Assessment of Palaeoenvironmental Evidence from 86561 Outseats Farm, Alfreton, Derbyshire

Acknowledgements

The samples were processed by Liz Chambers. The flots were sorted by Nicki Mulhall and assessed by Inés López-Dóriga.

1 INTRODUCTION

1.1.1 5 bulk samples were taken from a range of features such as pits and gullies and were processed for the recovery and assessment of charred plant remains and charcoal. The size of the samples varied between 6 and 40l., and on average was around 22l.

1.1 Background and summary quantification

1.1.2 The bulk samples break down into the following phase groups:

Table 1: Sample Provenance Summary

Phase	No of samples	Volume (litres)	Feature types
Modern	1		
Undated	4		
Totals	**5**	**110**	

2 AIMS AND METHODS

2.1 Charred plant remains

1.1.3 The purpose of this assessment is the evaluation of the quality of plant remains preserved at the site and the potential for further analysis to address specific site archaeological issues and to provide archaeobotanical data valuable for wider research frameworks.

1.1.4 The bulk samples were processed by standard flotation methods; the flot retained on a 0.5 mm mesh, residues fractionated into 5.6 mm, 2 mm and 1 mm fractions and dried. The coarse fractions (>5.6 mm) were sorted, weighed and discarded. A rifle box was used to split large flots into smaller flot subsamples when appropriate. The flots were scanned using a stereo incident light microscopy at magnifications of up to x40 using a Leica MS5 microscope for the identification of environmental remains. Different bioturbation indicators were considered, including the percentage of roots, the abundance of modern seeds and the presence of mycorrhizal fungi sclerotia (e.g. *Cenococcum geophilum*) and animal remains which would not be preserved unless anoxic conditions were detected, such as earthworm eggs and insects. The preservation and nature of the charred plant and wood charcoal remains, as well as the presence/absence of other environmental remains such as molluscs, animal bone and insects (if anoxic conditions for their preservation are present), is recorded in Table XXX.

1.1.5 Preliminary identifications of dominant or important taxa are noted below, following the nomenclature of Stace (1997) for wild plants, and traditional nomenclature, as provided by

Zohary and Hopf (2000, Tables 3, page 28 and 5, page 65), for cereals. Abundance of remains is qualitatively quantified (A*** = exceptional, A** = 100+, A* = 30-99, A = >10, B = 9-5, C = <5) as an estimation of the minimum number of individuals and not the number of remains per taxa.

3 RESULTS

3.1 Charred plant remains

1.1.6 The flots were generally large but there were high numbers of roots and modern seeds that may be indicative of stratigraphic movement and the possibility of contamination by later intrusive elements. Charred material was well preserved in terms of carbonisation, but eroded and incrusted with grit, hampering identification. Some of the assemblages contained non-native plant taxa which can provide with a chronological *post-quem* framework based on the introduction date.

1.1.7 All the assemblages with non-woody plant remains included onion couch (*Arrhenatherum elatius* subsp. *bulbosum*) tubers and possibly others were also found in pit <**305**>. The assemblage from this undated pit <**304**> has provided, in addition to tubers, a grass seed and parenchymatic tissue, a wheat (*Triticum* sp.) grain which can only indicate a post-Neolithic chronology but also a *Valerianella* sp. seed probably introduced in the Late Bronze Age (Preston *et al*. 2004). Undated gully <**704**> contained an assemblage of tubers and a seed from Apiaceae, probably hemlock (*Conium maculatum*), a weed also introduced in the Bronze Age (Preston *et al*. 2004).

1.1.8 Onion couch is a perennial grass with an edible tuber, found in a wide range of open grassland habitats, particularly persistent weed of arable fields. Since its first discovery in archaeological sites (Allison and Godwin 1949) interpretations have been diverse and have fluctuated between its accidental presence, as part of the burnt natural vegetation, or its intentional use as fuel, resulting from discarded waste from weeding crop-fields by up-rooting, from turf exploitation (Hall 2003) or its selection for use in cremation pyres (Jones 1978; Robinson 1988), or even its exploitation for consumption (Clapham1988), although recent studies suggest it is not worth it (Mears and Hillman 2007) and there is no historical record for it (Fern 1992-2010). Despite onion couch remains are relatively ubiquitous in archaeobotanical assemblages from a diversity of archaeological deposits, the reason for its presence is still open to controversial interpretation (Roehrs 2013).

3.2 Wood charcoal

1.1.9 Wood charcoal was noted from the flots of the bulk samples and is recorded in Table XX. The assemblages of charcoal were of variable sizes and the fragments belonged exclusively to mature wood. The modern land drain [**804**] was rich in coal.

4 DISCUSSION AND FURTHER POTENTIAL

1.1.10 The archaeobotanical assemblages have environmental and radiocarbon dating potential and analysis and publication is recommended. A full list of suitable samples will be proposed should more phases of fieldwork were to follow.

4.1 Charred plant remains

1.1.11 The assemblages recovered so far require no further analysis but should be published, as they provide information on the settlement and the local environment and the available evidence in the region is very rare. The potential of this data should be strengthened by radiocarbon dating, which would also help clarifying the chronology of the features.

1.1.12 For the analysis, all identified charred plant macrofossils recovered in the flots will be quantified. In addition, the 2 and 1mm residues which remain unsorted will be examined for plant macroremains, should dense items remain retained in them.

4.2 Wood charcoal

1.1.13 The analysis of the wood charcoal would provide some information on the species composition of the local environment and its evolution through time, if the assemblages were to be radiocarbon dated.

4.3 Recommendations for future sampling

1.1.14 Samples should be taken for the recovery of charred plant remains where permitting from features related to settlement activities and/or structures. Features that are specifically related to burning activities, such as cremations, should also be sampled. Generally, samples should be taken covering as wide a range of feature types and phases as possible. Given the low density of charred plant remains recovered so far, where available deposits permit, sample size should be of 40 to 60 litres from individual, secure contexts.

4.4 Scientific dating

1.1.15 All the assemblages have provided short-lived plant macroremains which have potential for radiocarbon dating to establish the chronology of their introduction and exploitation and an approximation to the chronology of the features.

1.1.16 The radiocarbon samples will be submitted to the 14CHRONO Centre, Queen's University, Belfast. The dates will be calculated using the IntCal13 calibration curve (Reimer et al. 2013) and the computer program OxCal (v4.2.3) (Bronk Ramsey and Lee 2013) and cited at 95% confidence. The degree of reliability of the radiocarbon date and the event which is aimed to be dated will be assessed following Waterbolk (1971) and Pelling et al. (2015).

4.5 Task list

1.1.17 Text

Table 1: Task list table

Task ID	Task	Resource	Duration
1	Extraction of Charred Plants and Wood Charcoal (3 samples)	ES	1.5
3	Commissioning analysis and contracts	PO	0.5
6	Analysis and Reporting of Charred Plant Remains (3 samples)	PO	0.5
7	Analysis and Reporting of Wood Charcoal (2 samples)	Ext.	
15	Environmental Illustration Requirements		0.5
16	C14 selection/IDs/report	PO	0.5
17	Costs per Date	£ 280	
18	Overview and Palaeo-environmental Summary	PO	0.25

19	Management, monitoring, editing text	PO	0.25

5 REFERENCES

5.1 Bibliography

Allison, J. & Godwin, H. 1949 Bronze Age Plant Remains from Wiltshire, Data for the Study of Post-Glacial History. XII *The New Phytologist* 48, 253-254.

Bronk Ramsey, C. & Lee, S. 2013 Recent and planned development of the Program OxCal. *Radiocarbon* 55, (2-3), 720-730.

Clapham, A.1988 *The charred Macroscopic Plant remains from a Neolithic pit and Bronze Age Barrow and ditch at Roughridge Hill, Wiltshire*. Ancient Monuments Laboratory, English Heritage.

Fern, K. 1992-2010 Plants For A Future: Plant Species Database. http://www.pfaf.org [last access 6-2-2017].

Hall, A. 2003. *Recognition and Characterisation of Turves in Archaeological Occupation Deposits by means of Macrofossil Plant Remains*. English Heritage Centre for Archaeology.

Jones, M. 1978 The plant remains. In: Parrington, M. (ed): *The excavation of an Iron Age Settlement, Bronze Age ditches and Roman features at Ashville Trading State, Abingdon (Oxfordshire) 1974-1976*. Oxfordshire Archaeological Unit.

Mears R. and Hillman G.C. 2007 *Wild food*. Hodder & Stoughton, London.

Pelling, R.; Campbell, G.; Carruthers, W.; Hunter, K. & Marshall, P. Exploring contamination (intrusion and residuality) in the archaeobotanical record: case studies from central and southern England. Vegetation History and Archaeobotany 2015, 24, 85-99.

Preston, C. D.; Pearman, D. A. & Hall, A. R. 2004 Archaeophytes in Britain *Botanical Journal of the Linnean Society* 145, 257–294.

Reimer, PJ; Bard, E; Bayliss, A; Beck, JW; Blackwell, PG; Bronk Ramsey, C; Buck, CE; Cheng, H; Edwards, RL; Friedrich, M; Grootes, PM; Guilderson, TP; Heaton, TJ; Hoffmann, DL; Hogg, AG; Hughes, KA; Kaiser, KF; Kromer, B; Manning, SW; Nui, M; Reimer, RW; Scott, EM; Southon, JR; Staff, RA; Turney, CSM & van der Plicht, J 2013 IntCal13 and Marine 13 Calibration Curve, 0–50,000 Years BP *Radiocarbon* 55 (4) 1869–1887.

Robinson, D. E. 1988 The significance of the tubers of Arrhenatherum elatius (L.) Beauv, from site 4, Cremation IS/II. In: Lambrick, G. (Ed.) *The Rollright Stones; megaliths, monuments and settlements in the prehistoric landscape*. Historic buildings and monuments commission.

Roehrs, H.; Klooss, S. & Kirleis, W.2013 Evaluating prehistoric finds of Arrhenatherum elatius var. bulbosum in north-western and central Europe with an emphasis on the first Neolithic finds in Northern Germany. *Archaeological and Anthropological Sciences* 5, 1-15.

Stace, C, 1997, *New flora of the British Isles* (2nd edition), Cambridge: Cambridge University Press.

Waterbolk, H. T. 1971 Working with radiocarbon dates. *Proceedings of the Prehistoric Society* 37 (2), 15-33.

Zohary, D, and Hopf, M, 2000, *Domestication of plants in the Old World: the origin and spread of cultivated plants in West Asia, Europe, and the Nile Valley*, 3rd edition, Clarendon Press, Oxford.

6 APPENDICES

6.1 Appendix 1: Environmental Data

Table 2: Assessment of the charred plant remains and charcoal

Feature	Context	Sample	Vol (L)	Flot (ml)	Bioturbation proxies	Grain	Chaff	Cereal Notes	Charred Other	Notes for Table	Charcoal > 4/2mm	Charcoal	Other	Preservation
Undated														
Pits														
304	305	301	34	50	80%, A*, E, F, I	C	-	*Triticum* sp.	B	*Arrhenatherum elatius* subsp. *bulbosum* tubers, parenchymatic tissue, *Valerianella* sp. and Poaceae seeds	20ml/2ml	Mature		Good
1306	1307	1301	10	50	90%, A, E, I, F	-	-	-	-	-	<1ml	Mature		-
1504	1505	1501	20	120	80%, A, E, F, I	-	-	-	C	*Arrhenatherum elatius* subsp. *bulbosum* tuber	60ml/1ml	Mature		Poor
Gully														
704	705	701	40	60	90%, A*, E, F, I	-	-	-	B	*Arrhenatherum elatius* subsp. *bulbosum* tubers, Apiaceae tp. *Conium maculatum* seed, indet seed	<1ml/<1ml	Mature		Good
Modern - land drain														
804	805	801	6	50	80%, A, E, I	-	-	-	-	-	<1ml/<1ml	Mature	Coal	-

Key: A*** = exceptional, A** = 100+, A* = 30-99, A = >10, B = 9-5, C = <5; Bioturbation proxies: Roots (%), Uncharred seeds (scale of abundance), F = mycorrhyzal fungi sclerotia, E = earthworm eggs, I = insects; Sab/f = small animal/fish bones/charred faecal pellets, Moll-t = terrestrial molluscs, Moll-f = aquatic molluscs; Analysis: C = charcoal, P = plant, M = molluscs, C14 = radiocarbon