SECTION EIGHT

The Excavation of Six Dry Valleys in the Brighton Area: The Changing Environment

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INTRODUCTION

The analysis of infilling deposits in six dry valleys threatened by the bypass was an integral part of the overall design of the A27 project (Fig. 1.1). These investigations were undertaken in an attempt to span the information gap about the areas between the hilltop sites by providing further artefactual and palaeoenvironmental evidence. The examination of biofossils preserved in colluvium in conjunction with artefacts could potentially widen existing knowledge of ancient farming practices and map the development of the landscape in the Brighton area since the Devensian Late Glacial (*c*.12,000 BP). This would provide a palaeoenvironmental framework in which the archaeological sites in the area could be set. It was also hoped to find, if present, evidence of hitherto unknown valley settlement sites which earlier work had suggested may have been more common than previously thought (Bell 1983; Allen 1984b). However, unlike Bell's (1983) studies at Kiln Combe and Itford Bottom, the six valleys investigated on the A27 project were all located relatively close together, within an area 10km east to west and 3km north to south, and away from the immediate vicinity of any previously known archaeological sites.

The field excavations were directed by Maureen Bennell, while the palaeoenvironmental aspect of the work was undertaken at all stages by Keith Wilkinson. (*NB* The palaeoenvironmental work was conducted as part of a Ph.D. thesis at the Institute of Archaeology, University College London.) Keith Wilkinson and Luke Barber were responsible for co-ordinating the post-excavation work and writing/editing the published report.

The geology of the Brighton area: a summary

The solid geology of the Brighton area consists of flint-bearing Middle and Upper Chalk, with Lower Chalk outcropping to the north of the study area on the scarp face of the South Downs. Various Quaternary formations overlie the chalk around Brighton, two of which – Clay-with-Flints and Head – have had a profound effect on many of the sites investigated. The Head deposits (also known as Coombe Rock), consist of weathered chalk and flint, often degraded to a soft marl, and are the result of solifluction during the Devensian cold stage. Both the Head and Clay-with-Flints deposits have been discussed in detail elsewhere (Young and Lake 1988). Flandrian sedimentological deposits in the study area consist almost exclusively of colluvium.

METHODOLOGY

Excavation

Originally the methods used were to follow those of Bell (1981a, 1983), i.e. a trench *c*. 30m long, 2m wide, machine-dug laterally across the dry valleys cutting through the infilling sediments. This was to be started in the centre of the valley (at the lowermost point threatened by the road line) and continue up one of the slopes. Unfortunately, the lack of time and adverse weather conditions meant that most trenches had to be much shorter than Bell's 30m.

After excavation the trench would have its base and one of its longer sections hand-cleaned. Some trenches were so unstable they required shoring before this could be undertaken, i.e. Hangleton and Benfield (*see* below). The cleaned section was subsequently drawn at a scale of 1:20, photographed and the layers individually numbered and described on pro-forma context sheets (which form part of the archive). More detailed sedimentological descriptions were undertaken in the laboratory on samples studied for palaeoenvironmental purposes.

Artefact columns

Following the recording of the main section, 'artefact columns' were excavated to obtain material to date the sequence of colluvium. With the time restraints on the work a single strip, 1m wide, and hand-excavated along the entire length of the section (as used by Bell) was impossible to undertake. For this reason three small artefact columns were usually excavated (each measuring 1m. wide by 0.5m. deep) through the deposits down to the basal chalk. At some valleys (for example Hangleton), it was not possible to excavate the columns to a width of 1m (owing to the spacing of the shoring boards). In such cases additional columns of smaller dimensions (i.e. 0.5m. × 0.5m.) were excavated. All artefact columns were given individual code letters (running sequentially through the valley sites) and placed in suitable/diagnostic positions along the section. Where possible the artefact columns were placed adjacent to a mollusc column in order to facilitate direct correlation of results. Unfortunately, owing to the smaller volume of sediment excavated for artefact recovery (compared to Bell's section-length strips), considerably lower quantities of datable material were recovered. This problem was accentuated by the fact that the dry valleys investigated on the A27 project were not selected for their proximity to known archaeological settlements, and hence were less likely to produce large amounts of pottery in the first instance. Greater reliance therefore had to be placed on absolute dating methods and cross-site comparisons.

During excavation all artefacts (pottery, worked flint, fire-cracked flint, bone, shell, foreign stone, glass etc.) were given a unique number (per valley), and recorded with respect to stratigraphy (distance along section, depth and distance in from section). This information was placed on pro-forma artefact forms (which form part of the archive) and was used to plot the various artefacts (by category and date) onto an overlay of the section drawing (drawn at 1:10). Each artefact was placed into its own numbered bag for later cleaning and identification. All categories of material are listed in the archive, although only the flintwork and pottery have been plotted in this publication.

Radiocarbon samples

These were taken wherever a suitably large piece of charcoal presented itself in a context for which it was desirable to obtain an absolute date. The piece of charcoal was initially plotted onto the section drawing and then carefully removed from the section, avoiding any foreign contact except with the trowel used in the extraction process. The charcoal was subsequently wrapped in aluminium foil to protect it and prevent contact with any other organic materials. The samples were cleaned and examined in the laboratory prior to submission to the Research Laboratory for Archaeology and the History of Art, Oxford University. Only single discrete pieces were submitted, there being no combination of samples to make up quantities needed for radiocarbon assay as Bell (1981a) had to do of necessity for 'conventional' radiocarbon dating. At Toadeshole Bottom East (*see* below) samples were also taken from mollusc samples, prior to processing with hydrogen peroxide.

Palaeoenvironmental techniques

Mollusc analysis

Samples were originally taken for mollusc analysis at a rate of three sample columns per trench (each column having its own identification letter). However, it was soon realised that this rather inflexible approach was resulting in the doubling, and even tripling of information on certain sedimentary layers. While not a bad thing in itself, the actual time spent in sampling and laboratory extraction, identification and quantification would also be doubled/tripled. Therefore on sites examined later in the project it became usual practice to take one column through the whole sequence, generally in the area where the deposits were at their thickest. If warranted, other columns, or even spot samples, were taken from stratigraphically important deposits or where the main column had not adequately covered a context (e.g. Toadeshole Bottom East: *see* below). This was one of the many examples where methods developed during the course of the project.

The field-sampling methods followed those advocated by Carter (1987) rather than those of Evans (1972) that were used previously in work on dry valley fills (i.e. by Bell and Allen). The use of volumetric sampling (as opposed to Evans' constant mass sampling) had the advantage of providing a method to assess accumulation rate, both of the sub-fossil mollusc assemblage and the sediments generally. Another advantage was the results could be presented in terms of absolute numbers for a given volume as well as the more usual percentage frequency of molluscs per sample (which has its associated problems: Thomas 1985).

Each sample column was 0.25m by 0.25m wide and was excavated in units of 6cm, so that every sample had a volume of 3750cm^3. Where this 6cm sample interval led to the crossing of a stratigraphic boundary a smaller sample was taken, wherever possible of either 2cm or 3cm thickness (so that later scaling of the results to the 'standard' 6cm, thick, 3750cm^3 volume could be achieved without the creation of fractions). A full account of the subsequent laboratory methodologies has been documented by Wilkinson (1993).

Magnetic susceptibility sampling

Magnetic susceptibility measurement has rarely been applied to colluvial deposits (Allen 1988). The methodology and associated technical problems are considered in detail by Mullins (1977) and Allen and MacPhail (1987).

The technique was used in this study as an aid to ascertaining sediment source and to detect eroded remnants of palaeosols and burnt layers otherwise invisible to the eye. All samples for magnetic susceptibility measurement were taken immediately adjacent to the main mollusc column (with matching sample intervals), so that correlation between the magneto- and bio-stratigraphy could be easily accomplished. The samples, which were volume specific, were taken as described by Thompson and Oldfield (1986).

At Hangleton Bottom, Toadeshole Bottom (East and West) and Cockroost Bottom, samples for magnetic susceptibility were also obtained from the mollusc samples. Samples for magnetic susceptibility measurement, whether taken in the field or from the mollusc column, were treated in the same way in order to obtain a reading. The measuring equipment used was a Bartington Magnetic susceptibility Meter MS2 with sensor type MS2B, calibrated for magnetic pots containing 10cc of sediment. A fuller account of the sampling and processing procedure is given by Wilkinson (1993).

Particle size analysis

This technique was applied to seven samples from Toadeshole Bottom East as this site possessed particularly interesting and relatively early stratigraphy. Techniques are detailed below and in more detail in Wilkinson (1993).

THE INVESTIGATED VALLEYS

COCKROOST BOTTOM

Introduction

The steep-sided dry valley of Cockroost Bottom is located at the western end of the Bypass at NGR TQ 24820799 (Figs 1.1 and 2.2). The trench, at 60m OD, is situated between the two settlement areas at Mile Oak, which are located on the upper slopes of Cockroost Bottom. The field in which the transect trench was excavated was pasture land at the time of field investigation and according to the farmer, had been so for quite some time.

Archaeological background

Originally the area around Cockroost Bottom was chosen for investigation owing to the presence of Romano-British field systems. However, during the course of sampling for these field systems several extensive earlier sites were found, although little trace of the field systems was revealed. To the east (Trench 27) the semi-eroded remains of a Bronze Age enclosure and settlement were located, while on the western hill was evidence of a Late Bronze Age (LBA) metalworking site (Trench K) (*see* Section 2). The molluscan analysis from the prehistoric enclosure ditch in Trench 27 suggests a complex of scrub and grassland environments after the site was abandoned (Wilkinson, Section 2).

Sampling strategy

A trench, measuring 26.4m × 2m was machine-excavated in order to study the colluvial deposits in the valley (Fig. 2.2). Unfortunately, this trench was excavated two weeks before archaeological work was started on the adjacent hills and, as a result, the existence of the important sites found later was unknown. A longer trench linking the two areas of activity might possibly have revealed how they contributed to, and affected, the accumulation of valley bottom sediment.

The stratigraphic sequence (Fig. 8.1)

Only 0.85m of colluvium was preserved in Cockroost Bottom, despite the steep gradient of the adjacent slopes and settlement activity. There was a total of 16 sedimentary contexts (nos 1000–1015) recorded in the valley section (Fig. 8.1) (see Table 8.1).

Dating

The small quantity of artefacts recovered from the three excavated artefact columns (Fig. 8.1: A–C) is somewhat surprising in view of the proximity of the settlement/activity areas, particularly when considering the large quantity of pottery found associated with these sites. The range of artefact types included worked flint, fire-cracked flint, pottery, foreign stone, charcoal, glass, bone, iron etc. Only the pottery (totalling six sherds) and worked flint have been plotted (Fig. 8.2). The other material is listed in the site archive.

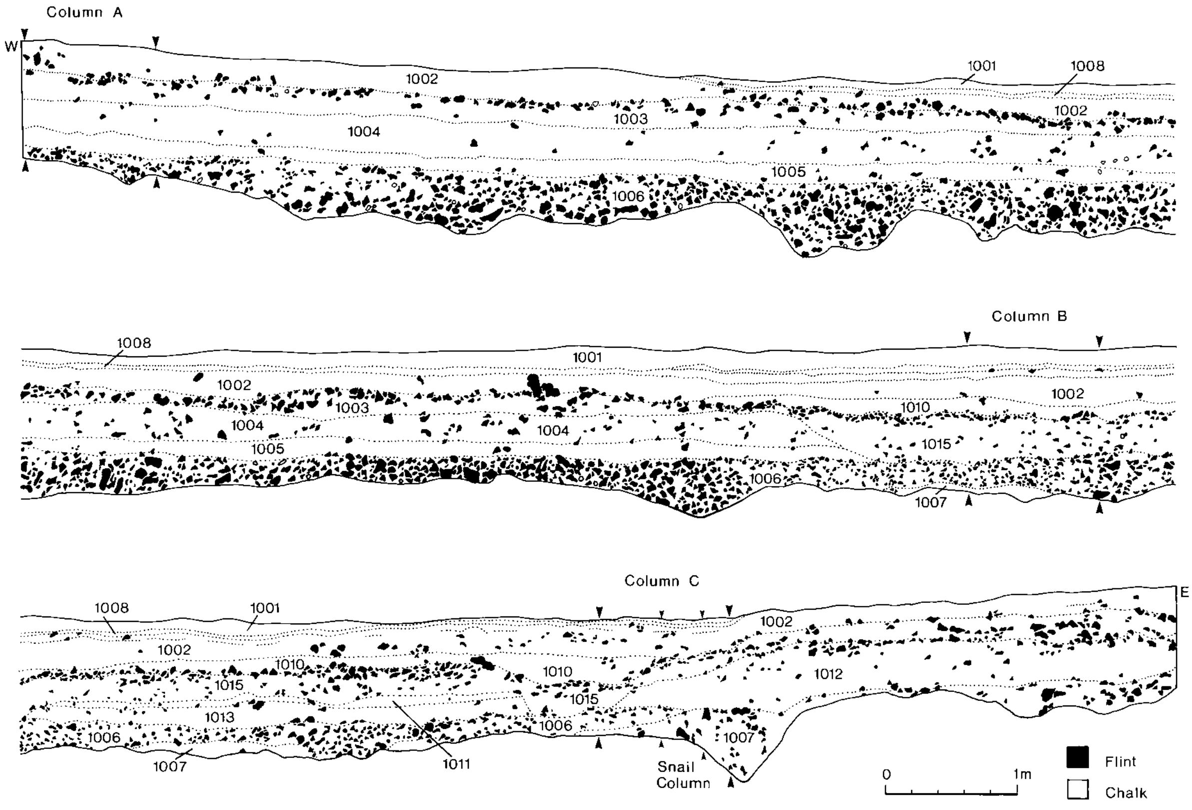

Fig. 8.1 Cockroost Bottom: Section.

The flintwork

Robin Holgate

The lowermost layers (Contexts 1006 and 1007) produced a number of pieces of mainly later Neolithic/Bronze Age débitage, along with at least one Mesolithic blade. The middle layers (Contexts 1004, 1005, 1012 and 1015), included mainly later Neolithic/Bronze Age debitage and a hollow scraper (Fig. 8.2: No. 123), although a residual Mesolithic bladelet was also present (Fig. 8.2: No. 80). The upper layers (Context 1002) produced residual later Neolithic/Bronze Age debitage and an endscraper (Fig. 8.2: No. 64) along with some residual Mesolithic pieces. Mesolithic and later Neolithic/Bronze Age activity clearly took place in the period prior to the adoption of intensive

Table 8.1 Cockroost Bottom: Context descriptions.

Context	Description
1000	*Modern turf-line*
1001	Organic rich calcareous clay silt 10YR 5/3 Brown. Pebble-sized sub-rounded chalk fragments, with occasional charcoal flecks – *probably deposited as a result of storms and flooding episodes in September 1987*
1002	10YR 4/3 Dark brown. Organic calcareous silt. Occasional cobble-sized sub-angular flints, 5% pebble-sized sub-rounded chalk fragments, 2% pebble-sized sub-angular flints. *Worm-sorted – pre-flood topsoil or subsoil. Containing modern artefacts such as bottle tops*
1003	10YR 6/4 Pale yellow brown silt clay. Containing 25% cobble-sized angular flints and 5% pebble-sized sub-rounded chalk fragments. Most flint concentrated at the top of the layer, but still matrix supported
1004	10YR 6/4 Pale yellow brown clay silt. Containing 5% cobble-sized sub-angular flints, 10% pebble- to granular-sized small sub-rounded chalk fragments and occasional cobble-sized sub-angular flints. Differs from 1003 in having superficial chalk wash
1005	10YR 5/4 Yellowish brown clay silt. Occasional pebble-sized sub-angular flint and sub-rounded chalk fragments. Occasional charcoal fragments
1006	10YR 5/4 Yellowish brown clay silt. 50% boulder-, cobble- and pebble-sized sub-angular and angular flints, but largely matrix supported. Largest flints at the base of the layer, while smaller more fragmented ones above
1007	7.5YR 5/6 Strong brown clay silt. Occasional cobble-sized sub-angular and angular flints. Occasional pockets of finer material above and below these flint fragments
1008	10YR 4/3 Dark brown silt. High organic content with many decayed roots. *Former turf-line below storm deposits*
1009	10YR 4/3 Dark brown silt. High organic content. 40% pebble- to granular-sized sub-rounded chalk. 'Pea grit' horizon of former soil
1010	10YR 5/3 Brown silt clay. Occasional pebble-sized sub-angular flint and sub-rounded chalk. High organic content
1011	10YR 6/4 Pale yellow brown clay silt. Containing 5% cobble-sized sub-angular flints, 10% pebble- to granular-sized sub-rounded chalk fragments and occasional cobble-sized sub-angular flints. Chalk 'washed' throughout
1012	Description as 1011
1013	Description as 1005
1014	Description as 1005
1015	10YR 5/3 Brown clay silt. 5% cobble-sized sub-angular flints. Occasional pebble-sized sub-rounded chalk fragments. Band of flints at top of layer similar to 1003. *Possibly caused by waterlogging at its lowest point*

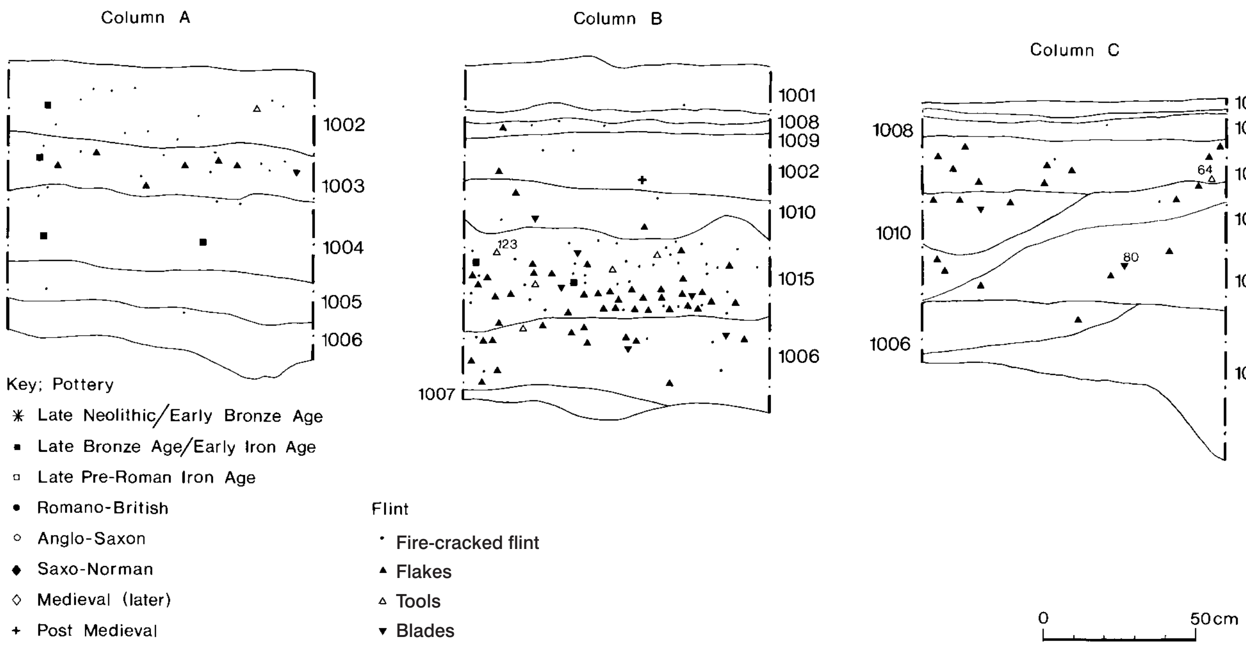

Fig. 8.2 Cockroost Bottom: Artefact distribution.

agriculture, perhaps suggesting the presence of contemporary hunting and farming sites relatively close by.

The pottery

Sue Hamilton

Few sherds were recovered, but those which were present suggest the accumulation of LBA/Early Iron Age (EIA) material in the lower-middle layers of the section columns, namely layers 1004 and 1015. By the upper-middle layers the LBA/EIA sherds are probably residual, since from and above layer 1002 modern sherds are also present. There are no Romano-British, Anglo-Saxon or Medieval pottery finds, which suggests that the post-EIA accumulation is relatively modern.

Palaeoenvironmental investigations

Magnetic susceptibility measurement

Low measurements (i.e. under 30 S1 units) were generally recorded throughout the valley section. This is somewhat surprising in Context 1001, which is the modern soil. However, if as has been suggested, this is of erosive material produced by the storms of 1987, and it is Context 1009 that was the soil previous to the storms, the high susceptibility in the latter would be explained. Contexts 1002–1007 are probably colluvial in nature, dating prior to the formation of Context 1009.

Mollusc analysis

A total of 17 mollusc samples were taken from Column C at Cockroost Bottom (Fig 8.1; Table 8.11 (Appendix 4)). However, preservation of shell was poor, averaging only 34 apical fragments per sample. Thus no reliable percentage frequency diagram could be drawn. This poor shell preservation appears to be a result of the decalcified nature of the deposits. However, between 540mm and 740mm, preservation was slightly better (for no obvious reason), and more useful results were obtained, although numbers were still not high enough to reach any precise conclusions.

Throughout the sequence the mollusc assemblage is consistent, with large numbers of individuals of open country species and *Trichia hispida*, and low numbers of other groups. The base of the sequence, although containing only a few shells, is basically an open country assemblage as found in other dry valley fills investigated by Bell (1983) and Allen (1984a). However, the presence of a single example of *Balea perversa* – which mainly lives on trees (Kerney and Cameron 1979) may suggest the presence of shade, although there is a danger that this shell may have been derived from an earlier deposit which has subsequently eroded away.

Above this, until 54cm, the number of preserved shells increases. Again the assemblage is one typical of colluvial valley fills, with large numbers of *Vallonia costata*, *Vallonia excentrica* and *Trichia hispida*. Other species present, for example *Helicella itala*, *Pupilla muscorum* and *Vertigo pygmaea* suggest the open conditions were stable and no high energy erosion was taking place. Some form of farming can be postulated as the cause of the open environment, although whether this was arable or pastoral is unknown. As well as the above species, however, were also a number of 'shade-lovers' such as *Carychium tridentatum*, *Discus rotundatus*, *Acanthinula aculeata*, *Clausilia bidentata* and *Cochlodina laminata*. Although never a very high proportion of the overall assemblage, the presence of these species must indicate shade somewhere near the valley bottom. What form the shade took is open to debate although it is possible woodland may have been nearby. Long grassland and/or scrubland could, however, have provided an adequate habitat for most of the species present. Above 48cm preservation deteriorates again, but, the species identified suggest open conditions.

Discussion

It is unfortunate that no material suitable for dating was recovered from the base of the valley fill so that the chronology of colluviation could be determined. Unfortunately, the poor preservation of mollusc shell in the deposits makes it virtually impossible to postulate what effect the LBA settlement had on the environment. During, or just after, the LBA the area was probably totally clear of shade. Whether the shade was cleared to provide fuel for the metalworking site on the western hill or to increase the area available for agriculture is unknown. With clearance for agriculture one would expect an increase in colluviation for which there is no evidence.

The small amount of colluvium in Cockroost Bottom is surprising as the valley sides are steep and it would be comparatively easy for material to move downslope during erosional events. A possible explanation for this is that the surrounding slopes were rarely under cultivation as there was frequent utilisation of these areas for constructional purposes during the Bronze Age. The time between the phases of occupation may have seen agriculture, but the surviving banks of the earthwork enclosure may have acted as lynchets, preventing accumulation on the valley floor. Alternatively, the area may have been used for pastoral activities, which are known to have a lower erosional impact (Butzer 1982).

A more likely hypothesis for the shallow colluvial deposits is that material did accumulate in the valley bottom, but has subsequently been eroded away along the valley axis and out of the dry valley system. This hypothesis is given credence by the extensive erosion noted on the enclosure ditch further east; the deepest sections of this ditch were in excess of a metre deep, yet the ditch on the western side of the enclosure had been totally eroded away. Valley axis erosion at Cockroost is a possibility as the water table in the area is unusually high and could have led to ephemeral and seasonal streams which may have incised the colluvial deposits.

There is no surviving evidence for colluviation prior to the construction of the Bronze Age enclosure even though the environment at this time (from molluscan evidence in the enclosure ditch) suggests open conditions. What the open terrain was used for after the construction of the enclosure is open to debate. It is possible the area was kept clear for either agricultural or ritual reasons (e.g. to allow the enclosure to be viewed from a distance). The fact that the enclosure is not situated specifically for good visibility would tend to suggest the former was the prominent reason for maintaining clearance. As stated before, whether this agriculture was pastoral or arable cannot be ascertained, for although a pastoral regime may partly explain the lack of colluviation in the valley bottom it would not explain the extensive erosion suffered by the enclosure ditch on its western side. It is possible therefore that arable cultivation was taking place with subsequent valley axis erosion.

After the abandonment of the Middle Bronze Age (MBA) settlement the area still appears to have been kept clear (according to the scant molluscan evidence). Agriculture is again likely to be the reason for this, however, the low input of colluvium to the valley bottom poses similar problems in interpretation: i.e. either pastoralism with low colluviation or arable with both high colluviation and valley axis erosion.

HANGLETON BOTTOM

Introduction

Hangleton Bottom is located at NGR TQ 258074 (Figs 1.1 and 8.5). The excavated trench was located at approximately 43m OD in the lowest area of the valley bottom threatened by the Bypass. The location appears not to lie in the valley centre because of the asymmetrical nature of the valley sides; the western slope being relatively steep (*c*.20%), while the eastern slope is more gradual. A small trench was also excavated on the eastern slope 40m to the east of the main trench to investigate the nature of the material here, but owing to the danger of trench collapse caused by adverse weather conditions during its excavation, this trench was not recorded in detail. The area was under pasture when excavated.

Archaeological background

Little is known of the archaeological background to the area. Perhaps the earliest finds are two LBA palstaves found on 'Hangleton Down' (Grinsell 1931). A Roman road crosses the valley to the north of the excavated trench (Margary 1936) and an Anglo-Saxon burial was found in the 1930s on Benfield Hill, to the east, during the expansion of West Hove Golf Course (Salmon 1932: 208). Excavations in this area during the A27 project revealed no further Anglo-Saxon activity (*see* Section 3).

Sampling strategy

The machine-excavated trench measured only 8.6m × 2m, but due to the depth of colluvial deposits and the unstable nature of the trench this length was deemed adequate to gain a representative sample of the deposits present. Unfortunately, the unstable nature of the deposits also meant that the section could not be drawn continuously as shoring was needed immediately prior to recording. (*NB* These planks are shown as rectangular white areas on Fig. 8.3.)

The stratigraphic sequence (Fig. 8.3)

Visual inspection of the deposits, which typically exceeded 2m in depth, showed that changes in the mechanism of deposition had occurred during accumulation. Context 1051 is the modern soil and its thickness and colour suggests stability with little colluvial input. Contexts 1052–1056 are obviously of a colluvial nature and all are poorly sorted. However, the cause, intensity, and possibly the source of erosion, are different for each. Contexts 1052–1054 contained a few large particles, and are on the whole, fine, suggesting fairly gradual erosion possibly by such processes as soil creep, rain splash and sheet flow (Butzer 1982). Context 1055 and to a lesser extent 1056 were of a much coarser nature, and their coarse components differed from those in 1052–1054 in being more angular. It is likely that these layers were deposited following rill or gully erosion of the valley sides, in either a single or series of storm events. This need not imply a different climate or environment to that occurring later, as this type of deposition is still currently taking place on the South Downs (Boardman 1992). Context 1057 was very fine and appears not to be of colluvial origin, unless it was caused by overland flow. It is more likely to have been formed from clay particles washed down the

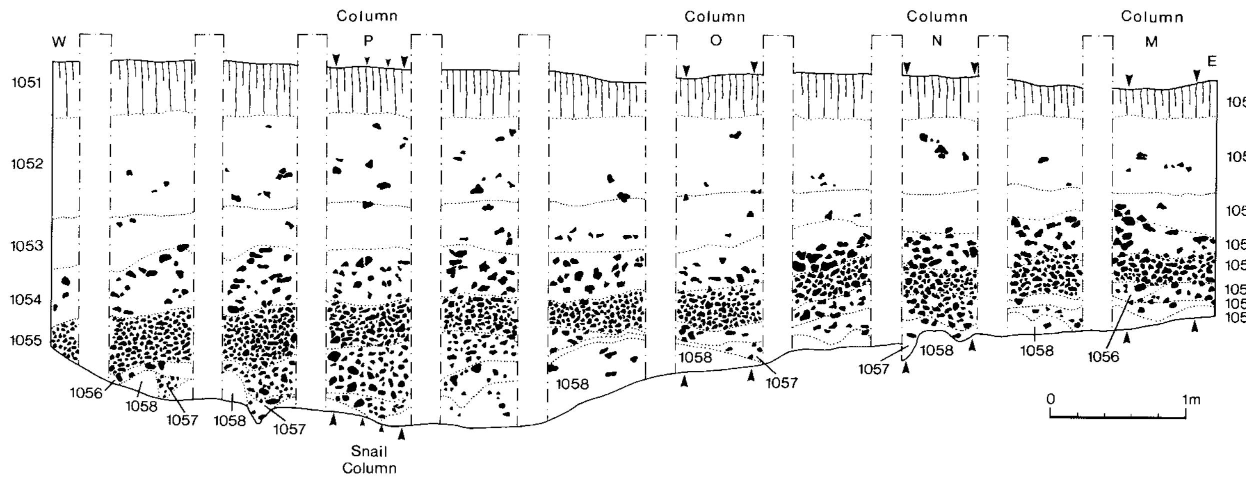

Fig. 8.3 Hangleton Bottom: Section.

Table 8.2 Hangleton Bottom: Context descriptions.

Context	Description
1051	10YR 3/3 Dark brown clay/silt, containing 5% pebble- and cobble-sized sub-angular flint fragments and 1% pebble-sized sub-rounded chalk fragments. Abrupt boundary to:
1052	10YR 5/4 Yellowish brown clay/silt containing <1% cobble-sized sub-angular flint nodules. Some pebble-sized flint and chalk fragments at the top of the layer probably caused by worm activity in 1051 above. Poorly sorted. Gradual boundary to:
1053	10YR 5/3 Brown silt containing 20% cobble-sized sub-angular flint. Poorly sorted. Gradual boundary to:
1054	10YR 4/3 Brown clay/silt containing 40% cobble-sized sub-angular flints. Poorly sorted. Matrix supported. Abrupt boundary to:
1055	10YR 4/3 Brown clay/silt containing 60% pebble- to cobble-sized sub-angular and angular flints. Some of these flint nodules have eroded to form smaller particles. Poorly sorted. Clast supported. Gradual boundary to:
1056	10YR 5/3 Mid-brown clay/silt containing 30% cobble-sized sub-rounded flint. Matrix slightly finer than 1055. Poorly sorted. Matrix supported. Abrupt boundary to:
1057	5YR 4/4 Reddish brown clay/silt containing <1% pebble-sized sub-angular flint fragments. Discontinuous, but well sorted. Abrupt boundary to:
1058	2.5YR 7/4 Pale yellow clay/silt containing 50% pebble-sized sub rounded chalk fragments. Well sorted. Irregular boundary with chalk bedrock
1059	2.5YR 8/4 Pale yellow clay/silt containing 5% pebble-sized sub-angular flints. Poorly sorted. Abrupt boundary to 1057

profile by illuvial processes. This hypothesis is further substantiated by the fact that all deposits of Context 1057 were found in hollows in Context 1058, their reddish colour suggesting the preferential accumulation of iron minerals in silts and clays.

Context 1058 was probably a periglacial solifluction deposit. Its undulating surface suggests that it had been heavily eroded in the past, although how is uncertain. Context 1059 is another colluvial layer, and seems to be of the same type as Contexts 1052–1054, although it obviously predates them. Its pale colour suggests that it had suffered depletion in iron, possibly through the translocation of clay particles to Context 1058. The stratigraphic layers are recorded in Table 8.2.

The soil test pit

A further 2m × 2m trench was excavated by machine in line with, and about 40m to the east of the main trench in order to investigate the deposits on this slope. Unfortunately, safety considerations prevented the section being drawn, but what could be seen of the profile seemed similar, if a little shallower (i.e. *c*.1.5m deep) than the main trench. The flint-rich layers, however (contexts 1055 and 1056) appeared to be absent, suggesting that input of these coarse layers into the valley bottom was from the western, steeper side of the valley. The east side, however, could have contributed to the accumulation of subsequent finer layers (1052–1054).

Dating

A total of 121 artefacts were recovered from the four 0.5m × 0.5m artefact columns (Fig. 8.3: M–P). A full list of these forms part of the archive and only the flintwork and pottery have been plotted (Fig. 8.4). Unfortunately, there were very few datable artefacts in the lower half of the profile (Contexts 1054, 1055, 1056 and 1059) and as no charcoal was recovered from this area for radiocarbon dating, no secure chronology could be obtained for the deposition of these lower layers. The lack of artefacts within this valley, particularly pottery, is somewhat unusual as the other colluvial valley fills examined generally contained ceramics. This is perhaps not surprising with Contexts 1055 and 1056 which are thought to have been the result of rill and gully processes, which may have led to erosion of the chalk bedrock. However, this does not explain the absence of material in Context 1054 for which the only explanation seems to be that there were few artefacts being deposited in and around the valley during the period of accumulation. It is possible that a cause for this is that pottery was not being incorporated into the manure at this stage or at least the quantity was minimal (larger artefact columns may have located artefacts). What is almost certain is that there was no settlement, or large-scale human activity nearby prior to the deposition of Context 1052 during the later Medieval period. This layer is possibly the result of arable cultivation based at the Medieval village of Hangleton which was located 1km to the east (Holden 1963; Hurst 1964).

The flintwork

Robin Holgate

The lowermost layers (1055 and 1056) produced a number of flakes and a cutting flake of later Neolithic/Bronze Age date (Fig. 8.4: No. 226), suggesting some activity during this period. The middle and upper layers (1052, 1053 and 1054) produced some residual later Neolithic/Bronze Age débitage, two scrapers (Fig. 8.4: nos 52 and 120) and a cutting blade (Fig. 8.4: No. 115), along with a probable Mesolithic blade (Fig. 8.4: No. 121).

The pottery

Sue Hamilton

The LBA/EIA sherd from Context 1053 has a secure fabric date and cannot exclude the possibility of an early first millennium BC origin for the accumulation of this layer (another similar sherd was located in mollusc samples of Context 1053). There is, of course, the possibility that these sherds are residual, although other associated artefactual or palaeoenvironmental evidence would be required to resolve this interpretation. Context 1052 has some Romano-British, Anglo-Saxon (1) and Saxo-Norman (1) sherds, but it mostly contains later Medieval material. The accumulation of

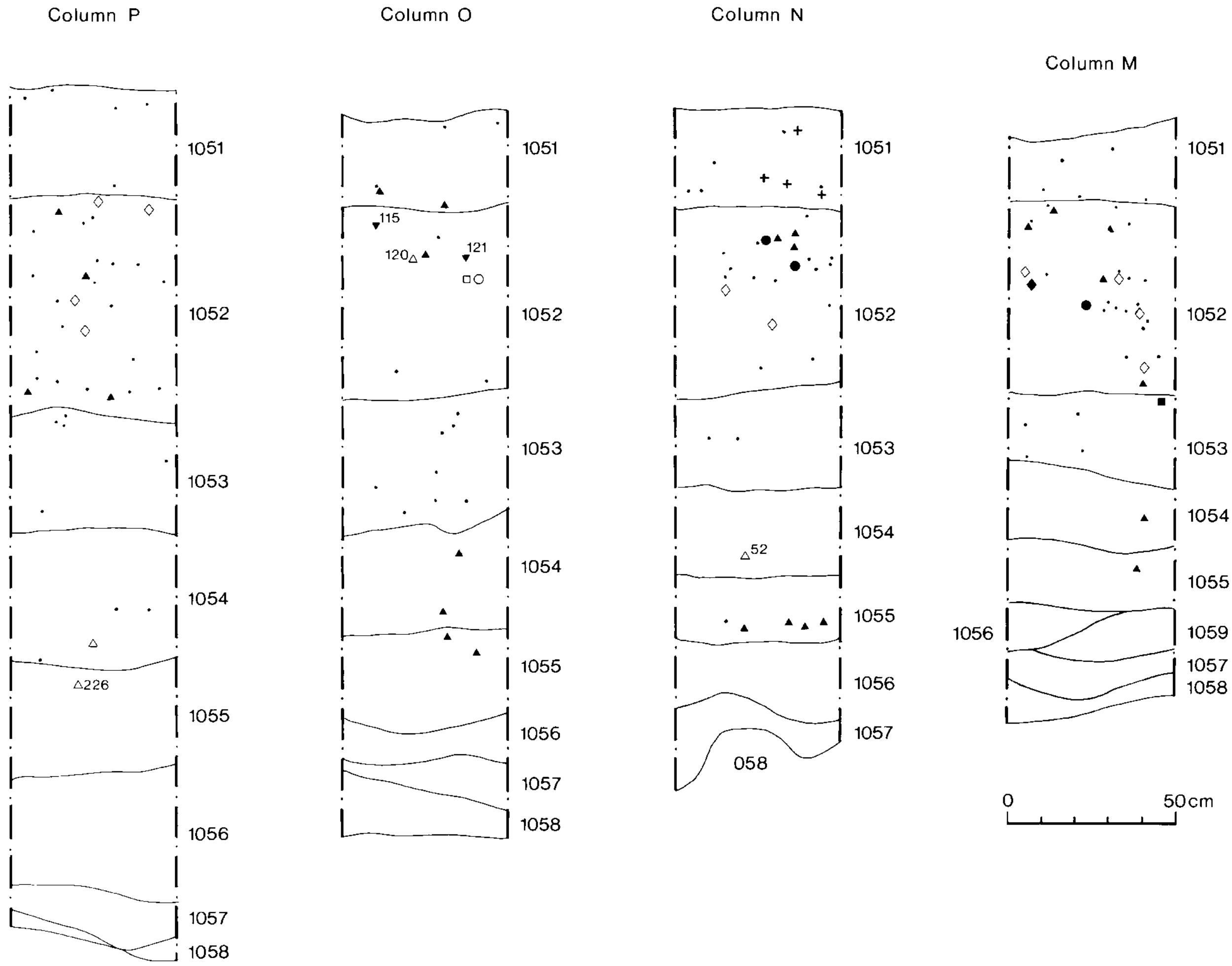

Fig. 8.4 Hangleton Bottom: Artefact distribution.

Context 1052 is therefore ascribed to the Medieval period with the other sherds interpreted as being residual. This Medieval build-up may relate to the nearby Medieval village at Hangleton (Holden 1963). The present topsoil (1051) contained a number of modern sherds.

Palaeoenvironmental investigations

Magnetic susceptibility measurement

Magnetic susceptibility was determined from finer sediment separated from the mollusc samples. A large degree of magnetic variability was detected in the measured samples demonstrating that the layers developed by varied mechanisms and at different rates. Layer 1058 produced very low susceptibility readings – which was expected, bearing in mind it was thought to be a glacial solifluction deposit (containing no organic/carbonised material).

Through layers 1056, 1055 and 1054 there was a continual rise in susceptibility readings, so that the peak levels attained in 1054 are similar to those of the modern topsoil 1051. The gradual rise in readings through 1056 and 1055 suggests that these deposits may not have been formed during a single erosional event and/or that there was a stand-still phase after their deposition during which time surface weathering occurred. The higher readings obtained for 1054 suggest a long period of exposure and therefore a low accumulation rate.

The top of layer 1054 and layers 1053 and 1052 show a decline in susceptibility to levels only half those in 1054, only returning to higher levels in the top of 1052. This suggests a change in the sedimentation pattern. A number of causes are possible although the most likely are:

(a) the character of the source sediment (i.e. the hillside soils) had changed to one containing less magnetic iron minerals
(b) the deposition rate was higher resulting in less surface weathering (i.e. less opportunity for iron minerals to oxidise).

The modern topsoil (1051) produced high susceptibilities consistent with a soil **A** horizon.

Mollusc analysis

A full report on the mollusc analysis, including a discussion on preservation and incorporation rates appears elsewhere (Wilkinson 1993). Despite poor mollusc shell preservation below 174cm, enough shells survived to suggest an open environment (Table 8.12 (Appendix 4)). The assemblage is typical of colluvial deposits elsewhere (Bell 1983), with *Vallonia excentrica*, *Vallonia costata* and *Trichia hispida* all being present, at least above 192cm. The presence of *Vitrea contracta* seems to indicate the presence of long grassland, or at least patches of longer vegetation, possibly suggesting pastoral rather than arable activity.

From 174cm to 144cm shell numbers increase. Initially the dominant species is *V. excentrica,* but this is rapidly replaced above 168cm by *V. costata*. The environment was probably open as before – possibly more so from 174cm to 168cm – although there is evidence for longer grassland above 168cm. Between 144cm and 110cm there is a change in the molluscan assemblage with a decrease in *V. costata* and its replacement by *V. excentrica* and *P. muscorum*. In addition to this *V. contracta* declines in number. Shorter grassland may be postulated, probably caused by a more intensive use of the landscape. The large numbers of *P. muscorum* indicate the presence of patches of unvegetated ground and perhaps therefore suggest an arable land-use. From 110cm to 98cm shell preservation decreases and there is a further change to the assemblage. This manifests itself in a resurgence of *V. costata,* an increase in *T. hispida*, a large reduction in *P. muscorum* and the disappearance of *V. contracta*. It would appear that arable cultivation may have been the cause of these changes or if already present, a reduction in the fallow period. The assemblage from 98cm to 50cm is very limited with low mollusc numbers, but generally similar species to those which predominated from 110cm to 98cm.

From 50cm to 38cm the mollusc assemblage is a mixture of that from the colluvial layer below and the **A** horizons above. Initially the assemblage is dominated by *V. costata* and then by the colluvial grassland combination of *V. costata*, *V. excentrica* and *T. hispida.* The assemblage above 38cm is diverse, but is not typical of long grassland, in turn suggesting that grazing has kept the grass short in recent times.

Discussion

The colluvial sediments at Hangleton Bottom are highly variable. This appears to be as a result of changes in the local environment which may be attributed to alterations in agricultural practice. The lack of pottery and charcoal for radiocarbon dating has unfortunately prevented the lower half of the profile from being dated.

Based on morphological properties the earliest deposits in the valley probably relate to a solifluction episode of the Devensian Late Glacial, although the absence of shells or material for radiocarbon dating makes confirmation of this thesis problematic. The 3cm of solifluction that survives represents a much eroded and decalcified (presumably as a result of Early Holocene pedogenesis) remnant of the considerable thickness which is likely to have once existed if the sequence at Toadeshole Bottom East is anything to judge by. There are no remnants of the Early Holocene soil – which has probably been lost as a result of erosion consequent on later prehistoric agriculture – but instead the earliest Holocene deposits (1055 and 1056) are spreads of flint gravels. These are likely to derive from the gullies that formed as a result of intensive erosion associated with early agriculture, although unfortunately the absence of ceramics means that this episode cannot be dated. The 'fan' gravels have also been decalcified by later soil formation and mollusc shell preservation is poor. Further evidence for weathering of the gravel surfaces is provided by the magnetic susceptibility results which are relatively high for the gravel surface and decrease downwards.

Layers 1056 and 1055 are the earliest colluvial deposits and are generally composed of flint gravel. As such they appear to have been deposited in a single or series of high energy events, probably by rill or gully erosion. These probably occurred soon after forest clearance for agriculture as no finer colluvium had formed below, and both 1055 and 1056 must have formed in an open environment as it is unlikely such large-scale erosion would have occurred under woodland. Some type of vegetation cover seems likely, but poor mollusc shell survival prevents detailed comments on the type of agriculture being practised. Magnetic susceptibility measurement suggests that once deposited, the gravel layer remained exposed for some time and therefore weathered. This in turn suggests that the valley bottom was not being ploughed and the slopes were not being heavily utilised.

Layer 1054 represents a more consistent input of sediment into the valley bottom than before. This appears to have taken place under some form of pastoral land-use, although low intensity arable cultivation is also possible. Although 1054 is undated by ceramic inclusions or radiocarbon dating, it is likely to have formed in the Bronze Age as the layer above (1053) is of LBA/EIA date.

Towards the top of layer 1054 the change in the molluscan assemblage suggests a more open environment, devoid of taller vegetation. No change was noted in the sediments suggesting the assemblage change is due to intensification of farming rather than a change in agricultural land-use.

The first datable layer, 1053, seems to represent a change both in intensity and type of agriculture. The environment became more open, and the last indicators of longer vegetation disappear. This, coupled with an increased rate of sedimentation, suggests arable cultivation, while archaeological evidence for the increase of small agricultural settlements in the Brighton area during the LBA/EIA suggests land-use pressures at this time. The fact that ceramics were found within 1053 in detectable quantities also suggests manuring; indicating that arable agriculture was taking place.

Layer 1052 appears from magnetic susceptibility measurements and mollusc incorporation rates to have been deposited relatively quickly and under arable conditions. The few mollusc shells recovered suggest intense ploughing, almost no vegetation, and therefore high erosion. It is possible that the introduction of winter cropping may have been the cause of this increased erosion. This layer appears to have formed during the Medieval period suggesting a hiatus from the top of 1053 to 1052 corresponding to the Iron Age and Romano-British periods. This may be the case for the Iron Age as only one sherd of pottery of this period was found, however, the presence of a number of residual Romano-British sherds suggests activity at this time, although this has not registered as a distinct event in the colluvial record.

The Iron Age hiatus, if present, is somewhat surprising as there is much known activity on the South Downs during this period i.e. hillforts such as Hollingbury (Curwen 1932; Holmes 1984), Wolstonbury (Curwen 1930b; Holleyman 1935b), Thundersbarrow Hill (Curwen 1933) and Devil's Dyke (unexcavated). There is less evidence for the presence of smaller settlements of this period in the Brighton area. The absence of lynchets at Hangleton would result in material spread on the slopes becoming incorporated in valley colluvium. All the evidence therefore points towards the non-exploitation of Hangleton during the Iron Age, in which case the environment could have regenerated to scrub woodland – although there was no molluscan evidence for this (or none has survived due to subsequent erosion). A second possibility is that the area was utilised, but either very little pottery of the period has survived or it was not being incorporated in manure spread on the fields. There is also the difficulty of distinguishing the pottery of this period from other fabrics as sherds are generally small and abraded in colluvial deposits.

Hangleton Bottom has a thick colluvial layer of Medieval date which must be derived from arable cultivation (much of the South Downs during this period being given over to sheep grazing for the wool market: Pelham 1934). This apparent difference from 'model' land-use is presumably due to the presence of the deserted village of Hangleton in the locality. Towards the later part of the Medieval period the area probably reverted to pastoralism, possibly until relatively recently. For instance Pelham (1934) states there were 1,000 to 2,000 sheep pastured in Blatchington in 1341 while 'corn' (sic) was grown only on the coastal plain.

BENFIELD VALLEY

Introduction

The trench in Benfield Valley was located at NGR TQ 265077 (Figs 1.1 and 8.5) at approximately 47m OD. The valley itself is about 1500m in length and is bordered by Benfield Hill to the west, Round Hill to the north-east and the suburbs of Hangleton to the south. At the point examined the valley floor was almost flat, but to the north this gives way to a steeper slope, after which the valley forks. The western slope to Benfield Hill is steep, while the eastern slope has a much lesser gradient giving the valley an asymmetrical profile. The field containing the trench was under arable cultivation at the time of the excavation.

Archaeological background

The best known archaeological site in the immediate vicinity is that of the deserted Medieval village of Hangleton which lies some 500m to the south-east of the valley trench at NGR 268074. Excavations here have shown the settlement – which consisted of a number of small houses, stores and industrial buildings – dated to between AD 1150 and AD 1450, while bones recovered from the excavations showed a dependence on sheep and pig (Holden 1963; Hurst 1964). Due to its close proximity it was hoped that Medieval agricultural activity would be well-represented in the colluvial deposits in the valley. Earlier activity in the area is evidenced by a Saxon grave on Benfield Hill (Salmon 1932: 208), by the ploughed-out remains of a field system (SMR ref. 2055) and by Romano-British activity/a villa at West Blatchington (SMR refs 2014–2019). Bronze Age barrows are located to the north-east on Round Hill (SMR. refs 1 and 2).

Sampling strategy

As with Hangleton Bottom, the deep unstable deposits (in excess of 2m) and time restrictions meant that the transect

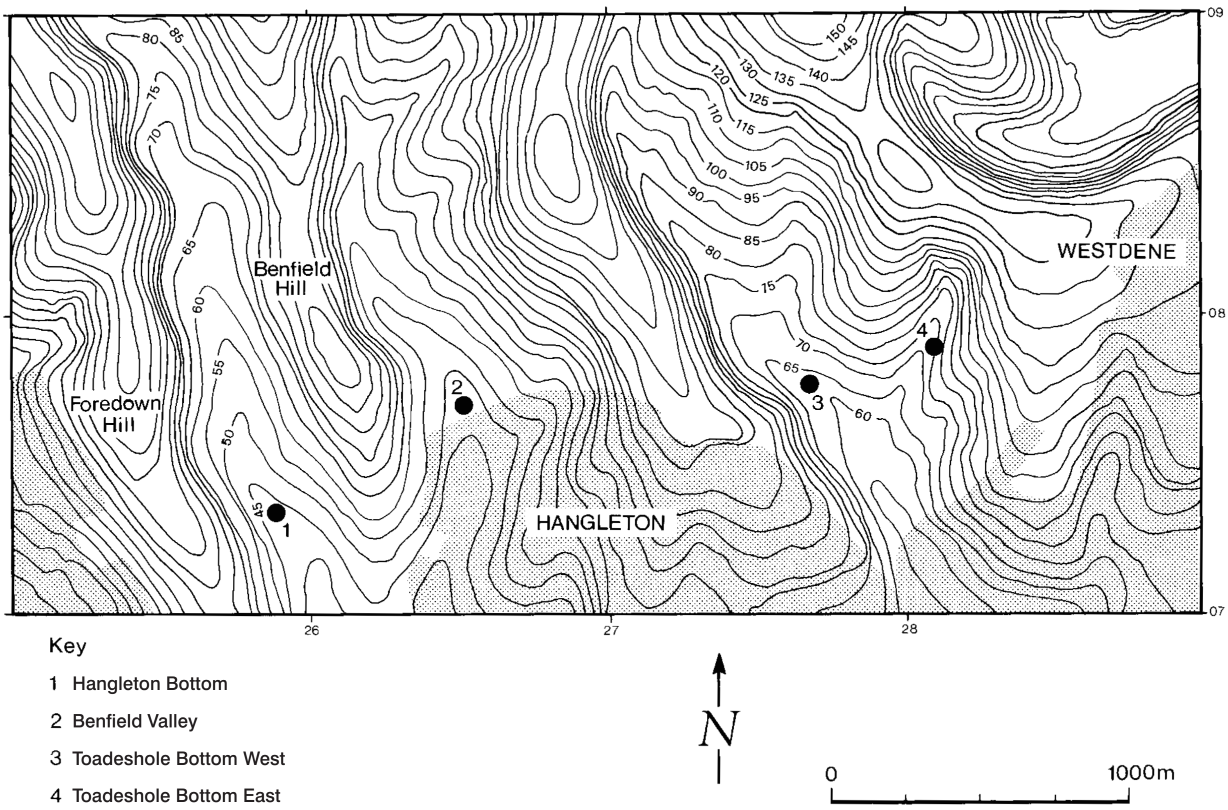

Fig. 8.5 Location map of Hangleton Bottom, Benfield Valley and Toadeshole Bottom (East and West).

trench measured only 7m × 2m. Shoring (white rectangles on Fig. 8.6) was also needed to prevent the trench sides from collapsing. Unlike Hangleton Bottom, which contained fairly large quantities of pottery in the upper half of the profile, Benfield Valley produced virtually no pottery, thus making dating almost impossible. For this reason, and because of poor mollusc shell preservation, this valley was not studied in great detail.

The stratigraphic sequence (Fig. 8.6)

The sediments at Benfield Valley showed a great visual similarity to those found at Hangleton Bottom (Fig. 8.6). The main feature the two valleys had in common was a thick deposit of almost exclusively boulder- and cobble-sized angular and sub-angular flint near the base of their profiles (Fig. 8.6: contexts 1065 and 1066). Unfortunately, as with Hangleton, no pottery was present to date these layers, but it is conceivable that they were caused by the same large-scale erosional event. At Benfield it is likely the source of this coarse material is from the steep valley side to the west of the trench.

Below Context 1066 was a much finer deposit (1067) mainly composed of clay and silt-grade material, but with occasional cobble- and boulder-sized flint. This obviously accumulated under gentler conditions than Context 1066, although it is also possible that illuvial processes are the cause.

Above Context 1065 were a series of poorly sorted deposits (1064, 1063 and 1062) below the modern topsoil (1081). These layers – mainly consisting of clays and silts, but with occasional flint – are obviously colluvial in origin and from the limited pottery evidence (*see* below) appear to be almost entirely Romano-British and later. The stratigraphic layers are recorded in Table 8.3.

Table 8.3 Benfield: Context descriptions.

Context	Description
1060	Unstratified finds.
1061	Mid grey-brown humic clay silt. Friable, containing 2% irregular medium flint. Abrupt boundary to:
1062	Light yellow-brown clay silt containing 2% granular-to pebble-sized irregular flint. Gradual boundary to:
1063	Mid yellow-brown silt clay containing 10% cobble-to boulder-sized flint. Gradual boundary to:
1064	Mid-brown silt clay. Friable containing 20–30% cobble-to boulder-sized flint. Abrupt boundary to:
1065	Mid-brown silt clay. Loose with cobble-to boulder-sized flint nodules and irregular fractured flints (80%). The flint is larger and less compact than that of 1066. Gradual boundary to:
1066	Mid-brown silt clay. Loose with 80% granular-to boulder-sized nodules and irregular fractured flint. Abrupt boundary to:
1067	Reddish brown clay silt. Compact containing 2% pebble-sized flint. Abrupt boundary to:
1068	Red-brown clay. Plastic matrix containing 1% granular-sized flint. Fills some pockets within solution hollows. Abrupt boundary to:
1069	Cream silt clay. Loose to compact containing 80% granular-sized chalk fragments. *Periglacial solifluction deposit*

Dating

Very few datable artefacts were located during the excavation of the three artefact columns (Fig. 8.6: Q–S). All the excavated material has been listed for archive and only the flintwork and pottery have been plotted in this publication (Fig 8.7).

The flintwork

Robin Holgate

There were no flints in the lowermost layers, while the middle and upper layers (1062–1066) produced some later Neolithic/Bronze Age débitage, scrapers (Fig. 8.7: Nos 9, 33, 259), knives (Nos 27 and 257), a piercer (No.69) and a rod (No.191), suggesting later Neolithic/Bronze Age activity on the valley slopes and adjacent ridges.

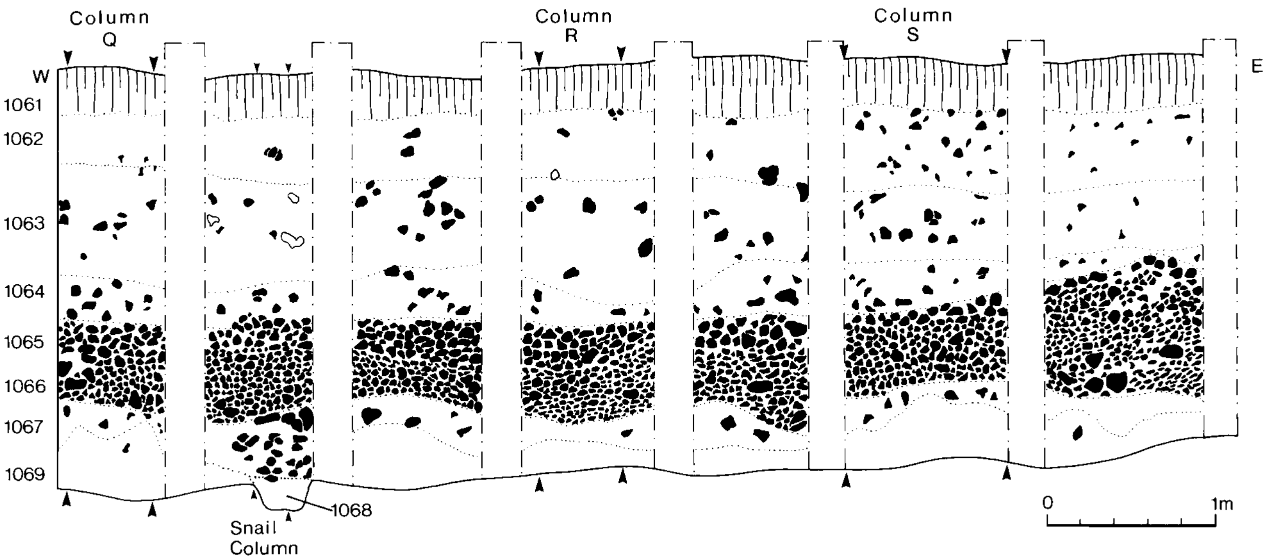

Fig. 8.6 Benfield Valley: Section.

The pottery

Sue Hamilton

Prehistoric sherds are virtually absent from deposits in Benfield Valley. The one sherd present in Context 1062 is presumed to be residual. Roman sherds are present in the middle layers (1063). Towards the top of Context 1063 one Saxo-Norman sherd is present. A couple of Roman sherds are present in Context 1062. Together this would suggest the possibility of an initial accumulation of Roman material in the middle layers, with Saxo-Norman activity by the top of Context 1063. The slightly bigger quantities of Roman pottery throughout the middle and upper layers may suggest a greater Roman presence in the proximate landscape, but it could equally indicate there was less tradition of manuring fields with domestic rubbish in the Medieval period.

Palaeoenvironmental investigations

Unfortunately, the preservation of mollusc shell in the excavated sample was found to be so poor that no meaningful results would have been gained. For this reason (and because of the lack of dating material), neither molluscan analysis, nor magnetic susceptibility measurement were made of the valley fills.

Discussion

With no detailed palaeoenvironmental data and scant dating evidence there is little that can be said regarding past land-use in Benfield Valley. A few general observations can, however, be made. The lower half of the profile, including the periglacial deposit (1069), is so similar to that found at Hangleton Bottom that it may tentatively be assumed that Contexts 1069, 1066 and 1065 were formed at similar times and under similar conditions to those that deposited Contexts 1055, 1056 and 1058 at Hangleton Bottom (*see* above). Context 1064 could possibly be of the Bronze Age/ EIA, although there is no firm dating evidence for this. The thick colluvial layer 1063 appears on ceramic evidence to be a predominantly Romano-British accumulation (presumably as a result of arable cultivation), however, the sherd of Saxo-Norman pottery present towards the top of the layer presents a problem. There appears to be no break in the deposition of Context 1063 suggesting either a continuity of land-use, or that the Romano-British sherds are residual. Context 1062, however, can probably be seen as a wholly Medieval accumulation (probably spanning the Saxo-Norman to later Medieval period), the absence of sherds probably representing the prominence of a pastoral land-use during this period based at the (now deserted) settlement of Hangleton.

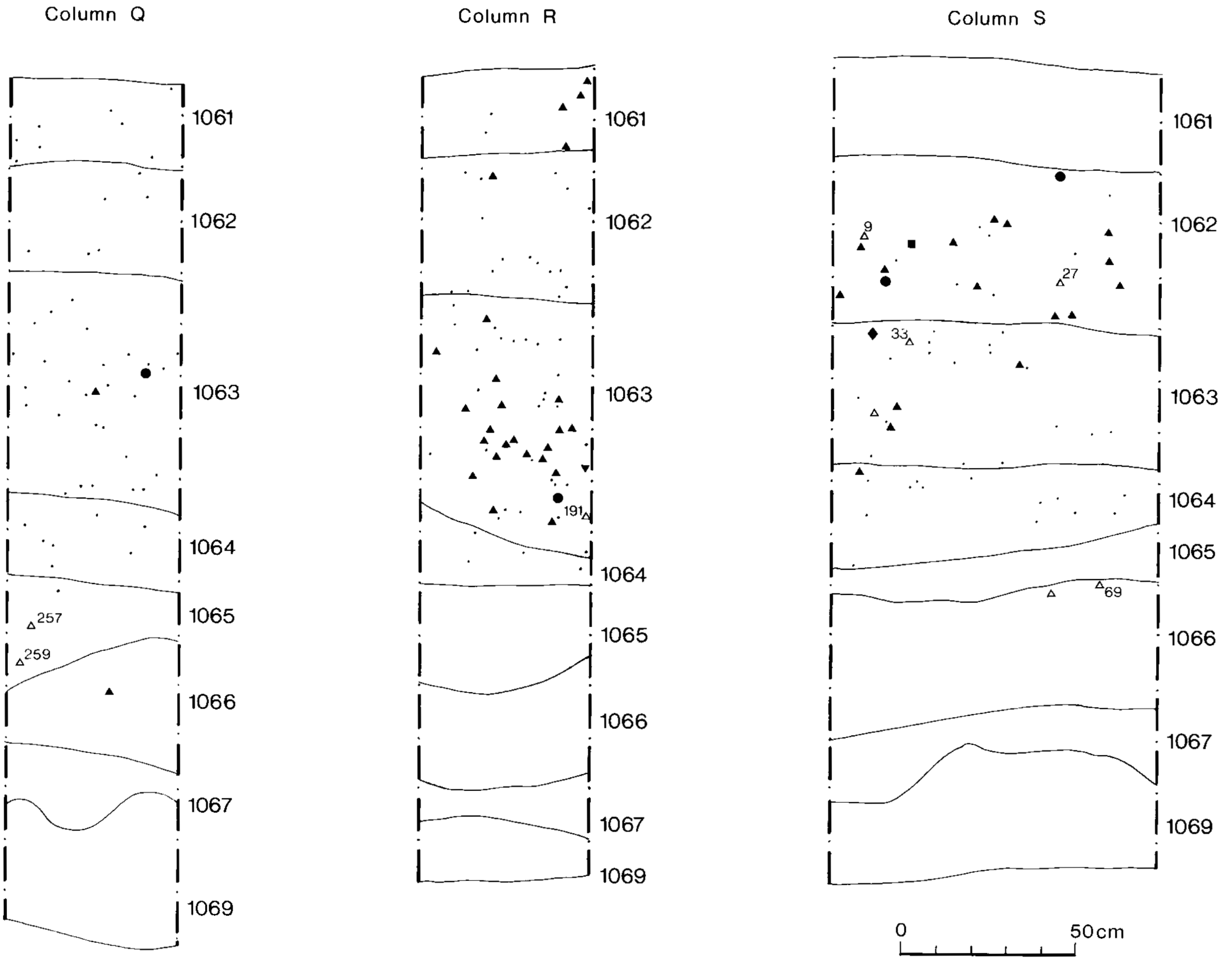

Fig. 8.7 Benfield Valley: Artefact distribution.

TOADESHOLE BOTTOM

Introduction

Toadeshole Bottom is a 400m wide, forked dry valley centred at NGR TQ 279075. Both divides contain colluvial sediments and were investigated separately at points some 400m apart. These trenches were named 'Toadeshole Bottom West' and Toadeshole Bottom East' (Figs 1.1 and 8.5).

Toadeshole Bottom is bordered to the west and south-west by a steep incline, surmounted by a 1960s housing estate. To the north the valley slopes gently upwards, the west fork continuing northwards for some 1500m, and the east fork north-eastwards for 600m (Fig. 8.5). The latter fork becomes significantly steeper in its northernmost 300m. To the east there is a more gentle slope, culminating in the Redhill cross-roads and another 1960s housing estate. It was hoped that the investigations of Toadeshole Bottom would help in placing the site at Redhill (*see* Section 5) into a contemporary palaeo-environmental context. Prior to excavation the area had been used primarily for arable cultivation, and in the case of Toadeshole Bottom East, for growing organic cereals.

Archaeological background

The area surrounding Toadeshole Bottom is comparatively rich in archaeological remains. The earliest finds are of Bronze Age date and consist of barrows on Round Hill as well as a collared urn from NGR TQ 26330856 (Drewett 1979) and flintwork (Grinsell 1931). Iron Age pottery has been found to the south-west at NGR TQ 272076 (SMR ref. 2053). The immediate area is also particularly rich in Romano-British remains. Finds of this period include a late Roman grave group found in 1954 at NGR TQ 285071 (Gilkes 1987); the site of a villa at West Blatchington (Clayton 1884; Phillips 1894; Norris and Burstow 1950) and an extensive area of ploughed-out field system with associated pottery scatters/settlement sites to the north (Holleyman 1935a; SMR refs: 2073, 2035, 2046, 2047, 2048). The Medieval period is represented by the deserted Medieval village of Hangleton which lies to the south-west of the valley (*see* above).

TOADESHOLE BOTTOM WEST

Sampling strategy

The 10.5m × 2m trench excavated at this site cut through over 2m of deposits, most of which were colluvial. Acroprops and shoring were used before the artefact and mollusc columns were excavated.

Stratigraphic sequence (Fig. 8.8)

The stratigraphic layers are recorded in Table 8.4.

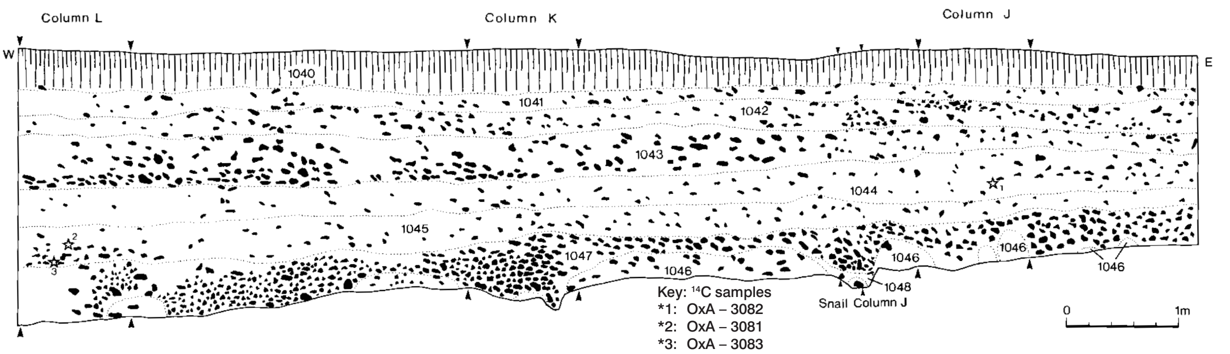

Fig. 8.8 Toadeshole Bottom West: Section.

Table 8.4 Toadeshole Bottom West: Context descriptions.

Context	Description
1040	10YR 4/2 Dark greyish brown clay/silt, with 10% granular- and pebble-sized sub-rounded chalk and pebble-sized sub-angular flint, 2% cobble- and boulder-sized sub angular flint. High humic content. *Soil A horizon*. Abrupt boundary to:
1041	7.5YR 5/4 Brown clay/silt. Contains 5% pebble- and cobble-sized sub-angular flint. Many roots present. Compact matrix and poorly sorted. Gradual boundary to:
1042	10YR 5/4 Yellowish brown clay/silt containing 40% granular- and pebble-sized sub-rounded chalk fragments and 15% cobble- and boulder-sized sub-angular flints. Matrix supported. Poorly sorted. Gradual boundary to:
1043	10YR 4/4 Dark yellowish brown silt. 20% cobble-to boulder-sized sub-angular flints in the east of the trench, increasing to 40% in the west. A composite layer of alternate bands of flints and clay/ silt matrix. Well sorted. Gradual boundary to:
1044	10YR 5/4 Yellowish brown clay/silt, containing <10% pebble- and cobble-sized sub-angular flints. Gradual boundary to:
1045	10YR 4/3 Brown/dark brown clay/silt. Contains 20% cobble- and boulder-sized sub-angular flint. Poorly sorted. Abrupt boundary to 1047
1046	10YR 8/3 Very pale brown silt. Contains >80% pebble- and cobble-sized sub-rounded chalk, and 5% pebble-sized sub-angular flint. Clast supported. Poorly sorted. *Eroded remnants of periglacial solifluction deposits*. Abrupt boundary to 1048
1047	10YR 6/4 Light yellowish brown silt. Contains 90% sub-angular flint gravel (boulder-to pebble-sized). Clast supported and poorly sorted. Abrupt boundaries to 1046 and 1048
1048	7.5YR 4/4 Brown/dark brown clay/silt. <1% pebble-sized sub-angular flints. Well sorted and of a very small mean size grade. Abrupt boundary with chalk bedrock

Of all the valleys, Toadeshole Bottom West had the most uniform sediment morphology, the colluvial deposits being of generally similar colours and lithic contents. However, a layer of flint gravel (1047), similar to those noted at Hangleton and Benfield (*see* above) was present. As previously mentioned, this deposit is likely to be the result of a series of erosional events, but, unlike the other sites, 1047 rested directly on the irregularly eroded remains of a coarse periglacial solifluction gravel (1046), often filling the depressions in its surface. A single subsoil hollow (1048) was located cut into the top of the solifluction gravel and filled by silt-sized material with virtually no chalk or flint inclusions. This suggests either that this was the remnants of a contemporary soil that had eroded into the hollow soon after the hollow's formation, or the result of fine particles being washed down through the profile, accumulating at its lowest point. The absence of calcareous clasts and mollusc shell is likely to be a product of decalcification consequent on Early Holocene soil formation.

The colluvial layers (1041–1045) were all of a similar nature, having a silt matrix and fewer lithic inclusions than Context 1047, perhaps suggesting they accumulated more gradually as a result of overland flow and rain splash erosion rather than by mass movement.

Context 1043 was of particular interest in that it consisted of bands of flints alternating with silts and clays. This suggests a series of events that caused both low and high energy erosion. An alternative explanation is that it formed as a result of earthworm sorting.

The presence of fairly high percentages of granular-sized chalk fragments in all the colluvial layers suggests that during their formation ploughing on the valley slopes must have been cutting into the chalk. This in turn suggests that soils have been thin on the surrounding slopes for the whole history of accumulation.

Dating

The three excavated artefact columns at Toadeshole Bottom West (Figs 8.8 and 8.9: J–L) produced relatively large quantities of pottery and flintwork compared to the other valleys. In addition to this, samples of charcoal provided the opportunity for radiocarbon dating of two of the colluvial layers. Only the flintwork and pottery have been plotted on Figure 8.9.

Accelerator mass spectrometry dates

A total of three samples were taken for AMS dating from Contexts 1044 (one sample) and 1045 (two samples). All were spot samples recovered during the excavation of the artefact columns and consisted of single large pieces of charcoal. The exact locations of the samples are plotted on Figure 8.8 from which it can be seen that OxA-3081 and OxA-3083 are from a very similar position in the west of the trench, while OxA-3082 is more centrally situated, but from considerably higher up in the profile. The resulting dates are tabulated below (Table 8.5).

The dates obtained vividly illustrate the problem of residuality in colluvial deposits, as OxA-3082 (2140–1630 cal BC; 3520±90 BP) – although from a higher (and there-

Table 8.5 Toadeshole Bottom West: AMS dates.

OxA-No.	Context	Radiocarbon Age (BP)	95% confidence (cal)
3082	1044	3520±90	2140–1630 cal BC
3081	1045	2700±90	1050–760 cal BC
3083	1045	2660±70	980–760 cal BC

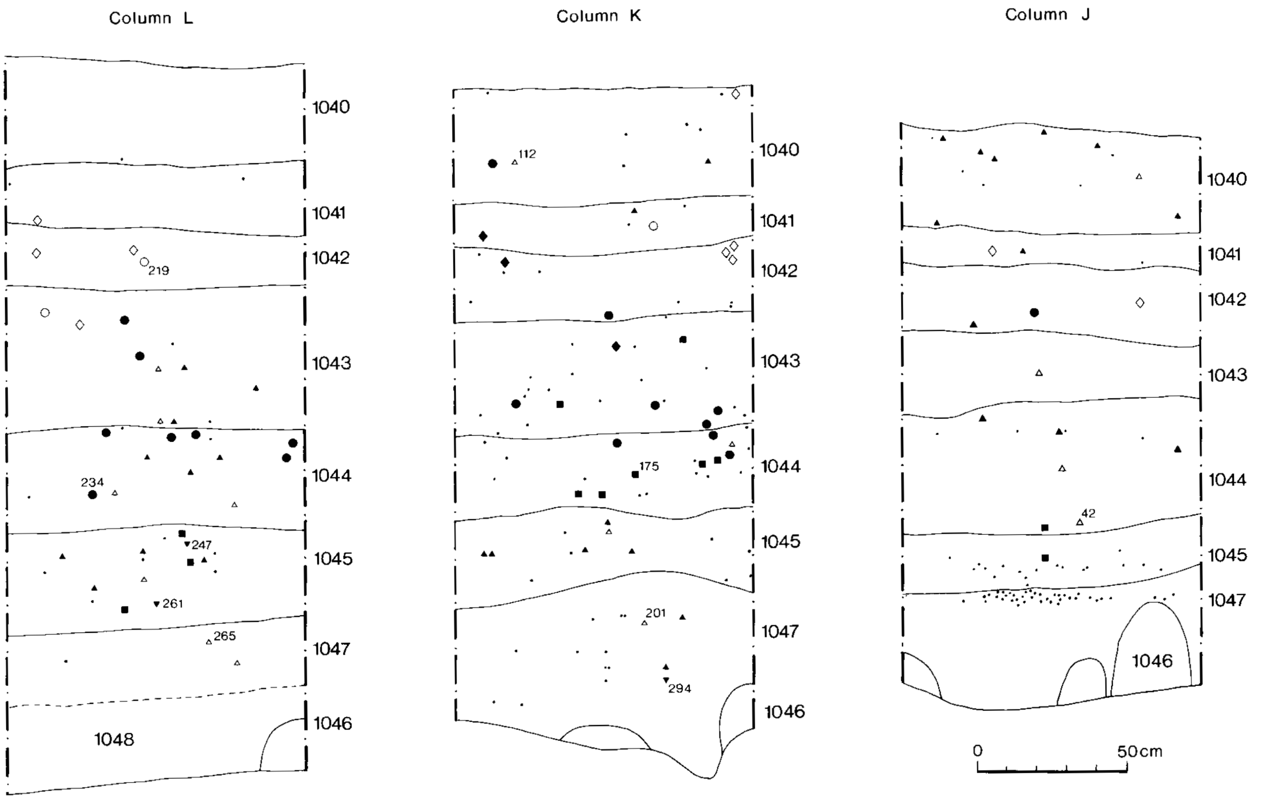

Fig. 8.9 Toadeshole Bottom West: Artefact distribution.

fore presumably younger) stratigraphic level than OxA-3081 (1050–760 cal BC; 2700±90 BP) and OxA-3083 (980–760 cal BC; 2660±70 BP) – is considerably older than those from Context 1045. An activity that including burning must have occurred in the period represented by this date (Late Neolithic/Early Bronze Age) on the valley sides, but no trace remains of it in the valley bottom. However, charcoal produced as a result must have later been eroded into the valley bottom during the formation of Context 1044.

OxA-3081 and OxA-3083 are not statistically significantly different (T'=0.1; T'(5%)=3.8; n=1; Ward and Wilson 1978) and therefore could represent the same depositional episode. Therefore it would seem probable that Context 1045 was formed during the first half of the first millennium BC, although as it was not the earliest colluvial layer, it cannot be stated when erosion began.

The flintwork

Robin Holgate

The lowermost context (1047) produced two flakes, two sidescrapers (Fig. 8.9: Nos 201 and 265) and a cutting blade of later Neolithic/Bronze Age date (No. 294), suggesting some form of activity took place in the valley at this period. The middle and upper layers (1040–1045) produced residual later Neolithic/Bronze Age débitage, scrapers (i.e. Fig 8.9: Nos 42 and 112) and cutting pieces, along with two residual Mesolithic blades (Nos 247 and 261); some later Bronze Age débitage, probably associated with the accumulation of the colluvial deposits, was also present. This suggests that activity of some description took place on the valley slopes and the adjacent ridges in the second millennium BC.

The pottery

Sue Hamilton

The majority of pottery from Toadeshole Bottom West came from Contexts 1043 and 1044, with less material coming from the lower layers. This could be due to the fact that at the time of deposition of Contexts 1043 and 1044, domestic rubbish was commonly being spread on the fields during manuring and/or there was greater activity in this period. Whatever the reason, the comparatively large quantity of pottery recovered allows a reasonable ceramic chronology to be constructed.

The pottery from Context 1045 is all of an LBA/EIA date. This correlates well with the AMS dates OxA-3081 and OxA-3083 for Context 1045 (*see* above).

Romano-British sherds are present in the subsequent layer (1044) suggesting that the LBA/EIA sherds here are residual. The Romano-British sherds in this layer, however, tend to be restricted to the upper three quarters of the layer with the earlier sherds lower down. This suggests the possibility that the lower quarter of Context 1044 dates to the LBA/EIA. Another possible explanation for the problem is that most of the Romano-British sherds in this layer may in fact be later Iron Age. (The distinction between post-conquest East Sussex Ware (Fabric 11) and pre-conquest Ouse Valley Ware (Fabric 10) is notoriously difficult when dealing with small abraded sherds from unsealed contexts.) If this were the case, Context 1044 could be seen as a continuation of cultivation through the Early to Late Iron Age.

Layer 1043 produced a mixture of LBA/EIA, Romano-British as well as Anglo-Saxon, Saxo-Norman and later Medieval sherds. The Medieval sherds tend to be concentrated towards the top of the layer along with residual Romano-British material. Whether the whole layer therefore represents later Medieval accumulation, or just the upper portion (the lower part being Romano-British), is uncertain.

Contexts 1042 and 1041, although containing residual material, appear to date to the later Medieval period. The ceramic data from this valley not only emphasise the problems of residuality in dry valley fills, but also the problems of dating certain types of pottery in an area which is still devoid of a securely dated late prehistoric ceramic typology.

Palaeoenvironmental investigations

Magnetic susceptibility measurement

The magnetic susceptibility measurements were fairly uniform (65–35 SI units × 10^{-8}) throughout the profile suggesting that depositional processes altered little during sediment accumulation. Unsurprisingly, the subsoil hollow (1048) produced the highest susceptibility readings, possibly as a result of its being filled by an eroded remnant of a former soil, or otherwise as a factor of its fine particle size.

Context 1047 produced the lowest readings for the whole profile. Through Contexts 1045 and 1044 there was a very small rise in susceptibility with a peak in the middle of 1044. From this point upwards there was a very gradual decline in susceptibility, although the morphology of the sediments did not similarly change (this is possibly the result of an increase in the sedimentation rate leading to decreased exposure of the sediments to weathering). This declining trend continued through Context 1043. However, in Contexts 1042 and 1041 there was an increase in susceptibility, which is possibly the result of material being brought down from the soil **A** horizon by earthworms and roots.

Mollusc analysis (Fig. 8.10)

Preservation of mollusc shell at Toadeshole Bottom West was generally good, except in Context 1047, where deposition in higher energy conditions had caused the destruction of most shells (Table 8.13 (Appendix 4)).

Incorporation of mollusc shells into the sediments appeared to follow a constant pattern for all the species found. This suggests that incorporation was initially slow until 164cm when it slowly increases. This increase continues until a peak is reached between 104cm and 74cm after which incorporation falls until 40cm when there is another peak and then a further fall to a constant level in the modern soil. Generally it can be assumed that incorporation rates are inversely proportional to the sedimentation rate, i.e. where incorporation values are high the sedimentation rate is low. Thus at Toadeshole Bottom West the sedimentation rate was probably lowest during the deposition of contexts 1044 and 1043, while in 1047 the rate must have been high

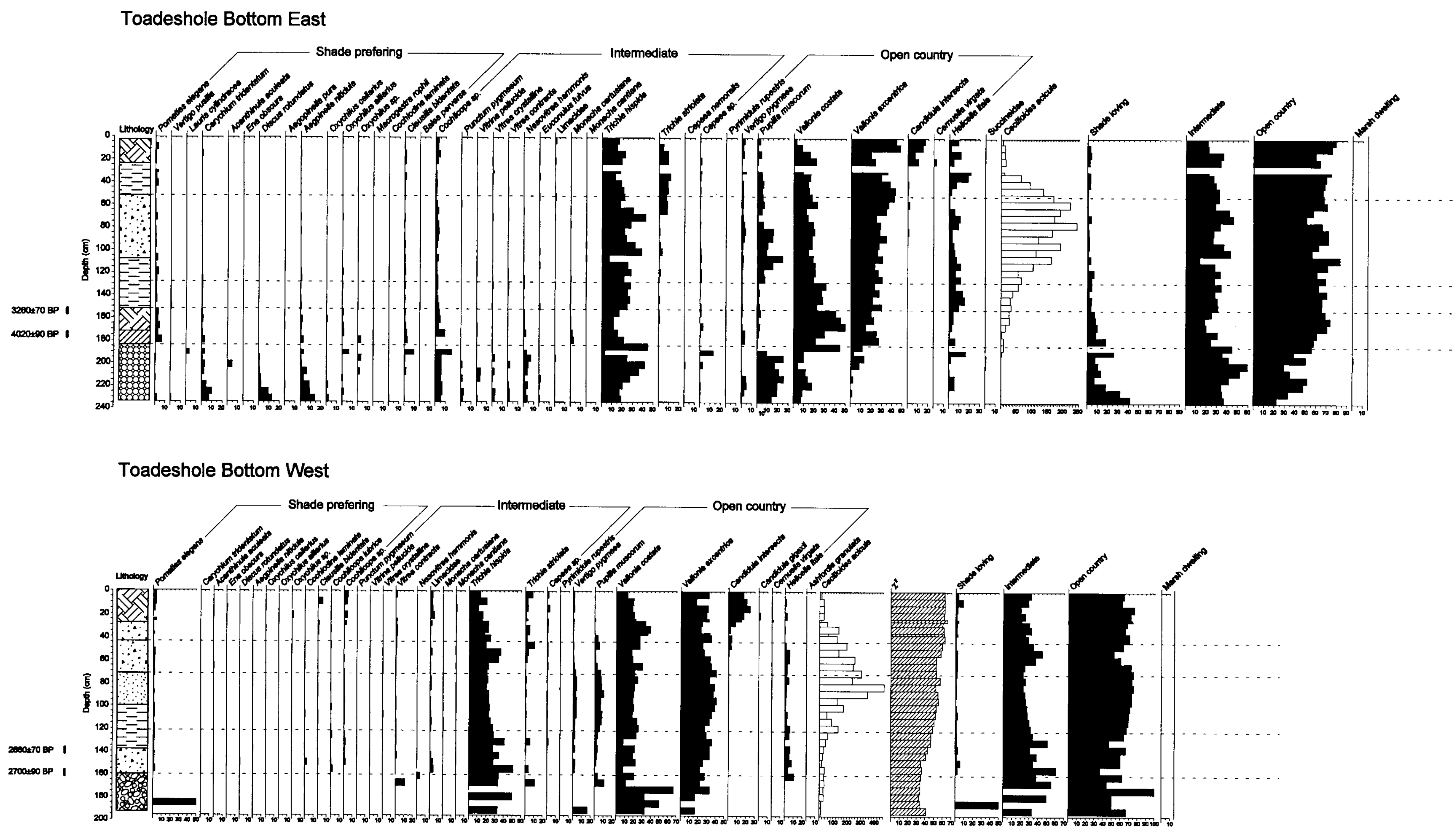

Fig. 8.10 Toadeshole Bottoms East and West: Mollusc percentage histograms.

(although poor preservation of shell in this layer is also a factor).

The assemblage from Context 1047 is predominantly characterised by *Trichia hispida, Vallonia costata* and *Vallonia excentrica* and is typical of colluvial deposits at most of the sites. Unfortunately, due to low shell numbers little can be said of the local environment, except that it was open. Although the assemblage is essentially the same in Context 1045 above, the better preservation of shells gives a clearer indication as to the contemporary environment. The presence of *Vertigo pygmaea* and *Helicella itala* with very low frequencies of 'shade-loving' species (as well as abundant *T. hispida*, *V. costata* and *V. excentrica*) suggest grassland rather than arable conditions. The high incorporation rate would tend to confirm this, indicating that the sedimentation rate was low.

The assemblage present in Context 1044 is very similar to that of Context 1045, again suggesting the possibility of grassland in the vicinity. It is also possible that arable agriculture predominated, but that there was more shade present than such environments have today. One interesting component of the assemblage is *Monacha cartusiana*, which is thought to have largely disappeared before, or just after, the Roman conquest to be replaced by its close relative *Monacha cantiana* (Evans 1972). Its preference today is for sunny, exposed places (Kerney and Cameron 1979) suggesting that bare ground existed (further indicated by large numbers of *H. itala*). However, these conditions can be created by pastoral as well as arable activity. The chronological aspects of its presence in Context 1044 are particularly interesting as this is dated to the Iron Age or Romano-British period on ceramic grounds. The mollusc evidence seems to suggest the former, if the Romano-British replacement theory is correct.

With the exception of the replacement of *M. cartusiana* with *M. cantiana* the initial assemblage of Context 1043 remains similar to that of Context 1044, although there are slight changes which suggest a possible small increase in vegetation cover. An open environment, probably of arable nature, can, however, be postulated.

Context 1042 contains a molluscan assemblage similar to that in Context 1043 suggesting the environment was unchanged from that present during the formation of Context 1043. In the upper portions of Context 1042 and continuing into Context 1041 the assemblage becomes dominated by *V. costata*, with a corresponding decrease in *V. excentrica*. This evidence may point to an increase in shade and possibly a conversion to a pastoral land-use.

A stable environment, of both arable and pastoral nature, has existed throughout the depositional history of colluvium in Toadeshole Bottom West. Only in the topmost deposits is there evidence for an increase in shade, possibly associated with conversion to pastoralism at some point in the late Medieval period.

Discussion

Evidence reviewed above shows just how little change has occurred at the site since the deposition of Context 1047 in the LBA or earlier. The lack of variation in mollusc assemblage, morphology of sediments and magnetic susceptibility probably suggests that there has been little alteration to the erosional regime or depositional environment – suggesting continuity of land-use. This is most unusual, as almost all the other valleys investigated seem to have undergone alterations in their land-use and intensity of exploitation.

All categories of data provided good evidence for the nature of depositional events at Toadeshole Bottom West. The chronological information from the ceramic assemblage is fairly complete, although there are alternative explanations for the dating of various layers. The results of the AMS dates (*see* Table 9.1) are slightly disappointing in that OxA-3082 proved to be from residual charcoal, but those from Context 1045 provide good supporting evidence for the date range suggested by the ceramics. Unfortunately as at Hangleton Bottom there proved to be no method of dating the flint rich layer, 1047, other than as 'LBA or earlier', based on stratigraphic evidence from Context 1045. This was unfortunate, as it may have been the earliest colluvial sediment deposited within the valley, and is probably the result of a particularly high energy erosional event; it is important to know when this occurred. The mollusc assemblage from Context 1047 was impoverished due to the decalcification of this unit, although the shells that were found suggest open country conditions. The subsoil hollow (1048) also proved impossible to date, although here, the very limited mollusc assemblage may give some indications, as it included open country species not generally thought to have occurred together prior to farming in the Neolithic. Thus as with fills from subsoil hollows at Toadeshole Bottom East and Sweetpatch (*see* Section 13) this may have a post-Mesolithic date, which is in contrast to similar features from other dry valley sites e.g. Itford Bottom (Bell 1983).

Following deposition of Context 1047, there may have been a hiatus before finer colluvium began to accumulate under much gentler conditions (possibly at a time when the fire-cracked flint was deposited). This new deposit (1045) seems to have begun accumulating at the very beginning of the first millennium BC, and was probably an indirect result of arable agriculture on the surrounding slopes. This accumulation may have continued into the Late Iron Age (LIA), or have stopped in the EIA before beginning again in the Romano-British period (1044). However, the cause would appear to have been the same as before, although a decrease in the sedimentation rate could have been due to the adoption of a more stable farming system utilising such erosion control measures as lynchets.

Colluvium continued to accumulate throughout the Romano-British and Medieval periods under arable conditions. The intensity of this may have varied at times, and there may have been short periods when the area was not utilised, but these have not been detected. However, at some point in the later Medieval period there is evidence for a slight increase in shade and a decrease in the sedimentation rate. This may suggest the adoption of a pastoral land-use with the development of associated grassland. The transition is well-known across extensive areas of the South Downs from various documentary sources (Pelham 1934), and was due to the economic climate prevalent in the Middle Ages, when production of wool gave better financial returns than growing cereals.

TOADESHOLE BOTTOM EAST

Sampling strategy

The 17.7m × 2m trench excavated at Toadeshole Bottom East cut through thick colluvial deposits which, in places, exceeded a depth of 2.5m. Acroprops and shoring were used to support the trench sides before excavation of artefact and mollusc columns.

Stratigraphic sequence (Fig. 8.11)

The sedimentary/stratigraphic sequence at Toadeshole Bottom East was markedly different to that of the western site (*see* above) in that morphologically distinct layers were apparent. Besides the ubiquitous and poorly sorted colluvial layers, a buried soil, two subsoil hollows, and a thick periglacial solifluction deposit were found. A full description and analysis of the subsoil hollows and solifluction deposits can be found elsewhere (Wilkinson 1993). The stratigraphy is outlined in Table 8.6.

Context 1036 was particularly distinctive, and bears little comparison with the other solifluction deposits found during the dry valley work. It is described in detail elsewhere (Wilkinson 1993: 111). This deposit had survived at Toadeshole Bottom East (along with 1035 and 1038) probably because later ploughing has failed to penetrate it and thereby cause erosion. This, if correct, suggests the other valleys may have contained similar deposits which have since been lost by agricultural erosion.

Context 1038 would appear to represent the remains of a palaeosol dating from some time during the Neolithic (*see* below), but which has largely been eroded by later ploughing. The time period represented by this layer is almost certainly very long, although those parts accumulating in the large subsoil hollow (over 1039) probably formed over a shorter period. This hollow probably 'filled' with sediment as described by Evans (1971), i.e. tree-throw followed by erosion of the contemporary soil into the hollow. However, depending on when the tree-throw episode occurred, the infilling sediment could be of many periods, as material would not only be mixed by the tree-throw process itself, but subsequent erosion of the contemporary soils and older sediment.

Context 1035 is a palaeosol of broadly similar characteristics to 1038, both having a finer average particle size and lower lithic content than overlying colluvium. This suggests that if ploughing was taking place either at the site or on the surrounding slopes, it was not reaching sufficient depths to erode the chalk bedrock. The fine particle size and the high degree of sorting also suggest that colluvial input was minimal. Where the profile is deeper, at the north-west end of the trench, large quantities of charcoal and burnt clay were found near the bottom of 1035. These suggest that burning had occurred *in situ*, and could therefore have been the result of either forest or scrub clearance. After this, soil development continued (i.e. the upper portions of 1035) with many of the same characteristics as 1038. However, at some point truncation of the burnt deposits seems to have occurred, as these were only found where 1035 was at its thickest, i.e. where it was well below later plough level.

The remaining part of the sequence is represented by two poorly sorted colluvial layers (1033 and 1034). However, changes were apparent within these 'layers', where the following trends were noted:

(a) a lightening in colour upwards
(b) coarsening of deposits upwards through 1034, peaking at the bottom of 1033 and fining thereafter.

These layers can thus be seen as one continuously developing deposit as the same processes seem to have occurred throughout the formation of both. The visible changes are probably the result of variations in the intensity and source of erosion. The lightening in colour is likely to be the result of increased incorporation of chalk as ploughing eroded the bedrock rather than a reduction in oxidised iron (*see* below). This would suggest that hillside soils were thinning during the deposition of 1033 and 1034.

Table 8.6 Toadeshole Bottom East: Context descriptions.

Context	Description
1029	7.5YR 4/6 Strong brown clay/silt, containing 10% granular- and pebble-sized sub-angular flints. Poorly sorted with large amounts of charcoal, burnt clay. Abrupt boundary to 1036. Not on section as found in plan only
1030	10YR 4/3 Brown/dark brown clay/silt. Contains 10% pebble- and cobble-sized sub-angular flints and 10% pebble-sized sub-rounded chalk fragments. High humic content although no visible vegetation cover. Well sorted. Modern soil **A** horizon. Abrupt boundary to:
1031	10YR 5/4 Yellowish brown clay/silt. Contains 2% cobble-to boulder-sized, 10% pebble-sized sub-angular flint, and 10% pebble-sized sub-rounded chalk fragments. Poorly sorted with moderate humic content. Local in nature in south-east of the trench, replaced by 1032 elsewhere. Gradual boundary to:
1032	10YR 5/5 Yellowish brown clay/silt. Contains 2% cobble- and boulder-sized and 2% pebble-sized sub-angular flints. Also <1% pebble-sized sub-rounded chalk and occasional charcoal fragments. Poorly sorted and of a very similar character to 1031. Gradual boundary to:
1033	10YR 5/4 Yellowish brown clay/silt. Contains 15% pebble-sized sub-angular flint, 15% pebble-sized sub-rounded chalk and <1% boulder-sized sub-angular flint. Larger flints increase in quantity as the deposit deepens. Poorly sorted. Gradual boundary to:
1034	10YR 4/4 Dark yellowish brown clay/silt. Contains 2% cobble- and pebble-sized, and <1% boulder-sized sub-angular flints. Bedding lines of flints in the north-west area of the trench. Elsewhere poorly sorted. Gradual boundary to:
1035	10YR 4/3 Brown/dark brown clay/silt. Contains <1% pebble-sized sub-rounded chalk and pebble-sized sub-angular flint. Becoming thicker with charcoal fragments and burnt clay in deeper areas of the valley. Well sorted. Gradual boundary to 1038
1036	10YR 8/3 Very pale brown silt. Contains 80% pebble-to cobble-sized sub-rounded chalk. Clast supported. Layer gets thicker in the deepest areas of the trench, but has several hollows in it. *Periglacial solifluction material*. Abrupt, but irregular boundary to chalk bedrock
1038	7.5YR 4/4 Brown/dark brown silt. Contains <1% pebble-sized sub-angular flint Present only in places, but appears well sorted. Abrupt boundary to 1036
1039	10YR 8/3 Pale brown chalky inclusions similar to 1036

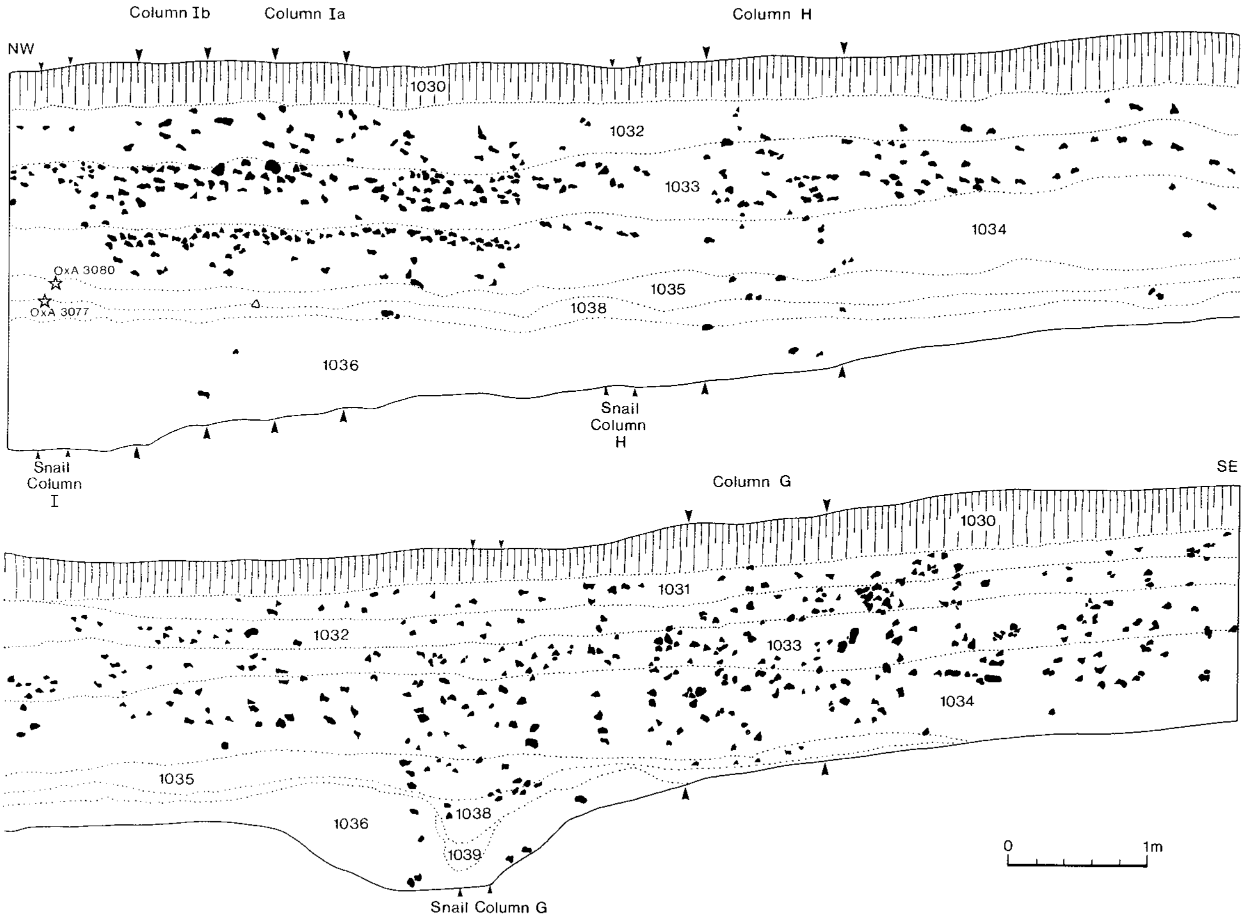

Fig. 8.11 Toadeshole Bottom East: Section.

Large flints were found at the top of Context 1034 and in Context 1033 suggesting that intensive erosion was occurring at this point. It is possible some of the 'layering' (observed in 1034), was the result of seasonal changes in vegetation, leading to greater exposure of the ground surface to weathering in some months. Another explanation may be that it is the result of episodic high and low energy erosional events. However, the evidence from 1034 and 1033 generally suggests the 'layering' formed over a long period of time.

Context 1031 was only present locally and often graded into Context 1032. Both layers would appear to be colluvial in origin, although formed under gentler conditions than those postulated for Contexts 1033 and 1034.

Context 1030, the modern 'soil', varied from those of the other valleys in its high content of colluvial sediment and low quantities of humus (both are probably the result of present land-use).

Context 1028 (not illustrated) was located cutting the chalk in the centre of the trench and thus did not appear in the main section. The fill (1029) of this 48cm diameter, 10cm deep subsoil hollow was morphologically similar to 1038, but darker in colour caused by the inclusion of charcoal and burnt clay. This may suggest that 1028 was a pit or hearth, perhaps with a domestic use, but whether this formed part of a larger settlement or of a transient camp could not be ascertained.

Particle size analysis

Particle size analysis was carried out of samples from Contexts 1035, 1038 and 1034 using sieving, pipette and laser techniques (Wilkinson 1993). The results were somewhat surprising in that it showed all the samples to have similar particle size distributions and that there were no obvious differences between the palaeosols (1035 and 1038) and the colluvial layer (1034). This implies that either the 'colluvium' has been wrongly interpreted, and is in fact part of 1035, or more likely, that it is largely derived from a soil of similar particle size distribution to 1035. All the samples were well sorted and could be described as clay silts. Sand-sized particles seemed to be insignificant in quantity. Within the silt category, medium silts seemed to dominate with similar lesser proportions of coarse and fine silts. These particle size properties are similar to those of loess, which is thought to have once covered most of Britain south of the Devensian ice-sheet. As loessic material is believed to have constituted a large proportion of early Flandrian forest soils (Limbrey 1975, 1978), loess would be expected in the first agricultural soils and colluvial deposits following forest clearance.

Dating

Four artefact columns were excavated at Toadeshole Bottom East; two measuring 0.5m² (Ia and Ib) and two measuring

1m × 0.5m (G and H). These provided not only flintwork and pottery but also yielded charred material for AMS dating. A full list of the excavated material forms part of the archive, only the flintwork and pottery has been plotted (Fig. 8.12).

Accelerator mass spectrometry dating

Four samples were submitted for AMS dating from Toadeshole Bottom East (Tables 8.7 and 9.1).

Unfortunately, insufficient well-stratified charcoal was found to date the colluvial layers 1034–1032, although as pottery has been found from 1035 a chronology is available for this part of the sequence. Despite an intensive search no charred material could be found from the periglacial layer 1036, which was more of a problem as the only alternative was dating by biostratigraphic comparison. As the nearest complete sequences of late glacial mollusca are in Kent and at Cow Gap, Beachy Head (Kerney 1963), correlation with them may not be appropriate.

Of the samples that were analysed, two are from the main sequence (OxA-3077 and OxA-3080) and the other two from the subsoil hollow, 1029 (OxA-3078 and OxA-3079).

OxA-3077 is from the lower palaeosol, 1038, and its Mid/Late Neolithic date suggests that colluviation had not commenced at this time. Moreover, conditions were such that a soil was able to develop, although due to poor shell preservation mollusc analysis was unable to determine the nature of the environment that existed (*see* below).

OxA-3080 is from the charcoal 'band' that occurs at the bottom of layer 1035. Mollusc analysis of this layer suggests that the burning represents secondary clearance,

Table 8.7 Toadeshole Bottom East: AMS dates.

OxA No.	Context	Radiocarbon Age (BP)	95% confidence (cal)
3077	1038	4020±90	2880–2310 cal BC
3078	1029	3560±80	2140–1690 cal BC
3079	1029	3550±90	2180–1680 cal BC
3080	1035	3260±70	1740–1410 cal BC

probably of scrub (*see* below). The Middle Bronze Age (MBA) date would suggest that it was only at this time that large-scale agricultural activity had begun in the vicinity of the valley.

OxA-3078 and OxA-3079 are separate samples from the subsoil hollow (1028) found in the centre of the trench. It was originally thought (on mollusc assemblage grounds) that this deposit was of early post-glacial date, but the dates obtained show that deposition occurred in the Late Neolithic to EBA.

The flintwork

Robin Holgate

There were no worked flints in the lowermost layers, while the middle and upper layers (1031, 1032, 1033, 1034 and 1035) included later Neolithic/Bronze Age débitage, scrapers (Fig. 8.12: No. 284) and notched flakes (i.e. Fig. 8.12: No. 228) resulting from activity on the valley sides and adjacent ridges in the third to second millennia BC.

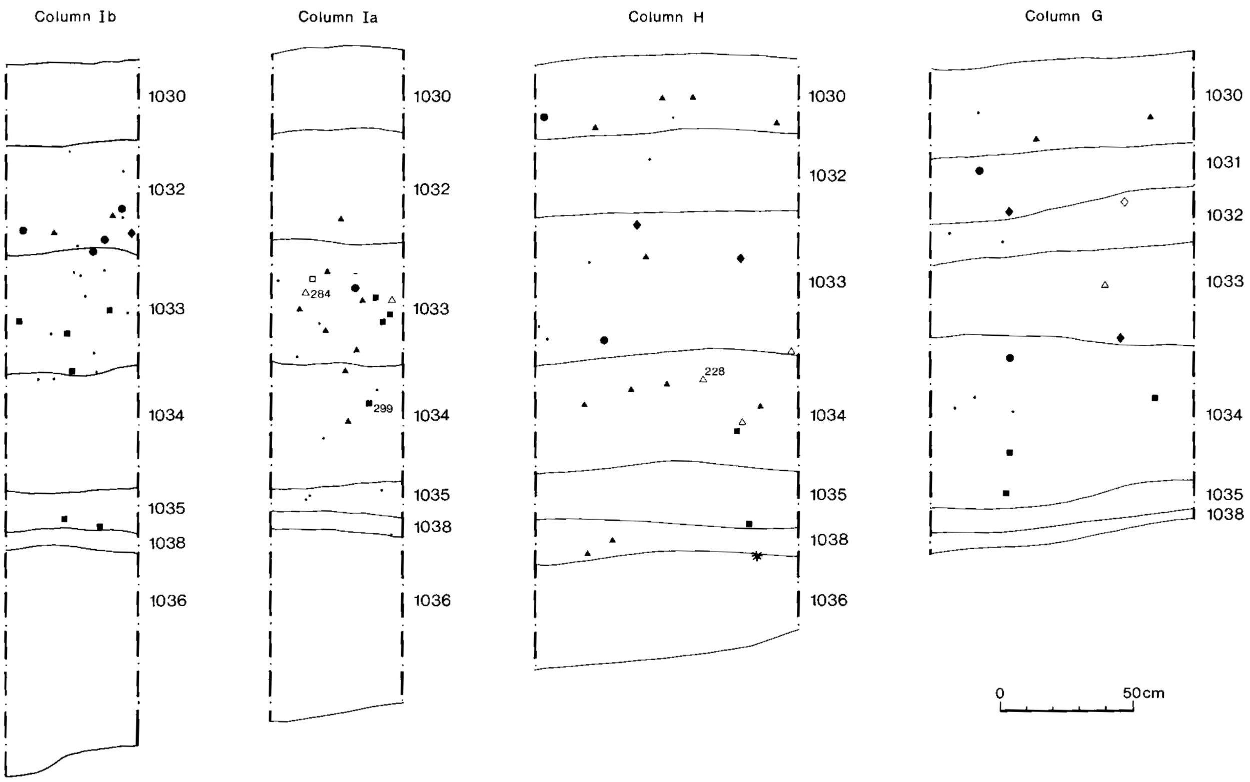

Fig. 8.12 Toadeshole Bottom East: Artefact distribution.

The pottery

Sue Hamilton

The pottery recovered adds considerable information as to the chronology of the sequence. Two sherds were recovered from layer 1038; one was unidentifiable, except as being prehistoric (*NB* not plotted on Fig. 8.12) while the other is of a probable Neolithic/Beaker date. The latter ties in fairly well with OxA-3077 (2880–2310 cal BC; 4020±90 BP). Layer 1035 contained pottery of an LBA/EIA date, which at first seems rather too late when compared to the MBA AMS date (OxA-3080; 1740–1410 cal BC; 3260±70 BP). Therefore it is possible that Context 1035 developed over a long period of time from the MBA to LBA. In the latter period processes of colluvial erosion would seem to be active as there is a concentration of LBA/EIA sherds from Context 1034. The single sherd of Romano-British pottery from Context 1034 suggests a later date for the formation of most of this layer. This fact poses some problems in interpretation as it suggests that deposition of Context 1034 possibly ceased during the Middle to Late Iron Ages, or that during this period pottery was not being deposited. This phenomenon was noted at the other valleys (*see* above) and it is possible the single sherd of East Sussex Ware (Fabric 11) in this layer is in fact Sussex Ouse Valley Ware (Fabric 10). If this were the case, it would suggest the possibility that deposition continued throughout the Iron Age and into the Romano-British period.

Layer 1033 is of a Saxo-Norman date, although it contains residual sherds of the Romano-British and EIA periods. Pottery in layers 1032, 1031 and 1030 is very mixed, but contains sherds of Saxo-Norman and later Medieval date (1032) suggesting a more recent deposition.

Palaeoenvironmental investigations

Magnetic susceptibility measurement (Fig. 8.13)

The magnetic susceptibility measurements show large fluctuations, predominantly caused by different modes of sedimentation. When interpreting the measurements it must be remembered that the layers are irregular, that boundaries between them are sometimes indistinct and that they have not necessarily formed in an exact horizontal plane. The full details of the sampling strategy and methods have been described elsewhere (Wilkinson 1993).

Not surprisingly, the solifluction deposit 1036, with its extremely low organic content and no traces of burning or soil formation, produced very low susceptibility measurements. Magnetic susceptibility rises through the palaeosol 1038, which was to be expected and is a result of faunal and floral interactions (Thompson and Oldfield 1986) and limited burning (as evidenced by occasional charcoal).

At the base of layer 1035 a massive rise in susceptibility was located (178–172cm). The values are so high that the

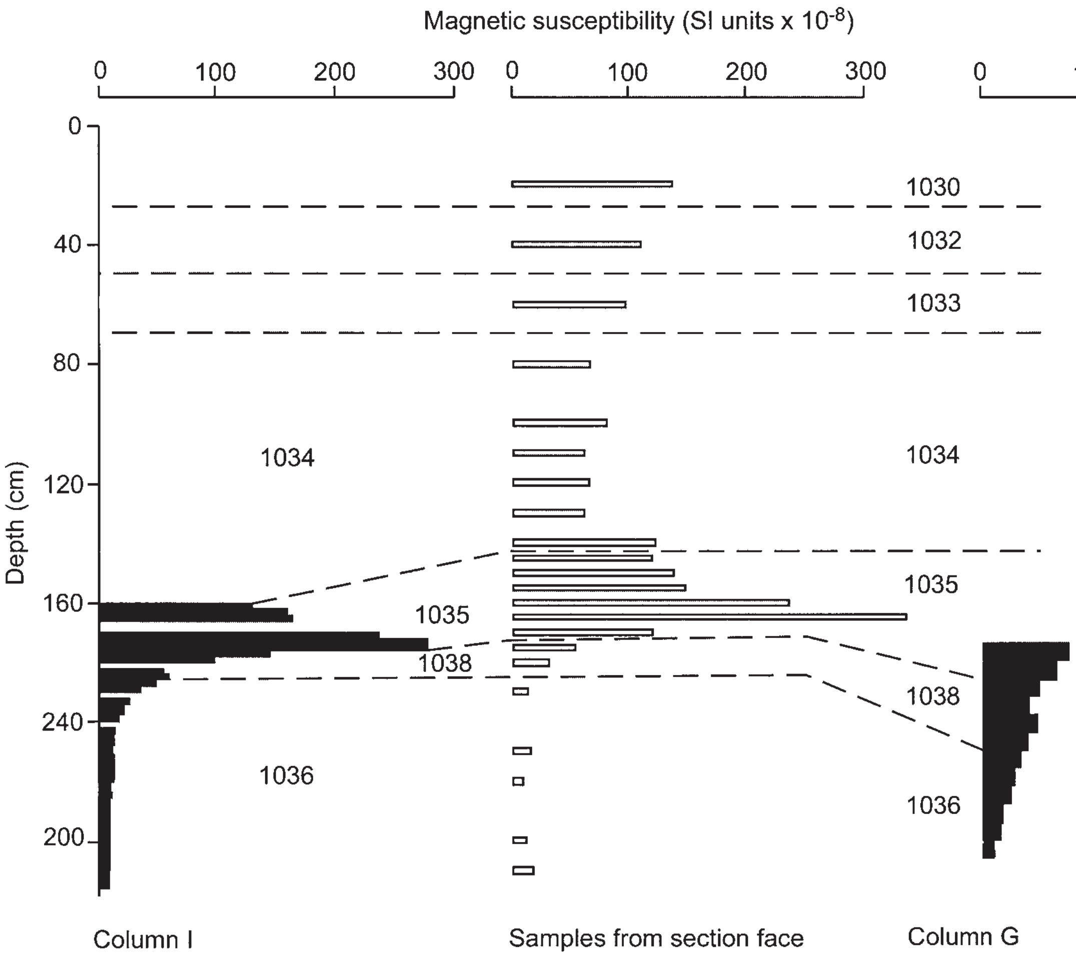

Fig. 8.13 Toadeshole Bottom East: Magnetic susceptibility profile.

only possible cause is *in situ* burning. These high readings coincide with the layer of charcoal and the AMS date of 1740–1410 cal BC (OxA-3080; 3260±70 BP), although why this discrete burnt horizon occurred remains uncertain. The fact that the high susceptibilities occurred discretely within the depth band defined suggests that subsequent mixing has not occurred to any great extent. If true, it is possible that material accumulated very quickly above the burnt layer and sealed it from penetration by soil microfauna. As soils take a long time to develop this could suggest that the upper levels of Context 1035 include a greater colluvial content than previously thought. The readings above the burnt horizon in 1035 show a rapid decrease in susceptibility, although they do not fall to the levels of the colluvium above.

A rapid drop in susceptibility was found in the overlying colluvial stratigraphy (Contexts 1034 and 1033), although the readings remain at a constant low level throughout most of Context 1034. The susceptibility readings rise through the upper part of Contexts 1033 and 1032 to a high in the present soil (1030). This rise is probably caused by an initial reduction in the sedimentation rate, with its consequent increase in surface weathering and incorporation of material from the modern soil.

The increasing susceptibility in Column G is indicative of increasing quantities of pedologically reworked silt in the sediments, i.e. further proof that the top of the solifluction debris has been impacted by worm action.

Mollusc analysis (Fig. 8.10 and Table 8.14 (Appendix 4))

Three molluscan columns were taken (Fig. 8.11) at Toadeshole Bottom East. One was intended to include all the layers at 6cm intervals or less (Col. H), the other two were placed to sample the subsoil hollow (Col. G) and the solifluction deposit (Col. I). Columns G and I are discussed in detail in Wilkinson (1993) and are not covered here. Preservation of mollusc shell was extremely good, except in layers 1035 and 1038 which had both been decalcified and included no chalk. In addition to the three columns a bulk sample was taken from the subsoil hollow 1029, found in the centre of the trench. Here shell preservation was again good.

Column H

Molluscan data from this column are presented as a percentage histogram in Figure 8.10 and in tabular form in Appendix 4 (Table 8.14).

The earliest layer represented is the solifluction deposit 1036. This contained an assemblage dominated by *Pupilla muscorum* and to a lesser extent *Trichia hispida*, with lesser components such as *Nesovitrea hammonis*, *Abida secale*, *Vallonia costata*, *Punctum pygmaeum*, *Vitrina pellucida*, Succineidae and *Helicella itala*. This type of assemblage is characteristic of the late glacial period in Southern Britain (Kerney 1963). The species composition suggests marsh and dry elements are both present, indicating that although deposition occurred under predominantly dry conditions water was never far away. The samples from this layer are unusual in that elements of a post-glacial woodland assemblage (comprising *c*.30% of the total assemblage) are present alongside the late glacial shells. This can be seen in mollusc histograms from other sites (Ellis 1985, 1986), but has not been stated and no explanation has been suggested as to why this should be so. The late glacial assemblage probably dates from mollusc zone z (Kerney 1977) (for which *A. secale* is a type fossil). Dates from Kent from this stage include 11,900±160 BP (Q-618) and 11,934±210 BP (Q-463; Kerney *et al*. 1980), and it is likely that deposition occurred at a similar date at Toadeshole Bottom East. The environment represented by this assemblage type is suggested as being cold, windswept and steppe-like, with almost no vegetation beyond a few shrubs (Kerney 1963; Evans 1966). In summer the permafrost which had developed in winter would thaw leading to mass movement and deposition in the valley bottoms – hence the formation of such solifluction deposits as Context 1036.

The early post-glacial assemblage from Context 1036 is dominated by 'shade-loving' species suggesting that prior to deposition (or re-deposition) they were living in a woodland environment. A date in the region of *c*.6600–5900 cal BC (*c*.7800–7000 BP) can be postulated for this assemblage (Kerney 1977; Kerney *et al*. 1980) giving a hiatus of around 5000 years between the early post-glacial and periglacial assemblages.

It has been suggested that layer 1038 is a palaeosol, dating to 2880–2310 cal BC (OxA-3077; 4020±90 BP). Unfortunately, shell preservation was extremely poor, probably caused by the decalcification inherent in the formation of a Brown Earth soil (Limbrey 1975; MacPhail, pers. comm.). The few shells that did survive are unhelpful as they may originate from both layers 1036 and 1035. However, there is probably a hiatus between the deposition of 1038 and the early post-glacial assemblage from Context 1036 below.

Incorporation of shells rises in layer 1035, and increases rapidly after the charcoal horizon at 170cm. The assemblage immediately before this event is largely of open country type, dominated by *Vallonia costata*. However, the presence of members of the Zonitidae, albeit in small numbers, and larger numbers of the 'terrestrial A' group (Sparkes 1961), indicates taller vegetation. Thus, although forest clearance may have occurred at this point, the possible presence of long vegetation suggests that this was by no means complete. If correct then the point of original forest clearance has been missed, has remained unrecognised, or the sediments representative of it have been eroded. It is possible also that the deforestation event occurred in Context 1038 where shell preservation is poor and therefore the process has remained unrecognised. The effect of burning, and the resultant change of environment on the mollusc assemblage at the base of Context 1035 is dramatic. The shell incorporation rate rapidly increases for all species except 'shade-lovers', i.e. the 'terrestrial A' group. However, the initial rise is most pronounced in *V. costata*, a species which is an efficient coloniser of newly cleared ground (Evans 1972).

Incorporation rates continue to increase throughout the rest of Context 1035 and into Context 1034. That of *V. costata* continues rising at the greatest rate, although that of *V. excentrica* is also rapid. *Helicella itala* also increases quickly suggesting that the ground surface may have had numerous patches devoid of vegetation. 'Shade-loving' species continue to occur, but in lower frequencies. By the top of Context 1035, the assemblage is typical of colluvial contexts (Bell 1983), and is dominated by *Vallonia* and *T.*

hispida. The environment at this stage was almost certainly open, although whether it was under an arable or pastoral agricultural regime is more difficult to ascertain. The assemblage from the colluvial layers 1034-1032 changes only in detail, and is again largely composed of the species prevalent in the top of Context 1035.

At the bottom of Context 1034, at 1.68m, there is an overall decline in percentage of *V. costata*, and a corresponding increase in *V. excentrica* and *T. hispida.* This probably indicates more open conditions than before, with very little shade. This idea is given further substance by the increase in *H. itala*, a species which prefers south-facing unvegetated situations. The exact land-use at this time is uncertain, but Evans (1991) indicates this association to be characteristic of grassland.

The same conditions continue to 1.28m, when the incorporation rate increases, and there is a fall in both *V. costata* and *H. itala*. *V. excentrica* and *T. hispida* remain at the same level as before, but *Pupilla muscorum* increases. This change probably marks an alteration to either local arable activity (if it had not existed before), or to more intense arable conditions. *P. muscorum* continues to expand until 74cm with values for most other species remaining constant.

Above 74cm the shell incorporation rate falls, there is a marked decline in *P. muscorum* and an increase in *H. itala* and *T. hispida*. Above 68cm incorporation rates increase again with a large expansion of *V. excentrica* and a recovery in *P. muscorum*. There is a slight increase in the incorporation of shells of *V. costata* and *T. hispida*. These changes point to the development of grassland, and a consequent fall in the sedimentation rate (causing the highest incorporation values). This grassland was probably short, as *V. excentrica* dominates over *V. costata*, and included areas devoid of vegetation as exploited by *P. muscorum.* Similar conditions persist until the base of the modern topsoil. The assemblage from the topsoil (1030) is generally indicative of a reversion to arable agriculture

Column G

Molluscan data from this column are presented in Table 8.15.

This column was taken through deposits filling a subsoil hollow cut into the underlying solifluction marls, presumably as a result of tree-throw in the Early Holocene (Evans 1971). In common with other Early Holocene subsoil hollows reported upon by Evans (1971, 1972) and Bell (1983) the molluscan assemblage is dominated by shade-loving species, in particular *Carychium tridentatum, Discus rotundatus* and *Oxychilus cellarius*. Another significant inclusion is the shade-loving species *Acicula fusca*, which today is rarely found in association with humans, suggesting that at the time the hollow formed, people were not active in

Table 8.15 Toadeshole Bottom East: Mollusc shells from Column G.

Depth (cm)	204–210	210–216	216–222	222–228	228–234	234–240	240+
Weight (g's)	1746	2084	1627	1785	1609	1524	1052
Context	1038	1039	1039	1039	1036	1036	1036
Valvata cristata				1			
Pomatias elegans	6	8	14		3		
Acicula fusca	1	2	6	3	8		1
Carychium tridentatum	4	12	53	25	16		
Cochlicopa lubrica	8				4	1	2
Cochlicopa sp.		10	8	11			
Pyramidula rupestris			1	4			
Pupilla muscorum	2	6	16	7	11		2
Lauria cylindracea			1			2	
Vallonia costata	2		1	1	4	1	
Valonia excentrica	4	3	1			1	
Acanthinula aculeata			4				
Punctum pygmaeum			1	2	1		
Discus rotundatus	19	16	47	68	27	1	
Vitrina pellucida			1		2		1
Vitrea crystallina				1			
Vitrea contracta		2	9	5	4		
Nesovitrea hammonis				2	1		
Aegopinella pura	1	5	6	7	8		
Aegopinella nitidula	4	13	8	7	1		
Oxychilus cellarius	3	6	31	29	8		
Oxychilus alliarius				2		4	1
Limacidae			1				
Euconulus fulvus				2	3		
Cecilioides acicula	6	1					
Macrogastra rolphii	1						
Cochlodina laminata		1	4		3		1
Clausilia bidentata	8	5	6	3			
Balea perversa		1					
Trichia hispida	14	15	21	18	12	1	3
Trichia striolata			1				
Cepaea sp.	8	4	8	3	2		
Total	91	110	249	201	118	11	11

the locality (Kerney and Cameron 1979). Open country elements present in the assemblage include *Vallonia costata*, *Vallonia excentrica* at low frequencies, and somewhat larger numbers of *Pupilla muscorum*. Assuming these shells have not been reworked from the underlying solifluction marls, their presence indicates that open areas existed in the early Holocene forest. The absence of the characteristic, tall 'glacial form' of *Pupilla muscorum* in the subsoil hollow mollusc assemblage appears to support this view. Dating of the assemblage is more problematic as no associated charcoal was found that could be radiocarbon dated. However, comparison of the molluscan biostratigraphy with that from the Holywell Coombe type site (Preece 1998) points to a date between *c*.7500 and 5500 radiocarbon years BP.

Subsoil hollow 1028: fill 1029 (bulk sample)

The whole fill of this feature was examined for the purposes of molluscan analysis. The assemblage recovered is an unusual one, in that it contains large numbers of both shade-loving and open country types. The interpretation of this therefore is extremely difficult, although it is possible to say that the open country and shade-loving components are unlikely to derive from the same environment and hence source. Therefore, either there was both open country and shade locally when the feature was being utilised, or there is a chronological difference between the two faunal elements.

The open country species present indicate full grassland rather than a local clearing in a forest (Evans 1991), whereas the shade-loving species include *Balea perversa*, *Cochlodina laminata* and *Helicigona lapicida* (all of which actually live on trees), and thus indicate woodland. Many explanations can be put forward for this contradictory assemblage, one of which being that the woodland species were brought in on wood being used to fuel the fire. However, woodland and grassland can be postulated as being fairly local, in the Late Neolithic to EBA.

Charcoal

Identified by Jon Hather

The only wood charcoal considered large enough to be identified was found in Context 1029 and proved to be *Pinus* (pine).

Discussion

The sedimentary profile at Toadeshole Bottom East was unique among the sites studied in this project in containing deposits dating from the late glacial and early post-glacial periods. Thus data were obtained from a relatively long, albeit discontinuous, time-sequence. These show large alterations to the local environment. This is in contrast with the situation at Toadeshole Bottom West, where no material definitely earlier than the Bronze Age was recorded and where the molluscan stratigraphy showed very few changes in environment or depositional history. This apparent paradox between sites some 400m apart and in the same valley system could have occurred through different erosional processes operating between the two sites, or by local variations in the environment and/or the pattern of sedimentation. However, whichever is the case, it would seem to suggest that local factors have influenced the way in which the two valleys have developed.

The earliest deposit present at Toadeshole Bottom East is a periglacial solifluction layer. On faunal grounds this is thought to have been deposited at the very end of the last glacial, around 11,500 BP, under a cold and open tundra-like environment. This assemblage compares very well with others of a similar date from Sussex, studied by Ellis (1985, 1986), and is sufficiently different from the Kent assemblages examined by Kerney (1963; Kerney *et al*. 1980) to suggest regional and/or contextual differences. However, incorporated in the top of the periglacial layer at Toadeshole Bottom East was a shade-loving assemblage characteristic of Kerney's mollusc zone d, which has been dated in Kent to 7500±100 BP (St-3410) (Kerney *et al.* 1980). Magnetic susceptibility, and mollusc incorporation rate data show this to have become incorporated gradually (Wilkinson 1993), which in turn suggests that worm action combined with deposit compression has led to its incorporation, rather than a wholesale re-deposition of the entire deposit.

An assemblage of similar characteristics to the post-glacial component of the periglacial deposit was found in a subsoil hollow (1029). There can be little doubt that soils relating to phases of early post-glacial woodland (mollusc zones a–c) once existed in Toadeshole Bottom East (and Sussex as a whole), but that they have subsequently eroded. The formation of palaeosol 1038 has been dated to 2880–2310 cal BC (OxA-3077; 4020±90 BP), so it would seem that erosion of the woodland soils occurred in the Early to Mid Neolithic, and probably as a result of forest clearance and subsequent agriculture. Particle size analysis of Contexts 1038 and 1035 shows that these layers probably have a large loessic content, and are therefore derived from previous woodland soils. Loessic soils are particularly susceptible to erosion, particularly by fluvial processes, as calcareous 'concretions' holding them together quickly dissolve (Catt 1978). Such erosion could have occurred with the opening up of the forest canopy, and the resultant exposure of the forest soils to direct rainfall for the first time. Therefore it is likely that Neolithic people must have had initial problems with soil erosion.

Turning back to the early Holocene assemblages, there is no evidence on faunal grounds for any effect of man on the environment – indeed quite the contrary is indicated by the presence of such anthropophobic species as *Balea perversa*, *Vertigo alpestris* and *Acicula fusca* – and the environment at this stage should be viewed as dense closed woodland. However, above these deposits was found the remains of a Neolithic palaeosol, 1038. This, despite the fact that no sizeable mollusc assemblage survived, would seem to have developed under conditions greatly affected by man (although only analysis using soil micro-morphological techniques could prove this), and probably represents a standstill phase in erosion (i.e. there is no evidence for colluviation). Following this soil formation in the Mid to Late Neolithic, there would appear to be a continued hiatus in deposition, or possibly erosion of subsequent deposits until the development of a second palaeosol (1035), in the EBA to MBA. Further data for this time period are provided by material found in the subsoil hollow 1029. This, possibly man-made feature, has been independently dated by two

AMS measurements to 2140–1690 cal BC (OxA-3078; 3560±80 BP) and 2180–1680 cal BC (OxA-3079; 3550±90 BP), i.e. the Late Neolithic/EBA, and appears to be a hearth possibly used by a foraging expedition. The associated molluscan assemblage indicates an environment with a mix of open country and shade, which is probably best explained as a clearing in secondary woodland. Further evidence of the presence of secondary woodland is provided by charcoal identified from the hollow as pine. Pine is thought to have migrated further north than Sussex by this period, but is also known to be a good early woodland coloniser (Rackham 1986). If this is the case it would suggest that after the formation of Context 1038 in the Mid/Late Neolithic, the immediate area was abandoned to nature and secondary woodland developed. All traces of the soil that must have once existed during the time of woodland development must have been removed by erosion, probably associated with renewed farming later in the Bronze Age. It is likely, based on particle size analysis of 1035, that soils in this secondary woodland were similar to those in Context 1038 and largely of loessic material, therefore being susceptible to erosion as discussed above. In the EBA/MBA, the palaeosol 1035 developed, and was associated with a large-scale clearance of most of the remaining vegetation. That this occurred is demonstrated by extremely high magnetic susceptibility readings at the bottom of the layer, that can only have been caused by burning taking place *in situ* (i.e. by directly affecting the finer particles (Mullins 1977)). After this point there is no further evidence for shade of any sort, and therefore it is likely that farming was the prevalent cause of subsequent hillslope erosion and consequent valley bottom deposition.

Colluvial deposits accumulating above Context 1035 were all being deposited in an open environment. The accumulation would seem to have begun during the LBA or EIA (evidence from ceramics found in Context 1035 and the bottom of Context 1034), and was most likely the result of agriculture. However, erosion does not seem to have been intense until the Romano-British period. In this, and the subsequent Medieval period, agriculture would appear to have become more intensive, leading to greater sediment deposition in the valley bottom. Therefore it is likely that by this stage arable agriculture was being practised on the slopes of the dry valley. The hillside soils also appear to have been getting progressively thinner throughout the Romano-British and Medieval periods because of erosion caused by the ploughing. This is shown in particular by the increasing abundance of chalk granules upwards through Contexts 1034 and 1033, and a lightening of sediments compared to those from the Bronze and Iron Ages (i.e. the later deposits have higher percentages of incorporated chalk). The chalk is almost certainly derived from the bedrock by erosive processes associated with ploughing.

However, at some point during the Medieval period the practice of arable agriculture seems to have ceased and a grassland environment came into existence. This would seem to have been of a short sward suggesting in turn that it was heavily grazed. Along with this alteration to the environment there appears to have been a reduction in the sedimentation rate consistent with a less intensive (and destructive) use of the landscape. It is tempting to date this change to the Late Middle Ages when a pastoral-based economy is thought to have been dominant (Pelham 1934), but there is no secure chronological information on which this can be based.

At some point following the Middle Ages arable agriculture was reintroduced, and just prior to the valley's destruction (i.e. filling to build a road embankment) it was being used to grow organic cereals.

EASTWICK BARN VALLEY BOTTOM

Introduction

The valley bottom trench at Eastwick Barn was located at NGR TQ 319096 (Fig. 6.2) at *c*.90m OD. The valley is bordered by the Ditchling Road to the east and modern development (including the Hollingbury industrial estate) to the south and south-west. At the point examined the valley bottom is fairly narrow, but flat. To the north-east, however, the valley twists towards the north and steepens. The eastern slope of the valley, adjacent to the transect trench, is very steep with lynchets covering the slope. However, the western side of the valley at this point, although still containing lynchets, is much more gentle giving the valley an asymmetrical profile at the point sampled. The field containing the trench was under long-standing pasture at the time of excavation.

Archaeological background

The area surrounding this valley bottom trench is rich in archaeological remains. The whole area, including the adjacent slopes, is covered by Iron Age and Romano-British field systems, many of which have been badly damaged/destroyed by modern cultivation. The lynchets immediately surrounding the valley bottom trench were well-preserved and were a focus of excavation during the project (*see* Section 6). A valley bottom rectilinear earthwork existed just to the north of the trench, and this has been interpreted as a Medieval stock enclosure (*see* Section 6). Other sites in the area, particularly those of the settlements which possibly cultivated the field system, have been discussed under the results of the field system excavations (*see* above).

Sampling strategy

The density of lynchets (and the presence of the valley bottom enclosure) meant it was virtually impossible to place the 8.8m × 2m trench without cutting one of the these features. The trench therefore clipped a lynchet at its eastern end. The thickness of colluvium within the valley measured only *c*.0.9m in most places. Considering the amount of cultivation that must have taken place on the adjacent slopes (attested by the large lynchets), this is highly unusual. Unfortunately, as with Benfield Valley, very little pottery was recovered to date the colluvium, and preservation of mollusc shell was extremely poor. For this reason no detailed palaeoenvironmental work was carried out.

The stratigraphic sequence (Fig. 8.14)

The main sediment type at Eastwick Barn Valley Bottom consisted of a flint gravel (although no chalk), with a silt or

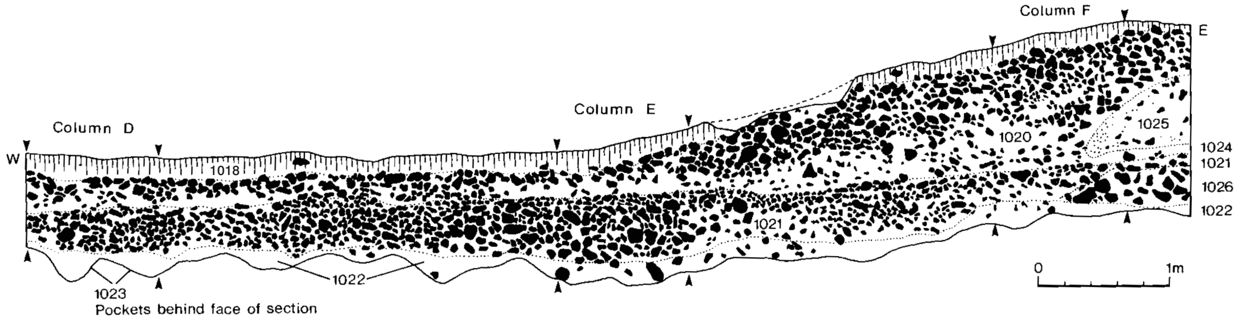

Fig. 8.14 Eastwick Barn Valley Bottom: Section.

Table 8.8 Eastwick Barn Valley Bottom: Context descriptions.

Context	Description
1017	General clearance
1018	Grey brown humic silt with. 2% pebble-sized flint fragments and occasional chalk granules. *Turf and worm-sorted topsoil.* Abrupt boundary to 1020
1019	Pale grey brown humic silt with 2% flint pebbles and chalk granules. *Area of hill wash at centre of valley?* Abrupt boundary to 1020
1020	Mid yellow brown clay/silt with 50% cobble-to boulder-sized flint nodules and angular flint. Larger flints concentrated at top of layer. *Lynchet bank and eroded material.* Abrupt boundary to 1021:
1021	Light yellow brown clay/silt with 75% cobble- and boulder-sized flint fragments and occasional chalk granules. Flints compacted and ill-sorted. Abrupt boundary to 1022:
1022	Orange brown clay with occasional boulder-sized flint nodules. Rests on irregular face of chalk bedrock or 1023 where it occurs
1023	Dark orange brown clay with 5% cobble-sized angular flint. (Only exposed after the removal of artefact columns – rests on chalk bedrock and in sub-soil hollows cut into it)
1024	Red brown clay/silt with occasional pebble-sized flint fragments
1025	Pale to mid brown clay/silt with 40% granular-sized chalk fragments, occasional charcoal flecks and flint fragments
1026	Lens of boulder-sized flint nodules at eastern end of trench. Same as 1021?

clay matrix, and was generally poorly sorted. Layers 1021 and 1026 may represent the onset of intensive arable agriculture and/or high energy erosion events. Much of the accumulation above this level can be seen as representing the flint bank forming the lynchet and its subsequent erosion (layer 1020). The one variation to this was found at the eastern end of the trench, where a very fine, virtually flint-free, deposit was found (1025). The morphology of this deposit, in addition to the way it interdigitated with the flint-rich deposits would seem to indicate it was the result of a single event, while the mechanism of erosion is most likely to have been overland flow. The stratigraphic layers are recorded in Table 8.8.

Dating

Very few datable artefacts were located during the excavation of the three 1.0m × 0.5m artefact columns (Fig. 8.14: D–F). All excavated material has been listed in the archive, and only the flintwork and pottery have been plotted in this volume (Fig. 8.15).

The flintwork

Robin Holgate

The stratigraphically lowest layer containing worked flint (1021) produced a number of flakes and blades, four cutting flakes and blades, two sidescrapers (i.e. No. 30) and a miscellaneous retouched flake, indicating that activity took place on the valley slopes and floor during the later Neolithic/earlier Bronze Age. This occurred before the evolution of intensive agriculture in the Later Bronze Age/ earlier Iron Age. The middle and upper layers (1018, 1019 and 1020) produced mainly residual later Neolithic/earlier Bronze Age débitage and scrapers.

The pottery

Sue Hamilton

Few sherds were recovered from the valley bottom, but those which were are all of LBA/EIA date suggesting that this was a notable phase of land usage/clearance.

Palaeoenvironmental investigations

For the same reasons as those encountered at Benfield Valley (*see* above) no molluscan analysis was carried out at Eastwick Barn Valley Bottom.

Discussion

Although the flintwork from the valley bottom trench suggests activity during the later Neolithic/EBA, the lack of

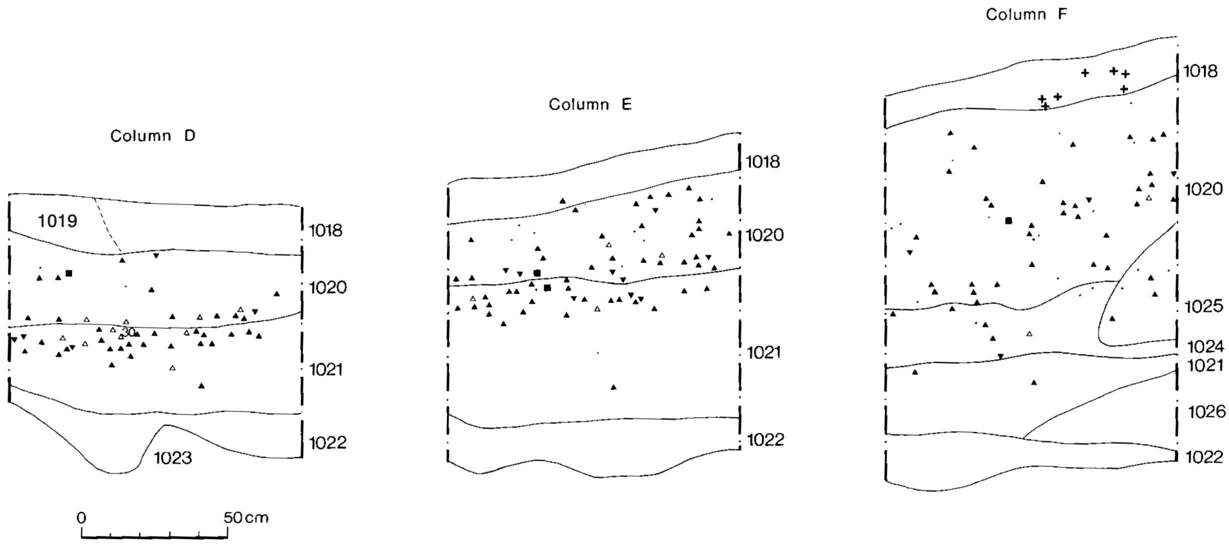

Fig. 8.15 Eastwick Barn Valley Bottom: Artefact distribution.

ceramic material makes it impossible to ascertain whether Context 1021 was deposited in this period (in part at least) or whether the colluvium from this period has been lost from the dry valley system by valley axis erosion.

All the pottery recovered from the trench is of an LBA/EIA date. This is somewhat surprising when the evidence from the surrounding lynchets is considered (*see* Section 6). Intense Romano-British arable cultivation is apparent not only from the upper deposits in these lynchets, but also from the relatively high number of Romano-British sherds incorporated in them. The lower layers are of an LBA/EIA date, which conforms with the ceramic evidence for the valley bottom colluvial deposits.

The reason for the colluvium being of solely prehistoric date, as well as being extremely shallow despite the steep eastern valley side, is probably due to the effect of the surrounding lynchets. It seems that colluvium was deposited on the valley floor during the initial intense cultivation of the valley during the prehistoric period. Once the lynchets had reached a certain size they appear to have prevented colluvial deposits from reaching the valley bottom and therefore no Romano-British material was incorporated in the valley bottom deposits. This obviously demonstrates the problems in interpreting other colluvial deposits, as the effect of lynchets may be either to prevent material entering the valley bottom or, if the lynchets are later eroded by ploughing, to create a severe delay in artefact incorporation.

The part of the valley sampled has probably seen little arable cultivation since the Romano-British period as the lynchets seemed to have suffered comparatively little erosion (a suggestion strengthened by the presence of the Medieval valley bottom stock enclosure). Any Medieval cultivation which took place probably respected the existing field boundaries and it seems that deposition of colluvium into the valley bottom did not occur.

Analysis of pottery sherds from dry valley accumulations in the Brighton area: their chronology and the implications for interpretation of adjacent landscape exploitation

Sue Hamilton

The pottery recovered from the dry valleys discussed above comprised small eroded sherds. Almost all of the sherds lacked diagnostic form features. The sherds were therefore attributed to date ranges using the criteria of fabrics. Prehistoric pottery, in particular, can vary considerably in its fabric characteristics from region to region. In order to ascribe approximate period dates to particular fabrics a sound local chronological sequence of well-contexted pottery with defined fabrics is required. Two local sites, Thundersbarrow Hill (Hamilton, forthcoming) and Hollingbury (Hamilton 1984), provide such sequences. The extensive first millennium BC fabric sequence for Bishopstone, near Newhaven (Hamilton 1977; Hamilton forthcoming), provided additional date indicators.

The prehistoric, Anglo-Saxon, Saxo-Norman and Medieval sherds from the dry valleys under consideration have been given fabric numbers to aid inter-site cross-referencing of fabrics. The Roman and Post-Medieval fabrics have been discussed under established general fabric groupings which are widely used and have a broader geographical applicability.

Fabric types

The fabric categories isolated and discussed below are central to the discussion of the chronology of sherd stratification at the dry valley sites under consideration. The fabric types listed below are isolated, defined and dated by comparison with stratified assemblages with defined fabric types and secure chronologies.

All descriptions of inclusion size are based on measurement of inclusions along their longest axis. Inclusions are classified according to the Wentworth sedimentological scale (Krumbein and Pettijohn 1938: 80) as is given in Table 8.9 below.

Estimates of inclusion abundance are based on comparison with a visual reference collection of quantified standards.

Late Neolithic/Early Bronze Age fabrics

Fabric A. Silty shell (Toadeshole Bottom East)

This is a thin-walled fine silty fabric with occasional fine to medium shell inclusions. The surfaces are burnished and have incised line decoration. The fabric is reduced throughout. A Late Neolithic to EBA date seems likely for this fabric.

Late Bronze Age/earlier Iron Age fabrics

Fabric 1. Coarse flint (Toadeshole Bottom West)

This is a coarse, flint-tempered fabric with an estimated 5% of its flint inclusions in the granule-sized category. The majority of the flint inclusions comprise very coarse and coarse sand-sized grades. A minor quantity of coarse sand-sized and medium sand-sized quartz inclusions, probably natural to the clay, are also present. The sherd thickness is approximately 9mm. The fabric compares with Thundersbarrow Hill Fabric 1 (Hamilton, forthcoming), Bishopstone Fabric 1b (Hamilton 1977: fig. 22) and Hollingbury Fabric 1 (Hamilton 1984: 57), all of which are dated to the LBA. Toadeshole Bottom West Fabric 1, together with Thundersbarrow Hill Fabric 1, are generally reduced throughout and differ in this respect from the Bishopstone and Hollingbury coarse flint fabrics which have a characteristic purple-coloured external surfaces.

Fabric 2. Medium flint (Cockroost Bottom; Hangleton Bottom; Benfield Valley; Toadeshole Bottom West; Toadeshole Bottom East; Eastwick Barn Valley Bottom)

This flint-tempered fabric is dominated by coarse and medium sand-sized grade flint inclusions. An estimated 5–8% of the flint inclusions are in the very coarse sand-sized grade. The fabric compares with Hollingbury Fabric 3, which is dated to the EIA (Hamilton 1984: 57). A minor amount of coarse and medium sand-sized grade quartz, natural to the clay, is present (under 10% of the total number of inclusions). Sherd cores are reduced. Exterior and interior surfaces are reduced with evidence of patchy oxidisation. Sherd wall thickness averages approximately 8mm. Toadeshole Bottom West produced one diagnostic sherd (Fig. 8.9: No.175), namely an out-turned, rounded rim from a shouldered bowl. Toadeshole Bottom East also produced a single diagnostic sherd, a flat-topped out-turned rim from a shouldered jar (No. 299). Both of these diagnostic sherds are in keeping with an LBA/EIA date for the fabric. The lack of any rim-top decoration or any other decorated sherds suggests that an LBA date may be more likely (Barrett 1980).

Table 8.9 Size classification for fabric inclusions.

Name	Grade limits (diam. in mm)
pebble	64.0–>4.0
granule	4.0–>2.0
very coarse sand	2.0–>1.0
coarse sand	1.0–>0.5
medium sand	0.25–>0.5
fine sand	0.125–>0.25

Fabric 3. Fine flint (Toadeshole Bottom West; Toadeshole Bottom East)

'Fine', medium sand-sized grade flint tempering dominated this fabric. There is a scattering of fine sand-sized grade quartz inclusions. The fabric is thin-walled (approximately 4mm wall thickness) and generally reduced throughout, with burnished external surfaces. There are no local well-contexted parallels for this fabric, but comparable fine fabrics occur elsewhere in LBA contexts, for example Yapton Fabric 3, West Sussex (Hamilton 1987: 59).

Fabric 4. Pisolitic iron oxide (Toadeshole Bottom West)

Pisolitic iron oxide fabrics are variably present among the fine wares of East Sussex LBA and earlier Iron Age assemblages. Their main distribution is east of the River Adur (Hamilton, in prep.) Inclusions comprise prolific pisolitic iron oxide grains which are of medium sand size. Associated with the iron oxides are medium and fine sand-grade quartz inclusions. Some sherds evidence medium abundant flint tempering of coarse sand size and medium sand size. The fabric has a grainy texture. Fired colour varies from buff to dark red-brown with the core and interior surface usually being reduced. Sherd cross-sections average 6mm.

The quantity of pisolitic iron oxides present suggest an earlier Iron Age date for the fabric with comparisons with Thundersbarrow Fabric 6 (Hamilton, forthcoming), Hollingbury Fabric 4 (Hamilton 1984: 57) and Bishopstone Fabrics 3b and 3c (Hamilton 1977: 90). The Bishopstone iron oxide fabrics are associated with pedestalled vessels. Hodson (1962: 142) recognised that the adoption of pedestalled bases in Britain could not have occurred before the sixth century BC. Pedestalled vessels in Britain appear essentially to have a date range of *c*. fifth to third centuries BC. A bronze brooch from layer 2 of the Bishopstone enclosure ditch (Bell 1977: 131, fig. 63: 28) found in association with iron oxide fabrics provides closer dating for the fabric. This Bishopstone brooch can perhaps be ascribed a later fourth-century date based on its comparison with a brooch from Hammersmith (Hodson 1971: 50–57: brooch B). Two brooches from the lynchet system at Eastwick Barn found in contexts dominated by Fabric 4 again suggest an Early/Middle Iron Age date for the fabric (*see* below for further discussion).

Fabric 5. Coarse quartz sand (Hangleton Bottom; Toadeshole Bottom West; Toadeshole Bottom East; Eastwick Barn Valley Bottom)

This fabric is similar to Thundersbarrow Hill Fabric 4 (quartz sand) and Fabric 5 (quartz sand and flint) (Hamilton, forthcoming), and Hollingbury Fabric 2 (Hamilton 1984:

57). Inclusions comprise abundant transparent to translucent, sub-rounded and rounded quartz sand grains of predominantly coarse and medium sand-sized grades. The quartz grains frequently have 'frosted' surfaces. Some sherds also evidence scattered flint tempering of coarse and medium sand-sized grades. The quartz sand may be deliberate tempering with beach sand as one possible source (Hamilton 1984: 58). The fired colour of the exterior and interior surfaces is variously orange, dark-red and dark-brown colour, but with the colour being consistent on individual sherds. Sherd sections are approximately 7–8mm in thickness.

Fabrics 6, 7 and 8

These fabrics were not present in the dry valley accumulations discussed here, but were associated with the Eastwick Barn lynchet accumulations and are described and discussed in that section of the text (*see* above).

Fabric 9. Fossil shell (Toadeshole Bottom East)

Fragments of Eocene fossil shell are present in this fabric. The majority of sherd cores and surfaces are soot black to dark grey in colour. Sherd sections average 9mm. Eocene fossil shell fabrics have now been recorded in a number of local LBA assemblages. The suggested source of the clay is Castlehill, Newhaven (Hamilton 1977: 92). Assemblages with this fabric type include Thundersbarrow Hill (Fabric 3: Hamilton, in prep.) and Highdown Hill (Hamilton, in prep.). This LBA fabric type was first isolated and extensively studied at Bishopstone. Bishopstone was the sole, or major, production source for pots made of this clay (Hamilton 1977: 89, 92).

Late pre-Roman Iron Age fabrics

Fabric 10. Sussex Ouse Valley Ware (Hangleton Bottom)

This fabric, which is represented by a single definite sherd from Hangleton Bottom, has abundant tempering (measuring up to 2mm) of brown/grey to black grog. External surfaces and cores are dark grey. The sherd section measures 6.6mm. Eocene fossil shell inclusions are also present. Grog-tempered fabrics are common on East Sussex sites relating to the time of the Roman conquest. They have received detailed study at Bishopstone (Fabric 5: Hamilton 1977: 91) and Testers (Fabric 5: Hamilton 1988). Production continues little changed into the post-conquest period (*see* below: East Sussex Ware). Without good contextual evidence, it is difficult to ascertain whether individual grog-tempered sherds relate to pre-conquest or post-conquest chronologies. The presence of Eocene fossil shell inclusions, noted also in the Bishopstone late pre-Roman Iron Age grog-tempered assemblage (Hamilton, in prep.: 10.6.4), may be indicative of a pre-Roman date for the Hangleton sherd.

Romano-British fabrics

Fabric group 11. East Sussex Ware known also as Cooking Jar Fabric (Benfield Valley; Toadeshole Bottom West; Toadeshole Bottom East)

These grog-tempered sherds appeared to be of post-conquest date. They are distinguished from the pre-conquest 'Sussex Ouse Valley Ware' grog-tempered tradition (*see* above) by the fact that the grog inclusions are more multi-coloured and more loosely bonded into the clay matrix. The fabric is described in detail by Green (1977, 1980). One out-turned rim sherd from a necked, shouldered jar (Fig. 8.9: No. 243) was recovered from Toadeshole Bottom West. This fabric remained common in East Sussex until at least the end of the third century AD.

Fabric group 12. Quartz sand, grey wares (Hangleton Bottom; Toadeshole Bottom West)

Green (1977: 156) provides a general discussion of the Sussex pottery which falls within this recognised fabric designation.

Fabric group 13. Quartz sand, buff wares (Benfield Valley; Hangleton Bottom; Toadeshole Bottom West; Toadeshole Bottom East)

The few eroded sherds recovered in this category have the characteristics of Porchester fabric D, a distinctive fourth-century AD fabric (Green 1977: 157). These are present in the topsoil at Benfield Valley, and there is one such sherd in layer 1042 and another two sherds in layer 1043 at Toadeshole Bottom West. Another single sherd in this fabric is present in layer 1030 at Toadeshole Bottom East.

Fabric group 14. Quartz sand, orange/red wares (Benfield Valley; Hangleton Bottom, Toadeshole Bottom East)

These wares provided no specific chronological indicators but are clearly wheel-thrown Romano-British wares.

Fabric group 15. Silty wares (Hangleton Bottom; Toadeshole Bottom West)

This category includes colour-coated wares. All sherds were very eroded. No visible inclusions are present, with the matrix comprising silt-sized particles (<0.25mm). The sherds are thin-walled (0.5mm), wheel-thrown and oxidised orange throughout. The sherds do not provide enough evidence for precise dating.

Fabric group 16. Samian (Toadeshole Bottom East)

One abraded body sherd.

Anglo-Saxon fabrics

Fabric 17. Coarse multicoloured flint grits, dark brown ware (Hangleton Bottom; Toadeshole Bottom West)

This fabric compares with Bishopstone Anglo-Saxon Fabric 2 (Bell 1977: 229). Its most obvious distinguishing feature is a quite abundant filler of sub-angular pieces of flint belonging to coarse and medium sand grades. These are slightly polished with multicoloured white, red, grey or pink surface patination. This multicoloured grit resembles beach sand and this is its possible origin. Some medium sand-sized shell inclusions are also occasionally present. A mid-fifth to mid-sixth-century date has been suggested for the beginnings of this fabric tradition (Bell 1977: 235). Fired matrix colour is generally dark grey, dark brown, or black. Sherd thickness measures 6–7mm. The fabric has a tabular break pattern. One diagnostic form sherd was recovered from Toadeshole Bottom West (Fig. 8.9: No. 219), namely an out-turned rim of mid- to late Anglo-Saxon date (M. Gardiner, pers. comm.).

Saxo-Norman fabrics

Fabric 18. Multicoloured flint with quartz sand, buff/orange ware (Benfield Valley; Hangleton Bottom; Toadeshole Bottom West)

The fabric has quite abundant inclusions of red, white and grey patinated flint of medium, and sometimes coarse sand-sized grades. Generally these inclusions are a little 'finer' in size than those of Fabric 17 (*see* above). Scattered medium to abundant fine and medium sand-sized quartz grains are also present. These quartz grains are sub-angular to rounded, polished and translucent to transparent. Sherd fracture is tabular and sherd thickness is *c*.6mm. External surfaces are generally fired to buff/orange in colour. Sherd cores are dark brown/dark grey. Benfield Valley produced one unstratified diagnostic form sherd; a flattened rim, slightly expanded on its exterior side.

Fabric 19. Fabric DA (Adur Valley); scattered fine quartz sand with limestone fragments (Hangleton Bottom)

This fabric is ascribed a tenth-century, pre-1150 date. The fabric has been found at Botolphs, Bramber and has been isolated and defined by Gardiner (1990: 253). Medium and fine sand-sized sub-rounded quartz grains are present together with rounded very coarse sand-sized limestone fragments. The latter are mostly dissolved out giving the fabric a corky texture. The fabric has a jagged fracture. Sherd thickness measures *c*.5mm. Sherd cores are mid to light grey. Internal surfaces are dull red to orange and external surfaces mid grey, but this can be reversed.

Fabric 20. Fabric DB (Adur Valley), quartz sand and limestone fragments (Toadeshole Bottom West)

This fabric also occurs at Botolphs, Bramber (Gardiner 1990: 254) and is a variant of Adur Valley Fabric DA (*see* Fabric 19 above). Fine and medium sand-sized quartz grains occur more frequently (medium abundance) than in Fabric DA. Some coarse sand-sized flint inclusions are also present, together with a scattering of very coarse sand-sized limestone. The fabric has a buff/red exterior, grey core and grey or red exterior. Sherd thickness measures *c*.5mm.

Fabric 21. Quartz sand and multicoloured flint with shell (Toadeshole Bottom East)

Moderately abundant coarse, medium and fine sand-sized grade polished quartz is present. These quartz grains are clear to translucent/milky. Some very coarse, and more often coarse, sand-grade multi-patinated (black/grey/white) flint is also present. The fabric has a grainy fracture. Surfaces are generally oxidised and the core dark. Sherd thickness measures *c*.6mm.

Later Medieval fabrics

Fabric 22. Quartz sand and finer multicoloured flint (Hangleton Bottom; Toadeshole Bottom West)

Moderately abundant polished, clear coarse, medium and fine sand-sized quartz grains predominated in this fabric. Multi-patinated (brown, grey and white) coarse sand-sized flint inclusions are also present. Some coarse sand-sized shell is also occasionally present. Surfaces are generally oxidised orange and the cores dark brown/black. Sherd thickness measures *c*.5–6mm. A twelfth–fourteenth-century date range is suggested for this fabric (M. Gardiner, pers. comm.).

Fabric 23. Coarse quartz sand and white patinated flint (Hangleton Bottom; Toadeshole Bottom West; Toadeshole Bottom East)

Abundant coarse, together with medium, sand-sized quartz grains dominated this fabric. These quartz grains are sub-angular to sub-rounded, polished and translucent (milky). Some coarse sand-sized (and occasionally very coarse sand-sized) polished, white-patinated flint is also present. Occasional, friable very coarse sand-sized specks of haematite also occur. Sherd surfaces are mostly oxidised orange/red and cores are dark brown/black. Sherds with dark surfaces also occur in this fabric. Sherd thickness measures 5–6mm. A date range of thirteenth–fourteenth centuries is probable for the fabric (M. Gardiner, pers. comm.).

Fabric 24. Coarse and medium quartz sand, with haematite specks (Hangleton Bottom)

Moderately abundant coarse and medium sand-sized quartz grains characterise this fabric together with occasional specks of friable coarse sand-sized haematite. The quartz grains are polished, sub-rounded to rounded in morphology and clear to translucent (milky). Sherd surfaces are orange/buff and cores grey/dark grey. Sherd thickness measures *c*.5.5mm. A date range of thirteenth–fourteenth centuries can be placed on the fabric (M. Gardiner, pers. comm.).

Fabric 25. Coarse quartz sand (brown glazed vessel interiors) (Toadeshole Bottom West)

Fabric 25 has medium abundant very coarse (occasional), coarse and medium size quartz sand. This sand is sub-angular to sub-rounded, polished and consistently of milky translucency. Surfaces and cores are oxidised an even buff/orange colour. A brown glaze with iron-rich dark specks is present on the internal sherd surface. This fabric has a fourteenth–fifteenth-century date (M. Gardiner, pers. comm.).

Post-Medieval fabrics

Fabric group 26. Earthenwares (including those with brown/red glazes) (Hangleton Bottom)

Fabric group 27. Stonewares (including those with white glazes) (Hangleton Bottom)

Conclusion

It is important to note that the sherds in slope-wash deposits while denoting sequential phases of activity in the vicinity of each valley bottom, are, at best, in a context of secondary deposition. Drewett (1982a: 208) has pointed out that clearance of rubbish onto fields may have taken place intermittently. Subsequent ploughing may result in earlier sherds moving downslope in plough wash without sherds contemporary with the phase of clearance/ploughing being present. The collective stratigraphic sequence of sherds from the valley bottoms under consideration indicates three, and possibly four, major phases of local landscape occupation, namely an LBA/EIA phase, a Roman phase and a Medieval phase. Some Saxon-Norman activity is also evidenced at Toadeshole Bottom East. The absence of middle and late pre-Roman Iron Age activity is notable and interesting. The presence of Saxo-Norman and Medieval layers of major accumulation suggests a sustained agricultural impact in this area of Sussex from the end of the Saxon period. The wholly EIA/LBA accumulation at Eastwick Valley Bottom is also notable.

The flint

Robin Holgate

The valley bottom excavations produced a total of 520 worked flints. Most pieces consisted of hard hammer-struck débitage of cutting, scraping and piercing implements fashioned out of hard hammer-struck flakes. The majority of this material probably dates to the later Neolithic/earlier Bronze Age, although some pieces could be Later Bronze Age in date, and was recovered in varying quantities from all six valley bottoms (Table 8.10). About 20 soft hammer-struck blades and bladelets, probably dating to the Mesolithic period, were recovered mostly from Cockroost Bottom; however, one or two pieces were also retrieved from Hangleton Bottom, Benfield Valley, Toadeshole Bottom West and Toadeshole Bottom East.

The recovery of flintwork from all six valley bottoms shows that this section of the South Downs was exploited to some degree during the Mesolithic period, with more intensive land-use ensuing during the later Neolithic/earlier Bronze Age and probably continuing throughout the Later Bronze Age. It is unlikely that any of the flintwork is associated with *in situ* domestic activity (*cf.* Kiln Combe, near Eastbourne, where a valley bottom excavation produced evidence of settlement: Bell 1983), as no cores and only a minimal range of implements were retrieved. Of the implements recovered, cutting and scraping tools predominated (Table 8.10). The scrapers included mostly sidescrapers or endscrapers, one of which had invasive retouch, but also included hollow scrapers, a nose scraper and a double-ended scraper. One endscraper was a backed knife that had subsequently been modified for use as a scraper. All the knives were backed and the rod fragment could have once been the 'butt end' of a fabricator.

Discussion: palaeoenvironment and past land-use in the Brighton area

A large amount of data has been accumulated during the work on the six dry valleys (seven including Sweetpatch – *see* Section 12). The location of certain dry valleys, close to some of the settlement sites investigated, is of especial interest and although the interactions between these sites and the resultant colluvium in the valleys cannot be fully understood in many instances, it is possible to draw some general conclusions.

Table 8.10 The Valley Bottom sections: The flintwork.

	Flakes	Blades	Bladelets	Shattered pieces	Misc. retouched pieces	Cutting flakes/blades	Scrapers	Piercers	Knives	Rod	Notched flake	Total
Cockroost Bottom	79	9	5	2	8	3	2	–	–	–	–	108
Hangleton Bottom	26	1	1	1	1	2	2	–	–	–	–	34
Benfield Valley	44	–	1	–	2	–	3	1	2	1	–	54
Toadeshole Bottom West	34	4	–	–	3	6	6	–	–	–	–	53
Toadeshole Bottom East	95	6	–	–	1	–	4	–	–	–	2	108
Eastwick Barn Valley Bottom	127	14	2	–	3	8	9	–	–	–	–	163
Total	405	34	9	3	18	19	26	1	2	1	2	520

Although the thickness of colluvium at Cockroost Bottom was surprisingly shallow considering the amount of activity on the adjacent slopes (*see* Section 2), many of the dry valley sediments present appeared to date to the same general period. How much earlier colluvial material had been lost via valley axis erosion could not be ascertained with any certainty and unfortunately, the poor mollusc shell preservation limited the accuracy of any palaeoenvironmental hypothesis that could be made.

Evidence from unstratified flintwork and the three features dated by AMS at Redhill (*see* Section 5; 2890–2450 cal BC (OxA-3246; 4060±80 BP); 2450–1880 cal BC (OxA-3247; 3700±80 BP); and 2470–2030 cal BC (OxA-3248; 3810±70 BP)) correlates with the Late Neolithic/EBA AMS date for the possible hearth (1029) in adjacent Toadeshole Bottom East (2140–1690 cal BC (OxA-3078; 3560±80 BP) and 2180–1680 cal BC (OxA-3079; 3550±90 BP)) and therefore a relatively high degree of activity may be postulated in this vicinity in this period. The exact form of this activity, however, is very difficult to ascertain from the valley sediments as there appears to be a hiatus in deposition between the Mid-Neolithic palaeosol (1038) and that of the MBA (1035) (excepting the 'hearth' 1029). This hiatus suggests that no agricultural cultivation took place and that there was possibly a phase of woodland regeneration. It is thus possible that during the Late Neolithic/EBA the valley was utilised for hunting. However, farming is attested by the flintwork from the site at Redhill, but again its exact nature and indeed location is unknown.

Evidence from the field system and valley bottom trench at Eastwick Barn is most revealing when considering the effect lynchets can play in the formation (and incorporation of datable material) of colluvium. However, not one of the dry valleys produced any strong evidence (either in terms of features or density of artefacts) for valley bottom settlement. As the number of sample sites and the area of each investigated was small, this has little statistical validity in showing whether valley sites were densely settled in the past or not.

As part of the current investigation brief it was important to model environmental change in the Brighton area through the late glacial and Holocene periods. In addition to material from the six valleys studied, the results of three other molluscan studies in the Brighton area are included – the dry valleys at Devil's Dyke (Ellis 1985, 1986), Sweetpatch Bottom (*see* Section 13) and the examination of samples from a ditch at the Neolithic causewayed camp at Whitehawk (Thomas 1996). The subject is discussed below sequentially and in relation to recognised archaeological periods. However, this is not an ideal way of considering the data as many changes in environment and of erosional patterns do not match the cultural changes as recognised by archaeology.

Before attempting to reconstruct the past environmental change it is worth noting some of the many problems in constructing such a hypothetical model accurately from dry valley data.

Chronological problems

All the valleys have – to a greater or lesser extent – problems of dating the colluvial stratigraphy. The general lack of datable artefacts recovered (particularly pottery) is due both to the relatively small volume of the hand-excavated artefact columns and to other factors. For example, differential manuring patterns (i.e. less intense arable cultivation resulting in less manuring), or manuring practices (domestic rubbish not being incorporated with the manure), would obviously have had a direct effect on the quantity of ceramics incorporated in colluvium. Similarly, the distance of the settlement from the valley trench would also have an effect, as would differential artefact preservation. Much prehistoric pottery, being low-fired and friable, has probably disintegrated during its erosion/transportation into the valley bottoms and is therefore under-represented compared to later fabrics. Other factors concerning the mode of incorporation of material have been emphasised at Eastwick Barn where the presence of lynchets means the colluvium found in the valley bottom is earlier than that found on the valley sides (*see* Section 6). Finally, there is the problem of differentiating between the less diagnostic pottery fabrics, for example Fabrics 10 and 11.

Palaeoenvironmental problems

Although the poor preservation of mollusc shell in some valleys/layers is an obvious hindrance, there are other considerations of shell incorporation in colluvium that need to be addressed. At present the catchment area for sediment (and therefore also mollusc shells) reaching each valley bottom is not known for certain. For the purpose of this discussion, however, it has had to be presumed that the mollusc shells recovered from a single valley location are representative of the valley as a whole, something which is known not always to be the case (Allen 1992). There are also further problems of shell taphonomy that are rather better known, for example robust shells such as those of *Pomatias elegans* and the Clausiliidae survive better than fragile shells such as those of the Zonitidae. The nature of shell taphonomy in calcareous soils has been studied in some detail (Carter 1990). These studies demonstrate that movement of material (including shells) by soil fauna (both upwards and downwards) is a problem, but alleviated in the cases of some sediments (such as many of those found in dry valleys) by a high sedimentation rate. Therefore in palaeosols, such as Contexts 1038 and 1035 at Toadeshole Bottom East for example, only the top *c*.50mm will be representative of the contemporary environment, while in rapidly accumulating sediments, such as Context 1034 at the same site, the mollusc assemblage is probably more representative of the contemporary environment.

The Devensian Late Glacial

Only Toadeshole Bottom East produced fossiliferous material dating to this period, although virtually every other dry valley site had solifluction deposits underlying the Holocene colluvial layers. The sediments surviving at Toadeshole Bottom East consisted of soliflucted medium and small chalk pellets, contained within a silt matrix. Similar deposits of this date have been recorded from many sites in Kent (Kerney 1963) and at Asham Quarry near Lewes (Williams 1971; Ellis 1986). However, fossiliferous solifluction deposits are likely to have once existed in the other dry valleys, but to have subsequently been eroded during the Holocene either by hydrological changes or farming.

The molluscan assemblage found in the solifluction of Toadeshole Bottom East is a typically restricted one indicative of open and cold environments, while the actual sediment itself was probably deposited by mass movement during summer thaw of permafrost. No absolute dating of the deposit was possible, but the assemblage most closely correlates with Kerney's (1977) zone Z, which has been dated to 11,900±160 BP (Q-618) and 11,934±210 BP (Q-463) in Kent. In Kent this period is characterised as being dominated by Gramineae and herbaceous plants, although pollen studies show that species of tree such as birch (*Betula nana*) and pine (*Pinus* sp.) were beginning to colonise. However, it would appear that there are some noticeable differences between the Toadeshole Bottom East mollusc assemblage and those in Kent (Wilkinson 1993), and therefore the dating of the deposit should not be taken as certain. There are no archaeological sites in the Brighton area of this period, although there are isolated findspots of Upper Palaeolithic artefacts (Drewett *et al*. 1988).

Early Holocene to *c*.3800 cal BC (5000 BP)

Two sites contain shell-bearing deposits of this period, namely Devil's Dyke and Toadeshole Bottom East. In both cases the sediments were in a secondary context, either as erosional material in subsoil hollows or through compression and mixing with late glacial deposits. This period in southern Britain is considered to have been dominated by forest and thus the diversity of habitats available for newly colonising mollusc species would be great. Therefore the molluscan assemblages found mixed with late glacial deposits at Toadeshole Bottom East and Devil's Dyke are essentially similar in character, but different in detail, i.e. in proportions of individual species, and even in the species recovered. However, they are more similar to each other than to (presumably) contemporary mollusc zone d assemblages described from Kent by Kerney *et al*. (1980) where the 'type sites' for Holocene mollusc colonisation are found. Zone d has been dated to 7,500± 100 BP (St-3410) in Kent, while distinctive assemblage changes are noted prior to this. Therefore it would seem that a hiatus of at least 3,000 years exists at both Toadeshole Bottom East and Devil's Dyke between the earliest Holocene assemblages. The fact that the zone d assemblages are from either re-worked or erosional sediments probably indicates that deposits dating to earlier in the Holocene period (i.e. mollusc zones a–c) have been lost to subsequent erosion, and thus there is no available palaeoenvironmental evidence relating to mollusc zones a–c in the Brighton area at present. However, pollen data from the nearby Vale of Brooks suggest that deciduous forest was the main vegetation type in the region prior to the Neolithic (Thorley 1981). The mollusc assemblage from the Devil's Dyke and that recorded mixed with late glacial deposits at Toadeshole Bottom East are probably of a similar date. However, the assemblage from the subsoil hollow at Toadeshole Bottom East would appear to have a slightly different composition of species and is possibly slightly later. How much later is not known, although the layer stratigraphically above it is a Middle to Late Neolithic palaeosol. At both Toadeshole Bottom East and Devil's Dyke close woodland is postulated.

The Early and Middle Neolithic

Two sites in the area have deposits dating from this period – Whitehawk Causewayed Enclosure and Toadeshole Bottom East. It is also possible that the other dry valley sites contained Early and Middle Neolithic deposits, but due to problems of dating they have not been recognised. This was because at all sites other than Toadeshole Bottom East it was impossible to date the earliest deposits as they contained no pottery and no material suitable for radiocarbon dating and therefore could date to any period after the Mesolithic and prior to the LBA.

It is not possible to compare directly molluscan data recorded at Whitehawk with those from Toadeshole Bottom East, because the assemblages are from entirely different depositional contexts. Whereas the former was from a man-made ditch which is thought to have been built in the Early Neolithic as an 'extension' to the enclosure (Russell and Rudling 1996), the latter were in samples from a palaeosol underlying colluvial sediments in a dry valley. There is also a possible difference in chronology, as Ditches 3 and 4 at Whitehawk have been radiocarbon dated to the mid-fourth millennium BC (Drewett *et al*. 1988: 35; 3780–3040 cal BC (I-11846; 4700±130 BP); 3650–3040 cal BC (I-11847; 4645±95 BP)), while the palaeosol from Toadeshole Bottom East has been dated by AMS to 2880–2310 cal BC (OxA-3077; 4020±90 BP). Unfortunately, another problem is that the Toadeshole Bottom East samples contain a poorly preserved mollusc assemblage, from which it is impossible to reconstruct the contemporary environment. However, the fact that a soil was forming and has been preserved suggests that the erosion was not a significant problem and therefore that ploughing was unlikely. However, as early Holocene forest soils had been removed before its formation, it would seem to suggest that forest clearance had occurred, possibly leading to initial massive erosion. The Whitehawk data (Thomas 1996) also point to an open landscape.

The Late Neolithic and Early Bronze Age

Several sites have deposits that date to this period. The enclosure at Mile Oak for example, has a *terminus post quem* of 1690–1460 cal BC (*see* sections 2 and 9), and could be either an EBA or MBA feature. Mollusc evidence suggests the enclosure was built in an open environment, although how long this state of affairs had existed prior to construction is unknown.

Colluvium was accumulating in two dry valleys (and possibly others) during this period, although the environment appears different at each. At Sweetpatch (*see* Section 12) two AMS dates of 2140-1690 cal BC (OxA-2994 and OxA-2995, both 3560±80 BP), one from a subsoil hollow and the other from a charcoal horizon at the base of the sequence, effectively date the onset of colluviation to the first half of the second millennium BC. This suggests that the contemporary environment was open and that farming was arable rather than pastoral. The amount of colluvium produced was relatively small, and there is no evidence of renewed deposition until *c*.1000 cal BC, suggesting that agriculture was initially short-lived. At Toadeshole Bottom East there is no evidence for the deposition of colluvium during the early second millennium BC. Indeed there is contrary evidence as directly overlying the Neolithic palaeosol was an EBA/MBA (i.e.

later) clearance horizon dating to 1740–1410 cal BC (OxA-3080; 3260±70 BP) (*see* below). Two AMS samples from a subsoil hollow or pit at Toadeshole Bottom East produced dates of 2140–1690 cal BC (OxA-3078; 3560±80 BP) and 2180–1680 cal BC (OxA-3079; 3550±90 BP), i.e. almost identical to those from Sweetpatch (T'=0.0; T'(5%)= 7.8; n=3; Ward and Wilson 1978). However, the mollusc assemblage consisted of a diverse 'shade-loving' assemblage, including several anthropophobic species, combined with several species of open country preference. Also found in the hollow were large quantities of wood charcoal, identified as pine. Several interpretations as to the contemporary environment can be suggested, but all foresee the presence of both woodland and open country, either spatially or temporally separated. It is interesting to speculate that the hollow was possibly either used, or excavated, as a hearth by an EBA group operating in woodland.

The Middle Bronze Age

This period covers the MBA at all sites so dated, and the first colluvial deposits at Hangleton Bottom, Toadeshole Bottom West and Cockroost Bottom, which have not been dated by any means, but which on stratigraphic grounds are of the LBA or earlier. At Sweetpatch (*see* Section 12) there is evidence that no sediment accumulation was occurring at this time. This period also coincides with the construction of settlements at Mile Oak (*see* Section 2) and Downsview (*see* Section 7). It is likely that populations in this area of the South Downs had risen during this period, possibly as a result of, or more likely, a cause for agricultural intensification, manifested in an increase in deposited colluvium.

Deposits relating to the MBA have been found in the ditch at the Mile Oak enclosure. The mollusc assemblage suggests that this feature was abandoned by this stage, and the ditch had overgrown, although the area around was still open. Later changes in the mollusc assemblage suggest that this shade spread over the area of the enclosure, probably in the form of scrub or even woodland, demonstrating the absence of agriculture. Such conditions continued until the construction of the MBA settlement, for which the enclosure area seems to have been cleared. The dry valley of Cockroost Bottom may contain sediments relating to this period because sherds similar to those found in the occupation deposits of the nearby archaeological site were found beneath 0.5m of colluvium. As 0.4m of material was found below the sherds it is therefore possible that some derives from the MBA. The mollusc assemblage is only well-preserved between depths of 0.7m and 0.5m which probably date to either the MBA or LBA. The assemblage evidence suggests that open country was the dominant environment type, although shade existed somewhere nearby. If these data are correlated with those from the Mile Oak enclosure, it would seem to suggest that scrub existed in the valley bottom while the slopes and hilltops around were still being farmed.

Molluscan data from the primary deposits of the encircling ditch at Downsview (*see* Section 7) also indicate that construction was carried out in an open environment, which was maintained during the life of the settlement. However, on abandonment, the ditch was allowed to overgrow, as demonstrated by a diverse 'shade-loving' component to the assemblage of the secondary fill. The local environment is still likely to have been open, but probably of grazed grassland rather than arable fields. The mollusc assemblage from one of the house terraces (and therefore post-dating the abandonment of the round-house) suggests that while the actual site was being grazed, further upslope an arable regime was in existence, leading to the deposition of poorly sorted colluvium in the terrace.

The deposits at Hangleton Bottom contrast markedly with those from Cockroost Bottom. A depth of 1.1m of colluvium was deposited prior to the formation of the first datable LBA layer. The character of the colluvium is also different, consisting of a flint gravel at the base, overlain by finer deposits. It would seem likely that deposition had first occurred a long time prior to the LBA. The environment, as represented by the molluscs, is open throughout, although immediately before the deposition of the first datable LBA deposit, slight shade is suggested, possibly indicating the absence of arable agriculture.

Gravels that predate the LBA have been found at Toadeshole Bottom West, Benfield Valley and Hangleton Bottom. All suggest that intensive erosion had occurred probably as a result of rill or gully processes during major storm events.

A more complete record of events is found from Toadeshole Bottom East, where what has been interpreted as a secondary clearance horizon was found in a palaeosol dating to this period. This consisted of a burnt deposit, some 6cm thick. This event could possibly relate to the clearance of scrub woodland that is thought to have existed in the Late Neolithic/EBA. A charcoal fragment from this horizon produced an AMS date of 1740–1410 cal BC (OxA-3080; 3260±70 BP), dating the occurrence to the Early to Middle Bronze Age. Interestingly enough, the secondary clearance did not immediately lead to erosion as the palaeosol continued to develop, but the molluscan assemblage shows the local environment to have been open.

The Late Bronze Age/Early Iron Age

This period is characterised by the construction of several hillforts in the area – e.g. Thundersbarrow Hill, Wolstonbury, Hollingbury Camp and Ditchling Beacon (Hamilton and Manley 1997). Their presence together with the excavated settlements, the fields and the evidence of colluviation, suggests considerable activity in the Brighton area during the LBA and EIA. Every dry valley site studied here contains deposits relating to this period.

Evidence for this period at Mile Oak is from a palaeosol buried beneath one of the metalworking mounds in Trench K (*see* Section 2). Although preservation of mollusc shell was extremely poor, it was possible to demonstrate that the environment in which metalworking activities had taken place was largely open. The nature of this environment is unknown, but the few shells of 'shade-loving' species that were found could indicate local shade – either in the form of long grass and trees and possibly from the same source as that predicted for the pre-LBA above – and therefore an intense arable environment is unlikely. This is perhaps not surprising as it is likely that settlement continued at Mile Oak at the time.

Deposition of colluvium in the dry valleys seems to have continued, been renewed or started during this period. At Sweetpatch, an episode of large-scale burning has been dated to 1010–760 cal BC (OxA-2993; 2680±80 BP), although it is not certain what the purpose of the burning was (*see* Section 12). This episode of burning is therefore slightly later than the occupation deposits at Mile Oak and Downsview. Magnetic susceptibility measurements indicate that the burnt area is confined to a 6cm band within one layer. The subsequent colluvial deposits – although mollusc shells were not well-preserved – were probably caused by arable agriculture. They also contain charcoal, but at a lower frequency than from the clearance horizon.

Two AMS dates were also obtained from charcoal contained in the first large-scale colluvial deposits at Toadeshole Bottom West. These dates, 1050–760 cal BC (OxA-3081; 2700±90 BP) and 980–760 cal BC (OxA-3083; 2660±70 BP), compare well with that from Sweetpatch (1010–760 cal BC; OxA-2993; 2680±80 BP). However, there is no evidence to suggest that the charcoal is from a clearance horizon, and indeed the magnetic susceptibility profile has no peaks from the same deposit. The colluvium appears to have been associated with an arable regime and, as at Sweetpatch, was deposited as a result of relatively gentle erosional conditions. Later – possibly in the LIA – the mollusc assemblage suggests the existence of a more diverse environment, perhaps through combination of pastoral and arable farming.

Similar conditions to those postulated at Sweetpatch and Toadeshole Bottom West seem to have been present at both Hangleton Bottom and Toadeshole Bottom East, where the mollusc assemblage contained in the colluvium demonstrates the arable origin of the deposit. However, dating at both these sites was on the basis of ceramic remains which may be residual. At Hangleton Bottom, Toadeshole Bottom East and Toadeshole Bottom West almost 0.5m of colluvium can be attributed to this phase, whereas at Sweetpatch only 0.16m could be. The greatest thickness of colluvium, occurred at Eastwick Barn Valley Bottom, where the whole profile, 0.9m thick, appeared to have been deposited in the LBA/EIA. It is likely that this was again caused by arable agriculture, possibly from the same source as that accumulating in the house terrace at Downsview.

At Devil's Dyke, Ellis (1985, 1986) states that the Iron Age is the period when colluvium started accumulating, despite the fact that the basal colluvial layers of that sequence have not been dated by any means other than by reference to the mollusc biozones of Kerney (1977). However, it should be noted that a radiocarbon date further up in the stratigraphy produced an Iron Age date (*see* below).

The Middle and Late Iron Ages

Few colluvial deposits positively date to this period. One possible reason could be a reduction in the sediment supply through a thinning of hillside soils (itself largely as a result of previous erosion) meaning that there was little material available for deposition (K. Thomas, pers. comm.). Hamilton (*see* above) comments on the fact that very little pottery that could definitely be assigned to the Middle and Late Iron Ages was found in any of the dry valley sites. However, two sites in the area have produced AMS determinations attributable to this period. At Sweetpatch an AMS date of 520–120 cal BC (OxA-2991; 2270±80 BP) was obtained from the bottom of a thick colluvial layer, while at Devil's Dyke a charcoal horizon was dated to 410–370 cal BC (BM-2137; 2315±35 BP; Ellis 1985). Therefore the problem, at Sweetpatch at least, would not seem to be so much that accumulation during this phase was not occurring, but that it cannot be recognised owing to the lack of ceramics. The sediments from which the AMS date was taken are of a similar character to those of the LBA/EIA found stratigraphically below and it is likely that the contemporary local agricultural regime was arable, further evidence for which was the discovery of charred wheat glumes.

At the sites of Toadeshole Bottom East, Toadeshole Bottom West and Hangleton, as at Sweetpatch, there is a sudden jump from sherds dating to the LBA/EIA to sherds dating the layer to the Romano-British period. However, as discussed above, the data from Sweetpatch demonstrate that accumulation was probably occurring in the period in between, but has not been recognised from ceramic data. It is possible that for cultural reasons no pottery was incorporated in manure spread on the fields, or as mentioned above, some of the local 'Romano-British' sherds (Fabrics 10 and 11: *see* above) are in fact of LIA date. If this is correct, it would seem that land-use during this period changed little from the LBA to the Romano-British periods as witnessed from sediments of similar properties and unchanging molluscan assemblages.

The Romano-British Period

Although the Roman occupation had a considerable cultural impact on the Brighton area (e.g. the construction of villas at Preston Park, Southwick and West Blatchington: Fig. 1.1), relatively little appears to have changed in terms of land-use and erosion. From the evidence obtained during the dry valley investigations it appears agriculture was predominantly arable (although pasture would obviously be present). However, relatively few distinct Romano-British colluvial layers were noted in the valley sediments. At Toadeshole Bottom West, Context 1044, and possibly the base of Context 1043, could date to this period, whereas at Toadeshole Bottom East only the top quarter of Context 1034 can be similarly assigned with any certainty. At Benfield Valley, most of Context 1063 appears to date to this period, while Hangleton Bottom contained only residual Romano-British material in later Medieval layers. The valleys of Cockroost Bottom and Eastwick Barn produced no material of this date in the colluvium, but at the latter the surrounding lynchets contained quantities of Romano-British material (*see* Section 6) showing arable and possibly also pastoral farming to have been a major feature of the landscape at the time. The latest sediments eroding into the house terrace at Downsview (*see* Section 7) are also likely to be of this date and would also appear to have been the result of arable farming.

Anglo-Saxon period

The small quantities of earlier Anglo-Saxon pottery found during the valley excavations demonstrate that farming was taking place during this period. Unfortunately, despite the virtual absence of settlement sites, the sherds found (from Hangleton Bottom and Toadeshole Bottom West) were all residual in Saxo-Norman or later Medieval layers and thus no individual layer could be attributed to this period. Nevertheless, the presence of these few sherds suggests that arable agriculture was being practised albeit on a more restricted scale than before and localised in extent. Any resultant deposits must have been relatively thin and disturbed by subsequent cultivation.

Saxo-Norman period

Sediments dating from this period were found at Toadeshole Bottom East (Context 1033), and possibly Benfield Valley (top of Context 1063 and possibly Context 1062). Residual sherds of this date were also present at Hangleton Bottom and Toadeshole Bottom West where they were all incorporated into later Medieval deposits.

The palaeoenvironmental data for this period suggest a continuation of predominantly arable cultivation, although this was possibly only at a localised scale. It is quite likely pastoralism was also actively pursued at this time (as indicated at Toadeshole Bottom East).

The later Medieval period

Deposits dating to this period were found at Hangleton Bottom, Toadeshole Bottom East, Toadeshole Bottom West and possibly Benfield Valley. Hangleton Bottom contained the thickest individual late Medieval deposit, some 0.6m of colluvium as represented by Context 1052. This is not surprising considering the relatively close proximity of the deserted Medieval village of Hangleton and as the other three valleys producing material of this date were also close to the village site, it is probable that most of the later Medieval colluvium in this area is as a result of agricultural activity based at the village. The thick deposit at Hangleton Bottom seems to be the result of intense arable activity, while similarly dated deposits at Toadeshole Bottom West (top of Context 1043) are also thought to be the result of cultivation.

A change in agricultural practice is, however, suggested from the dry valley studies. Context 1042 from Toadeshole Bottom West is likely to have an arable origin, but molluscan data suggest a possible transition in this layer to a pastoral land-use towards the top. The subsequent layer, Context 1041 also potentially represents erosion under pastoral conditions as is the case for Context 1031 at Toadeshole Bottom East. This is not surprising however, as the economy of this period (particularly on the Downs) is thought to have been dominated by the sheep farming (Pelham 1934).

The recent past

There is limited evidence for large-scale erosion during the majority of the Post-Medieval period. This may in part be a result of the importance of sheep farming in the area until the nineteenth and twentieth centuries. Research carried out by Dr John Boardman (e.g. 1990, 1992; Boardman and Robinson 1985) has demonstrated that the return to arable agriculture during and after the Second World War, has resulted in the renewed colluvial input into dry valleys of the South Downs. Boardman's work suggests that exposure to winter and spring storms of field surfaces devoid of vegetation leads to the formation of the type of rill and gully systems only previously seen in the later prehistoric and Roman periods. Nevertheless, evidence of such recent accumulation was only seen at three of the seven dry valley sites on the route of the A27. At Toadeshole Bottom East a 0.3m thick colluvial layer of recent origin blanketed the sequence and had resulted from the abandonment of an organically farmed crop immediately before the construction of the road. Similarly at Sweetpatch, a recent gatepost was found buried beneath 0.2m of sediment, while 0.09m of silt is known to have been deposited by the October storm of 1987 at Cockroost Bottom.

Conclusions

The evidence presented above indicates that environments in the Brighton area have undergone major changes in the Holocene. Generally these changes are time transgressive and follow a similar pattern, but do not necessarily occur synchronously at all sites. However, the greatest inter-site variation occurs prior to the LBA/EIA, by which time all the sites appear to be receiving inputs of colluvium. The pre-LBA situation is of little surprise as there is limited evidence for formal division of the landscape in this period, so individuals and communities would have cleared forest and scrub when they felt that new land was required to grow food. By the end of the Bronze Age populations became larger and possibly more (or differently) organised, as witnessed by increased settlement, at first in the form of ditched settlement enclosures, such as Mile Oak and Downsview, and then in hillforts. Therefore in this period and later there was probably greater pressure on the land bringing further areas into agricultural exploitation and thus indirectly causing increased thickness of colluvial deposits. Following this period the development of the landscape was probably influenced by economic factors relating to market needs, so sheep or cattle were reared at times, while cereals were grown at others, depending on what was most profitable.