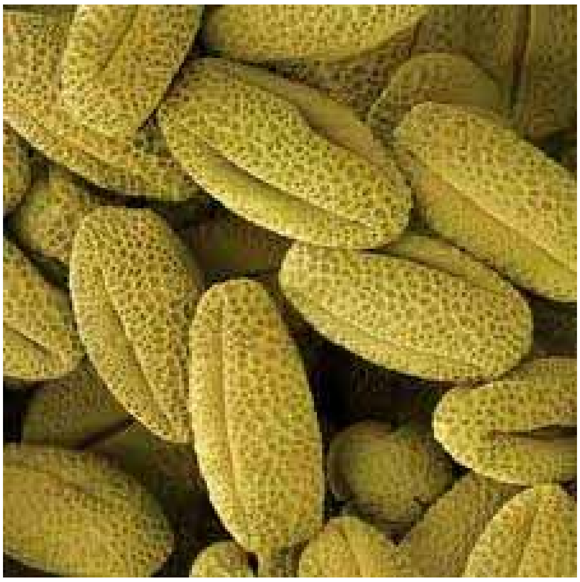

King's Stanley,

Gloucestershire

Palynological Analysis from a Neolithic Pit

Oxford Archaeology North

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David Evans

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SUMMARY

The palaeo-environmental remains, including pollen, from the sample taken from the single fill of an irregularly-shaped pit beneath a medieval moated hall at Kings Stanley, Gloucestershire, (NGR SO 809041) were assessed and recorded the presence of cereal-type pollen (Huckerby, 2006). The pit was excavated by David Evans and a charred hazel nut from it was dated 2470-2200 cal BC (3856±33 BP: OxA-15346) (Evans, 2006). Because the pollen assessment suggested that cereal cultivation was taking place, David Evans requested that the pollen from the single sample should be analysed, and further material from the pit has also been analysed by Wendy Carruthers for macroscopic plant remains (Carruthers 2013).

The exisiting pollen residue was still viable and the pollen, spores and non-pollen palynomorphs have been analysed from this residue. A pollen sum of 304 grains was reached and the results are presented in this short report. The analysis has confirmed the presence of arable cultivation with high values of cereal-type pollen and pollen from other herbs. The percentage of tree and shrub pollen makes up less than 16% of the pollen sum and suggests a largely cleared landscape with some alder and hazel woodland.

The fungal spores identified comprise several types including *Chaetomium* spp (HdV-7A), which are cellulose-decomposing fungi found in natural habitats but have also been associated with archaeological sites, suggesting that dung, damp straw, leather etc may provide a suitable source of food for the fungi. Other fungal spores include some coprophilous ones and another, which is common on dung and wood substrates.

The pollen assemblage in the sample, with high values of cereal-type pollen and pollen from a wide range of herbaceous plants, is characteristic of the medieval and suggests that the fill from the pit contains some material that is more recent than the Neolithic. A charred *Triticum aestivum* seed from the pit has been dated to cal AD 1025-1150 (950±14; NZA-51897) and this supports the pollen evidence (AEA, 2012, Carruthers, 2013).

ACKNOWLEDGEMENTS

OA North would like to thank David Evans for commissioning the programme of the palynological analysis from Kings Stanley, Gloucestershire. The pollen and non pollen palynomorphs were analysed by Mairead Rutherford, who co-wrote the report with Elizabeth Huckerby. Alan Lupton edited the report and Elizabeth managed the project.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 David Evans, hereafter referred to as the Client, commissioned Oxford Archaeology North (OA North) to undertake the palynological analysis of a single sample, which was previously assessed (Huckerby 2006). The sample was taken from an irregular pit beneath a medieval moated hall at King's Stanley, Gloucestershire (NGR SO 809041).

1.2 SITE BACKGROUND

1.2.1 Excavations at Kings Stanley, Gloucestershire, in 2004 and 2005 (NGR SO 809041), were originally centred on a medieval moated hall that was constructed in *c* 1150 AD and occupied until around 1300 AD. Beneath the hall, a large (3.8m by 1.8m at the lip) irregular-shaped pit was cut into the natural gravel, reaching a depth of 0.8m. The uniform reddish brown clay fill contained sherds of Peterborough Ware (Mortlake substyle) and Grooved Ware, as well as a small engraved limestone plaque, a sandstone wristguard fragment and possible cylindrical bead (David Evans, *pers com*, Wendy Carruthers *pers com*).

1.2.2 The pit was sealed by a layer of gravel and limestone chips for levelling at an unknown date (two possible residual Roman pot sherds were present). The dark soil above contained frequent sherds of 12^{th} century pottery, and the limestone plinth from the medieval hall lay above the soil.

2 METHODOLOGY

2.1 Preparation

2.1.1 The sample was processed originally for pollen using the standard technique of heating with hydrochloric acid, potassium hydroxide, sieving (170 microns), hot hydrofluoric acid, and Erdtman's acetolysis to remove carbonates, humic acids, large particles, silicates, and cellulose, respectively. The samples were then stained with safranin, dehydrated with tertiary butyl alcohol and mounted in 2000 centistoke silicone oil (Method B of Berglund & Ralska-Jasiewiczowa 1986) with the addition of one Lycopodium tablet (*cf*. Stockmarr 1971). Samples were mounted in silicone oil (1250 Cs) on standard glass slides with cover slips. Pollen slides were examined using a Leica DM2500 microscope using x400 magnification. Higher magnification (x1000 under oil immersion) were used for the determination of difficult grains where required. A pollen sum of 304 of pollen and fern spores was counted; whole slides were counted in evenly spaced traverses of the cover slip.

2.2 Identification

2.2.1 Pollen and Pteridophyte spore identification was carried out using the standard keys in Moore *et al* (1991) and Faegri and Iversen (1989) and a small pollen type slide collection for supplementary information. Andersen (1979), Tweddle *et al* 2005 and Joly *et al* 2007 were referenced for the identification of cereal grains. Plant nomenclature follows Stace (2010). Charcoal particles greater than 5 microns were recorded (Peglar 1993). Non-pollen palynomorph (NPP) nomenclature follows van Geel (1978), van Geel and Aptroot (2006) and Blackford *et al* (in Press). Non-pollen palynomorphs are given their HdV type number corresponding to their listing in the NPP catalogue in the Hugo de Vries laboratory, University of Amsterdam, The Netherlands.

2.3 Data Presentation

2.3.1 Pollen and spore data are presented as percentages of total land pollen for trees and shrubs including heather and heaths, cereal-types, herbs and ferns and fern allies (Table 1); and as a percentage of total land pollen, plus the group for other types for example non-pollen palynomorphs.

3 RESULTS

3.1 Results

3.1.1 The preservation of the pollen was poor to mixed but this did not prevent a viable pollen count being achieved. The pollen assemblage was dominated by herbaceous pollen, which made up 63.82% of the pollen sum. Grass (Poaceae 15.8%), cabbage/black mustard-type (*Brassica*-type 14.8%), daisy-type (*Aster*-type 10.9%) and dandelion type (*Taraxacum*-type, 12.8%) pollen were the major types recorded. The remaining herbaceous pollen was very varied and included pollen from a number of arable weeds, including cornflower (*Centaurea cyanus*), spurreys (*Spergula*) redshank (*Persicaria maculosa*), black-bindweed (*Fallopia convolvulus*), knotgrass (*Polygonum aviculare*) and members of the goosefoot/orache family (Chenopodiaceae) (Behre 1986).

3.1.2 A significant amount of cereal-type pollen (6.25%) was recorded in the sample and both barley-type (*Hordeum*-type) and oat/wheat-type (*Avena*/*Triticum*-type) were recorded. Cereal plants produce very little pollen, which only travels short distances from the parent plants.

3.1.3 Tree and shrub pollen made up <16% of the pollen sum with moderate amounts of hazel-type *(Corylus avellana*-type), alder (*Alnus glutinosa*) and oak (*Quercus*) and occasional grains of pine (*Pinus*), birch (*Betula*) and holly (*Ilex*). A little heather (*Calluna vulgaris*) and cross-leaved heath (*Erica tetralix*) pollen was also recorded.

3.1.4 Bracken (*Pteridium aquilinum*) and undifferentiated monolete fern spores were well represented with a few bog moss (*Sphagnum*) spores and a single colony of the freshwater colonial alga *Botryococcus*.

3.1.5 Five types of non-pollen palynomorphs were recorded in the sample of which there were greater numbers of *Chaetomium* spp (HdV-7A) spores than from the other four, which included *Coniochaeta xylariispora* (HdV-6), *Sordaria* (HdV-55A), *Sporomiella* (HdV-113) and HdV- 83.

Botanical names	**Colloquial names**	**Percentages**
Trees and shrubs including heather and heaths		15.46
Cereal-type		6.25
Herbs		63.82
Ferns and fern allies		14.47
Fungal spores NPP		6.77
Trees and small shrubs		
Alnus glutinosa	Alder	4.6
Betula	Birch	0.7
Corylus avellana-type	Hazel-type	7.2
Ilex aquifolium	Holly	0.3
Pinus	Pine	0.3
Quercus	Oak	2.3
Erica tetralix	Crossed- leaved heath	0.3
Calluna vulgaris	Heather	1
Crops		

Hordeum-type	Barley-type	4.9
Avena/Triticum-type	Oats/wheat-type	1.3
Herbs		
Apiaceae	Carrot/cow parsley family	1
Aster-type	Daisy-type	10.9
Brassica-type	Cabbages/black mustard	14.8
Caryophyllaceae	Pink family	0.7
Centaurea cyanus	Cornflower	0.3
Centaurea nigra	Common knapweed	1.6
Chenopodiaceae	Goosefoot/orache family	1.3
Cirsium-type	Thistle-type	0.7
Cyperaceae	Sedges	0.7
Fabaceae	Pea/vetch family	0.3
Fallopia convolvulus	Black-bindweed	0.7
Filipendula	Meadowsweet	0.7
Persicaria maculosa	Redshank	0.7
Plantago lanceolata	Ribwort plantain	0.3
Plantago major-media	Greater/hoary plantain	0.3
Poaceae	Grasses	15.8
Polygonum aviculare	Knotgrass	0.3
Potentilla-type	Cinquefoils	0.7
Rumex	Sorrels/docks	1
Spergula-type	Spurreys	0.3
Taraxacum-type	Dandelion-type	12.8
Ferns		
Polypodium vulgare	Polypody	0.3
Pteropsida	Undifferentiated ferns	6.25
Moss spores and algae		
Sphagnum	Bog moss	1.3
Botryococcus spp.	Freshwater alga	0.3
Indeterminate pollen grains		21
Lycopodium	Number of exotic spores counted	150
Charcoal		++
Fungal spores		
Chaetomium spp HdV-7A		3.4
Coniochaeta xylariispora HdV-6		0.3
Sordaria-type HdV-55A		1.2
Sporomiella HdV-113		0.3
HdV- 83		1.5

Table 1: Results of the palynological analysis from Kings Stanley, Gloucestershire.

4 INTERPRETATION AND DISCUSSION

4.1 INTERPRETATION

4.1.1 The pollen analysis suggests that the landscape was largely cleared with some hazel scrub woodland on the drier higher ground and alder woodland on the damper ground. The cereal-type pollen, together with the pollen, from arable weeds, suggest possible local arable cultivation. Cereal pollen is very poorly dispersed and the relatively high values in this sample may suggest quite extensive local arable cultivation, although cereal pollen can also be transported onto the site in the bracts of hulled barley and wheat (Robinson and Hubbard 1977). Carruthers (2013) recorded a few charred wheat grains during the analysis of the plant macrofossil analysis in the fill of the same pit but no chaff, suggesting that cereal pollen had not been transported to the site at King's Stanley.

4.1.2 The high percentages of grass, daisy and dandelion-type pollen and bracken and fern spores suggest that there were large areas of grassland, waste ground and possible trackways at King's Stanley. These plants can be found in a wide range of habitats (Behre 1986).

4.1.3 Non-pollen palynomorphs, many of which are fungal spores, together with pollen and other spores, can enhance interpretation of both local environments and depositional conditions. *Chaetomium* spp (HdV-7A), which belong to group of fungi called Ascomycetes, are cellulose-decomposing fungi, which are found today growing on plant remains, fibres and dung (van Geel and Aproot 2006). Apart from their occurrences in natural habitats *Chaetomium* spp (HdV-7A) spores appear to be linked to archaeological sites and settlements where in the past dung, damp straw, cloth, leather etc may have been present (van Geel and Aproot 2006). Today, both *Sordaria*-type (HdV-55A) and *Sporomiella* (HdV-113) are coprophilous fungi and *Coniochaeta xylariispora* (HdV- 6) is common on dung and wood, as the specific name suggests. The fungal spores recorded suggest the likely presence of animals in the settlement area and of organic debris and other settlement waste.

4.2 DISCUSSION

4.2.1 The pollen assemblage recorded in the sample is more likely to be contemporary with the recently dated charred *Triticum aestivum* grain, which gave a date of cal AD 1025-1150 (950±14BP; NZA-51897) in the Medieval Period (AEA, 2012, Carruthers, 2013). A charred hazelnut from the pit was dated in 2006 to 2470-2200 cal BC 3856±33 BP; OxA-15346) in the Neolithic (Evans, 2006).

4.2.2 Carruthers (2013) discusses the possible taphonomic processes of how the discrepancies in the dating evidence may have arisen. She suggested three possible explanations and they are:

- The charred *Triticum aestivum* grain and other plant remains are the result of contamination from the overlying dark soil;
- The pit was Medieval but had been cut through earlier deposits, which were extremely rich in Prehistoric artefacts;

- The pit was Medieval and the prehistoric finds had been curated within it.

4.2.3 During a recent watching brief of a hengiform ditch on the route of the Carlisle Northern Development Route there was a similar discrepancy between three AMS dates and the composition of the pollen assemblage (Rutherford, forthcoming). At this site a charred blackthorn/cherry (*Prunus* sp) fruit from the possible primary fill of the hengiform ditch was dated to 8720-8450 cal BC (9320±40BP; SUERC-33917). However, a charred wheat grain and a fragment of hazel charcoal from the context, which sealed this possible primary fill were dated respectively to cal AD 1300-1400 (560±35BP; SUERC-37827) and cal AD 1030-1210 (905±35BP; SUERC-37828). The pollen assemblage from the fills was Medieval in character.

4.2.4 Rutherford (forthcoming) suggested two possible explanations for the discrepancy between the older of the three plant macrofossil dates from the Carlisle site and the younger age suggested by the pollen assemblages. The first is that the sandy lithologies may have acted as a storehouse for pollen grains that may possibly have percolated through from land cultivated during Medieval times to occupy a feature positively identified as a Neolithic henge monument. However, it is unlikely that pollen grains would travel through almost 1.5m thickness of sediment. Alternatively and more likely, the entire sediment with its inherent pollen assemblage may have been displaced into the Neolithic feature (Rutherford, forthcoming).

4.2.5 The results of the pollen analysis can make little in the way of a further contribution to this debate except to say that the identifiable pollen grains in the assemblage are not characteristic of Neolithic pollen assemblages but would be consistent with assemblages of Medieval age. An alternative explanation is that the pollen assemblage may contain both Medieval and Prehistoric pollen. Daisy and dandelion-type pollen and the undifferentiated fern spores are very robust and, together with the indeterminate pollen grains, may represent residual prehistoric pollen in the fill. However, it seems more likely that the pollen is reflecting the Medieval environment rather than a Neolithic one at King's Stanley.

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