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Soil Report on Whitefriars, Norwich (421N)

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During 1979, Saxon to Medieval deposits were excavated by the Norfolk Archaeological Unit (Field Officer, B.S. Ayers) south of the River Wensum, Whitefriars, Norwich, to ascertain the nature of settlement in the Saxon and early Mediveal periods along this waterfront site.

A box-monolith was received containing a sample from Periods III and IV relating to the late 11th - early 12th century onward. As this was an anthropogenic deposit was treated in the same way as "Dark Earth" samples had been investigated previously. (See Ancient Monument Lab. Reports Nos. 3055, 3057, 3059, 3060 and 3061). It was tested for alkali soluble humus, loss on ignition and pH. Additionally, thin sections were manufactured from level 30 to study in detail features of this wet anthropogenic deposit, as the dark colour of the material tends to obscure most pedogenic characteristics.

Results

The layers examined, namely, 51, 46, 30 and 27 have a uniform, neutral pH. (See Analytical Data). Alkali soluble humus decreased from levels 51 and 46 to levels 30 and 27, perhaps through the oxidation of material in the upper par Loss on ignition, strangely increases in level 27, although washing for inclusion revealed far more charcoal in the underlying level 30. Mixed with the silt and sands, inclusions included pot fragments, mortar, plant remains, carbonised wheat grains, charcoal, a variety of bone and fish bone, slag shell, one struck prehistoric flint, and Bryzoa.

Three thin sections of level 30 were scrutinised. They revealed the relatively organic character of this deposit. The fabric is generally agglomeroplasmic in character (See Micromorphology) in that soil material is clustered as fine peds between large skeletal grains. The latter comprise quartz grains, shell fragmen charcoal, and a variety of plant material.

Most of soil matrix contains high proportions of organic matter, probably including fine charcoal, which together with the organic matter leads to the depos having a dark colour. Skeletal grains reflect the variation in dumped material, as noted in the inclusions earlier, and this includes plant material. The preservation of recognisable plant material, but more pertinently of amorphous organic matter clearly suggests the effects of anaerobism. This accounts for the lack of faunal mixing or droppings, but nevertheless poor pollen preservation (R.G. Scaife, pers. com.) and well structured peds, channels and metavughs suggests wetting and drying, and the movement of soil water. A high pH and any oxygenation would accelerate pollen destruction by microfauna, and obviously the upper deposits seem to have been oxidised to some extent.

The amorphous organic matter, the probable presence of vivianite, and the occurrence of parasite eggs in this level (R.G. Scaife, pers. com.) suggest that some of the input into this deposit may be cess, as described from similar urban environments, as at York.

In comparison to probable Late Roman "Dark Earth" from London, which has already been studied in thin sections (Macphail, 1980), the anthropogenic deposits at Whitefriars differ by being far more organic, with a uniform soil fabric. This relates to the absence of earthworms reworking the soil, as in London, where there is the loss of much organic matter due to oxidation. Nevertheless the variety of inclusions in both the "Dark Earth" of London and the deposit at Whitefriars is illustrative of soil formation in dumped material; although at Norwich inwash may also have supplied additional matter. The deposits at Whitefriars are thus acting as a wet base rich Bg horizon, while in contrast "Dark Earth" can be described as a dried-out base rich B horizon. In summary, the deposit at Whitefriars seems to be very heterogenous, and is mainly comprised of dumped material although inwashed material may well be included. Its wet character has preserved much organic matter, which may be in part derived from cess.

Analytical Data

Layer	pH	Alk. Sol, Humus	% Loss on Ignition
27	6.8	88.0	8.5
30	6.8	105.0	6.9
46	6.8	202.0	7.6
51	6.8	152.0	6.9

N.B. Alk. Sol. Humus, mgms. per 100 gms. air dry soil

Refs. Macphail, R.I. 1980 Soil and botanical studies of the "Dark Earth". BAR (Forthcoming)

Micromorphology, level 30, Whitefriars, Norwich (421N)

The fabric is mainly agglomeroplasmic, porphyroshelic in part, unorientated, with rather diffuse boundaries, and contains well devloped fine channels and metavughs, without cutans. Skeletal material is very diverse, and comprises mainly sub-rounded silts and fine and medium quartz sand, with feldspar and oolites also common. Coarse sand to fine gravel-sized aragonite (shell) fragments are present. Nonmineral skeletal material includes charcoal fragments and more commonly recogniseable plant remains (See Percentage Fabric Analysis below). Plant material is generally black under Plane Polarised Light (PPL), but may be dark reddish brown. It is non-birefringent, and black under Reflected Light (R. L.). In many cases cell material is visible. One coarse dendriform rod phytolith is present.

Amorphous organic matter is also present, and may be included within peds or act as a loose void-fill. This material is pale brown (PPL) with a finely granular texture under high power. In one slide amorphous organic matter is associated with crystal filaments, which are thin, pleochroic (pale blue to colourless - PPL), with strong birefringence and parallel extinction. This is likely to be the phosphate mineral, vivianite, as noted by the excavators in the underlying level 46.

The fine fabric of the peds is generally dark brown to black (PPL), non-birefringent (ie. opaque under Crossed Polarised light), and dark grey to black (R. L.). This suggests fines, clay and fine silt are complexed with high amounts of organic material, as described above. Also the high proportions of charcoal present in washed samples is also indicative of this material also being important in the peds. These large quantities of organic matter, including fine charcoal, are likely to give these deposits their dark colour - a suggestion already proposed for the "Dark Earth" of dry urban sites (Macphail 1980).

The deposit contains very few glaebules; ferri-manganic bodies, and as soil ignition indicated very low iron content, this may well relate to a waterlogged history. A high organic content would also sustain anaerobic conditions, again preserving the organic matter itself. In this sense evidence of soil fauna is not surprisingly missing.

Percentage Fabric Analysis (Semi-Quantitative)

Pore Space	31%
Mineral Grain	35%
Amorphous Organic Matter /Soil Complex	32%
Charcoal	0.5%
Amorphous Organic Matter	2%
Plant Material	13%