

APPENDIX 1 - POLLEN

by Robert Scaife

1.1 Assessment of the Pollen

Thurnham Roman Villa (ARC THM 98)

Introduction

- 1.1.1 Three monolith profiles were taken from the sediment fills of well 11010 during excavation works at Thurnham Roman Villa.
- 1.1.2 The recovery and study of the pollen profiles was undertaken in accordance with the Fieldwork Event Aims for the site, which are set out in section 2 of the main report, above. The principal aims of the pollen assessment were to ascertain whether pollen and spores were present or absent in the organic fills of this well and thus, the potential of the material for reconstructing the local environment of the villa. In spite of the complex taphonomy of pollen in the fills of wells (Dimbleby 1985; Scaife 1999), the initial research design recognised the environmental potential of the material, especially since the well was in the proximity of a crop processing area and corn-drier.

Methodology

- 1.1.3 Samples of 1-2ml volume taken at a sampling interval of 80mm were prepared using standard procedures for the extraction of sub-fossil pollen and spores outlined in Moore and Webb (1978) and Moore *et al.* (1991). Pollen counts of 100-150 grains per level of dry land taxa (the pollen sum) were made at each level plus marsh taxa and spores. In some levels, especially higher in the profile, pollen was poorly preserved and sparse and as such, a smaller number of grains was counted.
- 1.1.4 Data obtained are presented in standard pollen diagram form (Figures 11.1 and 11.2). Percentages have been calculated as follows:
- Sum = % total dry land pollen (tdlp)
- Marsh/aquatic = % tdlp+sum of marsh/aquatics
- Spores = % tdlp+sum of spores
- Misc = % tdlp+sum of misc. taxa
- 1.1.5 Taxonomy in general follows that of Moore and Webb (1978) modified according to Bennett *et al.* (1994) for pollen types and Stace (1992).

Quantification, Provenance and Stratigraphy

- 1.1.6 Three monolith profiles were taken from two sections of the sediment fills of the Roman well (11010). These were 10302 and 10303 (from section 10590) and 10305 (from section 10591). The overall stratigraphy of these profiles was examined during sub-sampling for pollen analysis, and is shown below. All measurements are depths in mm.

Section 10590

Column 10302 (top column) (no pollen)

Depth mm

0-60mm Dark grey/black silt

60-210mm Grey silt containing chalk fragments and some stones (120 & 180-210mm)

Column 10303 (lower column)

0-360mm Fine grained dark grey clay/silt. Humic. Containing substantial wood (trunk/fragments). Wood at 50-120mm, 200-250mm, 200-360mm

Section 10591

Column 10305

0-330mm Dark detrital/humic organic sediment containing small twigs to 10mm diameter set in black oxidised silt

Pollen profiles

- 1.1.7 Pollen was present in two of the three profiles. Although this is only an assessment study, some variations in the pollen spectra are in evidence and tentative pollen zonation has been carried out. The palynological characteristics of these profiles are shown below.

Profile 10305

- 1.1.8 Two pollen assemblage zones have been recognised in the 640mm of this profile which contained pollen and spores. These are defined and characterised as follows.

- 1.1.9 Zone 1: 320mm - 200mm. *Fraxinus-Corylus* type-Poaceae. Absolute pollen frequencies (apf) range from 35,000 at the base to 165,000 grains/ml. Tree pollen are dominant with *Fraxinus* at high values (to 78%). There are small numbers of *Betula*, *Quercus*, *Fagus* and *Alnus*. *Corylus avellana* type is the principal shrub (21%) with single records of *Cornus* and *Prunus/Malus* type. There are generally few herbs with Poaceae to 11%. There are few marsh taxa or spores.

- 1.1.10 Zone 2: 200mm - 0mm. *Quercus-Fraxinus-Corylus* type. The apf values range from 54,000 to 92,000 grains/ml. *Fraxinus* remains important but declines progressively throughout the zone (av. 50%). There are sporadic occurrences of *Betula*, *Fagus* and *Pinus*. There is an increase in the numbers and diversity of herbs although overall, numbers remain small compared to tree and shrubs (10-15%). These herbs include Poaceae (<10%) and occasional cereal type pollen. Spores of *Pteridium aquilinum*, monolete/*Dryopteris* type and *Equisetum* occur sporadically.

Profile 10303

- 1.1.11 Pollen was absent in the upper 80mm of this monolith/section and absolute pollen frequencies were low throughout. Two pollen assemblage zones can, however be delimited in the lower 280mm of this monolith profile.

- 1.1.12 Zone 1: 320mm - 200mm. *Fraxinus-Quercus-Corylus* type. The apf values are the highest recorded in this profile at 13,575 grains/ml but decline above. *Fraxinus* declines sharply from 40% to 6% whilst *Quercus* is expanding (28%). There is a

- 1.1.13 Pollen is less well preserved in this column than in profile 10305, and there is the possibility of differential preservation especially in the upper levels where pollen becomes sparse. This may be indicated by the increases in spores and pollen of Lactucoideae (dandelion types). The lower half of the profile (zone 1) compares with profile 10305 in having high values of *Fraxinus* (ash). However, unlike 10305, there is a decline from 200mm with *Quercus* and *Corylus* type remaining important. There is a single aberrant peak of alder, the taphonomy of which is conjectural.
- 1.1.14 Zone 2: 200mm - 80mm. *Quercus-Corylus* type-Poaceae. The apf. values are low and diminish upwards through this zone to 6,000 grains/ml. *Quercus* remains important with highest values at 80mm. Herbs become more important with Poaceae to 30% at 80mm. There are peaks of *Ranunculus* type (6%), and Lactucoideae (18%). There are increases in spores of *Pteridium aquilinum* (to 7%) and *Polypodium vulgare*.

General comments

- 1.1.15 At Thurnham, pollen has been preserved in the water-logged fills of the well, that is, in the lowest levels. Profile 10302 in the upper fills (contexts 10296 and 10297) was devoid of pollen. Microscopic plant debris remaining in these upper sediments was highly oxidised and it is likely that a fluctuating ground water table and drying-out of the sediments has degraded/destroyed the pollen. This similarly applies to the upper levels of monolith 10303 where pollen was similarly absent in the top 80mm.
- 1.1.16 Profile 10305 was, however, apparently much wetter and consequently, pollen preservation and absolute pollen frequencies much higher. This profile therefore perhaps provides the most useful information.
- 1.1.17 The most important aspect of this profile are the remarkably high values of *Fraxinus* (ash) pollen. This taxon is usually greatly underrepresented in pollen spectra (Andersen 1970, 1973) and as such these values are exceptional. This clearly relates to the presence of ash seeds which were also recovered from the well. This must relate to the presence of ash woodland locally and overhanging the well, rather than dumped material; consistent numbers throughout the depth of sediment implies longevity of the ash woodland/tree. The presence of *Quercus* (oak) and *Corylus* type (most probably hazel) suggests local woodland growth.
- 1.1.18 Compared with other well studies (noted below), there are few herbs, with notably little cereal pollen and associated weeds (segetals/ruderals). The latter tends to derive from ordure and similar deposits, which apparently became incorporated into wells. The Thurnham evidence thus suggests that the well was clean. It is also clear that there was little pollen input from the nearby crop-processing area. This is perhaps surprising since pollen incorporated into the husks of cereals (Robinson and Hubbard 1977) will have become liberated during crop-processing procedures.

Comparative material

- 1.1.19 The taphonomy of pollen wells is complex and the data may be difficult to interpret compared with naturally accumulating peat/sediment sequences. As such, there have been few studies with which to compare the data obtained from the Thurnham well. Exceptions are the studies of Roman wells by Barber (1976) at Portchester Castle and at Pomeroy Wood, Honiton (Scaife 1999), which have produced pollen data that

demonstrate that useful information can be obtained, especially in conjunction with insect and plant macrofossil studies. The contained pollen and spores may come from a variety of sources, derived via 'normal' airborne means or insect vectors, but are likely to derive from areas very close to the site.

- 1.1.20 However, wells are also likely to contain pollen from secondary sources including human and animal faeces, offal, domestic waste including floor coverings and food remains. All of these may contain considerable quantities of pollen which can strongly influence and bias pollen assemblages (Greig 1981; 1982) if this material was dumped in the well. The presence of such secondary/derived pollen may complicate the interpretation since the possibility of the dominance of this secondary element may have masked 'naturally' derived pollen from which interpretations of the local environment can be made.

Potential for further work

CTRL Landscape Zone Priorities and Fieldwork Event Aims

- 1.1.21 The following section discusses potential for further work in the light of the Landscape Zone Priorities and Fieldwork Event Aims.
- 1.1.22 From the assessment analysis carried out, it is clear that of the three pollen columns taken/available, the most productive is 10305. This has the highest absolute pollen frequencies and the best pollen preservation, due to its continuously waterlogged state. Subsequent study should concentrate on this sequence.
- 1.1.23 The pollen assemblages are dominated by ash, which attains remarkably high values. This may relate to very local woodland growing on/above the site. This and other evidence of woodland would seem at odds with the view that this was an active agricultural Roman Villa. Since the sequence comes from the top of the well, this may be evidence of woodland growth on abandonment of the villa. This suggests that the pollen assemblage has good potential to contribute to analysis of the character of the late and post Roman environment of the villa.
- 1.1.24 Further pollen study, including detailed counting of grains from column 10305, should form an integral part of a fuller environmental analysis which might include study of seeds, wood and insects. Such an integrated study would provide comparative and possibly corroborative data, and would aid the overall interpretation and study of the history of the local landscape.

New research aims and objectives for the CTRL archaeology project

- 1.1.25 There are few previous studies of pollen obtained from wells. Whilst it is clear that the pollen has the potential for providing information on the local vegetation, the taphonomy is not well understood. Any additional studies would act as valuable comparative data.

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