Society of Antiquaries of Scotland

Bearsden

A Roman Fort on the Antonine Wall

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Chapter 4

SOILS

4.1 THE WEST RAMPART

IAN D MÁTÉ

This profile is a box sample of soil, 330mm × 190mm × 90mm, extracted from immediately below the western edge of the west rampart of the fort.

Physical description

The colour was uniform throughout the sample: medium brown with a slight pink tinge. The Munsell colour on receipt was 5y R 4/4 (reddish brown) in a slightly damp state; dry, its colour was IO y R 5/2 (greyish brown). There was no mottling though there were colour variations on coatings (see below). It was a silty clay with fine sand fraction and some pebbles. The pebble size present ranged from 2mm to 60mm and constituted 5% of the sample. The larger pebbles were rounded but a majority of the small stones were angular grits.

Granular structure was present with fine peds less than 2mm. In general, packing density was low, the sample of medium porosity, with some fine fissuring. The uppermost 50mm to 80mm were more crumbly with a lower packing density and increased porosity. The soil strength was weak, but cemented on drying. It was moderately sticky, very plastic and very poorly cemented.

Roots in the sample were mainly fibrous though occasionally woody; all are fine being less than 1mm in diameter. There were 1–15 roots per 100cm^2.

On receipt, there was a distinct physical difference between the upper section of the sample and the main part of the soil body with an irregular boundary between the two (illus 4.1). This seemed to be due to worm activity.

There were occasional iron concretions which became more visible when the soil had dried. Often these concretions had formed on rounded quartz grains. Iron salts had also replaced woody material and concretions in the form of pseudomorphs of wood were found in the profile.

Laboratory analysis

pH

Method: to 1g of soil in a test tube, 1ml of distilled water was added and mixed by machine. The liquid phase was poured on to a watch glass and tested with Merck Spezial Indikator paper.

Result: Sample 1 pH 5.6;
Sample 2 pH 5.7;
Sample 3 pH 5.8.

Conclusion: This is a weakly acidic soil. There seems to be a slight indication of decreasing acidity down the profile, but the

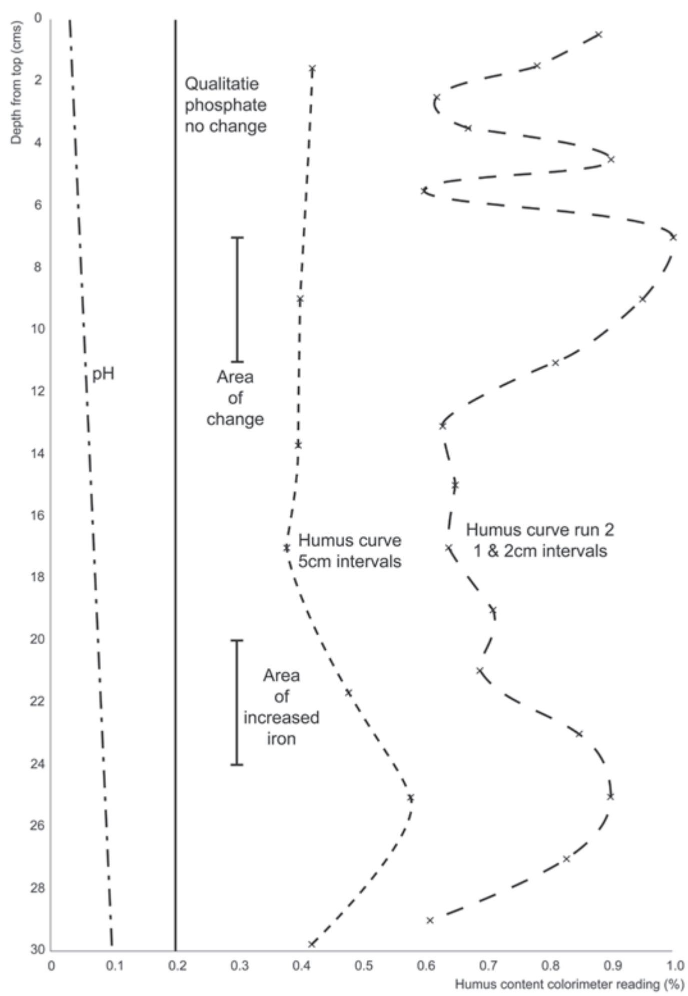

Illustration 4.1
Diagram of section below west rampart.

Table 4.1
Colouration of soil samples

Distance from top	*Colorimeter reading*
0–10mm	0.88
10mm–20mm	0.78
20mm–30mm	0.62
30mm–40mm	0.67
40mm–50mm	0.90
50mm–60mm	0.60
60mm–80mm	1 plus
80mm–100mm	0.95
100mm–120mm	0.81
110mm–140mm	0.63
140mm–160mm	0.65
160mm–180mm	0.64
180mm–200mm	0.71
200mm–220mm	0.69
220mm–240mm	0.85
240mm–260mm	0.90
260mm–280mm	0.83
280mm–300mm	0.61

tests were not indicative of any use of this soil as a habitation site and was much less than other habitation layers investigated by the analyst, for instance, of a Bronze Age hut circle at Tor Mor, Arran (Barber 1997). This leads to the belief that the land use, if any, was agricultural.

Discussion

The sampling method used in the tests on this soil presumed a vertically changing profile. There is some evidence of this visually as there is an apparently slightly enriched area of iron oxides 200mm–230mm from the top of the block forming a discontinuous poor pan.

The pH of the soil is such that the processes could have been self-initiating but it is unlikely that they would have progressed very far, especially as decreasing acidity is indicated downwards. However, throughout the profile there are iron oxide coatings lining root holes and worm holes as well as clay coatings of these channels. This suggests periodic changes in the soil water state, the increase of water content through the root and worm holes reducing the iron which is then reoxidised during dryer seasons. This seems to have been the predominant form of element mobilisation especially as the soil has retained a good clay structure. The clay coats are more predominant at the top of the soil where the soil is looser and crumbier. Most of the clay coatings are in the form of worm regurgitations rather than coats, so the soil cannot have been totally saturated.

Smaller pieces of charcoal were observed in the block, one piece at a depth of 130mm and another at a depth of 230mm. Its presence at points below the main zone of earthworm sorting suggests that the land was used agriculturally before the construction of the rampart and that the charcoal was not associated with the building of the fort in, say, a clearing operation.

The variation of humus content vertically through the profile was unexpected but can be accounted for. The top of the profile was an old buried surface so it should have had a higher humus content which would then have had decreased downwards. This is indeed the case, but there is a second peak which shows a variation over a few cm and coincides with the bottom of the looser soil at 60mm–100mm and an area of worm activity. There is also a third peak which is coincident with the highest concentration of visible iron oxide accumulation at about 250mm deep. This could represent the limit of interference from worms or man and be a zone of illuviation.

Conclusions

The profile as a whole suggests a wet meadow environment with seasonal changes in the water state and perhaps occasional saturation at lower levels decreasing the worm activity during these periods. It would support agriculture and is a brown earth soil. As the profile is sealed by the west rampart of the fort these conclusions relate to the pre-Roman occupation of the site.

4.2 SOIL SAMPLES FROM BUILDINGS

IAN D MÁTÉ AND SJOERD BOHNCKE

Fourteen samples were taken from the following locations to try to establish whether these was any positive evidence for the presence of horses: the gulley to the north of building 1; burnt wattle and daub in the gulley between buildings 1 and 2; the north-east post-hole of building 2 (two samples); patch of burnt wattle and daub in building 2; gulley to west of building 3; beside the same gulley; burnt wattle and daub overlying the west end of the gulley to the north of building 5 (four samples); pit to west of building 5; northern drain through east annexe rampart; gulley to east of annexe.

The soil samples were described, the pH and total phosphate content measured, the pollen content recorded, five samples tested with a view to determining whether fungi spores produced by dung inhabiting species might have been preserved, and the remains compared to modern horse droppings. It was not possible to draw any positive conclusions from the study of the micro-fossils but this could be due to the necessity to cook the samples in HF. There is an increase in phosphate especially in the drain around building 3, but this evidence in itself is not enough to confirm the presence of horses though it could point to the drain being used as a toilet run off for beasts. The acidic silty sandy soil, though at least occasionally wet, is not waterlogged, has organic activity and so would not be expected to preserve the kind of remains sought.

The gulley to the north of building 5 and the pit to the west of the same building yielded some pollen which presumably reflect the vegetation around the fort at the time the features were being filled. Both samples indicate grassland with the presence of alder and hazel trees. The presence of ribwort and Brassicaceae in both samples and of *trifolium repens* in the pit indicates that the grassland was likely to be in use as pasture. A Rosaceae pollen of the *alchemilla* type was found in the gulley and supports the idea of locally relatively wet grasslands and pastures.

The full report is in the archive.