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AUTHOR

R I Macphail

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SOIL REPORT ON "DARK EARTH" FROM THE BEDERN EXCAVATION AT YORK

R. I. Macphail - 26th February 1980

During 1979, an area in the North East part of the Roman fortress was excavated by the York Archaeological Unit (Environment Archaeologist, Andrew Jones), and included Roman walls in the lower levels and at least a metre of presumed "dark earth" beneath any apparent Medieval deposits. This particular "dark earth" zone contains much Roman pottery and is approximately 20 metres long. Two samples, one 30cm. down the face of the section (A), the other 80cm. down (B) were received from York after a request for "dark earth" samples had been circulated. These were examined for alkali extractable humus, loss on ignition, coarse inclusions and phytoliths, as a means of comparing "dark earth" from York with that of London. In addition, as London "dark earth" had been found to be so poor in pollen (An. Mon. Lab. Report No. 3001) the more organic nature of the York samples suggested that it may be a more rewarding medium for soil pollen analysis. Thus, at my request, R. G. Scaife examined the samples A and B for pollen, as an adjunct to the phytolith study.

Both samples have a neutral pH (see data), similar to all "dark earth" looked at so far. Zone A had a Weak response to a phosphate test while in direct contrast zone B had a Strong result. The suspected higher moisture content of the lower zone may have influenced the phosphate, in that less is likely to have been irreversibly absorbed into the mineral material as is likely to have occurred in the highly oxidised "dark earth" of London. In addition, even though both samples have equally very high quantities of alkali extractable humus, the lower zone has the most. Layer A, in fact, has a greater loss on ignition, and so better preservation of the organic content may well relate to its more moist condition.

Coarse inclusions (i.e. larger than 2mm.) present are comparable with those from London (GPO 75) and comprise stones, bone, charcoal, mortar, "tile" and pot (see data). Oyster shell which is present at the GPO site is apparently absent from the "dark earth" at Bedern. Thus, as the York "dark earth" is generally coarse in texture, and has a suite of inclusions, also similar to that present in London "dark

earth" then we may assume it is a comparable material; especially when the greater organic status of this material from York (approx. x 4) can be explained by its partially waterlogged condition.

Phytolith analysis included the extraction of fine soil (less than 1mm.), after pre-treatment with HCl and ashing of organic material. Three samples, each from layers A and B were mounted on glass slides producing total counts for each layer of between 617 and 680. Percentage types were calculated and show sharply differing inputs of organic material into these two levels. Firstly though, the York samples although basically Festucoid in character have far greater quantities of Panicoid grass types than found in London, the latter being almost totally dominated by Festucoid types. Interestingly, sample A contains a high proportion (19%) of Coarse Spiny phytoliths, and many of these were very large indeed (approx. 140 microns by 20 microns). Study of the Institute of Archaeology's phytolith reference collection indicated that many grass types were precluded from being represented by these particular phytoliths. Even genera with coarse spiny phytoliths, such as Cyperaceae spp. and Nardus spp. seemed unlikely candidates because these lack the multiple elements present on the spines of these Coarse Spiny types. However, reference phytoliths of Triticum aestivum both from the collection and from archaeological material clearly bears a close similarity to these Coarse Spiny types identified from York (sample A), insofar as they are both large, and have similar morphologies. Additionally, pollen evidence certainly indicates inputs of secondary cereal pollen (see R. G. Scaife, An. Mon. Lab. Report No. 3001) into this deposit, together with arable indicators, and this supports the contention of cereal material being included in the "dark earth". The soil pollen may also suggest that the site maintained a waste-ground flora (as present at the GPO London) which received additions of material with a probable high cess content, including parasite eggs and likely secondary pollen grains of cereal and arable indicators. The inclusion of presumed phytoliths from Triticum aestivum in this dumped material appears a strong possibility.

In the lower level (B), a waste-ground flora is again indicated, but in addition the large quantities of Calluna pollen suggest artificial additions of Calluna to the

site for a number of reasons as proposed by R. G. Scaife. The almost equally important quantities of Gramineae pollen may mean that grasses were also collected elsewhere and utilised on the site. Notably, in this lower level, phytolith data included 16% dumbbells revealing a relatively high composition of Panicoid grass types. Two typical Panicoid grasses are Sieglingia and Molinia, and a review of the reference slides together with Smithson's (1958) findings from North Wales seems to suggest that both of these may have contributed towards the Panicoid grass types represented in level B. Additionally, it is likely that the Calluna was collected from local moorland areas, and so both Sieglingia and Molinia may have easily become incorporated in the same way; but whether by design or accident it is difficult to say. Even so, the high Gramineae pollen content and the suggested uses of Calluna (R. G. Scaife) seem to reason a similar purposeful usage of grasses.

The analyses of "dark earth" samples from Bedern have been useful in that they detail some of the organic inputs contributing to the "dark earth" generally. This, together with other sites, has shown that the "dark earth" represents intensive use, rather than abandonment, and that although essentially an urban waste-ground deposit as indicated by its physical structure and pollen content, it has accumulated through additions of material relating to perhaps domestic and stock usage. These include Calluna and grasses, which were perhaps utilised as floor covering, animal bedding, fodder or brushwood, and possibly improperly threshed cereal material either again as fodder or purely as domestic refuse. Lastly, inputs of obvious cess have been mixed with other general urban debris to produce a typical anthropogenic deposit.

DATA

Level	pH	Phosphate	Alk. ext.	Humus	Loss on ignition	Colour	
						Wet	Dry
A	7.2	W		200.0	12.33	10YR3/0	10YR5/1
B	7.0	Str		212.0	10.30	10YR3/1	10YR5/1

N.B. i) Phosphate: W, Weak, approx. 0.15 - 0.4% P_2O_3
Str, Strong, approx. 0.8% or more P_2O_3

ii) Alk. ext. Humus, mgms. per 100 gms. dry soil

Inclusions (%)

Level	Pot	"Tile"	Mortar	Charcoal	Bone	Stones
A	26	8	31	0.5	1.4	33
B	5.7	10.5	36	11.6	2.4	33.6

References

Smithson, F. 1958. Grass opal in British soils. Journ. Soil Sci., 9, 1, 148-155.