Broom Gravel Pits

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Highlights

A site of exceptional interest to geomorphologists and archaeologists alike, Broom Gravel Pits expose a thick sequence of terrace deposits once attributed to waters spilling from glacially impounded 'Lake Maw'. However, the terrace sequence is now widely believed to have been deposited by braided streams in a periglacial environment. Broom is also notable for being the richest source of Lower Palaeolithic artefacts yet known from South-West England.

Introduction

The Axe Valley terrace gravels have a protracted history of investigation. They first attracted interest in an archaeological context (D'Urban, 1878; Evans, 1897), and over the years have yielded a profusion of Lower Palaeolithic implements. The age and origin of the gravels have proved controversial. Stephens (1970b, 1973, 1974, 1977) suggested that the deposits were laid down when a large, glacially impounded, Saalian-age lake 'overspilled' south through the 'Chard Gap'. However, most other workers have found no evidence to support the existence of such a lake, and have proposed that the terrace gravels were deposited by braided streams in a periglacial environment (C.P. Green, 1974b, 1988; Campbell, 1984; Shakesby and Stephens, 1984). The site has also been widely referred to elsewhere (Ussher, 1878, 1906; Reid, 1898; Salter, 1899; Reid Moir, 1936; Hawkes, 1943; J.F.N. Green, 1947; Calkin and Green, 1949; Waters, 1960d; Lewis, 1970; Macfadyen, 1970; Stephens, 1970a; Edmonds *et al.,* 1975; Stephens and Green, 1978; Todd, 1987; Campbell *et al.,* in prep.). Preliminary SEM work (Campbell, 1984) and pollen analyses (Scourse, 1984) have also been conducted on deposits from the site. A comprehensive reappraisal of the deposits awaits publication (C.P. Green *et al.,* in prep.).

Description

Regional setting

The relationship of Broom GCR site to the 'Chard Gap' and other important topographic features is shown in (Figure 9.9). Stephens (1977) has asserted that the Chard Gap is the largest and lowest (at 83–90 m OD) of a number of major breaks in the watershed between the Somerset Levels (and Bristol Channel) and the English Channel. Today, the headwaters of the north-flowing Isle are located within the gap; the Axe rises in the high ground to the north of Beaminster and flows past the southern end of the gap in a south-west direction. In east Devon and south Somerset, Cretaceous rocks (Chalk and Greensand) form multiple escarpments of varying height; less resistant Jurassic and Keuper clays and marls are exposed in the bottom of incised valleys (Ussher, 1906; J.F.N. Green, 1941; Gregory, 1969; Waters, 1971; Shakesby and Stephens, 1984). Structural and lithological variations have controlled dissection and erosion, giving rise to a 'cuesta' landscape (Stephens, 1977) with quite prominent west- and north-west-facing escarpments. Stephens (1970b) has also argued that the trench-like form of the Chard Gap is unlike any nearby watershed col except for that near Crewkerne, the Hewlish Gap, with a floor at *c.* 100–120 m OD. Local topography is therefore characterized by a series of comparatively flat-topped hills and low plateaux, although most of the Axe Valley lacks steep slopes. Between Chard Junction and Kilmington, the modern River Axe meanders across a broad floodplain; its main tributary, the Yarty, occupies a narrower, more confined valley (Shakesby and Stephens, 1984). Stephens (1974) identified five main types of superficial deposit in the local area:

1. Alluvium: mostly confined to existing river floodplains.

2. Valley gravels (described in more detail below): forming extensive outcrops on low ground to the north of the Chard Gap and also present, in small patches, within the gap and forming a major terrace in the lower Axe Valley (Figure 9.10). In places, a fine-grained 'brickearth' crops out on the surface of the terrace. The terrace surface itself declines in height

seawards from *c.* 70 m OD at Chard Junction, to *c.* 65 m OD at Broom and finally to *c.* 30 m OD at Seaton on the coast (Stephens, 1973; (Figure 9.10)).

3. Head: this consists generally of locally derived material from various geological outcrops.

4. 'Clay-with-flints' and '-chert': this is composed largely of argillaceous material believed to have been derived from Tertiary strata, and mixed with flints and chert from Cretaceous beds. The material forms a discontinuous capping of irregular thickness on the plateau-like interfluves east and west of Chard and the lower Axe Valley (see Beer Quarry; Chapter 3).

5. Interfluve and plateau gravels: these are found in patches on both sides of the Axe Valley north of Axminster (Figure 9.9). Both Ussher (1906) and Waters (1960d) described the gravels as occurring on widely separated interfluves between *c.* 200 and 315 m; Reid (1898) interpreted them as river gravels, although Waters claimed the presence of … unmistakable beach cobbles of flint' (Waters, 1960d; p. 92). The material varies from sub-angular to well-rounded pebbles in a sandy matrix, with chert, flint, quartz, tourmalinized rocks, greywacke, a miscellany of Palaeozoic rock types, and a few chatter-marked flint cobbles (Stephens, 1974, 1977). C.P. Green (1974b) analysed the lithological composition of these gravels which he regarded as Tertiary in age.

The Axe Valley gravels

Extensive Pleistocene terrace gravels border the River Axe and its tributaries, including the Blackwater and Yarty, lying above their modern floodplains (Figure 9.10). They form a major lithostratigraphic unit (the Axe Valley Formation) divisible into the Broom, Pratt's Pit, Chard Junction and Kilmington members (Campbell *et al.,* in prep.). The terrace 'gravels' are generally poorly sorted, comprising clasts from gravel to boulder grade. They are crudely bedded, occasionally exhibit imbrication and contain lenses of laminated sands; more continuous beds of clay, silt and sand are present locally. The gravels comprise mostly flint and chert (69–96%), but quartz (0–35%) and other pebbles derived from Palaeozoic rocks (0–12%) are present (C.P. Green, 1974b). Occasionally, the gravels contain distinctive 'blocks' or 'rafts' of laminated sand. Their upper layers are frequently disturbed by involutions.

The principal descriptions of the terrace gravels have been based on three sites: Chard Junction [ST 342 044]; Kilmington 'New' Pit [ST 277 976] and Broom Gravel Pits ([ST 326 020]; see below). At Chard Junction, over 11 m of terrace gravels, comprising mainly clasts of flint and chert, are exposed (Figure 9.11). The gravels are overlain by a loamy silt or 'brickearth' and the upper 1.5–2.0 m of the gravel are cryoturbated (Shakesby and Stephens, 1984). Kilmington New Pit shows at least 3 m of poorly sorted, crudely bedded terrace gravels with discontinuous lenses of silt and sand (Shakesby and Stephens, 1984). Chard Junction is currently the most substantial working, sections at many of the other pits having become somewhat degraded and overgrown. Nonetheless, the most recent stratigraphic descriptions of the terrace gravels are based on an extensive series of excavations carried out at Broom Gravel Pits between 1978 arid 1981 by Stephens and colleagues (Campbell, 1984; Scourse, 1984; Shakesby and Stephens, 1984; C.P. Green *et al.,* in prep.). The Broom Gravel Pits have proved not only the most prolific source of Palaeolithic implements from the Axe Valley, but are, to date, stratigraphically the most informative — hence their selection for the GCR.

Broom Gravel Pits

The GCR site comprises two disused gravel pits on the east side of the River Axe between Wadbrook Cross and Broom Crossing (Figure 9.12): 1. Pratt's New Pit [ST 328 023]; and 2. the Ballast or Railway Pit [ST 326 020]. A further disused pit, Pratt's Old Pit [ST 328 024], occurs to the north of Holditch Lane ((Figure 9.12); C.P. Green, 1988). These pits occur in a marked terrace which rises locally to *c.* 60 m OD.

Reid Moir (1936) gave the following composite stratigraphy for Broom (maximum bed thicknesses in parentheses):

4. Surface soil

3. Tumbled coarse gravels with partings of sandy clay and clayey matrix (derived implements) (7.6 m)

2. Stratified gravel with clayey and sandy seams, some black bands (fresh, unrolled implements) (2.4 m)

1. Unstratified sand and gravel (5.2 m)

The abandoned faces of the nineteenth century workings in the Ballast Pit at Broom reveal *c.* 13–15 m of chert-rich gravels disturbed by cryoturbation structures in their uppermost two metres. These gravels are overlain by a discontinuous stony silt ('brickearth'). Recent excavations at the base of the disused faces have shown that the 'chert' gravels overlie a laterally persistent layer of pollen-bearing (Scourse, 1984), manganese- and iron-stained clay, silt and sand up to 0.5 m thick ((Figure 9.12)d; Shakesby and Stephens, 1984; Campbell *et al.,* in prep.). These in turn overlie flint-rich gravel which extends below *c.* 45 m OD to an unknown depth (Scourse, 1984; Stephens and Shakesby, 1984; C.P. Green, 1988).

A fresh cut in Pratt's New Pit, made in 1975, revealed a similar succession comprising 6–10 m of crudely stratified gravels overlying lathinated sands and clays (Stephens, 1977). The Pleistocene sequence here extends below *c.* 46 m OD to an unknown depth.

Pratt's Old Pit, north of Holditch Lane, has been reclaimed and grassed over, and is not therefore included within the GCR site. The best descriptions of the sequence here are those gleaned by C.P. Green (1988) from the notebooks of the late Charles Bean. The sequence consisted of *c.* 16 m of terrace gravels separated by up to 2 m of clay, sandy clay and loam (the Upper Gravel, Middle Beds and Lower Gravel of Green (1988)). The red Upper Gravel appears to have reached a thickness of *c.* 9 m and contained lenses of sand and loam. The Middle Beds were described as brown and containing scattered stones and, notably, red- and black-stained gravel. They lay at levels between *c.* 45–50 m OD and their boundary with the Lower Gravel was sharp. The pale-grey to white Lower Gravel (> 5 m) contained smaller clasts than the Upper Gravel and was better stratified, exhibiting shallow cross-beds (C.P. Green, 1988).

Although full results of recent excavations at Broom Gravel Pits (C.P. Green *et al.,* in prep.) are not yet available, it appears that the broad threefold sequence described at each of the major disused pits is part of a laterally continuous succession (Campbell *et al.,* in prep.). Whether this pattern holds more widely elsewhere in the Axe Valley is unknown.

Palaeolithic artefacts

Numerous Lower Palaeolithic artefacts have been recovered from a wide range of locations in the Axe Valley, from Chard to Seaton. The main concentrations of material have been found at Chard Junction, Kilmington and Broom. Of these, Broom has undoubtedly been the most prolific: over a century of gravel working has yielded some 1800 hand-axes (Stephens, 1977; C.P. Green, 1988), although virtually none of these has a clearly defined stratigraphical or archaeological context (Todd, 1987; C.P. Green, 1988). Many, including the 900 or so collected by Charles Bean, probably originated from Pratt's Old Pit, north of Holditch Lane, and there are strong indications that most originated from the 'Middle Beds' at Broom in particular. Many fine hand-axes are preserved in the Exeter, Salisbury, Brighton and British museums (Macfadyen, 1970; Todd, 1987). Less impressive implements and flakes have fared less well, frequently being ignored or discarded (Rosenfeld, 1969; Todd, 1987). Most of the implements from Broom are made of green-brown Upper Greensand chert, although a few are made from chalk-flint (Hawkes, 1943; Macfadyen, 1970). Some are sharp-edged (unrolled), others waterworn (rolled), but in both cases an ovate type (more properly termed chordate, namely asymmetrical ovate) predominates (D'Urban, 1878; Evans, 1897; Stephens, 1974; C.P. Green, 1988). They vary considerably in size, from *c. 6–2*3 cm in length (Macfadyen, 1970). Roe (1968a, 1968b, 1981) described the industry as 'finely worked', and confirmed the view of earlier workers that ovates, including twisted forms, predominate (60%); nearly 40%, however, are pointed forms, the remainder being narrow cleavers, several of which appear to have been sharpened by the tranchet blow (Roe, 1981). This confirms Charles Bean's analysis which shows that ovate forms are dominant (C.P. Green, 1988). The industry as a whole is classified as part of Roe's 'Intermediate Group IV' of British hand-axe industries. Whereas 34 out of the 37 other sites used in this classification fall very clearly into either 'pointed' or 'ovate' hand-axe traditions, the mixed assemblage found at Broom does not. The unknown stratigraphic provenance of most of the Broom finds leaves the interesting possibility that several industries are present. Nonetheless, most authorities seem to agree that the hand-axes are of Early–Middle Acheulian Culture (e.g. Roe, 1968a, 1968b, 1981; Wymer, 1968, 1970, 1977). Stephens (1974) added that since the industry included triangular hand-axes and twisted ovates, it was therefore probably comparable to the Acheulian at Swanscombe (but see Roe, 1981; Bridgland, 1994). On this basis, the manufacture of artefacts at Broom has been seen as broadly contemporaneous with the Hoxnian and Wolstonian (Saalian) stages (Stephens, 1970b, 1973, 1974, 1977).

Interpretation

At the outset, it should be pointed out that no firsthand detailed account of the Broom Gravel Pits has ever been published. Many of the early accounts, particularly those of the 1930s and 1940s, gleaned their evidence from meagre earlier-published accounts rather than from detailed field observation. Some had a tendency to 'force' the field evidence into preconceived stratigraphic schemes based on localities far from Broom and probably wrong even for those localities. Many of these accounts are either very slight, secondhand, or both, and tend to reflect interpretative traditions that have now been largely discarded. The best account is undoubtedly that of Charles Bean, recorded in his notebooks and summarized by C.P. Green (1988). His observations have been fully borne out by excavations undertaken in the late 1970s/early 1980s and reported in preliminary form by Shakesby and Stephens (1984).

D'Urban (1878) recorded that many chert palaeoliths had been found in the Ballast Pit during 1878, and that some had even been picked up from the gravel spread along the adjacent railway line; none, however, had a known stratigraphic provenance. The hand-axes were considered to resemble closely those illustrated by Evans (1872) from Hoxne in East Anglia. D'Urban's remarks about the deposits from which the palaeoliths had come were brief. He noted that sections, up to *c.* 12–15 m high, through cherty gravel and clay occurred in the Ballast Pit; this material was believed to have been derived from the Greensand which caps the local hills (D'Urban, 1878). The earliest finds and descriptions of implements from the site were subsequently documented by Evans (1897).

The Ballast Pit was also referred to briefly by Salter (1899) who noted that the location and composition of the Axe Valley gravels showed that they had been emplaced 'by a strong current or stream from the north', and he regarded the Ballast Pit deposits as being made up of the debris from the 'high- and low-level plateau drifts' (cf. C.P. Green, 1974b). He observed that roughly shaped chert implements were abundant, being found largely in the 'bottom layers' of the pit.

Likewise, Jukes-Browne (1904a) regarded the valley gravels as having been formed by the 'action of rain and rivers during the excavation of the valleys to their present depth in the Pleistocene'. He thus considered them to have been derived from flint- and chert-rich clays (Eocene) found on the higher slopes and plateaux of the neighbourhood (Jukes-Browne, 1904a).

Between 1932 and 1941, Palaeolithic artefacts, including over 900 hand-axes, were recovered from the terrace deposits at Broom (the Holditch Lane Pits) by amateur archaeologist, Charles Bean. His detailed records, presented for the first time by C.P. Green (1988), show that most of the archaeological material originated from a complex bed (the Middle Beds), about 2 m in thickness, lying between two major gravel units (C.P. Green, 1988). Also from this early period of investigation comes an account of the site's stratigraphy by Reid Moir (1936) (see site description), and two further reviews of the archaeological material that had, by that time, been recovered (Gray, 1927; Smith, 1931).

Reid Moir (1936) described three gravel layers which he interpreted as a single aggradation. The mostly unstratified gravels (bed 3) were believed to have been formed by a mixture of periglacial solifluction and river processes. The stratified gravels (bed 2), on the other hand, showed dark bands which he interpreted as former interglacial land surfaces. The sharp, unrolled, implements found in this bed led Reid Moir to assign the Broom Palaeolithic industry to the Third Interglacial', in today's terminology, the Ipswichian.

Also from around this time comes a sketch of the Broom deposits showing an unconformity, representing a subaerial weathering surface, between lower unstratified and overlying stratified gravels (beds 1 and 2) (Paterson in Hawkes, 1943; (Figure 9.12)(b)). Hawkes (1943) commented that the lowest gravels and sands were probably deposited during the Third Glacial' (= Riss or Saalian), with the unconformity (land surface) representing the Mousterian (= Ipswichian). The overlying gravels were attributed to the 'Fourth Glacial' (= Devensian). These workers stated explicitly that rolled implements had been recovered from the basal gravels, while sharp, fresh implements had been obtained from the ancient land surface and from the bedded gravels; the different artefacts were therefore considered to represent separate stages of the Acheulian and Clactonian industries (Hawkes, 1943).

J.F.N. Green (1947) undertook reconnaissance mapping of the terrace deposits of the Otter, Dart and Axe valleys, and confirmed that a series of 'flats' could be traced down valley towards the sea; these were classified on the basis of the height of the gravels and correlated with other known terrace remnants in the lower Thames Valley and in the Sleight district of Dorset Q.F.N. Green, 1947; Calkin and Green, 1949).

In referring back to Reid Moir's composite stratigraphy for Broom, Calkin and Green concluded that the Broom section presented a complex sequence with two platforms cut by successive erosional stages of the River Axe ((Figure 9.12)(c)), together with associated aggradational and reworked ('bluff') gravels. This schematic diagram, which illustrates the disposition of these various erosional and depositional elements, shows how the interpretation of two separate gravel deposits from two different terrace accumulations may have become complicated by the slumping and redistribution of gravels ((Figure 9.12)(c)). The three terraces illustrated were believed to have been formed by a proto-Axe river flowing at successive heights equivalent to the rivers which deposited the Sleight, Boyn Hill and Iver terraces (respectively descending in height and age). Calkin and Green argued that after the middle terrace (= Boyn Hill Terrace) accumulated at Broom and its river had formed a cliff at the edge of its floodplain, it was likely that gravels and other sediments from an older and higher terrace (= Sleight Terrace) had slumped or been soliflucted down-slope as 'bluff' gravels (Reid Moir's bed 3) to overlie younger, in *situ,* well-stratified gravels (= Reid Moir's bed 2). Subsequently, erosion at a lower level led to cliffing and deposition of the lowest (= Iver) terrace; 'bluff' gravel was later deposited over these sediments in the same manner as described above ((Figure 9.12)(c)) Q.F.N. Green, 1947; Calkin and Green, 1949). On the basis that the principal source of artefacts had been the stratified gravels (bed 2), Calkin and Green assigned a Boyn Hill age to the industry (= Hoxnian).

Two main recent schools of thought pertain regarding the origin of the Axe Valley gravels. First, Stephens (1970b, 1973, 1974, 1977) speculated that a combination of Irish Sea and Welsh ice had blocked the Bristol Channel and pressed against the north Devon coast (see Brannam's Clay Pit; Chapter 7) in Saalian times, damming natural drainage and forming a large lake — 'Lake Maw' (Maw, 1864; Mitchell, 1960). He argued that such a lake would have overflowed at the lowest point of outlet to the south; the striking dry gap at Chard would have provided an ideal low-level routeway between the Somerset lowland to the north and the Axe Valley to the south (Stephens, 1970b). As this 'outwash' overflowed through the Chard Gap, it picked up Palaeolithic artefacts and incorporated them into a sizeable gravel terrace running all the way from Chard to Seaton. This consisted not only of locally reworked gravels (from plateau and interfluve areas) but, in addition, a variety of non-local rock types. The overspill from the lake was believed to have inundated a number of Palaeolithic working floors as attested by the vast numbers of artefacts found at localities such as Broom.

On the basis of the archaeological evidence for an Early–Middle Acheulian industry in the area, Stephens has argued that the Axe Valley terrace, with its incorporated artefacts, can be no earlier than the Hoxnian and no later than the Saalian (Stephens, 1970b). This fits neatly with the suggestion that proglacial Lake Maw built up during the Saalian Stage (= Wolstonian), approximately at the same time as the Fremington Clay was believed to have been deposited in north Devon (Stephens, 1970a, 1970b). Cryoturbation of the Axe Valley terrace gravels and deposition of brickearth (a silty loessic or colluvial deposit capping many local sequences) were attributed to periglacial conditions during the later part of the Saalian or in the Devensian cold stages (Stephens, 1974).

Second, an alternative explanation for the Axe Valley gravels, including those at Broom, was provided by C.P. Green (1974b) who determined the lithological composition of gravels both within the Axe Valley and in adjacent plateau and interfluve areas. He suggested that the Axe Valley terrace was unrelated to the Chard Gap. The source of erratic pebbles in the terrace gravels was thought to reflect the distribution and composition of adjacent Tertiary plateau gravels. Green has suggested that the incorporation of hand-axes into the terrace gravels at many sites in the Axe Valley was effected by extensive systems of braided streams, choked with chert and flint gravel, which occupied the valley floor where the Palaeolithic working sites had existed. Solifluction on valley sides and small tributary streams probably contributed material from plateau and valley-side sources to the valley floor, where shifting stream channels accomplished only limited sorting of material. All of these processes were believed to have been operative in a periglacial regime (C.P. Green, 1974b).

According to C.P. Green, erratics within the terrace gravels had been derived from Tertiary beds located on adjacent plateau and interfluve areas. A very strong argument in favour of this hypothesis is that deposits of similar composition to the Axe Valley gravels occur in other nearby valleys such as the Yarty and Otter — valleys which could not have been supplied via the Chard Gap. A glacial origin for the far-travelled material was thus rejected (C.P. Green, 1974b).

Campbell (1984) studied microtextural characteristics of sand from the Axe Valley terrace using Scanning Electron Microscopy (SEM). He noted that quartz-grain microtextural assemblages found in samples of the Axe Valley deposits are consistent with a marine origin, indicating reworking of material from Tertiary sources. At the same time, these preliminary SEM data indicated that probably very little reworking or abrasion of quartz grains had occurred since the material was remoired from its plateau sources. This is consistent with the view put forward by C.P. Green (1974b) and Shakesby and Stephens (1984).

Shakesby and Stephens (1984) provided a preliminary account of recent excavations in the Ballast Pit, and attached considerable significance to the stained clays, silts and sands which occur within the gravel sequence ((Figure 9.12)(d)).

Analysis of pollen extracted from this bed (Scourse, 1984) shows that the prevailing regional vegetation probably consisted of a boreal forest dominated by pine *Pinus,* spruce *Picea* and birch *Betula,* but also with silver fir *Abies.* Scourse has argued that these trees were probably restricted to small stands interspersed within large expanses of open country, with ericaceous heath on the higher ground; a depositional environment at the end of a Middle Pleistocene (possibly Hoxnian) interglacial is suggested, although an interstadial origin, perhaps within the Saalian, cannot be ruled out (Scourse, 1984). C.P. Green (1988) has suggested that the apparent diversity of the sediment association reflects generally low energy deposition in a complex of pools and channels on a floodplain surface; in this case, one formed near the confluence of the proto-Axe and tributary Blackwater rivers.

The recent stratigraphic and pollen evidence somewhat complicates the simple depositional model originally put forward by C.P. Green (1974b); an apparently temperate floodplain deposit within a series of cold-climate gravels shows that periglacial braided stream deposition was interrupted by the accumulation of the pollen-bearing clays, silts and sands during a period of more temperate conditions. At present, no firm dating for this sequence is possible; on the basis of the archaeological evidence, however, it is likely that the gravels and associated deposits span the temperate Hoxnian and cold Saalian stages (Shakesby and Stephens, 1984). There is no indication that any part of the terrace sequence accumulated during the Ipswichian; irregular cappings of brickearth, caused by solifluction and rain-wash, and cryoturbation structures in the upper 1–2 m of the terrace gravels, may have formed during the ensuing Devensian (Shakesby and Stephens, 1984).

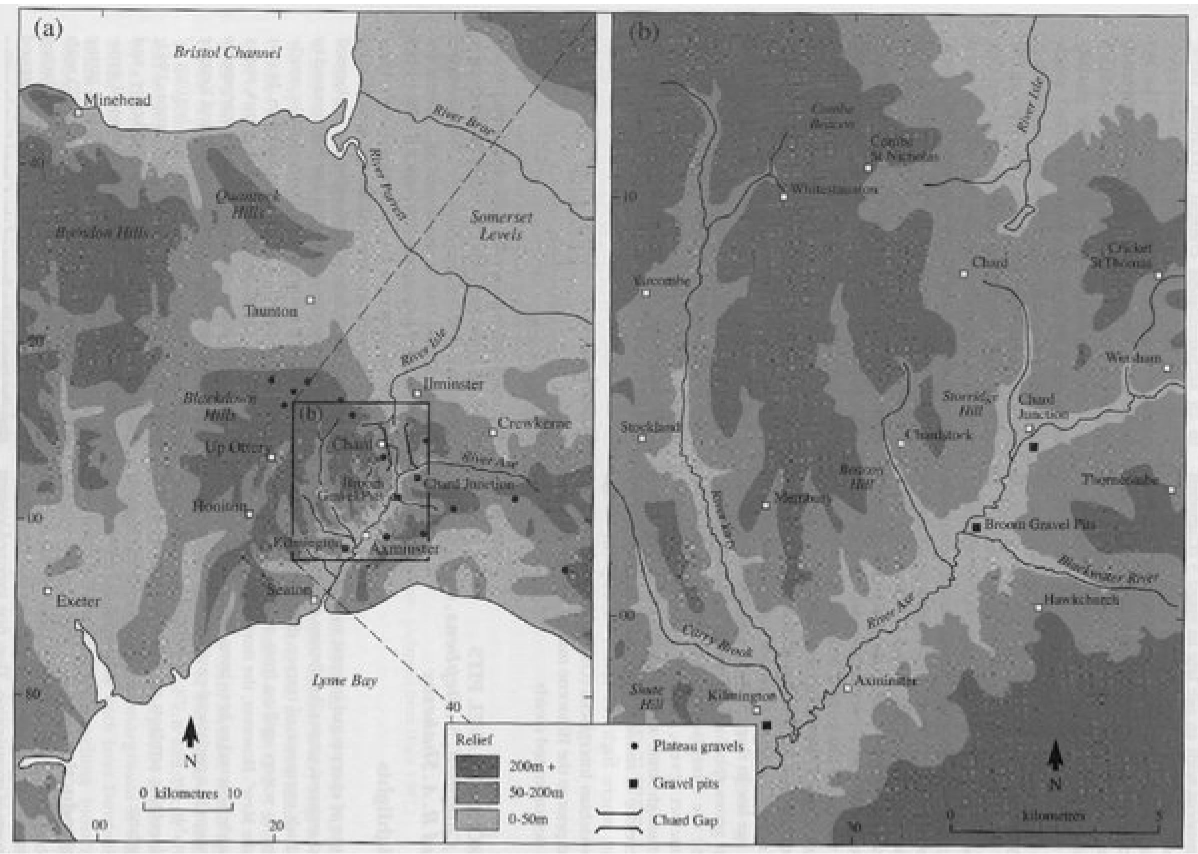
In conservation terms, Broom Gravel Pits show key exposures in the controversial Axe Valley terrace gravels. In addition to providing representative examples of the gravels themselves, recent site excavations have shown laterally persistent silt and clay bands to be present within the terrace gravels; pollen sampled from these beds (Scourse, 1984) offer, for the first time, the opportunity to begin to reconstruct the palaeoenvironment of the Axe Valley prior to the main formation phase of the large gravel terrace, perhaps at a time when the valley was extensively inhabited by Lower Palaeolithic Man. At present, the only possible clues as to the age of the terrace gravels come from the included Acheulian implements; even then, the age of the deposits is only loosely confined to between approximately the late Hoxnian and Saalian stages. Broom Gravel Pits have been, without doubt, the most important source of Lower Palaeolithic material from within the Axe Valley. Nonetheless, problems of interpreting the Palaeolithic assemblage from Broom still persist; it is not easily related to Acheulian assemblages found elsewhere in Britain (Rosenfeld, 1969), and it is quite likely that a mixture of industries is represented (Roe, 1968a, 1968b, 1981). Roe has suggested some affinities with the pointed hand-axe industries from Furze-Platt, Cuxton and Stoke Newington, but Broom differs markedly in showing a clear clustering of ovates within a narrow shape range (Rosenfeld, 1969). The unusual profusion of Palaeolithic material, particularly from the Ballast Pit, also presents a problem of interpretation; it may provide unique evidence in the South-West for a working floor. In any case, extremely rapid incorporation and burial of the hand-axes within the gravels is suggested (Shakesby and Stephens, 1984); the generally unrolled condition of the artefacts may suggest that they were originally discarded on the surface of the temperate floodplain deposits, and that they were only displaced over a short distance during low energy reworking on the floodplain (C.P. Green, 1988).

Conclusion

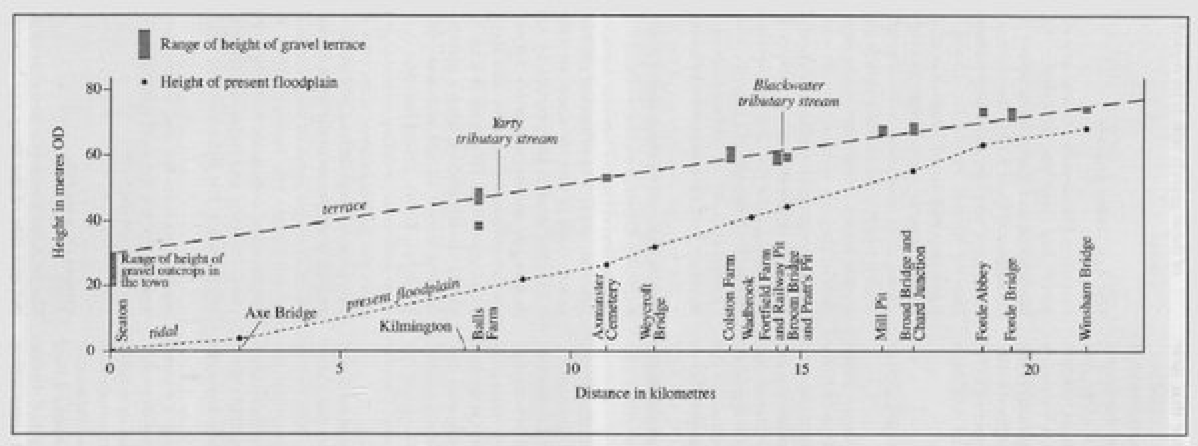
One of the classic geomorphological localities of South-West England, Broom Gravel Pits have long been central to arguments regarding the origin of the controversial Axe Valley terrace gravels. Most workers now hold that the gravels here were derived from Tertiary plateau deposits by Pleistocene solifluction and fluvial activity and then reworked, within the Axe Valley, by periglacial braided streams. Another more ambitious theory has tied the origin of the Axe Valley gravels to the Chard Gap, suggesting that the gravels were deposited (or at least their final terrace form created) as water spilled south from a large proglacial lake — 'Lake Maw' — dammed by Saalian-Stage ice in the Bristol Channel. Recent evidence from Broom shows that gravel accumulation was interrupted by a period of temperate climatic conditions when pollen-bearing clays, silts and sands were deposited. Whether this temperate event was part of a full interglacial within the Pleistocene, or merely a brief interstadial phase within one of the main cold phases, is as yet unresolved.

Broom also provides important evidence, in the form of a profusion of Acheulian implements (over 1800 hand-axes have so far been found at the site), for the activities of Lower Palaeolithic humans in the South-West. The large number of implements found here suggests that the site may have been a 'working floor' used for the manufacture of such tools; it is tempting to speculate that the relatively warm period detected within the sequence was coincident with a major occupation of the immediate area by Palaeolithic hunters who produced hand-axes in the Acheulian tradition. At present, the archaeological evidence is the only means of estimating the age of the sediment sequence here which, on that basis, has been assigned to between the late Hoxnian and Saalian stages.

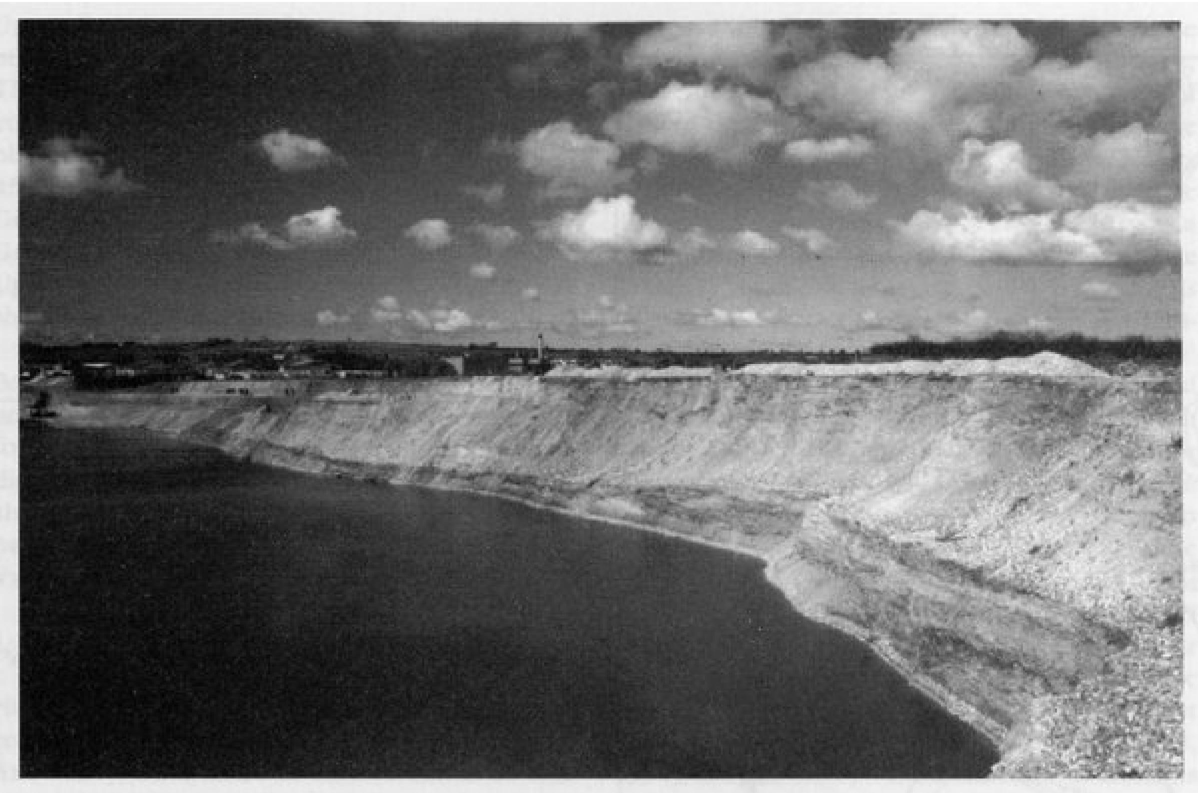
References



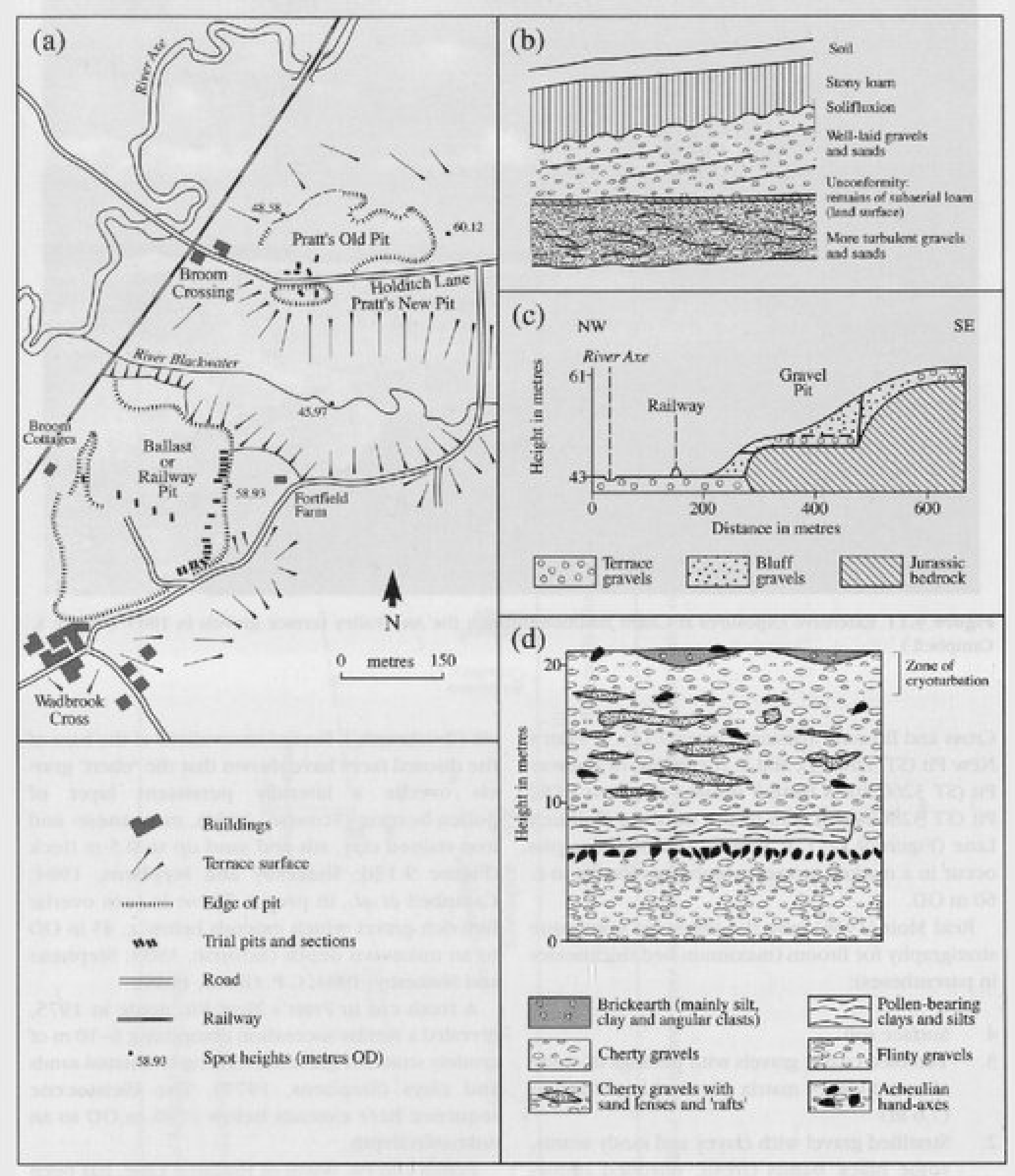
(Figure 9.9) (a) The topographic setting of the Axe Valley and the distribution of plateau-gravel sites. (b) The principal exposures of the Axe Valley terrace gravels. (Adapted from Stephens, 1977 and Green et al., in prep.)



(Figure 9.10) The long-profile of the modern River Axe, and the height-range and distribution of the principal terrace gravel outcrops. (Adapted from Green et al., in prep.)



(Figure 9.11) Extensive exposures at Chard Junction through the Axe Valley terrace gravels in 1985. (Photo: S. Campbell.)



(Figure 9.12) (a) Location of the Broom Gravel Pits, adapted from Green et al. (in prep.). (b) Schematic section of the Broom gravels, adapted from Reid Moir (1936) and Hawkes (1943). (c) An interpretation of a section of the Broom gravels, adapted from J.F.N. Green (1947) and Calkin and Green (1949). (d) A schematic composite section of the Broom gravels, adapted from Shakesby and Stephens (1984).