q–1249) and Welin *et al.* (1971) (5004 ± 105 BP; IGS-42).

(Table 7.1) Radiocarbon dates from the outer peat

Material	Lab. Ref	Result (years BP)	Height (metres OD)
wood	HAR–5642	4840 ± 70	–1.0
peat	HA–6363	5190 ± 80	—
peat	HAR–5640	5200 ± 120	–2.1
wood	HAR–5631	6100 ± 100	–2.0
wood	HAR–5630	5630 ± 80	–2.0
peat	HAR–5641	5740 ± 100	–2.2

The upper clay (bed 4) is present only within an isolated hollow in Area 3 (Figure 7.15) where it seals part of the outer peat (Balaam *et al.,* 1987). It is generally similar to the lower blue clay (bed 1), but contains more sand and less silt; its organic content is low. The material was not analysed in detail by Balaam *et al.* (1987) and no faunal or botanical data are available.

Area 1

The Holocene sequence in this area can be summarized as follows:

7. grey silt and silt-filled channels

6. inner peat (0.4 m)

5. silt

The inner peat (bed 6) is overlain in places by grey silt (bed 7) which is extensively exposed in Areas 1 and 4, and which lies roughly at OD (Figure 7.15). These silts are incised by a complex network of silt-filled channels. The deposits have yielded a variety of wooden structures (stakes and brushwood) and are locally rich in animal bone, marine molluscs and pollen. Bone from one of the channel-fills has yielded a radiocarbon date of 1560 ± 80 BP (HAR–6513), and one of the wooden stakes (embedded in silt but overlain by channel-fill silt) is dated to 1600 ± 80 BP (HAR– 6440) (Salaam *et al.,* 1987).

Interpretation

The Pleistocene sequence

The Pleistocene sequence at Westward Ho! was described by numerous early workers (e.g. De la Beche, 1839; Sedgwick and Murchison, 1840; Pengelly, 1867; Ussher, 1878; Dewey, 1913; Rogers, 1946) who established that it comprised a raised beach deposit overlain by head (Figure 7.17). Mitchell's (1960) study of Pleistocene sequences throughout the Irish Sea Basin and in South-West England provided a considerable stimulus for further work. A detailed interpretation of the sequence at Westward Ho! was provided by Stephens (1966a, 1970a, 1974) who upheld Mitchell's arguments and suggested the following sequence of Pleistocene events.

The elevated platform was believed to have been planed during the Cromerian (cf. Mitchell, 1960), and its surface to have been shattered during an ensuing cold phase (?Anglian) when large erratics were believed to have been ice-rafted into position around the coast of South-West England. During this stage, cold-climate head (bed 2) accumulated on the platform. The arrangement of the raised beach sediments (beds 3 and 4), deposited during the Hoxnian, suggested a period of sea level higher than at present. This was followed by climatic conditions sufficiently severe to disturb and crack the upper layers of the beach cobbles (bed 4). During this proposed Wolstonian (Saalian) event, head (bed 6) and blown sand (bed 5) accumulated on the raised beach sediments. At this time, an ice sheet was believed to have impinged on the north Devon coast, depositing tills and associated sediments in the Fremington area. The lower head (bed 6) was weathered during warmer conditions in the Ipswichian. During cold conditions in the Devensian, when glacier ice did not reach the north Devon coast, an upper head (beds 7 and 8) containing erratics reworked from glacial deposits equivalent to the Fremington Clay, was deposited under periglacial conditions. Such an interpretation was founded on the belief that the raised beach deposits found widely around the coastlands of the Irish Sea Basin and South-West England were Hoxnian in age. This chronostratigraphic interpretation was reinforced by the perceived relationship of deposits at Fremington Quay and at Brannam's Clay Pit. The proposed raised beach (Hoxnian) at Fremington Quay was correlated on the basis of altitude and sedimentary characteristics with a gravel sporadically exposed beneath till and lacustrine sediments at Brannam's Clay Pit; the latter were therefore believed to be of Wolstonian age (e.g. Mitchell, 1960; Stephens, 1966a, 1966b, 1970a).

Other workers have argued against this correlation, suggesting that nowhere in the region is there evidence for a raised beach deposit having been overridden by ice (e.g. Zeuner, 1959; Kidson, 1971, 1974; Edmonds, 1972; Kidson and

Wood, 1974; Kidson and Heyworth, 1977). These workers have therefore assigned raised beach deposits in the region, such as those at Westward Ho!, to the Ipswichian, and have considered the overlying head deposits to have accumulated during the Devensian. In this scheme, the giant erratics around the coast and the Fremington Clay were assigned to the same, Wolstonian (Saalian), glaciation — although such an event has now been thrown into considerable doubt (Chapter 2; Anglian and Saalian events).

In addition to the present-day shore platform and the elevated platform at 8–9 m OD, two further platform remnants at Westward Ho!, at – 1.5 m and + 5.0 m OD, have been recognized (Kidson, 1977; Kidson and Heyworth, 1977), the latter being represented by isolated stacks. It is therefore likely that there was more than one phase of platform formation (Kidson and Heyworth, 1977), although Everard *et al.* (1964) have argued that the detailed form of the platforms is, above all, controlled by structure and lithology.

Stephens (1970a, 1974) alluded to the possibility that beach cobbles ((Figure 7.14); bed 2) beneath the Holocene submerged forest, peat and clay sequence at the site, were Ipswichian in age, and cited their lower altitudinal position with regard to the cuffed raised cobble beach deposits farther west, as support for such a dating. The polygonal sorting and vertical-stone structures observed in this bed were believed to have formed under periglacial conditions in the Devensian Stage. The underlying head ((Figure 7.14); bed 1) was correlated tentatively with bed 6 (Pleistocene site description) in the cliff sections, and was believed to be of Saalian age (Stephens, 1970a). Wood (1970), however, observed that locally the beach cobbles (bed 2) are intermixed with the blue clay (bed 3), implying a Devensian late-glacial age for both.

The Holocene sequence

The Holocene sediments have attracted much attention. Hall (1879a) recorded 70–80 tree stumps in the peat. He demonstrated that some of their roots penetrated up to 1.2 m into the deposits, thereby establishing that the forest had grown *in situ.* Bate (1866) described the stratigraphy of the site and ascertained the relationship between the deposits and those at Braunton Burrows. Ellis (1866, 1867) recorded bones, teeth, flint flakes and cores, marine shell fragments (largely *Ostrea edulis* Linné and *Cerastoderma edule* (Linné)) from the beds, and although he established that the deposit of oyster shells (up to 0.6 m thick) was mixed up with the bones, their stratigraphic context was not given. It seems likely, however, that such a bed was probably part of the once more extensive kitchen midden later described by Churchill and Wymer (1965) and Balaam *et al.* (1987).

Pengelly (1868a) suggested that the relationship between the forest beds and the large pebble/cobble ridge on their landward side (Figure 7.14), was important for interpreting the relative levels of the land and sea in the region. He argued that the cobble beach indicated an upheaval of the land surface subsequent to a period of subsidence, during which the coastal forest had been swamped by the sea.

Rogers' (1908) observations on the forest beds added considerable data on the flora and fauna but, however, added little to the interpretation of the sequence; the stratigraphic context of most of the finds was not recorded although the mammalian remains were found *in situ* in a tough blue clay which contained abundant remains of the snail *Hydrobia ulvae* (Pennant) ((Figure 7.15); possibly bed 7 of Balaam *et al.,* 1987).

A detailed account of the stratigraphy was provided by E.H. Rogers (1946) who excavated at the site, and provided additional floral, faunal and archaeological finds. He noted that the seaward outlier of the peat (outer peat) overlay a shelly calcareous mud containing numerous split bones, teeth, flint flakes and cores. The peat also yielded a microlith, flakes and a core.

Churchill and Wymer (1965) provided a detailed account of the kitchen midden establishing its 'Mesolithic' character, and arguing that it had been formed in the zone between neap and spring high tides. Seeds and fruits extracted from the overlying peat (presumably the outer peat of Balaam *et al.* (1987)) showed a plant succession from a dry fen with *Quercus* and a ground flora of *Ajuga reptans, Carex, Ranunculus* and *Rubus fruticosus,* to an even drier fen with *Corylus avellana, Cretaegus monogyna, Populus, Prunus spinosa, Thelycrania, Sanguinea* and *Solanum dulcamara.* Such an assemblage was considered characteristic of present-day fen woods, with no traces of saltmarsh plants or deposits as recorded by Rogers (1946). An early Atlantic age was suggested for the peat on the basis of a radiocarbon date of 6585 ± 130 BP (Q–672) derived from a sample near the top of the peat bed. The presence of *Plantago lanceolata* pollen was taken to be an indicator of progressive forest clearance by Neolithic humans (Churchill and Wymer, 1965), although flint artefacts from the midden, the peat and the nearby day surface are Mesolithic in character.

Churchill and Wymer (1965) and Churchill (1965) argued, on the basis of estimates of mean sea level derived from radiocarbon-dated submerged forest and associated marine beds around the coast of Britain, that there has been no measureable tectonic displacement at Westward Ho! (and much of South-West England) since *c.* 6500 BP. This contrasted, they suggested, with sites to the north-west in the Irish Sea Basin (such as Ynyslas and Borth), which revealed an upward vertical displacement of *c.* 3 m, since that time, and sites in eastern England and The Netherlands which they argued had fallen by up to 6 m since then. This has since been strongly disputed by Kidson (1977) and Heyworth *et al.* (1985), among others, who have shown there to have been no significant differential movement of the west Wales and South-West England land surfaces during the Holocene.

Balaam *et al.* (1987) concluded, despite a lack of fossils, that the lower blue clay (their bed 1) found in Area 3 (Figure 7.15) was an estuarine deposit. They argued that the artefacts and charcoal found in its upper layers were not necessarily the same age as the clay. The age of the latter was enigmatic, and it could not be presumed that it immediately pre-dates the overlying midden material. However, they favoured an age for the clay of at least *c.* 8000 BP (based on archaeomagnetic dating) and believed that a lack of evidence for weathering and soil development indicated that the clay and midden materials were not greatly separated in time ("Salaam *et al.,* 1987).

These workers also confirmed that bed 2 was a Mesolithic shell midden, pollen, molluscan and insect remains providing significant evidence of environmental change during its deposition. They argued that the midden had started to accumulate amidst a fairly dense fen carr closely surrounded by mixed oak woodland with a few herbs, of which grasses and sedges were dominant. The mollusc and insect remains are taken to indicate that the midden accumulated as domestic rubbish in a stagnant (but not brackish) pool: the insect remains show strong evidence for decaying wood and other vegetable matter.

Pollen from the upper layers of the midden showed evidence for a change in local vegetation with higher levels of willow, birch and ivy. There was no evidence, however, for the modification of the local vegetation by humans. An environment of relatively closed, damp woodland was further suggested by the remains of *Anguis fragilis* Linné (slow worm), the scales and bones of *Rana* sp. (frog) and bones of *Clethrionomys glareolus* (Schreber) (bank vole). Insect remains indicate that open country and sand dunes lay beyond the woodland and midden at no great distance (Balaam *et al.,* 1987), contradicting Churchill's and Wymer's (1965) and Rogers' (1946) assertion that the midden lay at or near the strandline.

The human origins of the midden were confirmed, however, by the accumulation of marine molluscs (including *Scrobicularia*)*,* charcoal and flint artefacts. The bones of red deer, roe deer and fish were also probably introduced by humans. Balaam *et al.* (1987) noted that 1074 flints had been recovered from Area 3 indicating that Mesolithic people had knapped local flint (?beach cobbles) to make microliths for hunting and various blades and scrapers for more domestic activities.

Radiocarbon dates show that the overlying peat sequence (outer peat; bed 3) accumulated during a roughly 500- to 800-year timespan. Both radiocarbon and pollen evidence confirm its Atlantic (Godwin Zone Vila) age (Balaam *et al.,* 1987). The pollen and plant evidence indicates a willow-dominated fen carr amidst a vegetation of deciduous woodland, with oak, elm, ash, hazel and willow strongly represented. Both plant macrofossil and insect evidence confirms the presence of deciduous woodland with only localized waterlogging and small streams; laminae within the peat probably attest to minor flooding episodes. According to Balaam *et al.,* the outer peat shows surprisingly little evidence for human activity. However, although hazelnuts found in the bed appear to have accumulated naturally, pollen in the upper layers of the peat show a decline of elm and ash and the appearance of goosefoot and ribwort plantain. Such changes may be associated with human activity within the catchment, reducing evapotranspiration and increasing surface flows (Balaam *et al.,* 1987). The reduction in the levels of ash and elm could also be associated with increased wetness (climatic) and waterlogging caused by a rising groundwater table which would have heralded the marine transgression responsible for the overlying upper clay (bed 4). The evidence afforded by bones of Bovid and Cervid animals, fish bones and artefacts found in the outer peat is also equivocal: these may have been derived from the underlying midden by bioturbation (Balaam *et al.,* 1987). The overlying clay (bed 4) denotes a dramatic change in conditions and demonstrates marine/estuarine inundation of the outer peat by *c.* 5200 BP (Balaam *et al.,* 1987).

Importantly, Balaam *et al.* demonstrated clearly that the outer and inner peats at Westward Ho! are of different ages. (It appears likely that some of the earlier accounts have referred to material from both the Mesolithic midden and later Romano-British deposits without apparent differentiation.) Archaeomagnetic measurements from silt (bed 5) underlying the inner peat (bed 6), show the latter to date from the Romano-British period; the pollen spectra also corroborate a much later date for the inner peat (Salaam *et al.,* 1987). The latter appears to have accumulated in a more open environment than the outer peat: similar floral elements are present but in different abundances. The vegetation of the inner peat is of a sedge/grass fen community, not the *Salicetum* of the outer peat. Pollen of trees and shrubs are also substantially fewer. Although there is no direct evidence of human activity, the upper levels of the inner peat show significant increases in the amount of *Plantago lanceolata* and cereal pollen (Balaam *et al.,* 1987).

The overlying silts (bed 7) are discontinuous and difficult to interpret. Molluscan assemblages, which include *S. plana* and *H. ulvae,* however, suggest an estuarine origin for the deposits and this is supported by the pollen evidence which also indicates a saltmarsh and seashore environment; radiocarbon evidence points to a Romano-British age. The presence of cattle, sheep/goat and dog bones in these deposits, and the stake and brushwood structures, provides clear evidence of human activity. However, it remains unclear if the stakes were driven into the silts or whether the silts accumulated around them. Balaam *et al.* suggested, tentatively, that some of the stakes may have been used for mooring while others may have formed some part of a fish trap. No other artefacts are recorded by Balaam *et al.* from these deposits, although numerous flints have been recovered *ad hoc* from this general area over the years.

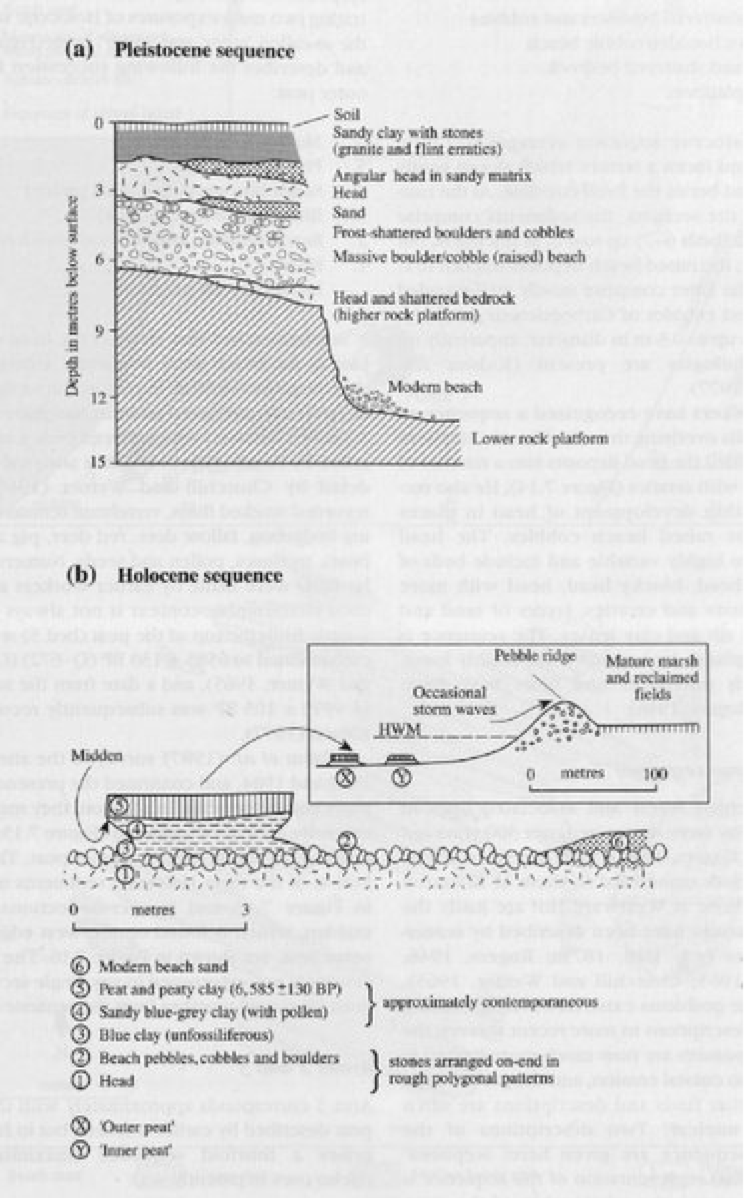
Conclusion

The interpretation of the classic raised beach and head sequence at Westward Ho! has proved controversial, with claims being made for either Ipswichian or Hoxnian ages for the raised beach deposits. Unfortunately, the latter are unfossiliferous and their relative age cannot therefore be resolved by amino-acid geochronology.

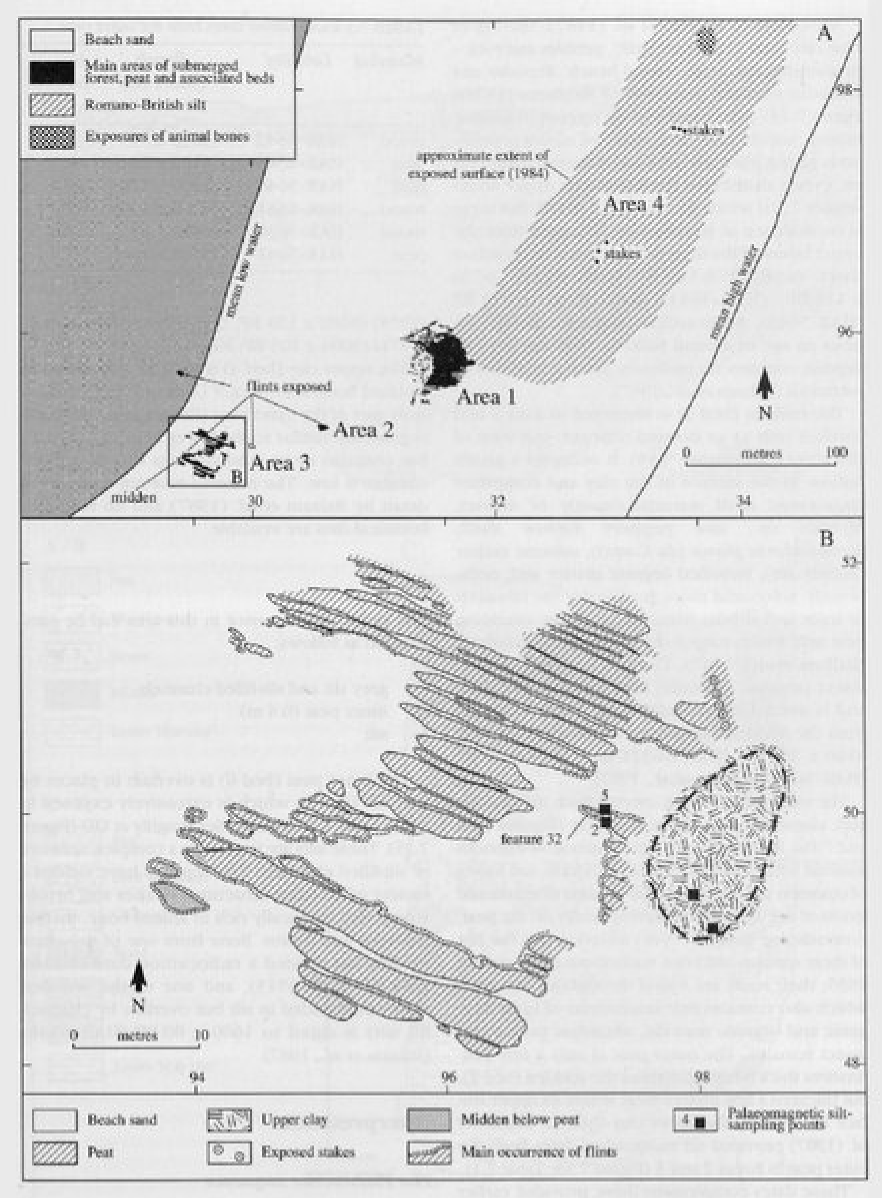
The site also provides one of the finest examples of a compound shore platform in western Britain. The extensive development of two principal platforms which lie at significantly different heights, and possibly two more which can be identified from more isolated remnants (Kidson and Heyworth, 1977), clearly disproves the earlier concept of a single platform planed during the Cromerian. It is clear from this evidence that there was more than one phase of platform formation, the ages of which are unknown, and that lithology and structure may have been controlling factors. The beach deposits overlying the highest of these platforms are one of the best examples of a raised cobble beach in Britain. The age and stratigraphic relationships of beach material (possibly soliflucted) underlying the submerged forest, are also a subject of debate and enhance the scientific value of the site.

Westward Ho! also provides perhaps the most famous and best studied of South-West England's coastal Holocene deposits, interest in the site having been stimulated by its evidence for Mesolithic occupation. The site reveals an important record of changing terrestrial and coastal conditions in the Holocene, demonstrating clear evidence for the transition from the very low sea-level conditions of the Late Devensian, through the initially rapid rise of the Holocene sea and the swamping of the coastal forest that had developed by about 6000 BP, to a late stage in which the rate of sea-level rise slowed and the present-day coastal configuration, including the landwards migration of the massive cobble ridge, was established. Its radiocarbon-dated peat and forest bed is important for establishing the pattern of relative land (isostatic) and sea (eustatic) movements around the coast of Britain.

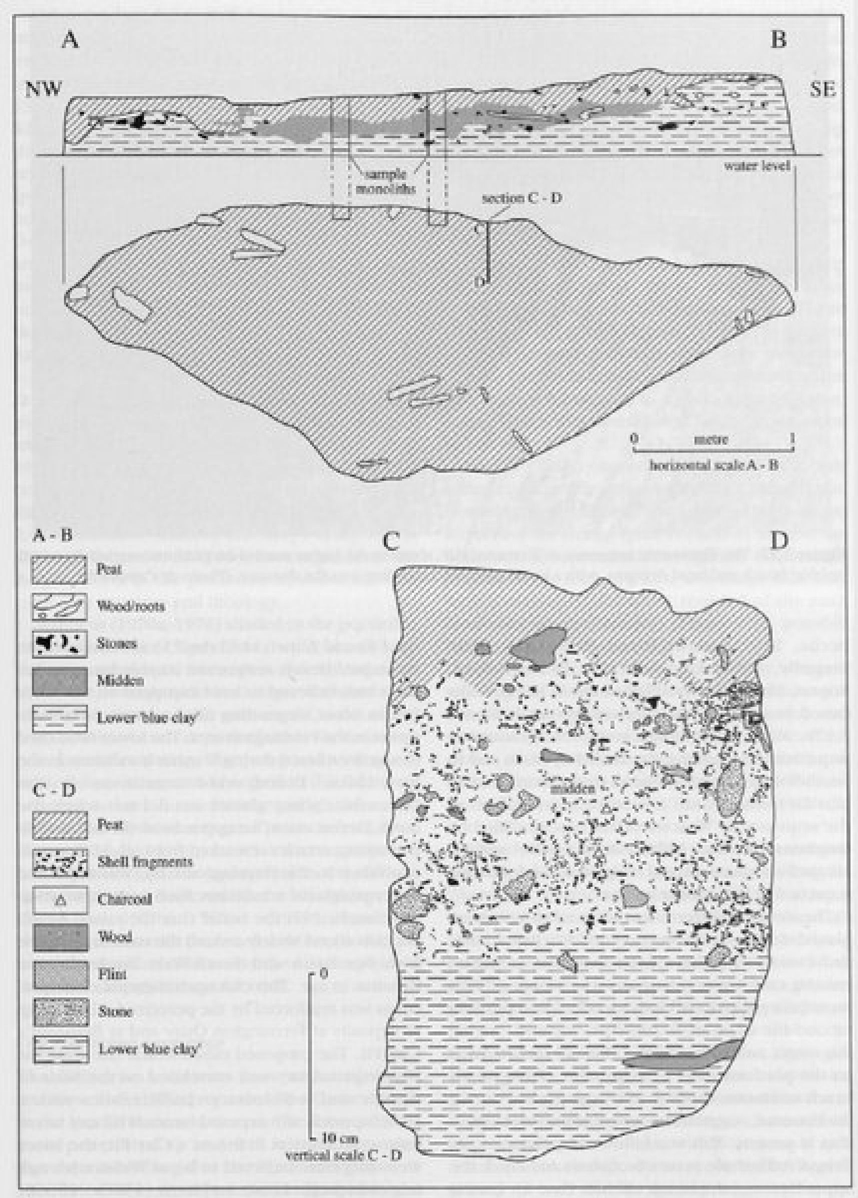
References



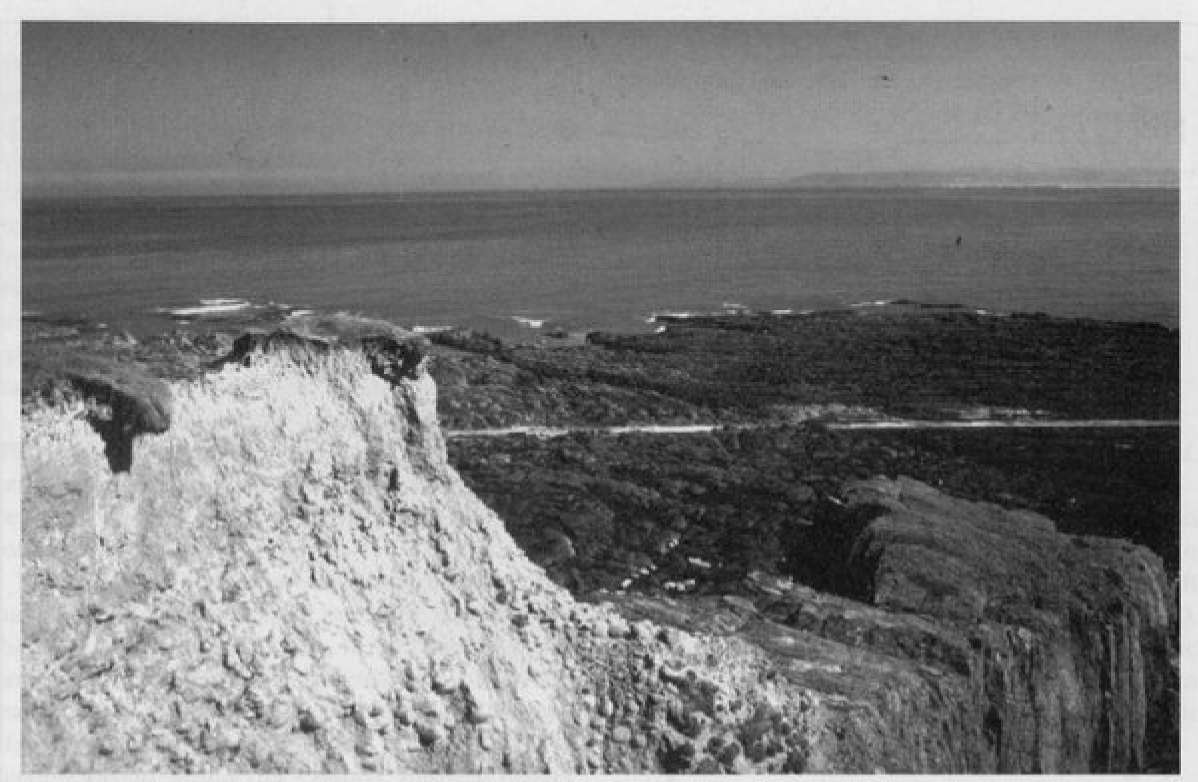
(Figure 7.14) Quaternary landforms and deposits at Westward Ho! (Adapted from Stephens 1970a.)



(Figure 7.15) The distribution of Holocene deposits at Westward Ho! (Adapted from Balaam et al., 1987.)



(Figure 7.16) Plan and section of the midden 'island' at Westward Ho! (Adapted from Balaam et al., 1987.)



(Figure 7.17) The Pleistocene sequence at Westward Ho!, showing the higher marine-cut platform overlain by raised 'cobble' beach and head deposits, with a lower platform extending into the distance. (Photo: S. Campbell.)