Soil report on the micromorphology, and first turf of the turf-stack at the Experimental Earthwork on Morden Bog, Wareham, Dorset 1980

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The Experimental Earthwork was re-examined in the summer of 1980 by Peter Fowler after being constructed in 1963 for the British Association for the Advancement of Science, and subsequently investigated in 1964, 1965, 1968 and 1972 (Evans and Limbrey, 1974). The Earthwork comprises a turf stack bank, berm and ditch, and was built to compare with archaeological earthworks; and thus changes through time of the structure and buried materials have been metred to help in interpretations of ancient earthworks.

The structure of the turf stack (turves being right way up), the local heathland environment, the buried humus-iron podzol and parent material of Eocene sands with pipe clay, have been described (Evans and Limbrey, 1974). During the excavation of 1980 a soil monolith including the lowest turf (of the bank) and buried turf was collected (by Noel Syers) and thin sections were manufactured from it. In addition, samples were ignited for loss on ignition and to appraise the iron content; analysed for organic carbon, alkali soluble humus; and sent to the Soil Survey of England and Wales Laboratory at Rothamsted for measurement of pyrophosphate and sodium dithionite extractable iron. Thin sections were described using a 1100 point count after Bullock (1974) and Bullock and Murphy (1979).

Both the buried turf and 1st turf of the turf stack exhibit compression, by approximately 2 to 3 times, although as shown at West Heath cemetery (Macphail, 1981[a]) degree of compression obviously declines towards the surface of the turf stack. As the turves were not inverted at Wareham thin sections only characterise the Ah/Ea [illegible] Ah proper, as in the buried soil. Hence, there is a sharp discrepancy in organic matter content (See Analytical Data) between the b Ah horizon and the Ah/Ea of the turf stack. Nevertheless, they both have very low iron contents, generally with most of the iron in the mobile (Fe. ex.) pyrophosphate extractable form. This suggests little breakdown of organic complexing agents under conditions of burial, except for in the bank where the environment may be more oxygenated.

If the percentage of alhali soluble humus when compared with organic carbon content is a measure of humification, then only 11 to 13% humification is apparent in these turves. This lack of organic breakdown is apparent in thin sections where much

organic material is only moderately or lightly decomposed, ie. plant material is still recongiseable (See Micromorphological Description and Data).

Organic matter decomposition, as investigated by Babel (1981) allows recognition of "browning" as the major mechanism of organic matter decay at Wareham. Parenchymatous tissue may be seen to be brownish with brownish spheres along cell walls. Other parenchymatous cells seem perfectly preserved, as are lignified epidermal cells of (calluna?) roots. Fungae were not identified, although bound to be present, and "blackening" (Babel 1981) and other melanotic alteration (Dinc etal., 1976) commonly related to fungal activity (Miedema, Wagenings, pers. comm.) seem to have been poorly expressed.

The nature of the organic fabric may be compared with turves from West Heath Cemetery (West Sussex) (approx. 3,000 years B.P.) which are from humus-iron podz ls developed on the Lower Greensand, Cretaceous. Here humification is greater, 20-24%; compression is more distinct - approximately by a factor of 6 and 3-4 at the base of the stack, expecially as the fabric is far more dense; practically no identifiable plant material remains ie. 100% strongly decomposed; mite excrements so common at Wareham are either welded or so altered as to be unidentifiable at West Heath Cemetery; and lastly at West Heath the major characteristic of organic decomposition is "blackening". Indeed, at Wareham a H horizon was clearly visible in the buried turf, while the H horizon at West Heath was only barely visible. Charcoal, also clearly characterised the turf at Wareham, whereas it was only apparent in floated samples from West Heath.

Soil conditions at Wareham and West Heath can be readily compared, and so differences stated in the previous paragraph can thus be attributed to time. It may be noted that under acid heath conditions at West Heath, organic decomposition has led to rather little oxidisation and mineralisation of organic matter eg. turves still contain 3.78-4.73% Organic Carbon. Rather, organic matter alteration has been most important with "welding", "blackening" and compression, with some humification being dominant. In contrast, on base-rich substrates, eg. Sproxton Bronze Age (1550 B.C.), barrow on Jurassic limestone, organic matter in relic turves has been very great ly mineralised and oxidised (Macphail 1979). Even so, on Dartmoor, upland conditions at Saddlesborough Reave (Bronze Age) are preserved buried peaty layers with none of the alteration (Macphail, 1981b) described from West Heath.

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Micromorphological Description; Wareham Experimental Earthwork

	Ah/Ea	(1,000 points counted)	
Way up	Old Ground Surface		Thin Section
	b Ah	(" " ")	

Lower part of 1st Turf, Ah/Ea: Homogeneous; fine granular (fecal pellets); 17% macrovoids; simple packing voids, some compound packing voids; orthovughs; 65% mineral material; quartz; medium sand; fine sand; course silt present; subrangular to subrounded; moderately well sorted; no clay; 16% strongly decomposed, 0.9% moderately decomposed, and 0.6% little decomposed organic matter; root fragments; granular to intertextic.

Old Ground Surfaces: (extraneous silasepic material may be present).
Buried turf, b Ah: Fine subrangular blocky, fine granular (fecal pellets); platy in H zone; 16% macrovoids; compound and simple packing voids; mainly orthorughs; no channels; 38% mineral material; 24% strongly decomposed; 15.5% moderately decomposed and 3.3% little decomposed organic matter (root fragments); 4% carbonised plant fragments (charcoal); mite droppings 60-100 um; organic material not strongly decomposed is often porous; of plant material, bark and epidermal cells present, inner cells becoming humified; elsewhere phloem still present; agglomeroplasmic, to weakly porphyroshelic.

b Ah comprises three zones

Ah zone 1.2 mm. thick; organic matter mainly strongly decomposed, rather dense fabric.

H zone 1.6 -3.6 mm. thick; organic matter little to moderately decomposed: little mineral material and a concentration of root fragments, and charcoal.

Ah zone 3 mm. + thick; organic matter moderately to strongly decomposed.

Analytical Data; Micromorphological

Soil	% Mineral Grain	% Void	% Organic Matter Strongly Decomposed	Moderately Decomposed	Lightly Charcoal
1st Turf					
Lower Ah/Ea	65	17	16	0.9	0.6
b Ah	38	16	24	15.5	3.3

Analytical Data; Chemical

Soil	pH	% Org. Carbon	% Loss on Ignition	Alk. Sol % Humus	Humus % Org. C.
Turf					
Ah/Ea	5.0	3.88	6.75	0.51	13.1
b Ah	4.8	7.41	17.68	0.85	11.5

	% Fe ext.	% Fe res
Ah/Ea	0.3	0.1
b Ah	0.3	0.0

N.B. The silasepic fabric along the Old Ground surface is evidence of introduced material, perhaps off some one's shoe.