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Ancient Monuments Laboratory
Report 32/90

PRELIMINARY POLLEN ANALYSIS OF A BURIED SOIL FROM THE WROXETER ROMAN BATH SITE, SHROPSHIRE.

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Summary

Preliminary pollen analysis was carried out on a typical brown earth soil from beneath a rampart at the Wroxeter Roman baths archaeological site. The results showed that scrub woodland was cleared from the area sometime prior to the rampart construction (in 125+ A.D.) although there is no pollen evidence to link the events in time.

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Site : Wroxeter Baths
Title : Preliminary pollen analysis of a buried soil from the Wroxeter Roman Baths Site, Shropshire.

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1.0 INTRODUCTION

1.1 **Introduction**

The following results and discussion are based on the analysis of seven soil samples following the excavation of the Wroxeter Roman Baths, Shropshire (NGR SJ086565 - Directed by Graham Webster).

The report will, where appropriate, refer to the results of Mr. M. Canti (Ancient Monuments Laboratory Report No. 1/88) who sampled and analysed the soil profile (context nos. 97/249 and 97/252).

1.2 **Aim**

To carry out a preliminary pollen study of the above site.

2.0 SAMPLING AND LABORATORY METHODS

2.1 **Field methods**

Two soil columns were taken by Canti (1988) for particle size analysis and loss on ignition tests. These covered the rampart (97/249) and its underlying soil profile (97/252). Seven samples were taken from the columns for pollen analysis at 18, 36, 37, 40, 42, 44 and 46 cms. below the top of the uppermost column.

2.2 **Laboratory methods**

The samples were prepared using the technique outlined in Moore and Webb (1978) using a 150 micron sieving mesh together with acetolysis and hydrofluoric acid treatment. Micro-mesh (10 microns) sieving was also used to remove the finer particles of silica. The pollen extracted was stained with safranine and mounted in glycerol jelly. All pollen counts were made using a Leitz Labourlux, phase contrast and bright field microscopy. A sum of total pollen counted was made (approximately 400 grains per slide) excluding spores.

For calculation of absolute pollen frequencies a known sum of exotic pollen (*Garrya elliptica*) was added to accurately weighed (two-three grammes) samples. However, the results did not prove useful for this study and the values are not shown in figure 2.

The pollen data have been presented in a graphical form (Fig. 2) and the results divided into pollen assemblage zones. This allows description of the main pollen phases recognised.

Soil profile at Wroxeter (adapted from Canti 1988)

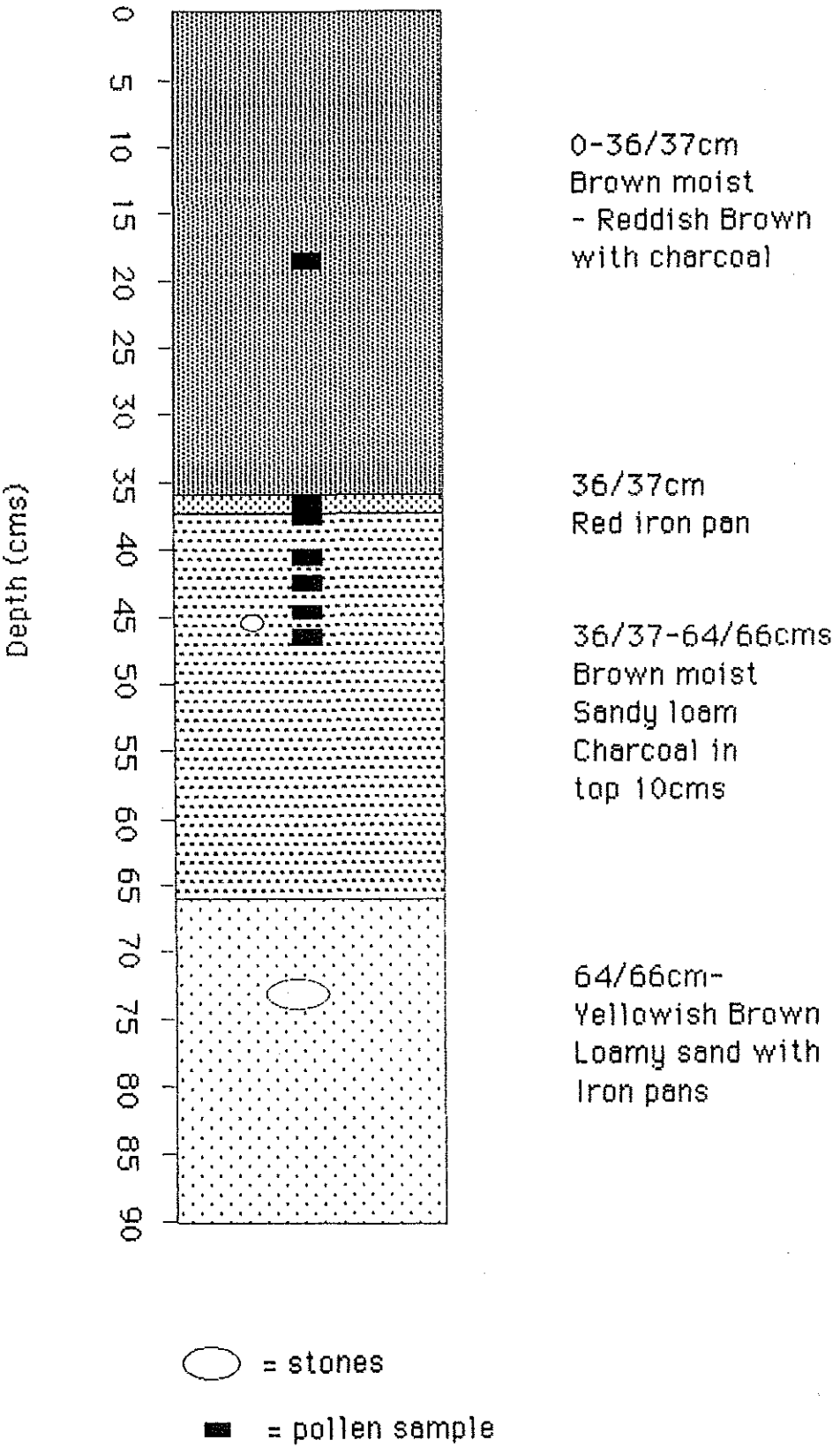


Figure 1 : Diagram of soil profile sampled for pollen analysis

3.0 POLLEN ANALYSIS

3.1 **Results**

The results are presented from the bottom of the soil profile upwards :

pollen assemblage zone WB:I (46-42 cms)

The uppermost organic layer of the buried soil was sampled. The pollen was found to be abundant but often badly corroded. These levels are dominated by Quercus (oak, 50% at 46cms) with Corylus type (hazel, 21% at 42cms) and to a lesser degree Alnus (alder), Tilia (lime) and Betula (birch). The dominance of arboreal pollen is apparent in this zone with low percentages of non-arboreal pollen, notably Gramineae (grasses). Chenopodium type (e.g. Chenopodium album - fat hen) is well represented with Plantago lanceolata (ribwort plantain) and Pteridium aquilinum spores (bracken) suggesting relatively open scrub woodland. Alnus is commonly located in wet habitats near rivers, streams and ponds and therefore probably grew near the river.

The presence of a number of pollen types which indicate plant species that commonly grow on disturbed, open ground suggests that the woodland present was not dense and there was sufficient light penetration to allow types like Plantago lanceolata, Sinapis type (e.g. Sinapis arvensis - charlock) and Artemisia (e.g. Artemisia vulgaris - mugwort) to grow. The pollen grains of Armeria (Armeria maritima - sea pink or thrift) are extremely interesting and their importance will be discussed further in section 3.2.

pollen assemblage zone WB:II (40 cms)

The overall preservation was better at this level, the top of the buried soil profile. There is a substantial increase in the percentages of non-arboreal pollen, namely Taraxacum type (dandelion type , 25%), Gramineae (44%) and Plantago lanceolata (8%). The values of Quercus, Tilia, Alnus and Corylus type fall to below 5%. The possible reasons for the demise of arboreal pollen levels will be discussed in 3.2. The episode is also marked by the appearance of Cereal pollen (3%) in low quantities.

pollen assemblage zone WB:III (37, 36 and 18 cms)

Three samples represent the rampart material. The levels are dominated by high percentages of arboreal pollen, namely, Quercus (40% at 37cms) and Corylus type (20% at 37cms)with Tilia and Alnus. The level of Chenopodium type pollen is relatively high (13% at 36cms). Notable pollen types present are Armeria and species representing disturbed ground e.g. Plantago lanceolata.

3.2 **Discussion**

The following discussion is based on the results in 3.1 and those of Canti (1988). Canti identified the soil as a typical brown earth. The range of pollen types in Fig.2 supports this view, indicating a scrub woodland prior to the rampart construction. The uppermost level sampled of the soil profile (zone II) infers that at some point in time, prior to the construction of the rampart in 125+ A.D., the flora represented in zone I of Fig. 2 was removed.

However, when attempting to interpret the pollen assemblage we have to consider the numerous problems when working with soil pollen in order to substantiate the above conclusion. In Fig.2 the differential preservation of certain pollen types in relation to others does not seem to have been an important factor. Those grains and spores normally overrepresented because of their resistance to degradation by oxidation are not well represented in the assemblage. Based on the research of Dimbleby (1985) and Havinga (1971) therefore, this suggests that the pollen assemblage is an accurate representation of the vegetation that grew in the immediate locality.

However, the interpretation may be incorrect if pollen has been translocated through the profile e.g. by water. Based on limited analysis of this sort it is often difficult to determine whether the pollen is derived from above, below or reflects vegetation contemporary with its stratigraphic position. When considering the pollen sequence at Wroxeter it is apparent that the variation between zone I and zone II indicates a transition to open, light loving vegetation (heliophytes) together with evidence of cereal cultivation. This infers insubstantial mixing and possible clearance.

The presence of Armeria pollen (Armeria maritima - sea pink or thrift) in zones I and III may also be an important indication of the extent to which the downwashing of pollen or mixing due to faunal activity has not occurred. Its presence zones I and III while not in II and the similarity of pollen types in zones I and III and not II, suggests that the rampart material and the subsoil may be one of the same. This may imply the removal of the upper few centimetres of the soil profile elsewhere in order to provide material for the rampart. This is a tentative interpretation based on a limited study however.

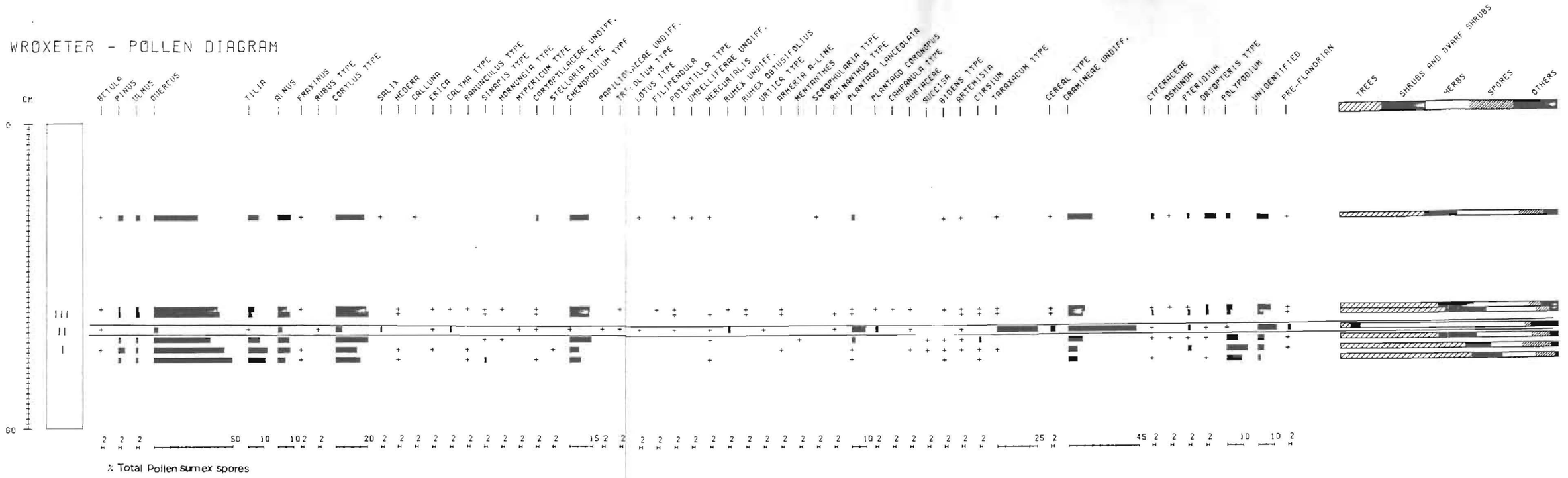
The presence of Armeria at Wroxeter is unexpected. Its present day distribution is confined to coastal or mountainous (up to 1280m O.D.) habitats and it is a lover of saline conditions (halophyte). The plant is insect pollinated (entomophilous) and therefore has low pollen production levels in comparison with wind pollinated species (anemophilous). The result is that one or two pollen grains are highly significant. For this reason two suggestions are given for its presence :

(i) That the pollen of Armeria at Wroxeter represents the mountainous form of Armeria maritima. The hills to the north and south of Wroxeter rise to 1400 ft. therefore there is every reason to believe that within the catchment of the River Severn, Armeria may have grown in its arctic/alpine form. Based on the interpretation of Dimbleby (1985) that soil pollen represents vegetation growing locally it may be that Armeria was transported over some great distance possibly by water derived from runoff. This suggests

that Armeria may have grown within the catchment either during the Devensian late-glacial and/or through the Flandrian and became incorporated in the soil.

(ii) Both the above suggestion and the following imply that the theory of a late glacial 'refugia' in mountainous and maritime locations for Armeria is correct (Tansley 1965). The suitability of such habitats for Armeria (sheltered location with a cool moist climate) being stimulated by natural soil acidification of the early post glacial. However, Godwin (1975) suggests that the 'refugia' is simply a 'residue' of its former distribution and he cites references to its inland and lowland growth. Although most examples are from the Devensian there are also examples from the Hoxnian e.g. at Nechells (Birmingham) where Armeria was found in a river terrace. Since Wroxeter is founded on a terrace it is logical to assume that Armeria may have grown there at some time and at an altitude of 200 ft. O.D.. Therefore, it is not unrealistic to conclude that Armeria may have grown at Wroxeter. This has important botanical and palaeoecological implications against using Armeria as a coastal and mountainous indicator pollen type.

WROXETER - POLLEN DIAGRAM



4.0 CONCLUSIONS

The above results and discussion suggest that clearance of scrub woodland took place at sometime prior to the construction of the rampart, although there is no evidence to link the two events in time. This conclusion is based on the pedological and palynological characteristics identified in the soil. In particular, the levels of *Plantago lanceolata*, the presence of cereal pollen (undifferentiated) and the grains of *Armeria*. The latter has especially important palaeoecological implications.

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