Imperial College Sports Ground and RMC Land, Harlington

The development of prehistoric and later communities in the Colne Valley and on the Heathrow Terrace

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fauna' (ecological grouping 'h' in Tables 10.22 and 10.23 and Fig. 10.3, 9.8%). These species are normally associated with settlement deposits and waste in the archaeological record (Hall and Kenward 1990; Kenward and Hall 1995). Typical of this grouping are *Xantholinus concinnus*, the cryptophagids, lathridiids, *Mycetea hirta* and the 'woodworm' *Anobium punctatum*. Also present was a single individual of the 'granary weevil' *Sitophilus granarius*, a species which is associated only with stored grain (Freeman 1980).

Sample 17032 from cut 16402 produced a small fauna of beetles which is essentially similar to that found in sample 2331.

Medieval well/waterhole

Sample 17052 came from the cut of feature 16200 and was part of the fill which was associated with a 12th-century bucket which has been radiocarbon dated (see Chapter 11).

The insect fauna recovered is again large in size and is dominated by species that are indicative of disturbed and agricultural land. This is clearly seen in the large number of carabid 'ground beetles' recovered. Species such as *Notiophilus biguttatus, Anisodactylus binotatus, Harpalus dimidiatus, H. rupicola, H. rufipes, Pterostichus melanarius, P. madidus, Platynus dorsalis* and *Amara aenea* are particularly indicative of this type of landscape (Lindroth 1974). Similarly open and rough ground is indicated by the nitidulid *Brachypterus urticae* and the 'weevils' *Apion urticarium* and *Cidnorhinus quadrimaculatus* which are associated with common nettle. The presence of clover is again indicated by a number of the species of *Sitona* weevil recovered. Both shepherd's purse (*Capsella bursa-pastoris* L.) and knotweeds (*Polygonum* spp.) were also present since these are the food plants of *Ceutorhynchus eryisimi* and *Rhinoncus pericarpius* respectively (Koch 1992). As with the other deposits discussed here a relatively large proportion of the taxa recovered are again 'dung beetles' indicating the presence of pasture and grazing in the area.

One aspect of this fauna that stands out is that 16% of the terrestrial fauna consists of two species of granary pest. However, this results from the very low numbers of terrestrial insects recovered from this sample and this ecological grouping is actually only represented only by two individual specimens. Both *Oryzaephilus surinamensis* and *Palorus ratzburgi* are both associated with spoilt stored grain (Freeman 1980). It may be that spoilt grain was deliberately dumped into this feature but it seems far more likely that it was used as supplementary feed for grazing animals and entered this deposit in dung which was washed into the feature.

Conclusions

The insect faunas recovered here clearly suggest that the landscape associated with the waterholes and ditch systems at ICSG was essentially cleared of trees and used for farming and the pasturing of stock animals. It has been suggested that for this area of the Middle Thames Valley clearance of forest for farming mainly occurred in the period between 2000–800 BC (Branch and Green 2004, Sidell *et al.* 2000; Rackham and Sidell 2000). At the sites of both Runnymede Bridge and Dorney the insect faunas recovered clearly show a transition from closed woodland to open and grazed landscapes during the Middle Bronze Age (Robinson 2000; Parker and Robinson 2003). The insect remains from the Bronze Age waterhole at ICSG, and the radiocarbon date from the log ladder in this feature, suggest that this area developed in the same way and at a similar period. Other sites in the area, such as those at Perry Oaks (Framework Archaeology 2006) and Heathrow Terminal 5 (Emma Tetlow pers. comm.) indicate that this cleared and agricultural landscape persisted into the Iron Age. Similar insect faunas and cleared landscapes appear to have also been present from the Middle to Late Bronze Age onwards both in the Upper Thames Valley (Robinson 1993) and in and around Greater London (Elias *et al.* 2009).

Pollen

by Michael J. Grant

Introduction

Pollen assessment was carried out upon eight features from ICSG and RMC Land. Subsequently two archaeological features were selected for full pollen analysis. At ICSG well G834 (monolith 12089) was analysed. This is interpreted as a possible well (feature 10891, a recut of 10824) containing a number of Late Iron Age/early Romano-British finds. At RMC Land, waterhole 524 (monolith 121, late Saxon/early medieval) was analysed. Additional spot samples were taken from sediments adhering to three wooden objects at ICSG – two Late Bronze Age/Early Iron Age (ONs 18221 and 18222) and one early medieval (ON 18756, two sample).

Methods

Twenty samples were assessed from eight stratified sections (two samples from each – see Tables 10.24–25) and four spot samples from sediment which remained attached to excavated wooden objects

Table 10.24 Features assessed for pollen from RMC Land

Feature no.	*Feature*	*Date*	*Monolith*
5380, 5442	Deep pit or well (and partial recut – 5442)	possible Neolithic	347
5287	Waterhole	Late Bronze Age/Early Iron Age	338
2462, 2054	Well (and recut – 2462)	Saxon	167
524	Well	Late Saxon/early medieval	121

Table 10.25 Features assessed for pollen from ICSG

Group	*Feature no.*	*Feature*	*Date*	*Monolith*
G477	4207	Ditch of rectangular enclosure G3001	Neolithic	2362
G503	4217	Ditch of rectangular enclosure G3001	Neolithic	2361
G2000	19380	Double ring ditch G2007 – outer ditch	Neolithic	18097–8
G834	10891	Possible well, recut within 10824	Late Iron Age/early Romano-British	12089

Table 10.26 Spot samples analysed for pollen from ICSG

Object	*Object no.*	*Feature No.*	*Context No.*	*Date*
Wooden stake	18221	G2156	17581	Late Bronze Age/Early Iron Age
Wooden lid/vessel base	18222	G2156	17581	Late Bronze Age/Early Iron Age
Wooden bucket	18756	16200	16220	Early medieval
Wooden bucket	-	16200	16220	Early medieval

Table 10.27 Sediment description from monolith 12089, feature G834 (10891), ICSG

Depth (m)	*Context*	*Description*
0–0.40	10826 10827	10yr 5/3 brown silt loam. 2% medium size inclusions concentrated at the top of the sequence, small to medium size round inclusions along the sediment. Abundant iron stains and a few manganese. Abundant macropores and some roots present. Burnt clay found at the top of the sample. This sequence has some thick layers. Sharp boundary
0.40–0.80	10827	10yr 5/1 gray silt loam. Few and small rounded inclusions, bigger inclusions concentrated at the bottom of the sediment. Fewer iron stains than the sediment above, fewer macropores too. Some tiny fragments of charcoal. There is more layering and finer than above. Gradual boundary.
0.80–1.00	10890	10yr 4/3 brown silty clay loam. Abundant (40%) small to medium size subangular inclusions. Abundant iron stains. Abundant macropores and roots

Table 10.28 Sediment description from monolith 121, feature 524, RMC Land

Depth (m)	*Context*	*Description*
0–18	525	10yr 5/6 yellowish brown silty clay. Few (2%) small subangular inclusions scattered some charcoal at the top of the sediment. Abundant manganese and iron stains. Few patches of very light yellowish silt. Sharp boundary.
18–20	528	Very thin iron pan, abruptly defined. Also manganese stains.
20–25	528	10yr 5/3 brown silty clay loam. Stone less. Iron and manganese stains. Very uniform and compact sediment. Clear boundary
25–36	529 1400	10yr 5/4 yellowish brown silty clay loam. Stone less. Very few macropores. No organic remains. Some iron and manganese stains, more pronounce towards the bottom of the sequence. Clear boundary
36–46	1400 1401	10yr 5/3 brown silty clay loam. Stone less. Abundant iron and manganese and light yellow silt. Compact and uniform sediment. Clear boundary
46–60	1401 1402	10yr 4/6 dark yellowish brown silty clay loam. No inclusions. Abundant iron stains, especially at the bottom of the sequence. Very compact soil.

Table 10.29 Pollen counts from RMC Land (percentage calculations are shown in brackets for samples where the TLP sum exceeded 100 grains)

Feature	524		2054/2462		5287		5380, 5442	
Monolith	121		167		338		347	
Depth below surface (m)	0.30	0.55	0.45	0.64	0.10	0.60	0.39	0.70
Trees								
Ulmus	3 (0.7%)	2 (0.5%)	-	-	-	-	-	-
Quercus	6 (1.4%)	13 (3.1%)	-	-	-	-	-	-
Betula	-	1 (0.2%)	-	-	-	-	-	-
Alnus glutinosa	1 (0.2%)	-	1	-	-	-	-	2
Fraxinus excelsior	1 (0.2%)	-	-	-	-	-	-	-
Shrubs and climbers								
Corylus avellana-type	1 (0.2%)	2 (0.5%)	3	-	-	-	-	-
Salix	2 (0.5%)	1 (0.2%)	-	-	-	-	-	-
Hedera helix	-	1 (0.2%)	-	-	-	-	-	-
Dwarf shrubs & herbs								
Ranunculus acris-type	2 (0.5%)	3 (0.7%)	-	-	-	-	-	-
Papaver rhoeas-type	1 (0.2%)	2 (0.5%)	-	-	-	-	-	-
Chelidonium majus	1 (0.2%)	-	-	-	-	-	-	-
Urtica dioica	2 (0.5%)	1 (0.2%)	-	-	-	-	-	-
Chenopodiaceae	5 (1.2%)	-	1	-	-	-	-	-
Cerastium-type	1 (0.2%)	-	-	-	-	-	-	-
Silene dioica-type	4 (1.0%)	6 (1.4%)	-	-	-	-	-	-
Polygonum	-	1 (0.2%)	-	-	-	-	-	-
Rumex obtusifolius-type	-	1 (0.2%)	-	-	-	-	-	-
Rumex sanguineus-type	-	1 (0.2%)	-	-	-	-	-	-
Brassicaceae	9 (2.2%)	4 (1.0%)	-	3	2	-	1	-
Calluna vulgaris	1 (0.2%)	-	-	-	-	-	-	-
Filipendula	2 (0.5%)	-	-	-	-	-	5	1
Rubus undiff.	2 (0.5%)	1 (0.2%)	-	-	-	-	-	-
Rosaceae undiff.	-	1 (0.2%)	-	-	-	1	-	-
Lotus	1 (0.2%)	-	-	-	-	-	-	-
Apiaceae undiff.	3 (0.7%)	2 (0.5%)	-	-	-	-	-	-
Stachys-type	2 (0.5%)	3 (0.7%)	-	-	-	-	-	-
Lamium album	1 (0.2%)	-	-	-	-	-	-	-
Mentha-type	3 (0.7%)	-	-	-	-	-	-	-
Plantago lanceolata	14 (3.4%)	9 (2.2%)	-	-	-	-	-	-
Melampyrum	-	3 (0.7%)	-	-	-	-	-	-
Rubiaceae	2 (0.5%)	3 (0.7%)	-	-	-	-	-	-
Cichorium intybus-type	60 (14.4%)	53 (12.7%)	4	3	1	-	-	-
Solidago virgaurea-type	38 (9.1%)	51 (12.3%)	-	3	-	-	-	-
Artemisia-type	-	1 (0.2%)	-	-	-	-	-	-
Cyperaceae undiff.	7 (1.7%)	6 (1.5%)	-	-	-	-	-	1
Poaceae undiff.	238 (56.9%)	243 (58.4%)	9	8	2	2	4	-
Poaceae annulus 8–10 µm	2 (0.5%)	-	-	-	-	-	-	-
Poaceae annulus 10–12 µm	2 (0.5%)	1 (0.2%)	-	-	-	-	-	-
Poaceae annulus >12 µm	1 (0.2%)	-	-	-	-	-	-	-
Polypodium			1	-	-	-	-	-
Pteridium aquilinum	8 (1.8%)	11 (2.6%)	-	1	-	-	-	-
Pteropsida (monolete) indet.	10 (2.3%)	3 (0.7%)	1	-	-	-	-	-
Bryophyte	1 (0.2%)	-	1	-	-	-	-	-
Trees	2.6%	3.9%	-	-	-	-	-	-
Shrubs & climbers	0.7%	1.0%	-	-	-	-	-	-
Dwarf shrubs & herbs	96.7%	95.1%	-	-	-	-	-	-
Indeterminable grains	10	7	1	-	-	-	-	-
Total land pollen sum	418	416	18	17	5	3	10	4
Pollen concentration (grains cm^{-3})	73160	63168	1636	5767	988	929	3203	929

Table 10.30 Pollen counts from ICSG (percentage calculations are shown in brackets for samples with the sufficient pollen sum)

Feature	4205		4217		10891		19380	
Monolith	2362		2361		12089		18097–8	
Depth below surface (m)	0.50	0.70	0.40	0.65	0.60	0.90	0.40	0.65
Trees								
Pinus sylvestris	-	-	-	-	-	2 (1.6)	-	-
Ulmus	-	-	-	-	1 (0.6)	2 (1.6)	-	-
Quercus	-	-	-	-	4 (2.5)	2 (1.6)	-	1
Betula	-	-	-	-	1 (0.6)	-	-	-
Alnus glutinosa	-	-	-	-	-	1 (0.8)	-	-
Shrubs & climbers								
Corylus avellana-type	-	-	-	1	3 (1.9)	-	-	-
Salix	1	-	-	-	-	2 (1.6)	-	-
Sorbus-type	-	-	-	-	1 (0.6)	-	-	-
Hedera helix	-	-	-	-	2 (1.2)	-	-	-
Dwarf shrubs & herbs								
Ranunculus acris-type	-	-	-	-	1 (0.6)	2 (1.6)	-	-
Chenopodiaceae	-	-	1	-	9 (5.6)	1 (0.8)	-	-
Silene dioica-type	-	-	-	-	15 (9.3)	1 (0.8)	2	-
Brassicaceae	1	-	-	-	-	1 (0.8)	-	-
Calluna vulgaris	-	-	-	-	1 (0.6)	1 (0.8)	-	-
Filipendula	-	-	-	-	3 (1.9)	5 (4.1)	1	-
Rubus undiff.	-	-	-	-	2 (1.2)	-	-	-
Rosaceae undiff.	-	-	-	-	1 (0.6)	-	-	-
Bupleurum	-	-	-	-	-	1 (0.8)	-	-
Apiaceae undiff.	-	-	-	-	1 (0.6)	-	-	-
Stachys-type	-	-	-	-	2 (1.2)	1 (0.8)	-	-
Plantago lanceolata	-	-	-	-	3 (1.9)	-	-	-
Succisa pratensis	-	-	-	-	1 (0.6)	-	-	-
Cichorium intybus-type	-	-	-	1	12 (7.5)	36 (29.6)	7	1
Solidago virgaurea-type	1	-	1	-	22 (13.7)	12 (9.8)	-	-
Cyperaceae undiff.	-	-	1	-	-	4 (3.3)	-	-
Poaceae undiff.	3	1	3	-	73 (45.3)	46 (37.7)	4	1
Poaceae annulus 8–10 µm	-	-	-	-	-	1 (0.8)	-	-
Poaceae annulus 10–12 µm	-	-	-	-	1 (0.6)	2 (1.6)	-	-
Polypodium	-	-	-	-	1 (0.6)	1 (0.8)	-	-
Pteridium aquilinum	-	-	1	-	-	1 (0.8)	-	-
Pteropsida (monolete) indet.	-	-	-	-	2 (1.2)	-	-	-
Trees	-	-	-	-	3.7	5.7	-	-
Shrubs & climbers	-	-	-	-	3.7	1.6	-	-
Dwarf shrubs & herbs	-	-	-	-	92.5	92.6	-	-
Indeterminable grains	2	2	1	-	13	3	-	-
Total Land Pollen Sum	6	1	6	2	161	122	14	3
Pollen concentration (grains cm^{-3})	1235	329	1986	235	169312	54864	2443	1042

Table 10.31 Pollen Zone descriptions for feature G834, cut 10891, monolith 12089, ICSG

Zone	*Depth (m)*	*Description*
10891–2	0.72–0.44	Dominated by Poaceae (60–81%), with *Cichorium intybus*-type (3–5%) and *Solidago virgaurea*-type (5–11%). Woodland taxa are limited, with only *Quercus* and *Corylus avellana*-type obtaining values greater than 1%. Herb taxa with a continuous presence that reach vales over 1% include *Ranunculus acris*-type (up to 2%), Chenopodiaceae (up to 5%), *Silene dioica*-type (up to 5%), Brassicaceae, *Plantago lanceolata* (up to 1.5%) and Poaceae with an annulus 8–10 µm (up to 1.5%). *Filipendula*, Apiaceae undif. (up to 1.5%) and *Stachys*-type also obtain values of 1%, but are not continuously present. Pollen concentrations vary between 80460 – 106363 grains cm^{-3}.
10891–1	0.90–0.72	Dominated by Poaceae (49–57%), *Cichorium intybus*-type (12–26%) and *Solidago virgaurea*-type (8–11%). Woodland taxa are limited, with only *Quercus* continuously present (up to 1%). Herb taxa with a continuous presence that reach vales over 1% include *Ranunculus acris*-type, Chenopodiaceae (up to 2.5%), *Cerastium*-type (up to 1.5%) *Silene dioica*-type (up to 1.5%), Brassicaceae (up to 3.5%), *Filipendula* (up to 1.5%), Apiaceae undiff. (up to 2%), *Stachys*-type, *Plantago lanceolata* (up to 1.5%) and Poaceae with an annulus 8–10 µm (up to 1.5%). Fabaceae undif. obtains values of 1.5%, but is not continuously present. Pollen concentrations vary between 26041 – 29452 grains cm^{-3}.

Table 10.32 Pollen Zone Descriptions for feature 524, monolith 121, RMC Land

Zone	*Depth (m)*	*Description*
524–3	0.325–0.150	Dominated by Poaceae (45–57%), *Cichorium intybus*-type (14–38%) and *Solidago virgaurea*-type (4–9%). Woodland taxa are limited, with only *Quercus* and *Corylus avellana*-type obtaining values greater than 1%. Herb taxa that reach vales over 1% include *Ranunculus acris*-type, Chenopodiaceae, *Silene dioica*-type (up to 2%), Brassicaceae (up to 2.5%), *Plantago lanceolata* (up to 3.5%) and Poaceae with an annulus 10–12 µm. *Pteridium aquilinum* is present throughout the zone (up to 2% TLP + Pteridophytes). Pollen concentrations decrease from 36580–7130 grains cm^{-3}.
524–2	0.425–0.325	Dominated by Poaceae (51–66%), *Cichorium intybus*-type (14–26%) and *Solidago virgaurea*-type (9–10%). *Quercus*, *Betula*, *Ulmus* and *Corylus avellana*-type fail to reach 1%. Herb taxa that reach vales over 1% include *Ranunculus acris*-type, *Urtica dioica*, *Silene dioica*-type, Brassicaceae (up to 2.5%), Apiaceae undiff. and *Plantago lanceolata* (up to 3.5%). Pollen concentrations increase from 63907–102334 grains cm^{-3}.
524–1	0.600–0.425	Dominated by Poaceae (35–58%), *Cichorium intybus*-type (13–29%) and *Solidago virgaurea*-type (7–13%). *Ranunculus acris*-type (1–2%), *Silene dioica*-type (1–2%), Brassicaceae (1–3%), Apiaceae (up to 1%), *Plantago lanceolata* (1–4%) and *Artemisia*-type (<1%) are present throughout the zone and increase towards the end. *Ulmus*, *Quercus*, *Betula* and *Alnus glutinosa* are only present as isolated occurrences, though *Quercus* does reach 3% at 0.55 mBGL. *Corylus avellana*-type is present throughout the zone, though at low values (<1%). Poaceae with an annulus >8 µm are present throughout the zone, with total percentages up to 3%. *Pteridium aquilinum* is present throughout the zone (up to 3% TLP + Pteridophytes). Pollen concentrations increase from 3628–40200 grains cm^{-3}.

(Table 10.26). Samples were processed using standard procedure (Moore *et al.* 1991); 2cm^3 of sediment was sampled. A *Lycopodium* spike was added to allow the calculation of pollen concentration. All samples received the following treatment: 20 mls of 10% KOH (80°C for 30 minutes); 20 mls of 60% HF (80°C for 120 minutes); 15 mls of acetolysis mix (80°C for 3 minutes); stained in 0.2% aqueous solution of safranin and mounted in silicone oil following dehydration with tert-butyl alcohol.

After assessment, it was decided to undertake full analysis upon 17 samples from two of the exposed stratified sections previously assessed. Ten samples were taken from the possible well G834 (cut 10891, monolith 12089) at ICSG, and seven samples from waterhole 524 (monolith 121) at RMC Land. Sedimentary descriptions of the two selected sequences are given in Tables 10.27–28. The four spot samples from ICSG were also fully analysed.

At assessment, counts of 100 Total Land Pollen (TLP – excluding Aquatics, Pteridophytes and Bryophytes) were made for each level and calculated as a percentage of the pollen sum (Aquatics, Pteridophytes and Bryophytes calculated as percentage TLP + Group Sum). At the analysis stage, the pollen count was increased from 100 to a minimum of 400 TLP. Identification was made using a Nikon SE and Nikon Eclipse E400 at x400 magnification. Pollen nomenclature is based on Bennett (1994; Bennett *et al.* 1994) and ordered according to Stace (1997). The pollen diagram was drawn using Tilia v 2.0.2 (Grimm 1991). Numerical zonation was performed using the CONISS program (Grimm 1987) after converting the data into percentages in the above sums.

Results

Results of pollen assessment from the feature based sequences are shown in Tables 10.29–30. Pollen preservation and concentrations were found to be poor in the majority of the features sampled. Concentrations in these low-yielding samples ranged from 235–5767 grains cm^{-3}, with an average of 1730 grains cm^{-3}. In addition, those pollen grains that were encountered were often poorly preserved. Only two features (waterhole/wells 524 and G834) showed sufficient potential for further investigation, and were subsequently taken to the analysis stage.

Results of pollen analysis from monoliths 12089 (well G834) and 121 (waterhole 524) are shown in Figures 10.4 and 10.5, with pollen zones described in Tables 10.31–32. Two local pollen assemblage zones (l.p.a.z.) have been defined for monolith 12089 and three l.p.a.z. for monolith 121.

Assessment of the four spot samples (wooden objects ONs 18221–2, 18756) yielded sufficient pollen to allow full analysis on the four spot samples, results of which are shown in Figures 10.6 and 10.7.

Interpretation and Discussion

Late Bronze Age/Early Iron Age (ONs 18221 and 18222)

Although taken from sediment attached to different objects, both of these spot samples are taken from the same feature (G2156) and context 17581 and so can be considered together. With all spot samples (and indeed all buried soils) an assumption is made that the pollen is largely derived from a local vegetation source and that the sediment sampled is

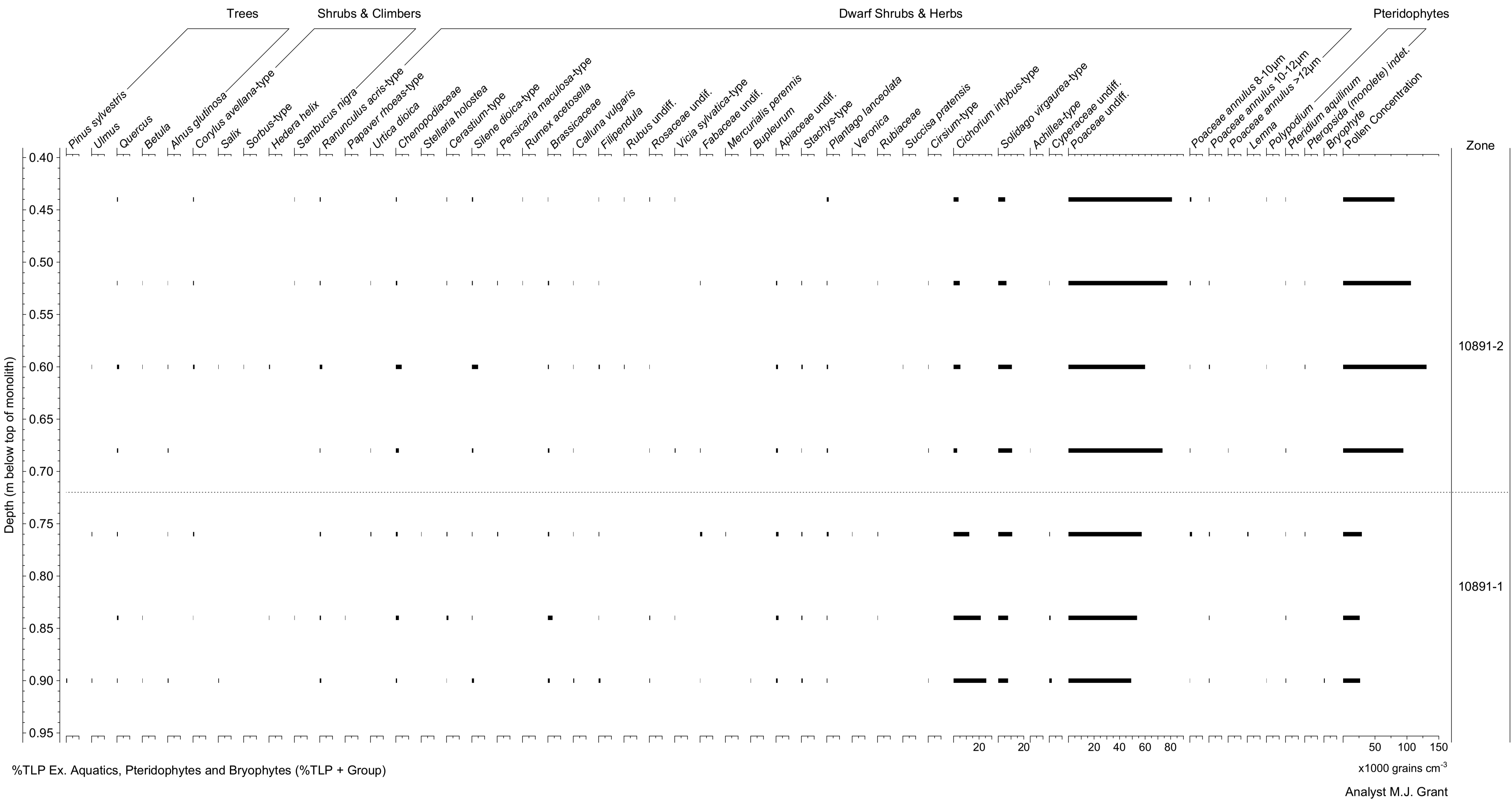

Figure 10.4 Pollen diagram from feature G834, monolith 12089 – Late Iron Age/early Romano-British recut, ICSG

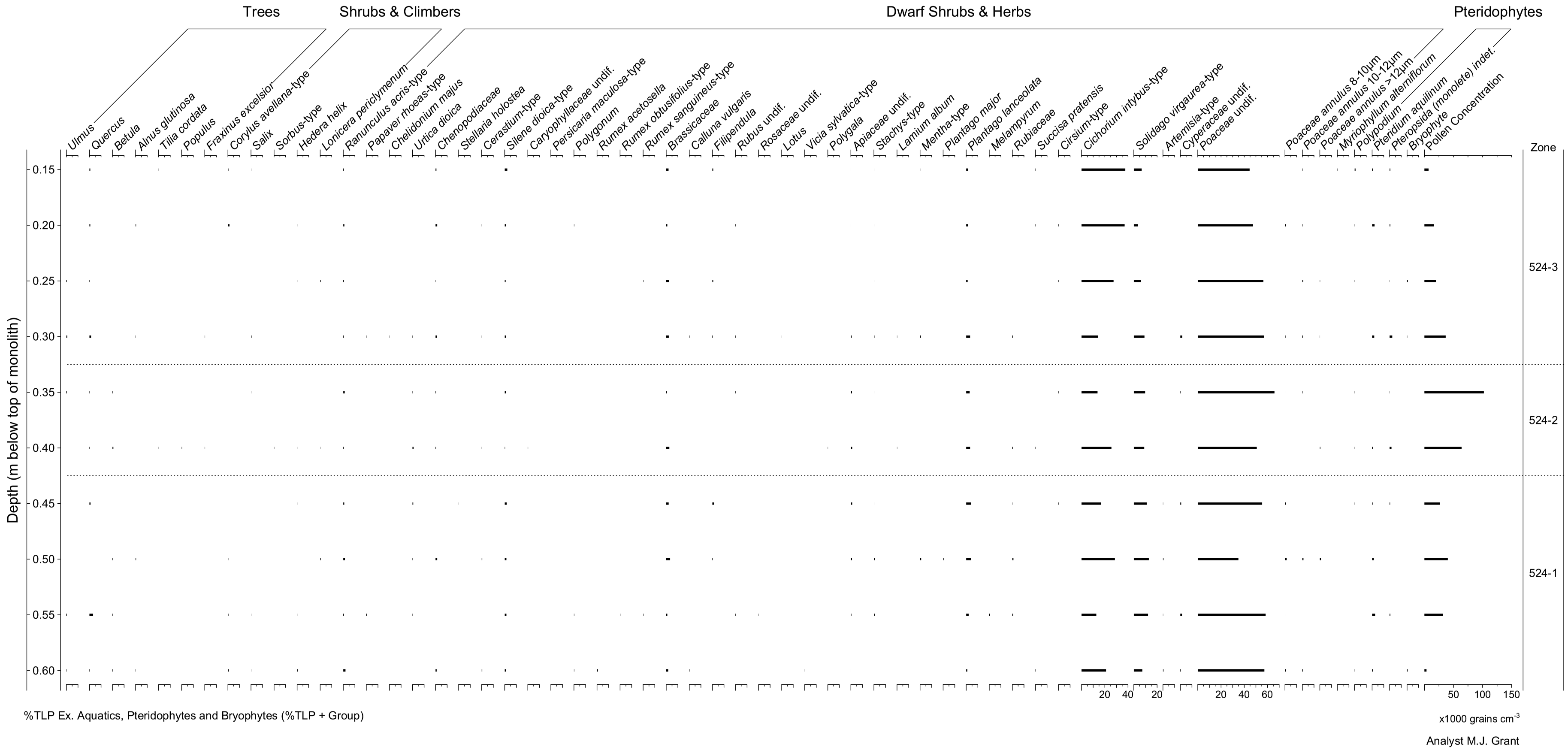

Figure 10.5 Pollen diagram from feature 524, monolith 121 – late Saxon/early medieval waterhole, RMC Land

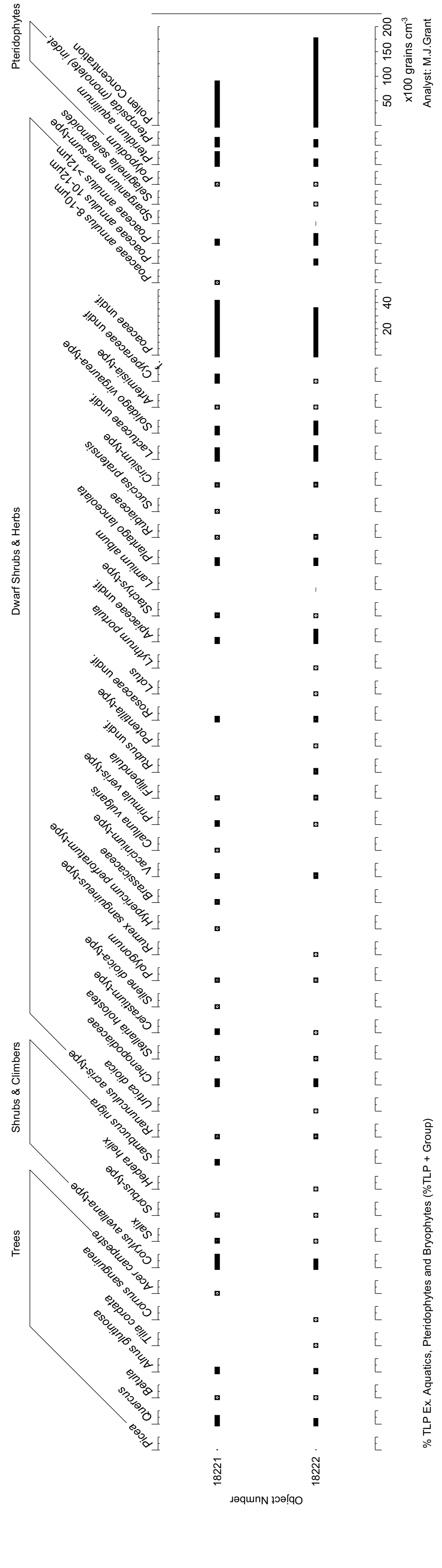

Figure 10.6 Spot pollen samples from Late Bronze Age/Early Iron Age objects 18221 and 18222, ICSG

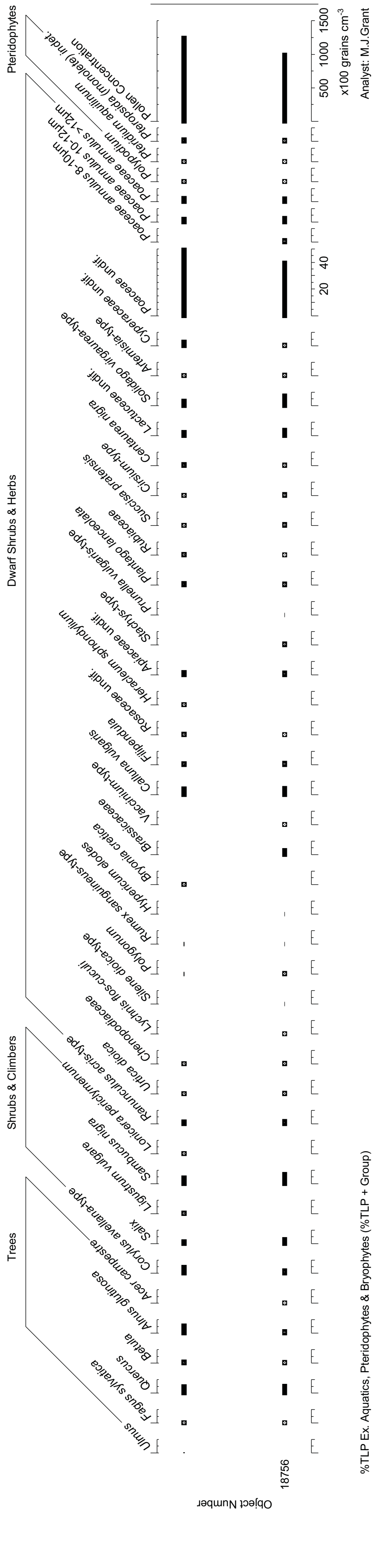

Figure 10.7 Spot pollen samples from early medieval object 18756, ICSG

contemporary with the feature/object under consideration. This therefore assumes that for the wooden objects (especially the stakes – ON 18221) that the pollen is not derived from older sources (eg, sediments into which the object was driven) or from an alternative origin (eg, sediment fill associated with the lid or vessel base (ON 18222).

The pollen assemblage from the spot samples upon the two wooden objects (ONs 18221 and 18222) indicates a largely open environment dominated by Poaceae (grasses), *Cichorium intybus*-type (dandelion/chicory), *Solidago virgaurea*-type (daises/goldenrods) with some *Corylus avellana*-type (hazel). Chenopodiaceae (goosefoot) and Apiaceae (carrot family) are also frequent. The presence of taxa such as *C. intybus*-type and *S. virgaurea*-type, although indicative of grassland and/or rough ground, are also found in poorly-preserved sediments (see below). However, due to the preservation of the wooden artefacts that these samples were taken from and the general waterlogged conditions of the sediment, differential preservation is not suspected to have been a major biasing factor in the resultant pollen assemblage from the spot samples.

The woodland signal from these samples is limited. *C. avellana*-type (5 and 9%) and *Quercus* (oak; 3 and 5%) are present indicating a limited presence of small patches of woodland and/or scrub, though some of this pollen may also be derived from long distance sources. There is also a low presence of *Alnus glutinosa* (alder), *Sorbus*-type (which includes cherry, hawthorn, apple and whitebeam), *Cornus sanguinea* (dogwood), *Acer campestre* (field maple) and *Sambucus nigra* (elder).

In addition to the main open environment taxa outlined above, there are also occurrences of taxa such as *Primula veris*-type (primrose) and *Rubus*-type (bramble) which may be associated with patches of managed woodland, scrub or found within grassy areas such as banks. The presence of low amounts of *Vaccinium*-type (includes heather, heath and bilberry) and *Calluna vulgaris* (heather) suggest small patches of heathland.

The presence of *Plantago lanceolata* (ribwort plantain) and *Pteridium aquilinum* (bracken) are indicative of disturbance and may be related to pastoral activity (*P. lanceolata* is fairly resistant to trampling). The presence of Poaceae grains with an annulus diameter >12 μm are most likely to be derived from cereals and therefore indicative of local cereal production.

Late Iron Age/early Romano-British well G834 (recut 10891)

The pollen assemblage indicates an open environment, dominated by Poaceae, *Cichorium intybus*-type and *Solidago virgaurea*-type (Fig. 10.5). Although the latter two are often indicative of grassland and/or rough ground, *C. intybus*-type is highest in l.p.a.z. 10891–1, and correlates with samples with low pollen concentrations. These taxa have very distinctive and robust pollen walls (exine) and are therefore typically over-represented in pollen spectra where preserving conditions are poor. Interpretation with regard to these must therefore be treated with some caution, though the diverse pollen assemblage present does suggest that poor preservation issues are limited.

The woodland signal from the pollen assemblage is minimal. *Quercus* is consistently present, with *Alnus glutinosa* and *Corylus avellana*-type also frequent, though at percentages of less than 2% TLP. This suggests that there were no trees living near the recut feature and that this pollen is derived from the general background pollen source. Other woodland taxa recorded include *Betula* (birch) and *Sambucus nigra*.

The majority of the remaining taxa can be divided between those indicating open ground, waste ground and grassland. The presence of *Silene dioica*-type (red campion) can be interpreted as indicating woods and hedgerows. However, this pollen group also includes *Silene noctiflora* (night-flowering catchfly) and *Silene gallica* (small-flowered catchfly) which are indicative of cultivated and open sandy ground. The presence of *Ranunculus acris*-type (buttercup), Brassicaceae (cabbage and mustard family), Apiaceae and *Stachys*-type (woundwort) can be indicative of a wide range of environments, but in this setting are likely to be associated with areas of cultivation, disturbance and/or the local waterlogged environment. The presence of taxa such as *Cerastium*-type (mouse-ear), *C. intybus*-type, *S. virgaurea*-type and Chenopodiaceae may also indicate waste ground after abandonment.

The high Poaceae values suggest that areas of grass were extensive. The continuous presence of large Poaceae grains is likely to be derived from local arable activity and cereal production. A continuous presence of *Plantago lanceolata* and occurrences of *Rumex acetosella* (sheep's sorrel) are indicative of grassland and cultivated land, with disturbance from grazing animals. These taxa therefore indicate that areas of the surrounding landscape were open and utilised for agriculture.

The low values of *Pteridium aquilinum* indicate that some areas of disturbance are also present within the pollen catchment area. The only aquatic pollen present is an isolated occurrence of *Lemna* (duckweed) indicative of slow moving or standing water. The absence of other aquatic pollen types is either due to poor preservation, frequent desiccation, or local vegetation cover limiting exposure to light.

Late Saxon/early medieval waterhole (524)
Similar to the recut well G834, the waterhole's pollen assemblage indicates an open environment, dominated by Poaceae (grasses), *C. intybus*-type and *S. virgaurea*-type. *C. intybus*-type and *S. virgaurea*-type values again correlate with samples with low pollen concentrations, and are therefore possibly over-represented as a result of poor preserving conditions.

The majority of the remaining taxa can again be divided between indicating open ground, waste ground and grassland, with a continued presence of *S. dioica*-type, *R. acris*-type, Brassicaceae, Apiaceae and *Stachys*-type. The presence of taxa such as *C. intybus*-type, *S. virgaurea*-type and Chenopodiaceae may also indicate waste ground after abandonment. Occurrences of *Papaver rhoeas* (poppy), *Rumex obtusifolius* (broad-leaved dock), *Rumex sanguineus*-type (wood dock), *Filipendula* (meadowsweet) and *Succisa pratensis* (devil's-bit scabious) are also derived from local wet areas, waste ground and/or cultivated land.

Woodland taxa are rare indicating the limited presence of trees in the local environment. *Quercus* and *C. avellana*-type are consistently present, with isolated occurrences of *A. glutinosa*, *Ulmus* (elm) and *Betula*. Other woodland taxa recorded of note are *Hedera helix* (ivy) and *Lonicera periclymenum* (honeysuckle). The later has very large pollen grains that are not easily distributed, potentially suggesting a local presence. The presence of these woodland taxa, along with the presence of *Sorbus*-type and *Rubus*-type (brambles) are also likely to be derived from areas of scrub, either woodland fringe or isolated small patches of woodland. Similar pollen sequences from buried soils at Perry Oaks were interpreted as indicating that hedgerows were an important element of the Bronze Age landscape and might have persisted right through to the Romano-British period (Wiltshire 2006, 29). One limitation of pollen analysis is that it is often not always possible to identify grains to species level but only to genus, family or a generalised group of grains with similar characteristics, which is also determined by the level of pollen preservation. This means that there are a number of different interpretations can be made for the environment indicated by these taxa. For example, *Sorbus*-type and *Rubus*-type may be derived from small patches of scrub that are present in the open grazed grassland environment or areas of abandoned waste ground rather than designated field-boundaries. In addition, if local patches of woodland were being maintained (even if unevenly temporally and spatially) under a process of active woodland management, such as coppicing, then this would create a large number of internal and external woodland edges (fringing areas of coppicing and agriculture). This process would also help promote the flowering of certain understorey shrubs and plants and improve pollen dispersal (especially if the overstorey maiden canopy was sparse) (Waller *et al.* 2012). The only contribution pollen analysis can therefore make in the interpretation of the surrounding vegetation structure is that the pollen source area contains small mosaic patches of woodland and scrub, yet their orientation and landuse cannot be determined with any certainty.

The high Poaceae values suggest that grassy areas were extensive. The continuous presence of Poaceae grains with a large annulus diameter is again likely to be derived from local arable activity and cereal production. The continuous presence of *P. lanceolata, Plantago major* (greater plantain) and occurrences of *R. acetosella* are indicative of grassland and cultivated land, with disturbances such as grazing animals. These taxa therefore indicate that areas of the surrounding landscape were open and utilised for agriculture.

The low values of *P. aquilinum* indicate that some areas of disturbance are also present within the pollen catchment area. Isolated occurrences of *Calluna vulgaris* may also indicate that small areas of heath were present.

Early medieval (ON 18756)
The pollen assemblage from the spot samples indicate a largely open environment dominated by Poaceae, with lower amounts (less than 8% TLP) of *C. intybus*-type and *S. virgaurea*-type derived from wasteland/ open grassland, *Quercus, C. avellana*-type and *S. nigra* from woodland, *A. glutinosa* from areas of wetter woodland, and *C. vulgaris* derived from local heathland. Additional woodland taxa present (at low amounts) include *Fagus sylvatica* (beech) and *Salix* (willow). Taxa that are likely to be associated with grassland/waste ground include *Urtica dioica* (common nettle), *Heracleum sphondylium* (hogweed), *Cirsium*-type (thistle) and *Centaurea nigra* (common knapweed). Low amounts of *P. lanceolata* and *P. aquilinum* may suggest a reduction in the amount of local pastoral activity, whereas the presence of Poaceae with a large annulus diameter is indicative of arable activity.

Conclusion

The pollen assemblages derived from features G834 and 524 and ONs 18221, 18222, and 18756 suggest that between the Late Bronze Age/Early Iron Age and early medieval period the surrounding environment was largely open and subject to arable and pastoral activity. The majority of the pollen types present are likely to be associated with areas of disturbed and waste ground, much of which is likely to be derived from taxa growing within and in close proximity to the features sampled. Small areas of heathland are suggested by the pollen assemblages from ICSG, though whether this expanded until the early medieval period (as *Calluna vulgaris* and *Vaccinium*-type values are highest in samples from ON 18756) cannot be clarified due to the limited number of sequences investigated and their spatial and temporal disparity. Woodland was extremely limited around the sample areas and, if present locally, is only likely to be in the form of small isolated patches of scrub and trees. Interpretations of more formalised distribution of woodland and shrubs (eg, hedgerows), as suggested from Perry Oaks, is theoretically possible but not explicitly demonstrated based solely upon the pollen assemblages obtained.

Pollen derived from the spot samples suggests a larger presence of woodland during the Late Bronze Age/Early Iron Age and early medieval period. Although these samples (compared with the buried soil profiles) may indicate a retraction and later re-establishment of patches of woodland and scrub, the source of the sediment (and hence pollen) is uncertain within the unstratified single samples. The general limited number of sequences suitable for pollen analysis and absence of phased sequence repetition across the two large sites means that how representative a single sequence is of the two sites and wider area cannot be clarified. The short period over which the features infill only provides a small snapshot of past vegetation, rather than a continuous narrative on the landscape evolution. Finally, the dominance of the pollen assemblages by taxa resistant to poor pollen preserving conditions means that there is the possibility of some bias in the reconstructed environment represented by the two features subjected to full analysis.

Sediments

by David Norcott

Typically of sites on permeable brickearth geology, the sampled deposits from the features of all periods on both sites indicate fluctuations between wet and dry conditions, with pits and ditches frequently holding water, but occasional drying observed even in some deeper features such as waterholes.

Ditches

The shallower features would have been well vegetated but would still have filled rapidly in the unstable brickearth geology, both by erosion of the feature sides and by periodic overbank flooding episodes. The repeated wetting and drying of the ditch fills has led to poor preservation of pollen and other indicators, greatly reducing the potential for palaeo-environmental reconstruction from these features.

Waterholes

Given their function (with access to watering animals accelerating the already rapid erosional processes) the waterholes on both sites are likely to have filled relatively quickly with sediment (derived largely from the feature sides), and will have required periodic clearing out in order to remain in use. The material sampled from such features is therefore likely to represent either the final stages of use or the disuse phase of the feature.

Wells

The steeper-sided deep features interpreted as wells, some if not all of which were probably wood-lined, are certain to have infilled more slowly – this is supported by the fine laminated water-lain sediments filling the lower portion of Late Iron Age/early Romano-British well G834. The presence of fine charcoal within these deposits indicates continued activity in the immediate vicinity during the deposition of these water-lain silts; palaeo-environmental data from these features can therefore be considered much more likely to be contemporary with on-site activity.