Analysis of charred plant remains from Coton Park

Mark McKerracher

In the winter of 2017, as part of the Feeding Anglo-Saxon England project (FeedSax), the author visited the Warwickshire County Council archives to view 16 environmental samples from excavations on the site of a deserted medieval village at Coton Park, Warwickshire (Maull 2001). The samples had previously been subject to semi-quantitative analysis, as part of the post-excavation work completed by Northamptonshire Archaeology – now Museum of London Archaeology – in 2001 (Hutchins 2001). The purpose of the FeedSax analysis was to establish whether the charred plant remains in these samples were of sufficient abundance and preservation-quality as to support (1) fully quantitative analysis, (2) radiocarbon dating, and (3) stable isotope analysis. Having reviewed the samples with a magnifying glass, the author judged that there was further potential in the charred plant remains, at least in terms of fully quantitative analysis. The samples were therefore borrowed and brought back to the University of Oxford's Institute of Archaeology for further study. This work included a fully quantitative analysis of the charred plant remains, which is reported on here. Radiocarbon dating was also undertaken, and the results are presented in Digital Archive Document C03. Stable isotope analysis was not, in the event, deemed appropriate, because the dominance of a single cereal crop (wheat) precluded inter-species comparisons.

Methods

The samples had already been floated and semi-sorted before deposition in the archive. The borrowed material therefore consisted of 'clean' environmental material in plastic tubes, with no sediments or residues remaining. Bone, shell, and charred plant remains had been separated into different vials, but the charred plant remains had not been sorted into any separate categories (e.g. by species or plant parts). The basic method adopted here was therefore to sort and identify the charred plant remains by taxon and anatomical part, to quantify those items according to standardized criteria, and finally to label and re-package them to facilitate future study. The samples were subject to a preliminary sorting and identification by Yinming Liu for a Masters project, then revised and repeated by Mark McKerracher for the FeedSax project. Items were examined with a CETI binocular microscope, at 8-65x magnification. Taxonomic identifications were made using published keys (Jacomet 2006; Cappers & Bekker 2013; Berggren 1981) and modern reference material at the Institute of Archaeology, University of Oxford. Nomenclature follows Stace (2010) for wild species, Jacomet (2006) for cultivars. Counts either represent whole items, minimum numbers of individual items derived from independent diagnostic parts, or equivalent individual items estimated from fragments. Quantitative analyses follow the methods and parameters set out by McKerracher (2019).

Results

Details of the 16 samples available for study in provided in Table 1. The table includes, where available, both the phases assigned to each sample in the assessment report (Hutchins 2001) and the radiocarbon dates obtained by the FeedSax project (calibrated using IntCal20: Reimer *et al.* 2020), which often did not agree with the original phasing. The radiocarbon dates have been preferred in this report.

Table 1 - register of samples available for study.

sample	context	original phase	calibrated radiocarbon date (confidence)	quantitative analysis
1	489	6 (mid-late C13)	AD 1034-1160 (95.4%)	yes
4	635	6 (mid-late C13)	-	no
5	782	6 (mid-late C13)	AD 1035-1161 (95.4%)	yes
18	1114	6 (mid-late C13)	-	no
19	1116	1? (prehistoric)	-	no
27	1463	-	-	no
35	1625	4 (C12)	AD 1161-1261 (95.4%)	yes
36	1703	6 (mid-late C13)	AD 1033-1159 (95.4%)	yes
40	2257	6 (mid-late C13)	AD 1031-1165 (95.4%)	yes
41	2329	5 (late C12-13)	AD 1036-1177 (93.9%)	yes
42	2077	4 (C12)	AD 1045-1086 (30.4%), 1121-1218 (62.1%)	yes
43	2692	5 (late C12-13)	-	no
44	3408	3 (mid C10-11)	-	no
45	3535	5 (late C12-13)	-	no
46	3577	-	-	no
50	4096	5 (late C12-13)	AD 1036-1177 (93.5%)	yes

Raw data for all 16 samples – including species identifications and item counts – are provided in Digital Archive Document B02. Of these 16, only nine contained sufficient charred plant remains to support quantitative analysis. The crop component of all nine of these samples was dominated by cereals; specifically, eight of these were dominated by free-threshing cereals – as is typical for medieval English samples – while the other one (sample <4>) was too small to support the calculation. The eight 'free-threshing cereal samples' were taken forward for further quantitative analysis; these samples have also all been radiocarbon-dated.

Cereals

All eight of the 'free-threshing cereal samples' are dominated by cereal grains and therefore likely to represent fine-sieved products of cereal crop processing (McKerracher 2019, pp.37-38). Consequently, charred grains – rather than items of chaff – are the best available proxy for the relative importance of the different cereals. Four free-threshing cereal crops are represented in the dataset, all typical of medieval English cereal assemblages: free-threshing wheat (*Triticum* L. free-threshing type), barley (most likely hulled barley: *Hordeum vulgare* L.), oats (*Avena* L.), and rye (*Secale cereale* L.). Although the charred grains of wild and cultivated oats are not readily distinguished, the recognition of a cultivated oat floret (*Avena sativa* L.) in sample <1> confirms that oats were indeed a crop at the settlement, rather than a prolific weed. All oat remains have therefore been treated as crops, for the purposes of this analysis (excluding the single floret positively identified as wild oat, *Avena fatua* L.). Similarly, charred grains of different species and subspecies of free-threshing wheat are not easily distinguishable, but the recognition here of hexaploid-type wheat rachis suggests that at least some of wheat cultivated at this settlement was bread-type wheat (*Triticum aestivum* L.), the dominant wheat of medieval English agriculture in general (Moffett 2006).

Table 2 calculates the percentages of grain belonging to each of the four cereals in each of the eight samples, and also assigns each sample an approximate date range based upon the radiocarbon dates obtained by the FeedSax project. For these purposes, indeterminate wheat grains (*Triticum* L.) have been combined with free-threshing wheat grains. They are inherently more likely to represent a free-threshing variety than a hulled wheat, because hulled wheats are comparatively rare in medieval English archaeobotany, and free-threshing wheats are more likely to be rendered indeterminate by the charring process (McKerracher 2019, p.30).

Table 2 - relative proportions of free-threshing cereal grains in samples, ordered chronologically.

sample	approx. date range	total grain	% grain (to 1 d.p.)			
			wheat	barley	oat	rye
1	early C11 – later C12	716	65.2	2.7	29.6	2.5
5	early C11 – later C12	147	66.7	2.7	26.5	4.1
36	early C11 – later C12	468	89.1	0.6	9.0	1.3
40	early C11 – later C12	2,793	80.5	6.1	11.2	2.1
41	early C11 – later C12	1,523	55.2	1.8	41.0	1.9
50	early C11 – later C12	106	90.6	4.7	1.9	2.8
42	mid C11 – early C13	116	61.2	0.9	34.5	3.4
35	mid C12 – mid C13	716	86.6	0.6	10.6	2.2

It is clear from these results that free-threshing wheat is the dominant crop at the site throughout the periods represented: it constitutes more than 50% of all identified free-threshing cereal grains in all eight samples, and more than 80% in four of them. These high percentages of wheat grain conform to a wider regional pattern of wheat-rich assemblages, characteristic of sites in the ‘Central Zone’ within which Coton Park lies (Hamerow *et al.* in prep.). The often-clayey composition of arable terrains in this region are likely to be one reason for this emphasis on wheat, which grows well on rich, heavy soils (Moffett 2006).

By contrast, the percentages of barley and rye grains never exceed 6.1%, and these crops may therefore be considered negligible components (or else contaminants) of the settlement’s cropping regime. Percentages of oat grain are much more variable, ranging from 1.9 to 41%, and it may be that oats were a secondary crop at the settlement, either grown alongside wheat in a mixed crop, or else grown separately but sometimes subject to post-harvest/post-depositional mixing.

Other crops

By contrast with the free-threshing cereals, pulse crops are very scarcely represented, and likely represent contaminants; they nonetheless indicate that peas (*Pisum sativum* L.) and broad beans (*Vicia faba* L.) were among the crops cultivated at the settlement. Also notable is the presence of hulled wheats in these medieval samples: mostly grains resembling spelt (*Triticum* cf. *spelta* L.) but also a grain and spikelet fork resembling emmer (*Triticum* cf. *dicoccum* Schübl.). Although these hulled wheat remains are greatly outnumbered by their free-threshing counterparts, they are conspicuous because hulled wheats are not normally thought to have been cultivated after the Roman period. Spelt was the predominant wheat crop of Roman Britain, but becomes so rare in the archaeobotanical record from the Anglo-Saxon period onwards that it is often deemed a residual Roman find – or a persistent volunteer crop – when it does occur in post-Roman samples (McKerracher 2019, p.94). Since Roman-period activity was identified at Coton Park, it is indeed possible that these (probable) spelt and emmer remains represent residual Romano-British crop remains later disturbed and reworked into medieval deposits. But it cannot be ruled out that spelt cultivation continued in some form into the medieval period: charred remains of both spelt and emmer have been radiocarbon-dated, at an increasing number of sites, to the Anglo-Saxon period, demonstrating that they did not rapidly disappear with the end of Roman governance in the early 5th century (e.g. Pelling and Robinson 2000). However, their persistence as late as the 11th and 12th centuries remains – to the author's knowledge – unproven.

Weeds

Various weed seeds have been identified, but most of these are too few in number, or too imprecise in identification, to shed much light on the ecology of the arable fields from which they ultimately derive. Three exceptions are Stinking Chamomile (*Anthemis cotula* L.), Common Sorrel (*Rumex acetosa* L.), and Soft/Rye Brome (*Bromus hordeaceus/secalinus* L.). These are all very common weeds in medieval English archaeobotany, but Stinking Chamomile is significant here because it is generally associated with heavy clay soils (Kay 1971). This species' presence in this assemblage therefore lends support to the idea, raised above, that the clay terrains in the settlement's hinterland were cultivated as prime terrain for wheat crops.

Summary

Overall, the quantitative analysis of this assemblage has shown it to be typical of its region in the medieval period: dominated by free-threshing wheat (probably bread wheat); supplemented by the other free-threshing cereals common in medieval crop husbandry (hulled barley, oats, and rye); and with common weeds such as Brome, Common Sorrel, and Stinking Chamomile – the latter consistent with the (ecologically appropriate) cultivation of wheat on heavy clay soils. A somewhat unusual feature of the assemblage is the presence – albeit in small numbers – of spelt and emmer remains, which may represent residual Roman-period material.

Acknowledgements

I would like to thank Sara Wear, Curator of Human History at Warwickshire County Council, for facilitating access to the archive and for permitting the loan of the environmental samples.

References

Berggren, G. (1981). *Atlas of seeds and small fruits of Northwest-European plant species with morphological descriptions. Part 3: Salicaceae - Cruciferae*. (Stockholm: Swedish Museum of Natural History).

Cappers, R.T.J. & Bekker, R.M. (2013). *A Manual for the Identification of Plant Seeds and Fruits*. (Groningen: Barkhuis & Groningen University Library).

Hamerow, H. *et al*. (in prep.) Feeding Anglo-Saxon England: The Bioarchaeology of an 'Agricultural Revolution'.

Hutchins, E. (2001). 'The Environmental Evidence', in Maull, A. Excavation of the Deserted Medieval Village of Coton at Coton Park, Rugby, Warwickshire 1998. Unpublished report by Northamptonshire Archaeology, 93-95.

Jacomet, S. (2006). *Identification of cereal remains from archaeological sites*. 2nd ed. (Basel: Basel University).

Kay, Q.O.N. 1971. 'Anthemis Cotula L.', *Journal of Ecology* 59, pp.623-636.

Maull, A. (2001). Excavation of the Deserted Medieval Village of Coton at Coton Park, Rugby, Warwickshire 1998. Unpublished report by Northamptonshire Archaeology.

McKerracher, M. (2019). *Anglo-Saxon Crops and Weeds: A Case Study in Quantitative Archaeobotany* (Oxford: Archaeopress).

Moffett, L. (2006). 'The Archaeology of Medieval Plant Foods', in C.M. Woolgar, D. Serjeantson and T. Waldron (eds) *Food in Medieval England* (Oxford: Oxford University Press), pp.41-55.

Pelling, R. and Robinson, M. (2000). 'Saxon emmer wheat from the Upper and Middle Thames Valley, England', *Environmental Archaeology* 5, pp.117-119.

Reimer, P., Austin, W., Bard, E., Bayliss, A., Blackwell, P., Bronk Ramsey, C., . . . Talamo, S. (2020). The IntCal20 Northern Hemisphere Radiocarbon Age Calibration Curve (0–55 cal kBP). *Radiocarbon*, 62(4), 725-757.

Stace, C.A. (2010). *New Flora of the British Isles*. 3rd ed. (Cambridge: Cambridge University Press).