

Low Grounds Farm (North), Marlow, Buckinghamshire

Geoarchaeological Assessment

Local Heritage Initiative 2008

NGR SU 83992 85656

Report on Monolith samples (Kubiena box sections) from Trenches 8 and 9

By Carl Champness (Oxford Archaeology)

Introduction and geo-archaeological background

The Marlow Archaeological Society (MAS) returned to the site of Low Grounds Farm, Marlow, to investigate whether the early prehistoric activity identified in the 2006 excavations continued along the headland of the field. Two further trenches (T8 and T9) were excavated in 2007 to the west of the previous Trench 7a. These new trenches are the subject of this report and were located between the Bronze Age barrows and the edge of the field.

The excavation uncovered a continuation of prehistoric activity associated with a potential buried soil horizon within Trenches 8 and 9. Seven environmental samples (environmental samples 1-7) were taken during the course of the excavation which were sent to Oxford Archaeology (OA) for environmental and sedimentary assessment. This work provides a detailed discussion of the sedimentary and environmental samples from the trenches and attempts to place the archaeological activity within its wider landscape context. The archaeological and sedimentary background of the site has been previously outlined within the 2006 evaluation report (OA, 2007).

Aims and methodology

The principal aim of the assessment was to undertake a detailed examination of the sediment sequence and environmental samples taken from Trenches 7, 8 and 9. This work will help to identify the formation of the sediment sequence, soil formation processes and possible anthropogenic inputs. By understanding how the trench sequences formed it may be possible to gain new insights into the archaeological activity represented at the site.

The sediments were recorded according to relative depth and a description of the deposits using standard sedimentary terminology according to Jones *et al* 1999, and in accordance with English Heritage guidelines for geoarchaeological recording (EH, 2004). This included information on colour, composition, texture, structure, compaction, erosional contacts, artefactual and ecofactual inclusions. Samples were processed in accordance with the OA Environmental Sampling Guidelines and Instruction Manual (OA, first edition, July 2002), that is based on guidelines presented by English Heritage (2002).

Results:

Sediment sequences

The detailed examination of the Kubierna sample (Environmental sample 3) revealed a sequence of loose light yellow medium coarse sandy deposits (8004) with small gravel inclusions, overlain by soft fine brownish yellow fine clayey sand with grit sized sub-rounded gravel inclusions (8003). This layer had a diffuse boundary with the overlying material, which was soft fine brown clayey sand (8002). Based on the trench descriptions, this is overlain by a clayey silt/sand ploughsoil (8001).

Present at the interface between deposits 8003/8002 is an area of what would appear to be an *in-situ* flint scatter, a series of stake holes and several dug archaeological features (F3, F2) within Trench 8. Similar circular pit features (F5 and F6) were recorded within Trench 9. As in the 2006 excavation this phase of activity appears to be associated with a buried topsoil (8002) that was sealed and protected by later alluviation. It is possible that this surface has been sorted by worm action or bioturbation (root and animal action) in the past causing a mixing between the two deposits.

The soils within the area are mapped as the Sutton 2 soil association – typical argillic brown earth soils formed on River Terrace Gravel (Jarvis et al 1983, 1984). By studying the soil deposits it may be possible to attain some information on the Neolithic land use; one possibility being animal grazing/stocking based on examples of Neo-Bronze Age soils at Raunds on the Nene (Macphail, Forthcoming; Macphail and Linderholm 2004). Evidence of any past wooded environment, effects of clearance and the possibility of agriculture; will also be sought through soil micromorphology (Courty et al 1989; French 2003).

It was noted during the previous assessment that an increase in silt content within the buried soil deposit (7002) might indicate episodic periods of alluviation. The overlying silty clay deposit (8001) within Trench 8 most likely derives from later flooding and alluviation over the site, when water-levels rose in the later periods and rivers became heavily laden with sediment eroded from the surrounded high ground.

The samples taken from the archaeological features from the trenches were closely examined and assessed. Chemical tests carried out on the white chemical precipitate sample (Environmental Sample 6) from feature F3 revealed an alkali residual, possibly derived from lime or urine used in the processing of animal hides. This was contained within a matrix of low-energy waterlain deposits. The production of rope or linen may have produced similar features and deposits. It is possible that the both the bowl shaped depression (F2) and regular shaped pit (F3) are different phases of tanning pits used in the production of leather. However without the preservation of plant material or pollen from these samples it is impossible to tell whether these features were used exclusively for this purpose.

It should be noted that the lime/urine and water mixture is used in the tanning process to help break down the keratin in hair, and loosen the fat as a part of the defleshing and fat removal process. A predominance of scrappers within the associated flint assemblage from the trench may help to confirm this interpretation. The small gully

(F1) within Trench 8 could also have been used to channel water into and out of the tanning pits. However it should be noted that several deep plough scars are also noted to be running along the same alignment.

Table : Sediment sequence within Trench 8

Enviro 3	Sample Depth	Context No	Description	Sedimentary environment
	0-0.21 m	(8001)	Loose brown (10YR4/6) clayey silt/sand with small grit inclusions	Ploughsoil
	0.21-0.34 m	(8002)	Soft brown (10YR4/6) clayey sand with fine grit inclusions.	Buried Palaeosoil. Indicating a period of dry stable conditions with slower sediment accumulation.
	0.34 m-0.45 m	(8003)	Loose brownish yellowish medium to fine clayey sand with sub-rounded grit sized inclusions. Diffuse lower boundary.	Becoming finer in texture up the profile. Represent a buried subsoil deposit.
	0.45-0.50m	(8004)	Loose light yellow (10YR6/6) coarse sand.	Weather natural

Soil Micromorphology

By Dr Richard Macphail (University College London) and Dr J. Crowther (University of Wales, Lampeter, Ceredigion)

Introduction

Two monolith samples (environmental columns 6 and 3) were evaluated and sub-sampled for soil micromorphology and phosphate analysis in order to investigate the sediment-soil background to these occupations.

Methods

The four thin section samples were impregnated with a clear polyester resin-acetone mixture; samples were then topped up with resin, ahead of curing and slabbing for 75x50 mm-size thin section manufacture by Spectrum Petrographics, Vancouver, Washington, USA (Goldberg and Macphail, 2006; Murphy, 1986).

Results

Soil Chemistry

Details of the samples and analytical results are presented in Table 1 (Appendix 3). Overall, the samples are largely minerogenic, calcareous to very calcareous, and show no clear sign of phosphate enrichment from animal activity.

Environmental sample 6 (Trench 7)

The two samples (from contexts 7003 and 7004) both have a very low LOI, which suggests that they are essentially of minerogenic origin – i.e. there is limited indication that either might be associated with a former topsoil/buried ground surface. In light of this, it is somewhat surprising that the highest phosphate-Pi concentration (0.645 mg g⁻¹) over the four samples was recorded in context 7003. Both samples are very calcareous.

Environmental monolith 3 (Trench 8)

The two samples (from contexts 8002 and 8003) have a higher LOI than those from monolith 6. In the case of 8002 (2.70%) this may well be indicative of a period topsoil pedogenesis. This may explain the lower carbonate concentration (i.e. a result of decalcification through leaching) recorded in 8002. However, there is no evidence of phosphate enrichment, which tends to occur naturally as a result of preferential uptake and cycling of phosphate within the soil-vegetation system, to support this interpretation.

Thin sections

The thin section data are presented in Tables 2 and 3, and illustrated in Figs 1-12 (Appendix 2). The soil micromorphology findings are consistent with bulk data described above, with for example, M8A (8002) being essentially a decalcified ploughsoil – hence low estimated carbonate content but relatively high LOI (Table 1). Equally, the presence of sand-size chalk and secondary calcium carbonate in M6A, M6B and M8B is reflected in high estimated carbonate.

Monolith 6 (Contexts 7003 and 7004)

Thin section M6B Context 7004 is composed of massive and poorly bedded mainly medium quartz and chalk sands, with some beds also containing coarse silt (Figs 1, 3-6). There is very little gravel throughout but at the top of the thin section there is a layer of small (maximum 11 mm) angular (fire-cracked?) flint, one showing that it is one partly calcined (Figs 1, 7-8). Others show some weak iron staining, but probably because of gleying (waterlogging). There are also traces of fine charcoal.

The presence of detrital fine charcoal records likely reflect local human impact while bioturbation of the weakly humic chalky soil by roots and small invertebrate mesofauna indicate periods of stability and soil formation between alluvial episodes (Figs 3-4). Moreover, the pan at ~37-39 cm depth probably represents an ephemeral trampled surface(s) formed by muddy puddling, a layer which was briefly rooted and bioturbated (Figs 1, 5-6). The possible layer of fire-cracked (?) flints may represent broadly associated human occupation, although this is separated by a 1 cm of sandy alluvium (Figs 1, 7-8).

Monolith 3 (Contexts 8002 and 8003)

Thin section 8B (Context 8003) is very compact calcareous coarse silt to medium quartz and chalky sand, with burrowed-in decalcified sandy loam; the latter becomes dominant upwards. Both organic and calcitic root traces occur and an example of very fine, stained bone is present (Fig 9). Overall, the soil is strongly and coarsely burrowed and mixed; iron and iron and manganese staining occurs, and textural pedofeatures characterise the upper decalcified zone (boundary between 8002 and 8003)(Fig 2).

Context 8002 is a decalcified and the relatively more humic (Table 1) upper Holocene alluvium (see above) ploughsoil, and includes fragments of the calcareous subsoil (8003) that have been probably brought up by ploughing (Figs 10-11)(Jongerijs, 1970, 1983; Macphail *et al.*, 1990). Given the lack of phosphate enrichment (Table 1) and suggested use of the area for prehistoric arable agriculture (Draft SMR report), it can be suggested that the Context 8002 is unlikely to be a modern ploughsoil and is perhaps of prehistoric age. At the same time it can be suggested that some muddy inwash, i.e., that forms clear dusty clay pans (Fig 12) which have not been fragmented by biological activity, may be the result of continued over-bank flood alluvium (cf. later prehistoric and medieval Nene valley, Raunds, Northamptonshire (Macphail, Forthcoming). Moreover, it is plausible that perhaps arable ploughing produced the coarsely mixed junction between the (early prehistoric) calcareous alluvial subsoil and the overlying decalcified (later prehistoric) ploughsoil; the thin section possibly recording the very base of an arable mark (Gebhardt, 1990, 1992; Goldberg and Macphail, 2006, 202-207; Lewis, 1998).

Conclusion

Four bulk samples were analysed (LOI, estimated carbonate and phosphate-P_i) alongside the soil micromorphology study of four thin sections. Monolith 6 recorded early Holocene alluvial sedimentation and weak soil formation, alongside an example of 20 mm-thick muddy puddling (human trampling). The latter may be broadly associated with a concentration of small, probable fire-cracked flints, all presumably associated with Early-Middle Neolithic occupation(s). At Monolith 3, early Holocene alluvium and soils have been homogenised by biological activity. Decalcified loamy soils, which overlie these early prehistoric levels in both Monoliths 6 and 3, are

probably of later prehistoric alluvial origin, and was ploughed and also sometimes affected by continuing alluviation. The junction between Contexts 8002 and 8003 in thin section M8B may show an ard mark.

Plant remains

By Wendy Smith (Oxford Archaeology)

In total 6 samples were collected from the two excavated trenches and assessed for both waterlogged and charred plant remains. A seventh sample (a vertical Kubiena sample through a section in Trench 8) was collected for more detailed sediment recording. The full assessment report can be found in Appendix 4.

Aims

Assessment of plant remains was undertaken in order to establish if charred plant macrofossils or charcoal were present and of sufficient quantity to be interpretable. Also to establish if the plant macrofossils and charred remains provide information about agricultural/ economic practices and information on fuel selection/ surrounding woodland resources

Method

Sample volumes ranged from 18.6L to 0.072L. Samples were processed at Oxford by water flotation using a modified Siraf flotation machine. Flots (and in the case sample 2, context 8005 the 4 - 05.mm residue fraction) were scanned using a low-power microscope at a magnification of x12. Identifications were made without directly comparing material with modern references and are semi-quantified on a notional basis. Nomenclature for indigenous taxa follows Stace (1997). As a result, the assessment should be seen as provisional and likely to under-represent small-sized plant remains.

Results

The results of Table 1 presents a summary of the results for charred plant remains and charcoal recovered in the six samples from Trenches 8 and 9 at Low Grounds Farm. In all cases, only small quantities of charcoal and charred plant remains were recovered. Two flots (samples 2 and 6, both context 8005) produced small quantities of charred hazel (*Corylus avellana* L.) nutshell fragments.

Discussion

To date, there are no Neolithic archaeobotanical results for Buckinghamshire (e.g. English Heritage Environmental Archaeology Database updated 2004; consulted Feb 2008). As a result, although a limited project, the results gathered by the Marlow Archaeological Society at Low Grounds Farm are of major regional importance. In particular, archaeobotanical sampling has established that charred plant remains are present on site. It also has established that the sample size required for the recovery of interpretable assemblages of charred plant remains from Neolithic deposits in the area needs to be of 40 L volume or 100% of a deposit if less than 40 L of sediment is available for sampling.

Potential

None of the samples examined have potential for further analysis. However, the hazel nutshells from samples 2 and 6 (context 8005) are suitable for radiocarbon determinations, if required.

Environmental sampling from Trenches 8 and 9 at Low Grounds Farm, Marlow, Buckinghamshire has produced small quantities of charcoal and charred plant macrofossils. Other areas of this site have generated more abundant charred plant macrofossils and charcoal; which may suggest that activities in this area of the site were less likely to involve heating processes. The small quantity of plant remains recovered in these samples suggests that a minimum of 40L of sediment should be sampled from Neolithic (possibly also Bronze Age) deposits in any future excavations in the area.

Palynological assessment

By Elizabeth Huckerby (Oxford Archaeology North)

Introduction

Three pollen sub-samples were assessed for palynological potential from Trench 8 (Environmental Sample 3) from the most recent phase of excavation. It was hoped that this assessment would identify if pollen grains had been preserved in the deposits and if the data might provide information about the environment of the site.

Sediment Sampling

The monolith sample (Enviro 3) was taken through three contexts, Context 8002, (a buried soil horizon), Context 8003 (subsoil) and Context 8004 (weathered natural). A single pollen sub-sample was taken from each context at depths of 0.28 m, 0.40 m and 0.47 m for the top of the monolith.

Method

The three samples were prepared for pollen analysis using a standard chemical procedure. Slides were examined at a magnification of 400x by equally spaced traverses across at least two slides to reduce the possible effects of differential dispersal on the slide. Tablets with a known concentration of Lycopodium spores were added to a known volume of sediment at the beginning of the preparation so that pollen concentrations could be calculated if necessary. Initially, two cover slips of each slide were scanned in order to determine the presence or absence of pollen. If the slides were devoid of pollen grains then no further counting was carried out, however if the slides contained pollen then counting continued until a sum of at least 100 determinate pollen grains was reached or until ten transects were counted over two cover slips. Pollen identification was carried out using the standard keys of Faegri et al (1989) and Moore et al (1991), and the limited reference collection held at OA North. The abundance of microscopic charcoal fragments >5µm was noted where present. Plant nomenclature follows Stace (1997).

Results

The concentration of pollen grains in the three samples was very low and it was not possible to count 100 pollen grains using the criteria outlined above. The sample from the buried soil deposit (Context 8002, 0.28m) had a few grains of well-preserved

pollen in it from grasses (Poaceae), Asteraceae (Lactucoideae, dandelion type) and shepherd's purse family (Brassicaceae). In Context 8003 (0.40m) there were only a few poorly preserved pollen grains recorded but they did include some from trees together with ones from the same herb taxa as in Context 8002. The concentration of pollen in the third sample (Context 8004 0.47m) was even lower and those grains that were recorded were very poorly preserved. Microscopic charcoal particles were noted in the three samples.

Interpretation

This palynological assessment (Appendix 5) has demonstrated that the depositional conditions of the sediments were not favourable for the preservation of pollen grains. Pollen grains are normally only well preserved in acidic, anaerobic, waterlogged conditions, although they can be preserved in more alkaline ones. Because the dataset is so small any interpretation of the data is extremely tentative however the few pollen grains that were identified in the two upper buried soil samples (0.27m and 0.40m) suggest that there were very few trees growing near the site when it was in use. The identification of grass pollen and bracken spores might possibly indicate that the environment was one of open grassland with some bracken, dandelion like plants and other herbaceous taxa.

It is not possible to draw even any tentative conclusions from the lower sample (Context 8004 0.47m) except to say that the few grains, which were recorded, were so poorly preserved that they are probably reworked from earlier deposits.

These data were unable to contribute to our understanding of the site.

Main Discussion

The sediment sequence and archaeological features identified within Trenches 8 and 9 represents a continuation of the important Early/Middle Neolithic activity associated with a preserved early buried land surface within the 2006 excavation. The result of the recent phase of work has also helped to confirm the suggestion of more long-term Neolithic occupation of this area, rather than short-term shifting occupation. It has also produced important evidence of leather working on the site.

The identification of possible Neolithic leather processing on site is of notable significance, as few examples are known from this period. Leather would have been an important resource for Neolithic communities. It would have been used for all sorts of purposes including the manufacture of clothes, shoes, and bags. The remains of possible tannery pits discovered within Trenches 8 and 9 provides first-hand evidence of leather processing on the site, and more significantly within the region. The organised rows of stake holes in Trench 8 potentially reflect hide drying racks that were part of the tanning process.

There were six main stages involved in the tanning of animal skins. Firstly, the skins had to be thoroughly washed and soaked in water for the removal of blood and the cleaning of the outer surface. After washing, the skins were immersed in a potent mixture of lime and water to loosen the hair which could then be scraped away, and a potential source of the white precipitate identified within F3. The process of fleshing then took place; fat from the underside of the skin was scraped away with flint scrapers. A second washing process was undertaken to remove any traces of lime. The actual tanning process involved the laying of the skins in a vat or pit containing

vegetable liquor of varying strength, for varying periods. Finally, the skins were removed from the tanning pit, coated in oil and hung on racks in a current of air to dry slowly.

Later archaeological parallels of tanning pits have produced large quantities of seeds, pips and fruit-stones in the remains of the pit. Based on comparisons with later excavated examples the tannery was often equipped with its own drainage system, pipes and gullies. This area would have been generally away (possibly downwind) from the main occupation area usually due to the foul smell generated by the process. The absence of pottery in the tannage pit makes precise dating difficult, but it appears to be recorded as being stratigraphically associated with the Neolithic activity represented on the site.

The activity identified within Trenches 8 and 9 may be slightly different from the activity represented within Trench 7. No evidence of heating or cooking was identified within Trenches 8 and 9, and these were largely devoid of pottery, charred grain or chaff. The numerous stakeholes and possible areas of burning identified within Trench 7, together with large quantities of burnt flint, could suggest the erection here of primitive shelters, cooking apparatus or meat drying racks. Radiocarbon dating of these charred assemblages has previously dated this activity to the Early/Middle Neolithic.

Though no definite buildings were identified, the small postholes identified in Trench 7 are thought to represent insubstantial and short-lived structures, usually with small pits in association. Of note in the Yarnton landscape is that sites external or peripheral to settlement appear to be associated with palaeo-channels. Buried surfaces were recorded along the edge of one such channel and excavation of these revealed burnt flint, worked flint and burnt stone. Burnt spreads of charred material and fired stone are common finds on the Yarnton floodplain: plant remains include hazelnut shells and some cereal grains (Hey, 1997, pp 106-110).

There are archaeological parallels for the potential hide drying and cooking structures in Trenches 7 and 8. Excavations at Stratford Market Depot, east London on the ancient River Lea floodplain record a cooking pit with an irregular pattern of stakeholes at the base and sides of the feature. Fired clay, burnt flint blocks, charred wood, alder and hazelnut charcoal were found in association and the excavators interpreted the feature as a cooking pit with wooden apparatus built to suspend cooking vessels above the fire. Several arrangements of postholes were noted, implying several uses of the feature. The structure was thought to date to the later prehistoric on ceramic grounds (Hiller and Wilkinson. 2005, 16-17). The associations in Trenches 7 and 8 of stakeholes suggest that a range of different activities appear to be represented on the site, which is difficult to distinguish between over such a limited area.

The tentative palaeoenvironmental information obtained from the pollen and charred plant assessment indicated that the activity on the site was occurring within a largely treeless landscape consisting of possible grazed grassland and dandelions. The environmental samples potentially indicate a mixed subsistence of cereal growth, foraging and animal husbandry. The remains of charred cereal grains and chaff from Trench 7 indicate that cereal crops were being cultivated on the site. The

identification of a prehistoric ploughsoil and possible ard marks in Trench 8, in the area of tanning activity, potentially indicates patterns of shifting arable activity.

Previously comparisons have been made between patterns of late Mesolithic practices and mobility to early Neolithic settlement evidence next to rivers. Neolithic activity identified next to Thames has been interpreted as either task-specific or seasonal, relating to tasks like cattle grazing or ritual activity (Holgatt, 1988). Certainly small Neolithic occupation deposits have been taken to indicate short-term occupation and shifting 'swidden agriculture' (Pollard, 1999). However the evidence of occupation, leather processing and cultivation on site may suggest that more long-term settlement was occurring here. The evidence from Marlow provides further support to long-term early Neolithic occupation of the Thames floodplain, to that identified at Eton Rowing Lake (Allen et al, 2004). It is not entirely clear whether this represented repeated occupation (similar to Mesolithic practices) or more continuous permanent occupation of the site.

The pattern of Neolithic and later settlement associated with ritual sites on gravel islands defined by palaeo-channels, is being increasingly identified at a number of other locations along the Thames Valley, including at the Eton Rowing Lake site near Dorney and Wallingford, to the west of Marlow (Cromarty *et al* 2006, 33). It is possible that earliest Neolithic settlers or at least their culture, was moving up the Thames Valley.

The other key point is that parts of the site, notably the headlands of the field, have significant potential to preserve further remains, providing a much greater understanding of early prehistoric activity within the area.

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APPENDICES

APPENDIX 1 Summary of Site Details

Site name: Low Grounds Farm (North), Marlow, Buckinghamshire

Site code: 755.2006.147

NGR: SU 83992 85656

Type of project: 2-trench investigation.

Date and duration of project: 2007

Area of site: 0.38 ha., 3,778 sq. m

Summary of results: Natural flint gravel sealed by localised prehistoric soil layers and alluvial deposits. Evidence of tanning pits and stakeholes indicative of hide drying racks. Flint finds of late Neolithic and early Bronze Age date. Radio-carbon dates of charcoal dated to the early-middle Neolithic. Limited amount of mid-late Bronze Age pottery from extreme north of the site. Few Roman and post-medieval finds associated with ploughing; some evidence of alluviation.

Location of archive: The archive is currently held with Marlow Archaeological Society/Minas Tirith Ltd. and will be deposited with Buckinghamshire County Museum Service in due course, under the following accession number: AYBCM. 2007.147

APPENDIX 2 Low Grounds Farm (north), Marlow, Buckinghamshire (755): soil micromorphology and phosphate concentrations

By Dr Richard I Macphail Institute of Archaeology, University College London and
Dr John Crowther Archaeological Services, University of Wales, Lampeter.

INTRODUCTION

Two monolith samples (environmental columns 6 and 3) believed to be associated with Early-Middle Neolithic and Late Neolithic/Early Bronze Age activity, respectively, at Low Grounds Farm (north), Marlow, Buckinghamshire, were received from Carl Champness (Oxford Archaeology). These monoliths were evaluated and subsampled for soil micromorphology and phosphate analysis in order to investigate the sediment-soil background to these occupations.

METHODS

Column samples 6 and 3 were first subsampled for bulk organic matter (LOI), carbonate and total phosphate analyses (Contexts 7003 and 7004, Contexts 8002 and 8003, respectively) and soil micromorphology (four thin section samples: M6A-M6B and M8A-M8B).

LOI, carbonate and inorganic phosphate analysis

Analysis was undertaken on the fine earth fraction (i.e. <2 mm) of the samples. Inorganic phosphate (phosphate-P_i) was extracted from finely ground samples using 1 N HCl (with a slight excess of acid being added first to neutralise the carbonate present), and concentrations were determined colorimetrically using molybdenum blue at a wavelength of 720 nm. LOI was determined by ignition at 375°C for 16 hrs (Ball, 1964) – previous experimental studies having shown that there is normally no significant breakdown of carbonate at this temperature. Carbonate content was estimated by observing the reaction following the application of 10% HCl (Hodgson, 1974).

Soil micromorphology

The four thin section samples were impregnated with a clear polyester resin-acetone mixture; samples were then topped up with resin, ahead of curing and slabbing for 75x50 mm-size thin section manufacture by Spectrum Petrographics, Vancouver, Washington, USA (Goldberg and Macphail, 2006; Murphy, 1986). On receipt from the manufacturer, thin sections were given an extra clean and polished with 1,000 grit paper, and then digitally scanned (Figs 1-2). They were then analysed using a petrological microscope under plane polarised light (PPL), crossed polarised light (XPL), oblique incident light (OIL) and using fluorescent microscopy (blue light – BL), at magnifications ranging from x1 to x200/400; for example BL was useful in identifying extant roots and assessing their state of preservation. Thin sections were described, ascribed soil microfabric types (MFTs) and microfacies types (MFTs)(see Tables 2 and 3), and counted according to established methods (Bullock *et al.*, 1985; Courty, 2001; Courty *et al.*, 1989; Goldberg and Macphail, 2006; Macphail and Cruise, 2001; Stoops, 2003).

RESULTS AND DISCUSSION

LOI, carbonate and inorganic phosphate analysis

Details of the samples and analytical results are presented in Table 1. Overall, the samples are largely minerogenic (LOI range: 1.22-2.70%), calcareous to very calcareous, and show no clear sign of phosphate enrichment (phosphate-P_i range: 0.507-0.645 mg g⁻¹).

Environmental monolith 6

The two samples (from contexts 7003 and 7004) both have a very low LOI, which suggests that they are essentially of minerogenic origin – i.e. there is no indication that either might be associated with a former topsoil/buried ground surface. In light of this, it is somewhat surprising that the highest phosphate-P_i concentration (0.645 mg g⁻¹) over the four samples was recorded in context 7003. Both samples are very calcareous.

Environmental monolith 3

The two samples (from contexts 8002 and 8003) have a higher LOI than those from monolith 6. In the case of 8002 (2.70%) this may well be indicative of a period topsoil pedogenesis. This may explain the lower carbonate concentration (i.e. a result of decalcification through leaching) recorded in 8002. However, there is no evidence of phosphate enrichment, which tends to occur naturally as a result of preferential uptake and cycling of phosphate within the soil-vegetation system, to support this interpretation.

Soil micromorphology

Data are presented in Tables 2 and 3, and illustrated in Figs 1-12. The soil micromorphology findings are consistent with bulk data described above, with for example, M8A (8002) being essentially a decalcified ploughsoil – hence low estimated carbonate content but relatively high LOI (Table 1). Equally, the presence of sand-size chalk and secondary calcium carbonate in M6A, M6B and M8B is reflected in high estimated carbonate.

Monolith 6 (Contexts 7003 and 7004)

Thin section M6B Context 7004 is composed of massive and poorly bedded mainly medium quartz and chalk sands, with some beds also containing coarse silt (Figs 1, 3-6). There are very few gravel throughout but at the top of the thin section there is a layer of small (maximum 11 mm) angular (fire-cracked?) flint, one showing that it is one partly calcined (Figs 1, 7-8). Others show some weak iron staining, but probably because of gleying (waterlogging) any rubefication of this iron (burning evidence) has been lost. These quartz and chalky sands are moderately bio-mixed (burrowed and weakly rooted), and become more iron-stained upwards, probably because they were once weakly humic. There are also trace amounts of detrital fine charcoal. An example of very small aquatic(?) mollusc was also noted. A major fine chalky layer occurs at ~37-39 cm depth (within the monolith). This layer or pan which was once-humic in places (organic matter is now iron and manganese stained) and contains occasional flecks of charcoal, also shows fine root traces. Finely laminated chalky sediment also infills very broad (c. 4 mm) burrows in it (Figs 1, 5-6). As a whole the

sediment shows a trace amount of down-washed dusty clay and secondary calcium carbonate deposition.

This once well-bedded Thames alluvium is composed of mainly medium sand-size quartz and chalk, with beds sometimes also containing a coarse silt content. Interbedded fine chalky sediment becomes more humic upwards, with examples of muddy chalky layers/pans being formed. Presumably, these represent upward fining sediments over gravely alluvium recording (coarse) channel and (fine) overbank sedimentation (Figs 3-4), and is typical of soils formed in alluvium in southern England during the late glacial and early Holocene Period (Avery, 1990, 113-114, 301-303; Catt, 1979)(cf. Mesolithic Goring and Neolithic Dorney and Drayton upstream; Allen *et al.*, 2004; Allen, 1995; Barclay *et al.*, 2003). Present day mapping at the site of Pelo-calcareous alluvial gley soils (Thames soil association; Jarvis *et al.*, 1983, 1984, 274), is somewhat misleading (in regard to the Neolithic and Bronze Age archaeology), because it records fine alluviation that affected the Thames valley from the Iron Age onwards, and not the late glacial-early Holocene soil (Robinson, 1992, fig 19.3)(see Contexts 8002 and 8003 below). It is therefore probably more accurate to describe the Neolithic site as having a weakly developed Calcaric alluvial gley soil (Avery, 1990, 328) that shows accretionary alluviation of dominantly sandy beds and examples of muddy calcareous deposition – along with amorphous organic matter and occasional fine charcoal.

The presence of detrital fine charcoal records likely local human impact while biomixing of the weakly humic chalky soil by roots and small invertebrate mesofauna indicate periods of stasis and short-lived pedogenesis between alluvial episodes(Figs 3-4). Moreover, the pan at ~37-39 cm depth probably represents an ephemeral trampled surface(s) formed by muddy puddling, a layer which was briefly rooted and bio-worked (Figs 1, 5-6). The possible layer of fire-cracked(?) flints may represent broadly associated human occupation, although separated by a 1 cm of sandy alluvium (Figs 1, 7-8). No coarse charcoal was noted in thin section, but it is known that charcoal floats away and can be lost when sites are flooded (Bell *et al.*, 2000; Macphail and Cruise, 2000; Wilkinson and Murphy, 1995). At such Early Neolithic river valley sites the presence of domestic stock needs to be considered (Healy and Harding, Forthcoming; Macphail and Linderholm, 2004), but the degree of soil disturbance and phosphate concentration is too low to indicate this.

Thin section M6A Context 7003 is a similar massive, mainly homogeneous and compact calcareous coarse silt to coarse sand-size quartz and chalky sediment, with trace amount of coarse and very fine charcoal. It features abundant inwash and burrow-mixing of dusty clay. It also exhibits very abundant weak iron staining, with rare iron and manganese staining (both resulting from episodic waterlogging) and very abundant secondary CaCO₃ formation, including root pseudomorphs.

This is a biologically homogenised calcareous sandy alluvium, with rare inclusions of charcoal, and resulted from continued alluviation and pedogenesis (Calcaric alluvial gley soil) that post-date Early-Middle Neolithic occupation. The inwash and mixing-in of decalcified dusty clay from overlying decalcified soils (see M8A) is likely the result of cultivation of later prehistoric to medieval alluvial soils that bury the early Holocene alluvial soils and Neolithic occupation horizon (Robinson, 1992; see above).

Monolith 3 (Contexts 8002 and 8003)

Thin section 8B Context 8003 is a very compact calcareous coarse silt to medium quartz and chalky sand, with burrowed-in decalcified sandy loam; the latter becomes dominant upwards. Both organic and calcitic root traces occur and an example of very fine, stained bone is present (Fig 9). Overall, the soil is strongly and coarsely burrowed and mixed; iron and iron and manganese staining occurs, and textural pedofeatures characterise the upper decalcified zone (boundary between 8002 and 8003)(Fig 2).

This is again a Calcaric alluvial gley soil, formed from accreting alluvium; the example of fine and iron-stained bone is probably relict of carnivore scat (cf. Boxgrove, West Sussex; Roberts and Parfitt, 1999, book cover, figs 83d and 83h). The original alluvial bedding has been destroyed by biological homogenisation and traces of ephemeral pedogenesis (stasis and soil formation of ephemeral surfaces) that may have been contemporary with Late Neolithic/Early Bronze Age activities have been lost, apart from iron and manganese staining that is relict of past humic soil material. Upwards the soil is very coarsely mixed with decalcified soil – the latter featuring textural pedofeatures indicative of soil disturbance (cultivation?).

Thin section 8A Context 8002 is a compact decalcified (apart from coarse inclusions of 8003) sandy loam soil containing fragments of calcareous subsoil, and overall is characterised by textural pedofeatures, such as very abundant very dusty intercalations and *c.* 100 µm thick dusty clay coatings and infills. There are also rare 250 µm thick dusty clay pans/infills. General biological mixing has also occurred.

This Context 8002 is a decalcified and the relatively more humic (Table 1) upper Holocene alluvium (see above) ploughsoil, and includes fragments of the calcareous subsoil (8003) that have been probably brought up by ploughing (Figs 10-11)(Jongierius, 1970, 1983; Macphail *et al.*, 1990). Given the lack of phosphate enrichment (Table 1) and suggested use of the area for prehistoric arable agriculture (Draft SMR report), it can be suggested that the Context 8002 is unlikely to be a modern ploughsoil and is perhaps of prehistoric age. At the same time it can be suggested that some muddy inwash, i.e., that forms clear dusty clay pans (Fig 12) which have not been fragmented by biological activity, may be the result of continued over-bank flood alluvium (cf. later prehistoric and medieval Nene valley, Raunds, Northamptonshire (Macphail, Forthcoming). Moreover, it is plausible that perhaps ard ploughing produced the coarsely mixed junction between the (early prehistoric) calcareous alluvial subsoil and the overlying decalcified (later prehistoric) ploughsoil; the thin section possibly recording the very base of an ard mark (Gebhardt, 1990, 1992; Goldberg and Macphail, 2006, 202-207; Lewis, 1998).

CONCLUSIONS

Four bulk samples were analysed (LOI, estimated carbonate and phosphate-P_i) alongside the soil micromorphology study of four thin sections. Monolith 6 recorded early Holocene alluvial sedimentation and weak soil formation, alongside an example of 20 mm-thick muddy puddling (human trampling). The latter may be broadly associated with a concentration of small, probable fire-cracked flints, all presumably associated with Early-Middle Neolithic occupation(s). At Monolith 3, early Holocene alluvium and soils have been homogenised by biological activity. Decalcified loamy soils which overlie these early prehistoric levels at both Monolith 6 and 3, are probably of later prehistoric alluvial origin, and was ploughed and also sometimes

affected by continuing alluviation. The junction between Contexts 8002 and 8003 in thin section M8B may show an ard mark.

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Table 2: Marlow 755; Samples and micromorphological counts

Thin section Sample	Depth	Bulk sample Context	Microfacies	SMT	Voids	Chalk gravel	Flint gravel	Burned flint	Molluscs	Earthworm granules	Dusty clay
<i>Environmental 6</i>											
M6A	28-36 cm	x7003	B	2b	25%						aaaa
M6B	37-45 cm	x7004	A	1a, 2a	35%(20%)	*	f	a-1	a*		a*
<i>Environmental 3</i>											
M8A	27-35 cm	x8002	D	3a	20% (10%)		*	a-1		a-1	aaaaa
M8B	36-44 cm	x8003	C/D	2b/3a	10%					a-1	aa
Table 2, cont:											
Thin section Sample	Context	Dusty clay pans	Chalky pans	CaCO3 roots	2ndary CaCO3	Iron staining	Fe-Mn staining	Burrows			
<i>Environmental 6</i>											
M6A	x7003			aaa	aaaaa	aaaa	a	aaaaa			
M6B	x7004		aaa	a*		aaaa	a	aaa			
<i>Environmental 3</i>											
M8A	x8002	a		(a)	(aa)	aa	aaa	aaaaa			
M8B	x8003			aaa	aaaa	aa	aaa	aaaaa			

* - very few 0-5%, f - few 5-15%, ff - frequent 15-30%, fff - common 30-50%, ffff - dominant 50-70%,

a - rare <2% (a-*1%; a-1, single occurrence), aa - occasional 2-5%, aaa - many 5-10%, aaaa - abundant 10-20%, aaaaa - very abundant >2

Table 3: Marlow 755: Soil Micromorphology (Descriptions and preliminary interpretations)

Microfacies type (MFT)/Soil microfabric type (SMT)	Sample No.	Depth (relative depth) Soil Micromorphology (SM)	Preliminary Interpretation and Comments
MFT B/SMT 2b	M6A	28-36 cm SM: mainly homogeneous (SMT 2b); <i>Microstructure</i> : massive and channel; 25% voids, very fine to fine (0.3-1.00mm) channels; <i>Coarse Mineral</i> : C:F, 70:30, poorly sorted coarse silt to very coarse sand-size flint and chalk (as below); <i>Coarse Organic and Anthropogenic</i> : rare traces of charcoal (max 1mm); many fine roots as CaCO ₃ pseudomorphs; rare trace of humic roots; <i>Fine Fabric</i> : SMT 2b: dark greyish brown (PPL), moderately low interference colours (close porphyric, crystallitic b-fabric, XPL), greyish orange and patchy orange (OIL); thin patchy humic staining and amorphous OM (mainly ferruginised) with trace of very fine charcoal; <i>Pedofeatures</i> : <i>Textural</i> : very abundant poorly oriented dusty clay void coatings and infills (50-250 µm); rare examples of moderately oriented clay infills/coatings; <i>Crystalline</i> : abundant secondary micritic CaCO ₃ impregnation and many root replacement – some microsparite formation; <i>Amorphous</i> : many weak iron impregnation of matrix SMT 2b and dusty clay inwash, with rare Fe-Mn impregnation of relict amorphous organic matter patches; <i>Fabric</i> : very abundant thin to broad (0.5-2.00mm) burrows, commonly mixing-in inwashed dusty clay.	7003 Massive, mainly homogeneous and compact calcareous coarse silt to coarse sand-size quartz and chalk, with trace amount of coarse and very fine charcoal; abundant inwash and burrow-mixing of dusty clay; very abundant weak iron staining, with rare Fe-Mn staining and very abundant secondary CaCO ₃ formation including root pseudomorphs. <i>Biologically homogenised calcareous sandy alluvium, with rare inclusion of charcoal; inwash and mixing-in of decalcified dusty clay from overlying decalcified soils (see M8A).</i>
MFT A/SMT 1a and 2a	M6B	37-45 cm SM: heterogeneous with mixed common SMT 1a and 2a, and concentration of SMT 2a at ~37-39 cm and angular flints at 36 cm, and bedding; <i>Microstructure</i> : massive and poorly coarsely laminated, 35% voids (20% in pan), fine (0.5mm) channels and complex and simple packing porosity; <i>Coarse Mineral</i> : C:F (limit at 10 µm), 90:80 (sandy sediment), 60:40 (mixed sand and chalky sediment) and 20:80 (chalky 'soil' pan); moderately poorly sorted fine to coarse (mainly medium)	7004 Massive and poorly bedded mainly medium quartz and chalk sands (with beds containing coarse silt), with very few gravel and layer of small (max 11mm) angular (fire-cracked?) flint – one partly calcined; with moderately bio-mixed (burrowed and weakly rooted) sands, chalky sands, becoming more iron-stained (once weakly humic) upwards – trace amounts of detrital fine charcoal; example of

		<p>sand-size quartz (some beds with coarse silt-size quartz), with common chalk, fossiliferous limestone, calcite, fossil and probable tufa fragments; and opaque minerals (e.g., limonite), clay clasts, weathered glauconite and ironstone; very few chalk gravel (max 3.5 mm) and few angular flint (c. 36cm) gravel (max. 12mm); rare traces of very fine molluscs; <i>Coarse Organic and Anthropogenic</i>: example of coarse angular flint showing traces of calcined edges/burning; <i>Fine Fabric</i>: SMT 1a: cloudy grey and brownish grey (PPL), moderately high interference colours (close porphyric, crystallitic b-fabric, XPL), grey and brownish grey (OIL); rare traces of humic staining, amorphous organic matter and very fine charcoal; SMT 2a: speckled dark brownish and brownish grey (PPL), very low to medium interference colours (close porphyric, crystallitic b-fabric, XPL), orange and orange grey (OIL); possible once-humic stained, rare traces to patches of abundant fine amorphous organic matter and charcoal; <i>Pedofeatures</i>: <i>Textural</i>: occasional very thin (0.5 mm) to thick (11 mm) humic-stained chalky pans; rare thin (200 µm) dusty clay void coatings (vertical channels); <i>Crystalline</i>: trace of secondary micritic CaCO₃ and root replacement; <i>Amorphous</i>: abundant moderate iron impregnation of fine fabric SMT 2a, with rare Fe-Mn impregnation of relict amorphous organic matter; <i>Fabric</i>: occasional intercalations associated with pans; occasional fine (0.5mm), and very fine (250 µm) root channels in pans; many thin to broad (0.5-2.00mm) burrows.</p>	<p>very small aquatic(?) mollusc; major chalky pan formed at ~37-39 cm which was once-humic in places (Fe-Mn stained) and contains occasional flecks of charcoal, and shows fine rooting; trace of down-washed dusty clay and secondary calcium carbonate deposition. <i>Once-bedded alluvial medium quartz and chalk sands, with chalky fine sediment becoming more humic upwards, with examples of muddy chalky pans being formed; detrital fine charcoal present alongside weakly humic chalky soil biomixed by small invertebrate mesofauna and roots. Calcaric alluvial gley soils, showing accretionary alluviation of dominantly sandy beds and examples of muddy calcareous deposition – along with amorphous organic matter and occasional fine charcoal; ephemeral probable trampled surfaces were briefly rooted and bio-worked; possible layer of fire-cracked(?) flints may represent human occupation (any coarse charcoal associated with this event may well have been lost during succeeding alluvial events – ie it may have floated away).</i></p>
MFT D/SMT 3a	M8A	<p>27-35 cm SM: slightly heterogeneous, with dominant SMT 3a and few fragments of SMT 2b; <i>Microstructure</i>: massive with prismatic; compact as M8B; <i>Coarse Mineral</i>: C:F, 60:40; <i>Coarse Organic and Anthropogenic</i>: two examples of coarse (max 5mm) angular flint, one calcined (burned?); examples of earthworm granules; many coarse inclusions of SMT 2b; <i>Fine Fabric</i>: SMT 3a (see M8B); <i>Pedofeatures</i>: <i>Textural</i>: very abundant very dusty intercalations and c. 100 µm thick coatings and infills; rare 250 m thick dusty clay pans/fills;</p>	<p>8002 Compact decalcified sandy loam soil containing fragments of calcareous subsoil, and overall characterised by textural pedofeatures (very abundant very dusty intercalations and c. 100 µm thick coatings and infills; rare 250 µm thick dusty clay pans/fills) along with biological mixing. <i>Decalcified upper Holocene alluvium – ploughsoil that probably was occasionally affected by flood alluvium.</i></p>

		<i>Amorphous</i> : occasional weak ferruginisation of matrix and many Fe-Mn impregnations; <i>Fabric</i> : strong fabric homogenisation and thin to very broad burrowing.	
MFT D/SMT 3a over MFT C/SMT 2b	M8B	36-44 cm SM: moderately heterogeneous with SMT 2a becoming mixed with SMT 3a, upwards; <i>Microstructure</i> : massive (part of very coarse prismatic; compact, 10% voids, medium (3 mm) moderately accommodated curved planar voids, very fine (300-500 µm) channels <i>Coarse Mineral</i> : C:F, 70:30, poorly sorted coarse silt to very coarse sand-size flint and chalk (as M6B); example of partially decalcified earthworm granule (in decalcified SMT 3a); rare traces of organic root remains and occasional CaCO ₃ root pseudomorphs; <i>Coarse Organic and Anthropogenic</i> : example of possible very fine stained bone; <i>Fine Fabric</i> : SMT 3a: dark brown (PPL), very low interference colours (close porphyric, speckled and granostriate b-fabric, XPL), orange (OIL); very weak (now-ferruginised) staining with rare traces of amorphous organic matter; <i>Pedofeatures</i> : <i>Textural</i> : many very poorly oriented intercalations in SMT 3a, possible associated thin (30 µm) coatings; <i>Depletion</i> : occasional partial decalcification of SMT 2b; <i>Crystalline</i> : abundant (in SMT 2b) CaCO ₃ impregnation; <i>Amorphous</i> : occasional weak ferruginisation of matrix and many Fe-Mn impregnations; <i>Fabric</i> : very abundant thin, broad (2-4mm) and very broad (30 mm) burrows/mixing.	8003 Very compact calcareous coarse silt to medium sand quartz and chalk, with burrowed-in decalcified sandy loam which becomes dominant upwards; organic and calcitic root traces; possible example of very fine stained bone; iron and iron and manganese staining; strongly and coarsely burrowed/mixed; textural pedofeatures present in upper decalcified zone. <i>Calcaric alluvial gley soil, formed from accreting alluvium (includes example of relict fine bone) and much biological activity and very coarse mixing with decalcified soil upwards – the latter featuring textural pedofeatures indicative of soil disturbance (cultivation?)</i>

**Low Grounds Farm (north), Marlow, Buckinghamshire: Soil Micromorphology
Figures 1-12**

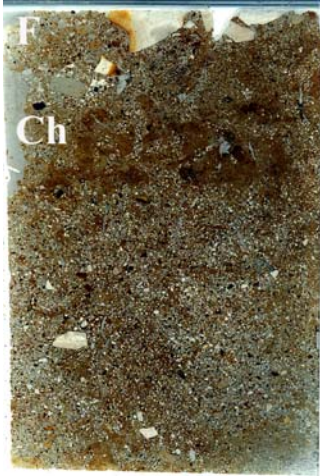


Fig. 1: Scan of M6B (Context 7004); sand and chalky alluvium containing very few flint and chalk gravel; note chalky mud layer (Ch) and overlying fire-cracked(?) flint layer (F). Frame width is ~50mm.



Fig. 2: Scan of M8B (Context 8003) showing homogenised Calcaric alluvial gley soil and possible ard mark junction (arrows) with decalcified Context 8004. Frame width is ~50mm.

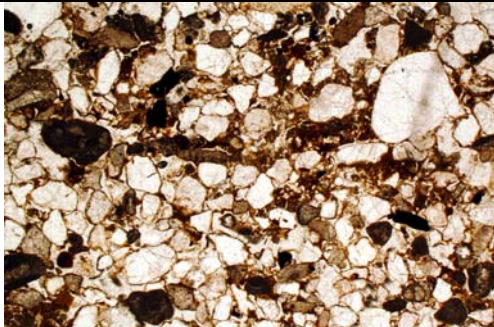


Fig. 3: Photomicrograph of M6B (Context 7004); relict bedding showing sandy alluvium with bioworked calcareous fine sediment (upper half of photo). Plane polarised light (PPL), frame width is ~4.62mm.

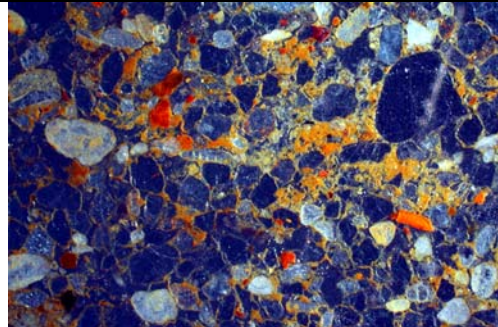


Fig. 4: As Fig 3, under oblique incident light showing ochreous weakly iron-stained calcareous fine material.

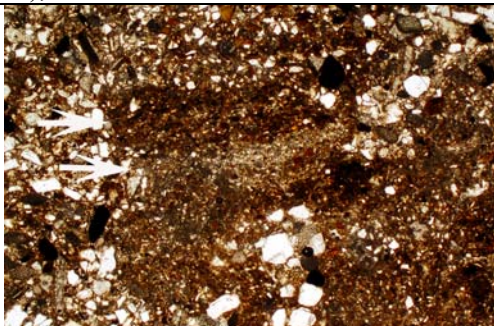


Fig. 5: M6B; the chalky mud layer (see Fig 1); note fine layered infill (arrows – see Fig 6); chalky layer is anomalous (cf Figs 3-4) and may be the result of human trampling. PPL, frame width is ~4.62mm.

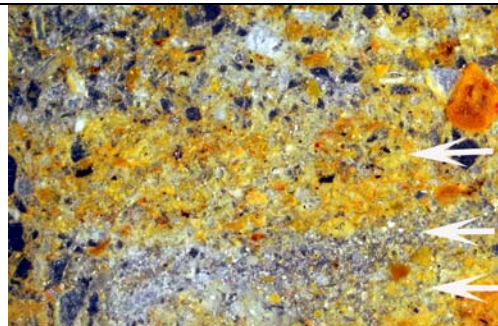


Fig. 6: Detail of Fig 5, under oblique incident light (OIL), showing alternating chalky and clean silty laminae (arrows), with included fine black charcoal. Frame width is ~2.38mm.

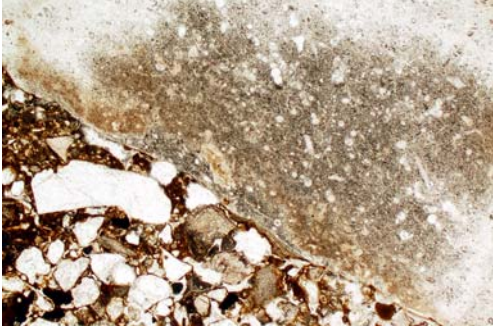


Fig. 7: M6B; detail of burned angular (fire-cracked?) flint in Fig 2. PPL, frame width is ~4.62mm.

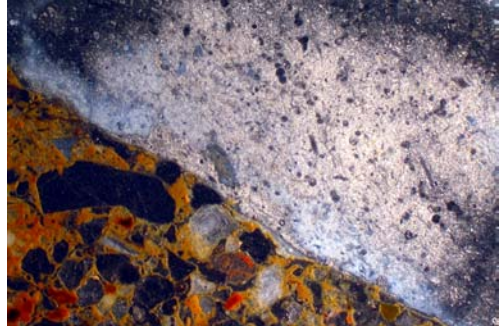


Fig. 8: As Fig 7, under OIL, showing flint is partially calcined ('whitened') as the result of burning.

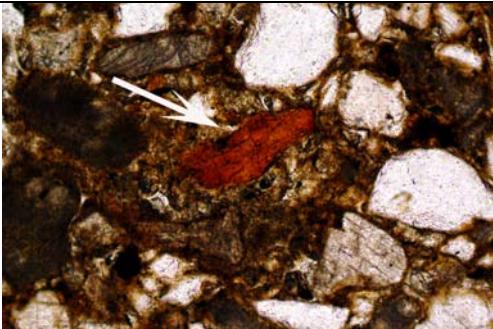


Fig. 9: Photomicrograph of M8B (Context 8003); example of very fine bone fragment in alluvium – probably relict of animal scat. PPL, frame width is ~0.90mm.

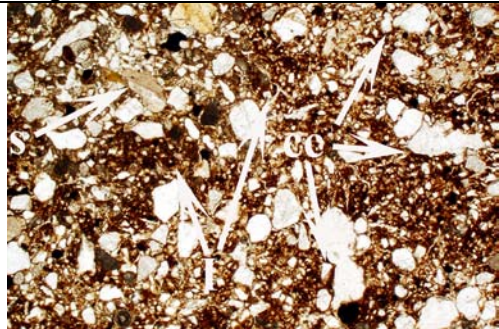


Fig. 10: M8A; decalcified ploughsoil Context 8002 with subsoil fragment of Context 8003 (s); note also textural pedofeatures of cultivation origin, clayey intercalations (I) and void clay coatings (cc). PPL, frame width is ~4.62mm.

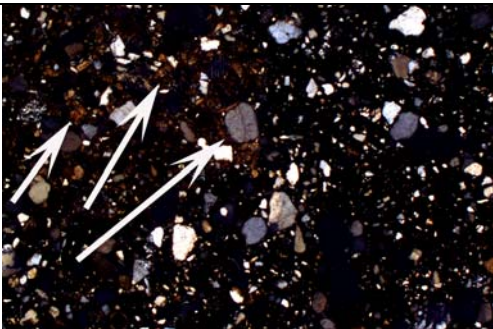


Fig. 11: As Fig 10, under crossed polarised light (XPL), showing higher interference colours of included calcareous material (arrows – actually one large fragment) in this decalcified soil.

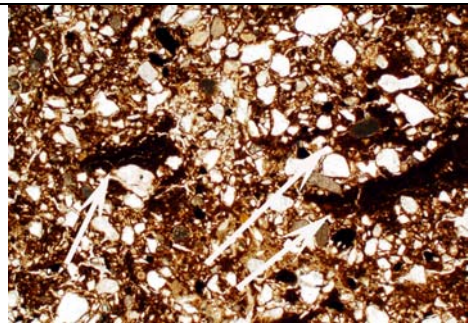


Fig. 12: M8A; very dark clayey pans (arrows) that may indicate occasional inwash of muddy alluvium into this ploughsoil. PPL, frame width is ~4.62mm.

APPENDIX 3 REPORT ON PHOSPHATE CONCENTRATIONS IN SOIL/SEDIMENT SAMPLES FROM MARLOW EXCAVATION

By Dr J. Crowther (University of Wales, Lampeter, Ceredigion, UK SA48 7ED)

Introduction

Inorganic phosphate (phosphate-P_i) and loss-on-ignition analyses were undertaken on four bulk samples of soil/sediment (taken to complement thin section analysis undertaken by Dr Richard Macphail) from the river terrace gravels sequence exposed during the Marlow excavation. The gravel bar on which the site is located shows extensive evidence of Neolithic and Bronze Age activity and the samples were investigated in the hope that they may provide some insight into soil/sediment formation and possible anthropogenic influence. Phosphate enrichment is associated with inputs of organic materials, most notably excreta and especially bone (see reviews by Bethel and Máté, 1989; Crowther, 1997; Heron, 2001); and LOI provides an estimate of the organic matter concentration, with elevated concentrations within gravel sequences often being associated with periods of pedogenesis. It should be noted at the outset that the results from such a small sample set need to be interpreted with caution, especially in the absence of 'control samples' or of samples from contexts known from other evidence to be strongly associated with periods of anthropogenic activity.

Methods

Analysis was undertaken on the fine earth fraction (i.e. <2 mm) of the samples. Phosphate-P_i was extracted from finely ground samples using 1 N HCl (with a slight excess of acid being added first to neutralize the carbonate present), and concentrations were determined colorimetrically using molybdenum blue at a wavelength of 720 nm. LOI was determined by ignition at 375°C for 16 hrs (Ball, 1964) – previous experimental studies having shown that there is normally no significant breakdown of carbonate at this temperature. Carbonate content was estimated by observing the reaction following the application of 10% HCl (Hodgson, 1974).

Results And Discussion

Details of the samples and analytical results are presented in Table 1. Overall, the samples are largely minerogenic (LOI range: 1.22-2.70%), calcareous to very calcareous, and show no clear sign of phosphate enrichment (phosphate-P_i range: 0.507-0.645 mg g⁻¹).

Environmental monolith 6

The two samples (from contexts 7003 and 7004) both have a very low LOI, which suggests that they are essentially of minerogenic origin – i.e. there is no indication that either might be associated with a former topsoil/buried ground surface. In light of this, it is somewhat surprising that the highest phosphate-P_i concentration (0.645 mg g⁻¹) over the four samples was recorded in context 7003. Both samples are very calcareous.

Environmental monolith 3

The two samples (from contexts 8002 and 8003) have a higher LOI than those from monolith 6. In the case of 8002 (2.70%) this may well be indicative of a period topsoil

pedogenesis. This may explain the lower carbonate concentration (i.e. a result of decalcification through leaching) recorded in 8002. However, there is no evidence of phosphate enrichment, which tends to occur naturally as a result of preferential uptake and cycling of phosphate within the soil-vegetation system, to support this interpretation.

Conclusion

Unfortunately, the results are quite equivocal and are, in any case, somewhat difficult to interpret in the absence of control samples or samples from contexts known to be associated with past phases of anthropogenic activity. However, there is an indication that the upper soil/sediment (context 8002) sampled from monolith 3 may be associated with pedogenesis. The results of thin section analysis should provide further insight into this.

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Table 1: Analytical data for the bulk samples

Context	Depth (cm)	LOI (%)	Carbonate (est.) (%)	Phosphate-P _i (mg g ⁻¹)
Environmental monolith 6				
7003	28-36	1.26	10.0+	0.645
7004	36-45	1.22	10.0+	0.508
Environmental monolith 3				
8002	27-44?	2.70	5.0	0.507
8003	27-44?	1.82	10.0+	0.583

APPENDIX 4 Assessment of Charred Plant Remains

By Wendy Smith (*Oxford Archaeology*)

Introduction

Excavations by the Marlow Archaeological Society at Low Ground Farm (north), Marlow, Buckinghamshire (NGR SU 83992 85656) in 2006, included sampling for the recovery of charred plant remains. In total 6 samples were collected and all were assessed here. A seventh sample (a vertical Kubierna sample through a section in Trench 8) was not assessed for charred plant remains.

Assessment of charred plant remains was carried out in order to:

- establish if charred plant macrofossils or charcoal were present and of sufficient quantity to be interpretable.
- establish if the plant macrofossils provide information about agricultural/ economic practice
- establish if the charcoal remains provide information on fuel selection/ surrounding woodland resources

Method

The soil samples were collected by members of the Marlow Archaeological Society during the course of the excavation. Sample volumes ranged from 18.648L to 0.072L. Samples were processed at Oxford Archaeology by water flotation using a modified Siraf flotation machine. Flots (the material which floats) were retained in a 0.25mm mesh and heavy residues (the material which does not float) were retained in a 0.5mm mesh. Heavy residues were scanned by eye for ecofacts and artefacts by OA environmental assistants. Small quantities of plant remains and charcoal were recovered and in one case (sample 2, context 8005) the 4 - 0.5mm fraction contained small-sized hazel nutshell fragments, so was retained in its entirety, as it would require sorting with the aid of magnification.

Flots (and in the case of sample 2, context 8005 the 4 - 0.5mm residue fraction) were scanned using a low-power microscope at a magnification of x12. Identifications were made without directly comparing material with modern references and are semi-quantified on a notional basis. Nomenclature for indigenous taxa follows Stace (1997). As a result, the assessment results should be seen as provisional and likely to under-represent small-sized plant remains.

Results

Table 1 presents a summary of the results for charred plant remains and charcoal recovered in the six samples from Trenches 8 and 9 at Low Grounds Farm. In all cases, only small quantities of charcoal and charred plant remains were recovered. Two flots (samples 2 and 6, both context 8005) produced small quantities of charred hazel (*Corylus avellana* L.) nutshell fragments.

Discussion

To date, there are no Neolithic archaeobotanical results for Buckinghamshire (e.g. English Heritage Environmental Archaeology Database updated 2004; consulted Feb 2008). As a result, although a limited project, the results gathered by the Marlow Archaeological Society

at Low Grounds Farm are of major regional importance. In particular, archaeobotanical sampling has established that charred plant remains are present on site. It also has established that the sample size required for the recovery of interpretable assemblages of charred plant remains from Neolithic deposits in the area needs to be of 40 L volume or 100% of a deposit if less than 40 L of sediment is available for sampling.

Potential

None of the samples examined have potential for further analysis. However, the hazel nutshells from samples 2 and 6 (context 8005) are suitable for radiocarbon determinations, if needed.

Conclusions

Environmental sampling from Trenches 8 and 9 at Low Grounds Farm, Marlow, Buckinghamshire has produced small quantities of charcoal and charred plant macrofossils. Other areas of this site have generated more abundant charred plant macrofossils and charcoal; which may suggest that activities in this area of the site were less likely to involve heating processes. The small quantity of plant remains recovered in these samples suggests that a minimum of 40L of sediment should be sampled from Neolithic (possibly also Bronze Age) deposits in any future excavations in the area.

References

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http://ads.ahds.ac.uk/catalogue/specColl/eab_eh_2004/; consulted 28/2/08.

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Table 1: Assessment results for Low Ground Farm, Trenches 8 and 9

Sample	Context	Trench	Notes	Phase	Sample Vol (L.)	Flot Vol. (ml)	Grain	Chaff	Weeds	Other Charred	?Dried-out WPR/ sub-fossil	Bone	Charcoal	Mollusc	Comments on CPR	CPR Potential	Full Analysis	Charcoal Potential
1	8002/8003	T8	within buried soil	?NEO	18.648	10 ml	-	-	-	-	+++	-	+	+++	100% of flot scanned. Abundant modern root. Small quantity of charcoal present. Goosefoot (<i>Chenopodium</i> spp.) and knotweed (<i>Persicaria</i> sp.) present which could be either dried-out waterlogged material or possibly sub-fossil. No CPR observed.	C	N	N
2	8005	T9	fill of pit	?NEO	12.474	15 ml	-	-	-	++	-	-	+	+	100% of flot scanned. Abundant modern root. Some mollusc and charcoal observed. Hazel (<i>Corylus avellana</i> L.) nutshell fragments present. 10-4mm HR Fraction: Charred roots (possibly grass (POACEAE/ or small shrub (including heather)). 4-0.5mm HR retained - hazel nutshell fragments observed.	C	N	N
3	all?	T10	vertical Kubierna	?NEO	4.004	no flot												
4	8003	T11	fill of stakehole [8117]	?NEO	0.072	< 5 ml	-	-	-	-	-	-	+	-	100% of flot scanned. Only small flecks of charcoal observed. NO CPR observed.	C	N	N
5	8003	T12	fill of stakehole [8118]	?NEO	0.072	<5 ml	-	-	-	-	-	-	+	-	100% of flot scanned. A few modern/ sub-fossil goosefoot (<i>Chenopodium</i> sp.) seeds present. A few flecks of charcoal present. No CPR observed.	C	N	N
6	8005	T13	bottom of pit	?NEO	0.27	< 5 ml	-	-	-	+	-	-	+	-	100% of flot scanned. A few flecks of charcoal and a few hazel (<i>Corylus avellana</i> L.) nutshell fragments present. Modern/ sub-fossil leaf and twig present. No other CPR observed.	C	N	N

Table 1B: Assessment results for Low Ground Farm, Trenches 8 and 9 continued...

Sample	Context	Trench	Notes	Phase	Sample Vol (L.)	Flot Vol. (ml)	Grain	Chaff	Weeds	Other Charred	?Dried-out WPR/ sub-fossil	Bone	Charcoal	Mollusc	Comments on CPR	CPR Potential	Full Analysis	Charcoal Potential
7	9003	T9	fill of posthole [9101]	?NEO	0.16	<5 ml	-	-	-	-	-	-	+	++	100% of flot scanned. Several molluscs present. A few flecks of charcoal observed, but otherwise no CPR present. Anthracite/ coal fragments present.	C	N	N

APPENDIX 5 Palynological assessment of three samples from Low Ground Farm, Marlow

By Elizabeth Huckerby (Oxford Archaeology North)

Introduction

Oxford Archaeology North was asked to assess the palynological potential of three pollen sub samples from Trench 8 (Environmental Sample 3) from the recent phase of excavation. It was hoped that this assessment would identify if pollen grains had been preserved in the deposits and if the data might provide information about the environment of the site from which many finds of cracked and worked flints were retrieved and a number of possible stakeholes identified..

Sediment Sampling

The monolith sample (Environmental Sample 3) was taken through three contexts, Context 8002, (a buried soil horizon), Context 8003 (subsoil) and Context 8004(weathered natural). A single pollen sub-sample was taken from each context at depths of 0.28m, 0.40m and 0.47m for the top of the monolith.

Method

The three samples were prepared for pollen analysis using a standard chemical procedure, method B of Berglund & Ralska - Jasiewiczowa (1986), using HCl, NaOH, sieving, HF, and Erdtman's acetolysis, to remove carbonates, humic acids, particles > 170 microns, silicates, and cellulose, respectively. The samples were then stained with safranin, dehydrated in tertiary butyl alcohol, and the residues mounted in 2000 cs silicone oil. Slides were examined at a magnification of 400x by equally-spaced traverses across at least two slides to reduce the possible effects of differential dispersal on the slide. Tablets with a known concentration of Lycopodium spores were added to a known volume of sediment at the beginning of the preparation so that pollen concentrations could be calculated if necessary. Initially, two cover slips of each slide were scanned in order to determine the presence or absence of pollen. If the slides were devoid of pollen grains then no further counting was carried out, however if the slides contained pollen then counting continued until a sum of at least 100 determinate pollen grains was reached or until ten transects were counted over two cover slips. Pollen identification was carried out using the standard keys of Faegri et al (1989) and Moore et al (1991), and the limited reference collection held at OA North. The abundance of microscopic charcoal fragments >5µm was noted where present. Plant nomenclature follows Stace (1997). The raw data were entered into Table 1.

Results

The concentration of pollen grains in the three samples was very low and it was not possible to count 100 pollen grains using the criteria outlined above. The sample from the alluvial deposit (Context 8002, 0.28m) had a few grains of well-preserved pollen in it from grasses (Poaceae), Asteraceae (Lactucoideae, dandelion type) and shepherd's purse family (Brassicaceae). In Context 8003 (0.40m) there were only a few poorly preserved pollen grains recorded but they did include some from trees together with ones from the same herb taxa as in Context 8002. The concentration of pollen in the third sample (Context 8004 0.47m) was even lower and those grains that were recorded were very poorly preserved. Microscopic charcoal particles were noted in the three samples.

Depth m		0.28	0.40	0.47
Context		8002	8003	8004
Trees & Shrubs				

<i>Corylus avellana</i> -type	Hazel		1	4
<i>Fagus sylvatica</i>	beech			1
<i>Pinus sylvestris</i>	Scots pine		3	
Herbs				
Poaceae	Grass family	6	5	
Cyperaceae	Sedge family		1	
Asteraceae (Lactucoideae)	Dandelion family	6	1	
Brassicaceae	Shepherd's purse family	3	2	
<i>Rumex</i>	Dock		2	1
<i>Urtica</i>	Nettle	1		
Pteridophytes				
<i>Pteridium aquilinum</i>	Bracken	5	2	
Pteropsida (monolete) indet.	Undifferentiated ferns	1		
Unidentifiable pollen		4	5	1
Microscopic charcoal		++	+	++

Table 1: Palynological assessment from Trench 8 Environmental Sample 3, Lowgrounds, Marlow.

The numbers are the actual number of pollen grains recorded.

Discussion and Conclusions

This palynological assessment has demonstrated that the depositional conditions of the sediments were not favourable for the preservation of pollen grains. Pollen grains are normally only well preserved in acidic, anaerobic, waterlogged conditions, although they can be preserved in more alkaline ones. Because the dataset is so small any interpretation of the data is extremely tentative however the few pollen grains that were identified in the two upper samples (0.27m and 0.40m) suggest that there were very few trees growing near the site when it was in use. The identification of grass pollen and bracken spores might possibly indicate that the environment was one of open grassland with some bracken, dandelion like plants and other herbaceous taxa.

It is not possible to draw even any tentative conclusions from the lower sample (Context 8004 0.47m) except to say that the few grains, which were recorded, were so poorly preserved that they are probably reworked from earlier deposits. These data were unable to contribute to our understanding of the site.

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