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SOIL REPORT ON TRETHELLAN FARM, NEWQUAY, CORNWALL.

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Summary

The interpretation of soil micromorphological data from seven thin sections and other analyses showed that the Bronze Age soil at Trethellan Farm was a moderately acid brown earth. In addition, the development of Bronze Age house floor layers, trampled areas and possible cultivated soils were studied. A suggestion that the site was buried after the Iron Age by mass movement of the unstable schillite brown earth material is forwarded. The site was also affected by the post-Roman blowing of beach sand. Twenty-four colour plates are included.

Author's address :-

R I Macphail BSc MSc PhD

Department of Human Environment
Institute of Archaeology
31 - 34 Gordon Square
London
WC1H OPY

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1. Introduction

During the summer of 1987 the Bronze Age site of Trethellan Farm, Newquay was being excavated (director, Jacky Nowakowski) by the Cornwall Archaeological Unit. The site, on the south facing slope of Trethellan hill, comprises a number of Bronze Age houses, pits, ritual areas and a prehistoric field system and Iron Age burials (Nowakowski, pers comm). In the area of study, the hut system lay beneath 1-2 metres of hillslope deposits (plate 1). These (Canti and Walker, unpub report) and buried soils were the object of the study.

2. Methods and Samples

Seven (A-G) undisturbed soil monoliths were taken by the author or Ms Vanessa Straker. These samples were air dried, impregnated with crystic resin (Murphy, 1986) and made into thin sections (Guilloré, 1985) 5 x 6 cm in size. These were described according to Bullock et al (1985) and interpreted after Courty et al (1989). Selected complementary bulk samples were taken alongside the box monoliths and analysed for organic carbon, calcium carbonate and grain size employing the methods of Avery and Bascomb (1974). Thin sections A and B (fig 1; plate 2) are of presumed Bronze Age soil (1030) in a field system south of the estate road, whereas thin section C (context 2126) is of soil beneath a post prehistoric wall (2014) and overlying Iron Age burials (2145) and (2142) (plate 3). Thin section D (context 2214) is of a Bronze Age house (2222) fill and thin section E (context 2205) is of prehistoric soil (plate 4) buried by a wall. The

hillslope deposits (plate 1) were investigated in thin sections F (c.140 cm depth [2025]) and G (c.80 cm depth [2024]) (appendix 1; profile 1).

3. Results

Selected soils were described (Hodgson, 1974) in appendix 1. Thin section description and their preliminary interpretation are presented in appendix 2 alongside the colour plates. Analytical data are tabulated (table 1).

4. Interpretations and Discussion

The two modern soils associated with the site are Typical Sand Pararendzinas (Sandwich Association; Findlay, et al, 1985) reflecting the affects of blown beach sand, and Typical Brown Earths (Denbigh 2 Association) developed on the schillite head deposits.

The interpretations which are presented below, are primarily based on the micromorphology of the soils (appendix 2). These have been affected to a greater and lesser extent by post-depositional earthworm activity. Minor amounts of calcium carbonate inwash from the overlying calcareous (table 1; sample 1) blown sands have also been noted. Lastly, the tendency of the soils developed on the schillite to slake (ie when water saturated, to collapse and become mobile) and form mud, as reported on site (Nowakowski, Straker; pers comm) and as interpreted from the microfabric studies, is another important factor in the consideration of the reconstruction of the soil history at Trethellan Farm.

The Bronze Age sandy silt loam (table 1; samples 3, 4) soils in thin sections A and B (plate 2) contain small amounts of fine charcoal, indicating their

anthropogenic origins. They are strongly homogenised, first by some activity such as trampling (associated slaking led to the development of very dusty coatings and intercalations), and second by strong earthworm activity. Much of the evidence of total slaking has been replaced by a mammilated and total biological fabric (plates 5, 6). It is possible within the field system that cultivation may have produced the slaked original fabric and that post-cultivation biological activity reworked it.

Strangely enough the only evidence of the natural prehistoric soil at Trethellan Farm occurs in house 2222. At the base of thin section D, a heterogeneous fabric of amorphous organic matter, and pale and dark brown silt loam mineral soil is present. This fabric also features abundant clay coatings and infills that are finely to moderately dusty and microlaminated (plates 7, 8, 9, 10). The raw nature of the organic matter suggests a rather acid topsoil origin (Babel, 1975), which is also reflected in the dirty brown colour of the clay coatings (Fedoroff, et al, 1981; Fedoroff and Goldberg, 1982). An acid soil origin is also indicated by the depleted nature of the mineral material (Duchaufour, 1982). The abundance of clay coatings and the way they have formed closed vughs clearly indicates that the soil has been disturbed (cf Courty, et al, 1989, p127). The presence of this soil material at the base of the house deposits, which as described later are darker, more homogeneous and more charcoal-rich, suggests that the relic soil material was little affected by anthropogenic activity and was probably dumped to make a hut floor. Other prehistoric instances of digging-up "clean" soil for lining a hut floor can be cited (Courty, et al, 1989, chapter 17). At any event, this relic soil material allows the suggestion that the mid-Flandrian/late Bronze Age soil, which had weathered from the weakly metamorphosed shaley siltstone parent material (schillite) was a moderately acid brown earth (Avery, 1980) or possibly an argillic brown earth. The homogenisation of this soil (probable Ah,

A12/Ea, Bw/B(t) horizons) would produce the brown earth silt loam material as described, for example, in thin sections A and B.

The upper part of thin section D is more typical of house deposits. Charcoal and burned bone are present, and trampling and reworking have produced a fine charcoal-rich homogeneous deposit, but one containing fragments, in the form of papules, of earlier features of mud floors (plates 11, 12, 13, 14). In addition, few voids are present and these are closed vughs. All these features are typical of trampled mud floor surfaces.

In short, thin section D details the development of a house mud floor, from the original dumping of "clean" soil, to its homogenisation by trampling which worked-in burned bone fragments and broke up charcoal into increasingly finer pieces. Associated slaking caused dense soil crust formation, a feature that has been more commonly studied in agriculture (Jongerius, 1983, p 118-9), but which can equally occur through trampling.

Thin section C has a microfabric (plates 15, 16) similar to that of thin sections A and B, except that burial by a wall (plate 3) has preserved the prehistoric character far better from earthworm reworking. Again the major character of the buried soil is one of being slaked, and because of the presence of oriented clay fragments (papules), that it was repeatedly disturbed and slaked. Cultivation (Macphail et al, 1987) again could possibly produce such a fabric, but it is too homogeneous and too slurry-like, and can be best interpreted as trampled mud between the houses on the site.

Thin section E is from the buried soil just above the scarp (3006), on an approximately 11^{o} slope. Like many of soils on the site it has had a history of

slaking, but unlike some of the other soils described, it has an open porosity. It also uniquely contains rounded fragments of dark, poorly birefringent soil (plates 17, 18). These fragments are interpreted as pieces of burned soil or hearth (Courty, 1984). Their inclusion in this soil suggests that these are transported fragments, probably eroded from occupation areas upslope and that the deposit as a whole is a ploughsoil colluvium (Mücher, 1974), possibly containing a minor blown beach sand component. The slaking features and papules present would also be consistent with this, as is the minor biological reworking.

Examination of the scarp (appendix 1; profile 1; plate 1) shows it to have a 28° slope, whereas the terrace lower down averages only 2-4°. The basal 120 cm of the hillslope deposits at profile 1 can be traced downslope and buries for example profile 2, but this particular deposit is not laterally extensive (Nowakowski pers comm; fig 000). In thin section (F) an example of it contained two major fabrics. One is open (60% voids) and related to the burrowing of earthworms which brought down calcareous sand from the overlying deposits (see thin section G). The other is dense (15% voids), massive structured (plates 19, 20, 21, 22) with fine pores and intercalatory textural features (Bullock et al, 1985), which suggests that it suffered a single (no papules) phase of total slaking. In this way this deposit is far more consistent with being the result of mass-movement (mud flow; Courty et al, 1989, p 159-160) than being hillwash (cf thin section E). In addition, there was the archaeological suggestion that some of the Bronze Age walls may have been partly pushed downslope (Nowakowski, pers comm), and the geomorphological consideration that terracing oversteepened the scarp and led to slope instability.

In contrast, the overlying hillslope deposit (thin section G) is a calcareous sandy loam (table 1; sample 1), much worked by earthworms (plates 23, 24). There

is a predominance of fine- and medium-size sand and this sorting with the large quantity of shell material demonstrates that there is a substantial beach sand contribution to the deposit. The fine soil can be recognised as deriving from the weathered schillite (brown earth). This mixture of soil elements is probably the result of cultivation of this slope concurrent with the blowing of beach sand, and similar soil mixtures have been reported from other late prehistoric sites, for instance Bar Point on the Isles of Scilly (Evans, 1984). This overburden of calcareous sand across the site has sometimes affected the earlier stratigraphy through downwash or burrowing, but it appears that all the soils until after the mass-movement event (post Iron Age) developed from the schillite parent material and were not influenced to any major degree by wind blown sand.

5. Conclusions

a) Bronze Age occupation and cultivation took place in an area of moderately acid brown earths or possibly argillic brown earths.

b) Natural soils were employed for the construction of house floors and these became increasingly mixed, through trampling, with anthropogenic materials such as charcoal and burned bone.

c) Muddy, trampled areas occurred between the houses, but similar soils outside the major occupation area and within the lower field system may have been cultivated.

d) There is clear evidence of plough erosion (of burned areas of burned soil) and the formation of a ploughsoil colluvium (probably containing an element of blown sand) above the upper scarp.

e) After the Iron Age, the site was buried by unstable schillite soil material, possibly through a mass-movement event that had been slowly triggered by the oversteepening of the slope by scarping during the Bronze Age occupation.

f) Later colluvium, which further buries the site, also contains a high proportion of blown sand - the latter not obviously present in the Bronze Age soils.

6. Acknowledgements

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7. References

Avery B W, and Bascomb C L, 1974 Soil Survey laboratory methods, Soil Survey technical monograph, 6, Harpendon.

Avery B W, 1980 Soil classification for England and Wales, Soil Survey monograph, 14.

Babel U, 1975 Micromorphology of soil organic matter, in Soil components, 1, organic matter (ed J E Geisking), Springer-Verlag, 369-473, New York.

Bullock, P, Fedoroff N, Jongerius A, Stoops G, and Tursina T, 1985 Handbook for soil thin section description Waine Research Pub, Wolverhampton.

Canti M and Walker R, 1987 Trethellan Farm; survey by auger. Unpub AMLR.

Courty M A, 1984 Interpretation des aires de combustion par la

micromorphologie, Bulletin de la Societe Prehistorique Francaise (1983) 80, 6, 169-171.

Courty M A, Goldberg P, and Macphail, R I, 1989 Soils and micromorphology in archaeology Manuals in archaeology series, Univ Press, Cambridge.

Duchaufour P, 1982 Pedology George Allen and Unwin, London.

Evans J G, 1984 Excavations at Bar Point, St Mary's, Isles of Scilly, 1979-80, Cornish Studies 11, 7-32.

Findlay D C, Colbourne G J N, Cope D W, Harrod T R, and Staines S J, 1983 Soils of England and Wales, sheet 5, south west England, Ordnance Survey, Southampton.

Fedoroff N, De Kimpe, Page F and Bourbeau, 1981 Essai d'interpretation des transferts sous forme figuree dans les podzols du Quebec Meridional a partir de l'etude micromorphologique des profiles, Geoderma 16, 25-45.

Fedoroff N and Goldberg P, 1982 Comparative micromorphology of two late pleistocene paleosols (in the Paris Basin) Catena 9, 227-251.

Guilloré P, 1985 Methode de fabrication mechanique et en serie des lames minces, Institut National Agronomique, Paris, Deptement des Sols.

Hodgson J M, 1974 Soil Survey field handbook, Soil Survey technical mon 5, Harpendon.

Jongerius A, 1983 The role of micromorphology in agricultural research, in Soil Micromorphology, (eds P Bullock and C P Murphy), A B Academic Publishers, Berkhampstead, 111-138.

Macphail R I, Romans J C C, and Robertson L, 1987 The application of soil micromorphology to the understanding of Holocene soil development in the British Isles; with special reference to early agriculture, in Soil Micromorphology, (eds N Fedoroff, L M Bresson, and M A Courty), A F E S, 647-656, Plaisir.

Micher H J, 1974 Micromorphology of slope deposits; the necessity of a classification, in Soil Micromorphology, (ed G K Rutherford), Limestone Press, Kingston,Ontario, 553-566.

Murphy, C P, 1986 Thin section preparation of soils and sediments, AB Academic Publishers, Berkhampstead.

Table 1. Analytical Data: Trethellan Farm

No, Layer	Thin section	%Organic Carbon	CaCo3	Clay	FZ	MZ	CZ	Silt	VFS	FS	MS	CS	VCS	Sand	Texture
1 2024	G	1.3	16.4	9	15	8	11	34	10	15	19	7	6	57	SL
2 2025	F	0.7	0.2	16	16	8	13	37	7	10	13	7	10	47	SZL
3 2205	B	0.6	0.7	17	14	9	14	37	5	11	10	10	10	46	SZL
4 2205	A	0.4	1.0	16	14	9	15	38	5	9	10	9	13	46	SZL

Appendix 1

Soil Profile Description: Trethellan Farm, Penrie, Newquay, Cornwall

Profile 1: Upper scarp (Plate 1)

Soil Type: Typical Sand Pararendzina (Sandwich Association, Findlay et al, 1985) over Typical Brown Earth (Denbigh 2 Association). Parent Material: blown beach sand over slope deposits of weathered schillite. Altitude: c.38m OD. Slope: 11° (above scarp), 28° (scarp), 6° (present surface). Aspect: South. Vegetation: grassland. Weather: dry and hot (June 1987).

Horizon, depth cm.

15 cm of overburden.

A1/B1 0-23 Dark brown (10YR3/3) moderately firm sandy loam; coarse subangular blocky; common small stones of schillite; moderately humose; few fine roots; worm channels; calcium carbonate efflorescence; fine shell fragments; gradual, smooth boundary.

B2 (2024) 23-80 Dark yellowish brown (10YR3/4) moderately firm sandy loam (Table 1, sample 1); poorly developed coarse prisms; common small to medium stones of schillite; poorly humose; common worm channels; frequent calcium carbonate efflorescence; gradual, smooth boundary.

bB3 (2025) 80-207 Dark yellowish brown (10YR3/4 and 10YR3/6) moderately firm sandy silt loam (Table 1, sample 2); massive to poorly developed coarse prisms; very strong with medium to large stones of schillite; very poorly humose; clear, smooth boundary.

C 207+ Weathered schillite head.

Profile 2; just below lower scarp (Plate 2)

Soil Type: Typical Brown Earth (Denbigh 2 Association). Parent Material: weathered schillite (moderately metamorphosed Lower Old Red Sandstone, Devonian). Altitude: c.31m OD. Slope: 4° south.

B1 (2025) 0-44 Dark brown to dark yellowish brown (10YR3/3-3/4) moderately firm sandy silt loam; massive to poorly developed coarse prisms; abundant small to medium stones of schillite; very poorly humose; gradual, smooth boundary.

bB2 (2205) 44-46 Dark yellowish brown (10YR4/4) moderately firm sandy silt loam (Table 1; sample 3); poorly formed coarse prisms; many medium and fine stones; poorly humose; many probable old root channels; few pottery and charcoal; gradual, smooth boundary.

bB3 (2205) Dark yellowish brown (10YR4/4) moderately firm sandy silt loam (Table 1, sample 4); poorly formed coarse prisms; many stones; poorly humose;

66-76 many relic root channels; few pottery and charcoal; clear, smooth boundary.

bC Weathered schillite head.

76+

Appendix 2

Soil Micromorphological Description: Trethellan Farm, Newquay, Cornwall

A: 63-70 cm (Profile 2), layer 3 (1030)

Structure: moderately well developed medium to coarse angular blocky. Porosity: 35%; inter-ped are moderately poorly accommodated packing planes. Intra-ped there are dominantly medium and fine closed vughs, with coarse open vughs and medium channels. Sometimes intra-ped porosity as low as 20% when dominated purely by closed vughs (closed vughs pre-date more open porosity). Mineral: C:F, 45:55. Coarse dominant stone to sand-size schillite (weakly metamorphosed shaley siltstone). Frequent silt (probably liberated from schillite); frequent medium sand-size quartz and fine opaques, mica. Fine brown, strongly speckled (PPL), moderately birefringent, brownish orange (OIL). Organic. Coarse occasional charcoal, rare fungal bodies. Fine occasional amorphous fragments, and charred flecks. Groundmass: close porphyric, speckled b-fabric. Pedofeatures Textural very abundant intercalations and associated impure clay void coatings/matrans. Rare fragments of dark reddish brown slightly dusty, moderately birefringent clay infills. Depletion: weak decalcification of calcitic features. Crystalline: rare, microsparitic infills suffering decalcification. Excrements abundant, probable mammilated mineral excrements of earthworms.

Interpretation. Briefly, the soil material has been very strongly slaked, and then affected by moderate post-depositional earthworm working.

B: 55-62 cm (Profile 2) Layer 4 (1030)

Structure: massive, with very poor medium sub-angular blocky; spongey microstructure. Porosity: 40%, very dominant, medium to coarse, open vughs; few closed vughs. Mineral and Organic (as A). Groundmass (as A). Pedofeatures Textural: many intercalations and associated impure clay coatings/matrans. Crystalline: occasional calcium carbonate hypocoatings around fine voids. Fabric: totally homogeneous fabric. Excrements: almost total biological fabric; mammilated mineral excrements. These post-date textural pedofeatures.

Interpretation. Strongly slaked and homogenised soil material is almost totally re-worked biologically.

C: layer 2126

Structure: massive, with poorly developed fine blocky. Porosity: 35%, dominant moderately smooth walled, poorly accommodated planes; common intra-ped medium and fine vughs (many closed). Mineral: coarse (as A). Fine brown, highly speckled (PPL), moderate birefringence, orange (OIL). Organic: Coarse: rare fine charcoal spores. Fine occasional amorphous cells, charred fragments. Groundmass: close porphyric, speckled with minor grano-striate b-fabric. Pedofeatures. Textural very abundant poor intercalations which are associated with matrans affecting dominant amount of void-matrix interfaces. Occasional moderately dusty void coatings. Occasional rounded fragments of matran interclatory material. Crystalline: rare somewhat decalcified sparitic infills. Amorphous as in (A) and (B) ferruginous staining of weathering schillite very abundant. Fabric: strongly homogenised but includes "recently" inherited papules of previously slaked soil. Excrements only poorly influenced by biological reworking.

Interpretation. Multiple slaked soil, was buried by wall in slaked state and only affected by minor reworking. As in (A) and (B) rare calcium carbonate features may relate to calcareous solutions from blown sand (shell bearing) above.

D: layer 2214 (hut fill?) 0-8 cm

Structure: massive, with weakly developed subangular blocky; vughy microstructure. Porosity: 15-20%, very dominant closed fine vughs, often smooth walls more open at base. Mineral: Coarse (as A) occasional fine, generally burned (pale brown and non-birefringent) bone fragments. Fine moderate heterogeneity a) few pale brown and dark brown speckled (PPL), moderately low birefringence, patchy pale brown, brown, grey and dark brown (OIL) (bottom 6-8 cm) brown, heavily speckled (PPL), moderate birefringence, pale brown (OIL). Organic. Coarse: many coarse wood charcoal. Fine a) patches of very abundant polymorphic (?) amorphous organic matter (eg from F horizon); abundant amorphous organic matter throughout; many charcoal (medium to very fine in size); b) strongly homogeneous, abundant fine fragments, many charred; amorphous fragments, charcoal shreds, possible grass fragments, although no obvious phytoliths present. Groundmass: close porphyric, speckled b-fabric. Pedofeatures Textural: in fine fabric (a) abundant dark brown, moderately birefringent, moderately oriented, finely dusty clay void coatings and infills (acid/humus affected?). Finely laminated and oriented to present way-up. Very abundant very dusty clay/matrans coatings. In (b) occasional fragments of oriented clay (papules), which may have originated from material described above because it has similar characteristics. Abundant intercalations and matrans. Depletion: parts of fine fabric (a) may be soil depleted of iron. Fabric: fabric is generally homogenous

(b), but may contain fine brown soil fragments and papules. Fine fabric (a) is heterogeneous with depleted and non-depleted soil. Overall, the hut fill is moderately heterogeneous at depth and homogeneous above. Excrements: there is little evidence for faunal working as the fabric is so dense.

Interpretation. This is a very interesting slide and gives many clues to the site. Firstly fine fabric (a) appears to represent evidence of the natural soils at Trethellan Farm. The depleted nature of the soil and the presence of amorphous organic matter may suggest the probably occurrence of an argillic brown earth soil here (formed under woodland in the early/mid Flandrian). This soil was probably moderately acid (amorphous OM and dark colour of coatings) through long pedogenesis of the phyllite. It may represent the previously undisturbed soil cover prior to Bronze Age occupation.

The soil, mainly Ah and Ea horizon material with minor B/Bt horizon material, appears to have been involved in a burning episode before being fully turbated as a hut floor deposit. This could date to any "recent" event but may relate to a clearance episode. The dumping of soil, which slakes and forms coatings in situ in hut floors has been reported elsewhere (Courty, et al 1989). As floor material and domestic refuse (charcoal, burned bone) accumulated above, this lower zone was protected from full homogenisation. Trampling of the hut floor produced a very dense fabric with plenty of evidence (intercalations, matrans, soil fragmentation) of slaking typical of such deposits. The floor material mainly differs from the soil materials of A, B and C by containing higher amounts of charred organic matter,and also includes burned bone.

E: layer 2205 (0-6.5 cm)

Structure: poorly developed sub-angular blocky. Porosity: 35% dominant medium and coarse open vughs, few closed vughs, fine channels. Mineral Coarse generally as (A); with frequent fine to medium size reddish brown, poorly to non-birefringent nodules and soil fragments, reddish brown under OIL (probably burned soil/hearth fragments); few medium size, rounded shell (decalcifying aragonite) fragments. Fine a) very dominant brown, speckled (PPL), moderate birefringence, brownish orange (OIL); b) very few brown, speckled (PPL), moderately high birefringence, brownish orange (OIL) (calcitic soil fragments - some as inclusions, others as material in coarse channels). Organic Coarse rare root; occasional charcoal. Fine occasional amorphous material and charred OM. Groundmass: close porphyric, speckled b-fabric. Pedofeatures Textural abundant poor intercalations associated with matrans around voids. Occasional dark brown, moderate birefringent, dusty clay coatings and infills (possibly associated with sorting of mass slaking), also rare papules of clay coatings. Depletion: moderate decalcification of calcitic fine fabric (B) and shell material. Crystalline: occasional inwash of calcitic fabric and recrystallisation (from overlying blowing beach sand). Amorphous (see coarse mineral for burned/reddened "nodular" material). Fabric: generally homogenised with inclusions of burned soil, shell material and slight mixing of calcitic material (probably from above). Excrements: occasional mammilated mineral excrements suggests much of open fabric relates to minor earthworm penetration.

Interpretation: This soil has been affected in a small way by biological and inwash movement of calcareous soil from above - probably through the wall. The rest of the soil resembles the fabrics of the Bronze Age soils described earlier (A, B etc), but differs by containing an element of the blown sand, in the form

of shell material (that is at present not thought to be through contamination) and frequent rounded burned soil. These latter indicate the earlier presence of occupation (hearths and related features) that have been eroded and transported (Mücher, 1974). The deposit is probably a ploughsoil colluvium, that was influenced by some minor amounts of shell material. This material overall seems to post-date the Bronze Age soils, but has reacted in the same way to human activity by slaking.

F: (layer 1) c.140-145 cm

Structure: massive, with poorly developed heterogeneous coarse sub-angular blocky and very fine angular blocky peds. Porosity: heterogeneous; a) 60% (where biological perforation has brought in beach sand and shell from above) dominant complex packing pores; or b) within massive (ped) areas, 15%, with common fine smooth wall channels and open vughs, and common fine smooth wall closed vughs. Mineral: a) 25% or less of slide. C:F, 60:40. Coarse very dominant medium and coarse sand size (well sorted) rounded quartz and shell fragments. Fine as in (b). b) C:F, 60:40. Coarse dominant small stone size (mainly 4mm and 10mm in size) rock fragments of phyllite material. Dominant poorly sorted coarse sand (phyllite fragments), medium, fine and silt-size quartz, few ferruginous nodules; very few micas. Fine brown, speckled (PPL), moderate birefringence, slightly brownish orange (OIL). Organic Coarse (absent) Fine rare amorphous fragments. Groundmass close porphyric, speckled and weakly grano-striate b-fabric. Pedofeatures Textural many poorly developed intercalations that merge into poorly birefringent generally thin void matrans. Crystalline rare micrite impregnated fabric. Fabric dominantly dense homogeneous fabric except for open areas of biological channels bringing in soil material from blown sand colluvium above (see G). Excrements many probably mammilated excrements.

Interpretation. Apart from minor reworking by fauna and contamination from blown sand colluvium above, the major character of the soil is a dense, probably slaked soil. It contains little evidence of being a colluvial ploughsoil - in that it is very poor in organic matter and contains no soil nodules (that occur in E for example). Its limited area in the field and compacted nature, porosity and textural features, may suggest it is a mass-movement (mud flow) deposit brought about by BA occupation oversteepening the slope. Further work has to be carried out, however, to check this..

G: (layer 2), c.80-80.5 cm

Structure: mainly structureless, possible very coarse laminar fabric overlain by poorly developed medium and coarse subangular blocky; complex microstructure, single grain and microaggregate. Porosity: 40-50%, very dominant complex packing pores; fine vughs within areas of fine fabric/soil fragments. Mineral C:F generally 70:30, except for soil aggregates of 50:50. Coarse frequent small stone size phyllite fragments, with moderately well sorted, dominant medium and fine sand size quartz and shell (commonly aragonite) (soil aggregates very coarse sand to small stone size). Fine darkish brown, speckled (PPL), moderately low birefringence, brownish orange. Organic Coarse occasional fine charcoal. Fine many organic fragments, some charred. Groundmass: areas of enaulic and mo nic, with few porphyric (soil aggregates), the last with a speckled b-fabric. Pedofeatures Crystalline rare calcite needles and calcitic impregnation. Fabric strong mixture of coarse material (sand and shell) with braces of and intergrain microaggregates - well homogenised, except for upper part of slide where compacted soil fragments still occur. Excrements: occasional mammilated, abundant fine mineral microaggregates.

Interpretation. Well mixed soil of blown sand and fine material from phyllite parent material. Probable origin relates to cultivation and colluviation under dominant impact of beach sand blowing.

Trethellan Farm; captions to the plates.

Plate 1. Profile 1; hillslope deposits juxtaposed to the upper scarp.

Plate 2. Profile 2; sediments at the edge of the Bronze Age field system and adjacent to occupation areas (Area 1), being sampled (thin sections A and B; see Fig 1).

Plate 3. Sample C (2126) in soil in an area of Iron Age burials, buried by a post prehistoric wall (2014).

Plate 4. Sample E (2205) from a thin soil over bedrock, buried by a low bank at the top of the upper scarp.

Plate 5. Thin section A: original massive and closed vughy microfabric containing textural features (evidence of total slaking), now strongly reworked by biological activity and displaying a mainly open fabric. Plane polarised light (PPL), frame length is 5.4mm.

Plate 6. As plate 5, crossed polarised light (XPL).

Plate 7. Base of thin section D (earliest deposits [2214] in house 2222); fragment of dark brown soil containing amorphous organic matter, fine charcoal and abundant dusty clay coatings and infills; probably from local natural acid brown soil. PPL, frame length is 3.4mm.

Plate 8. As plate 7, XPL.

Plate 9. Detail of plate 7 shows fine fabric to be mainly pale (depleted) except for areas of dark brown amorphous (acid) organic matter and flecks of charcoal. Clay coatings are finely dusty and "dirty" again suggesting acid conditions. These clay coatings indicate soil disturbance, probably from the digging up of this natural soil and its dumping for, and use as a house floor. PPL, frame length is 0.33mm.

Plate 10. As plate 9, XPL.

Plate 11. Upper part of thin section D (house deposits; 2214; dense, homogenised soil featuring very dusty coatings and intercalations, and is dark because of the abundant fine charred organic matter present. The fabric has been produced by the mixing (through trampling and slaking) of natural soil (see plates 7-10) and anthropogenic materials eg charcoal and other organic wastes (see plate 14). PPL, length of frame is 5.4mm.

Plate 12. As plate 11, XPL.

Plate 13. As plate 11; detail of homogenised fabric with, in the centre, a fragment of a clay coating which indicates the disruption of earlier soil microfabrics that is typical of trampled floors. PPL, frame length is 0.33mm.

Plate 14. As plate 11; bone fragment as an example of included anthropogenic material; dull colour (with poor birefringence) suggests that it is burned. PPL, length of frame is 3.4mm.

Plate 15. Thin section C; soil (2126) beneath post prehistoric wall; the dense microfabric, including closed vughs and abundant dusty clay coatings indicates that this soil was slaked, and that burial protected it from post-depositional biological reworking (cf plates 5, 6). This shallow soil could be a trampled area between houses. PPL, length of frame is 3.34mm.

Plate 17. Thin section E; buried soil (2205) at top of upper scarp; this moderately heterogeneous (both open and closed porosity, some textural features) soil is interesting because it contains rounded (colluvially transported) dark soil that are believed to be fragments of previously existing burned soil archaeological features. This layer could be a ploughwash deposit. PPL, frame length is 5.4mm.

Plate 18. As plate 17, XPL; note poor birefringence of burned soil fragments.

Plate 19. Thin section F; lower hillslope deposits (see plate 1); massive, dense compact soil containing very abundant fextural features such as intercalations, eg left of centre, and these suggest total slaking as in a mud flow. PPL, frame length is 5.4mm.

Plate 20. As plate 19, XPl.

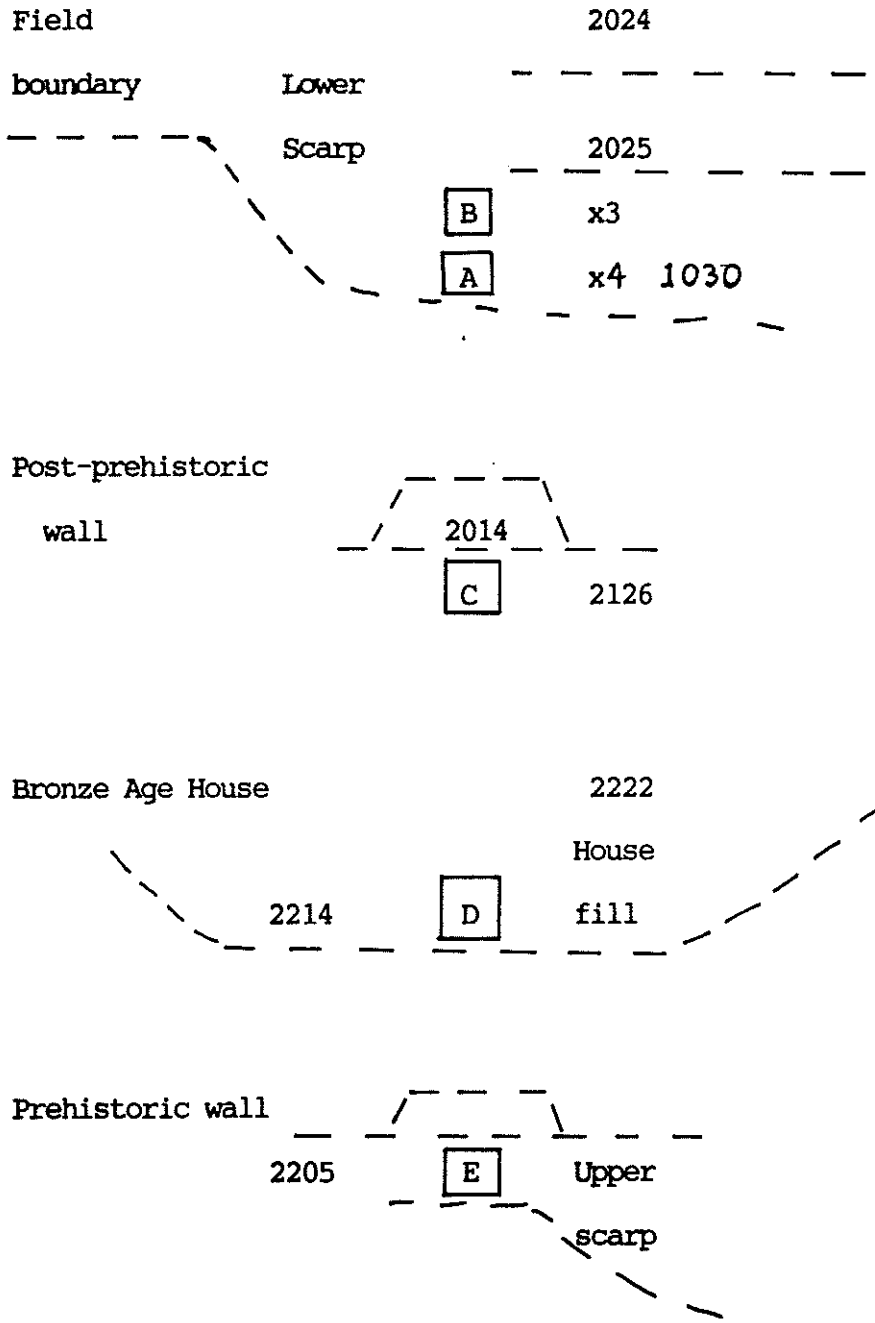
Plate 21. As plate 19; detail of textural features. PPL, frame length is 0.33mm.

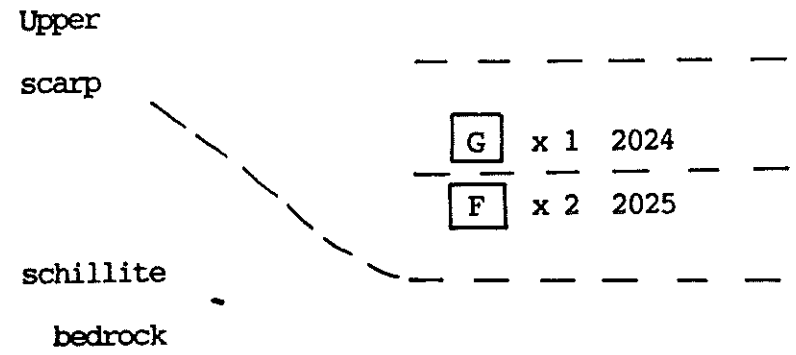
Plate 22. As plate 21, XPL.

Plate 23. Thin section G; upper hillslope deposits (see plate 1); loose sand and shell fragments, with biologically worked fine soil. A mixture of ploughwash and blown beach sand. PPL, frame length is 5.34mm.

Plate 24. As plate 23, XPL.

Fig 1: Location of soil samples





□ - box sample

x - bulk sample

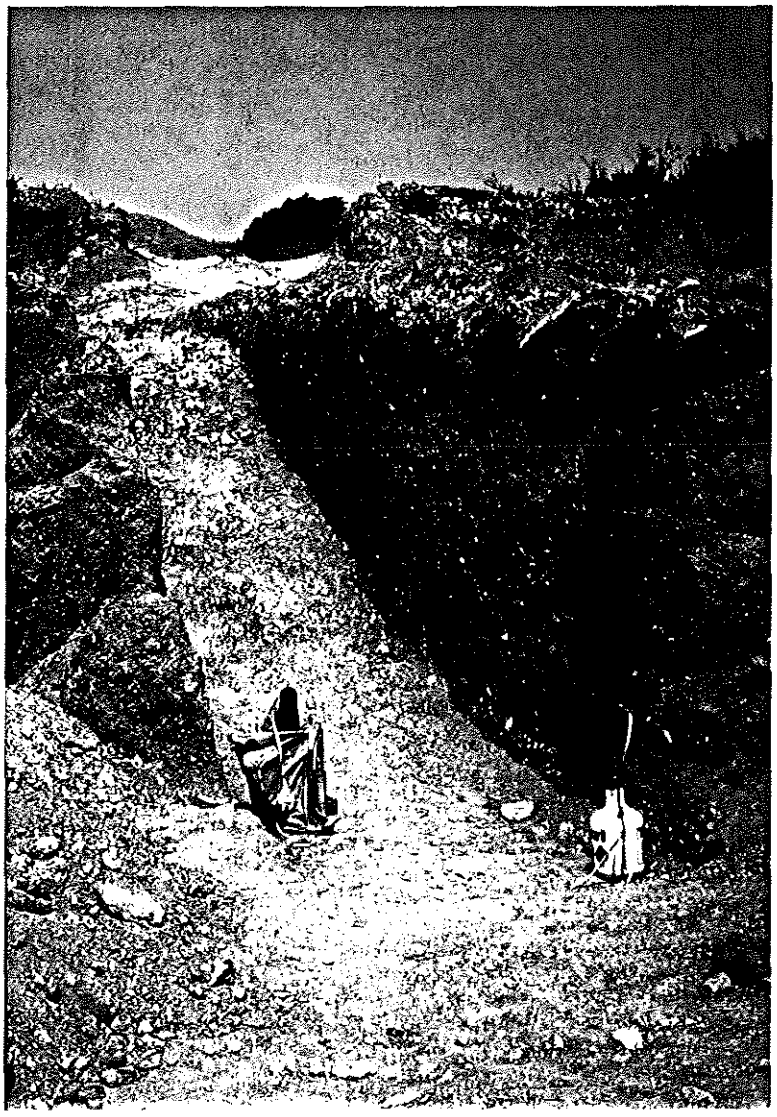


Plate 1. Profile 1; hillslope deposits juxtaposed to the upper scarp.

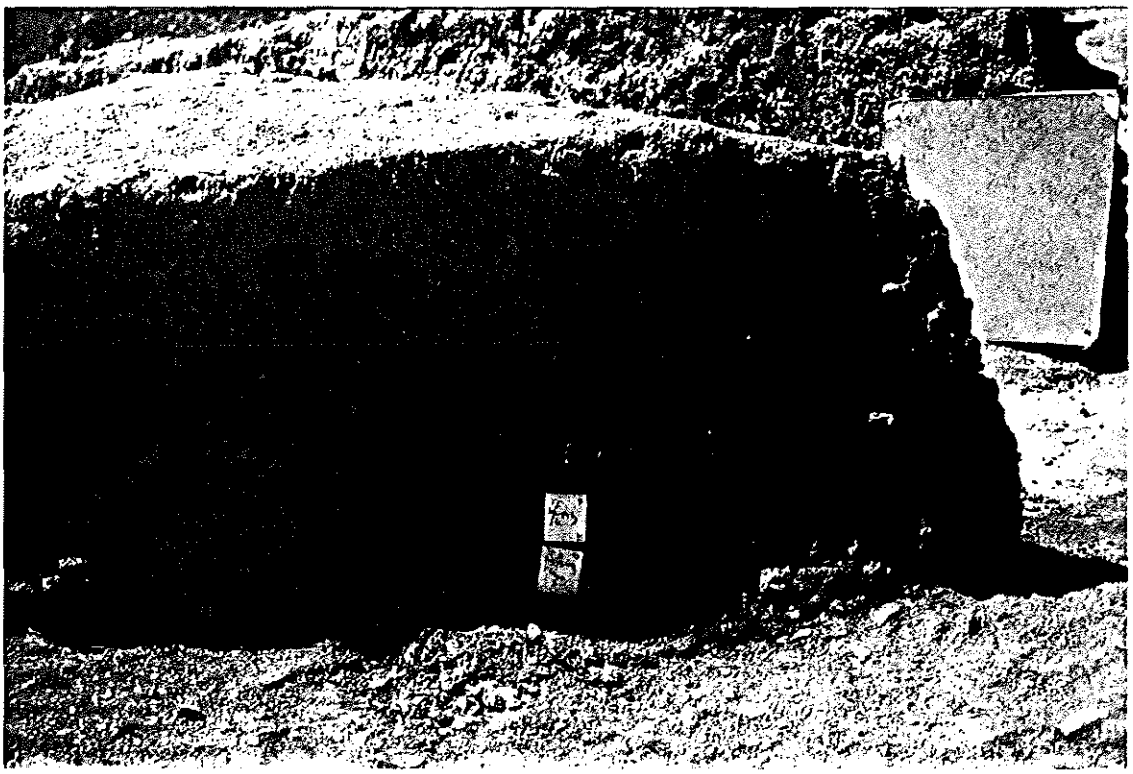


Plate 2. Profile 2; sediments at the edge of the Bronze Age field system and adjacent to occupation areas (Area 1), being sampled (thin sections A and B; see Fig 1).

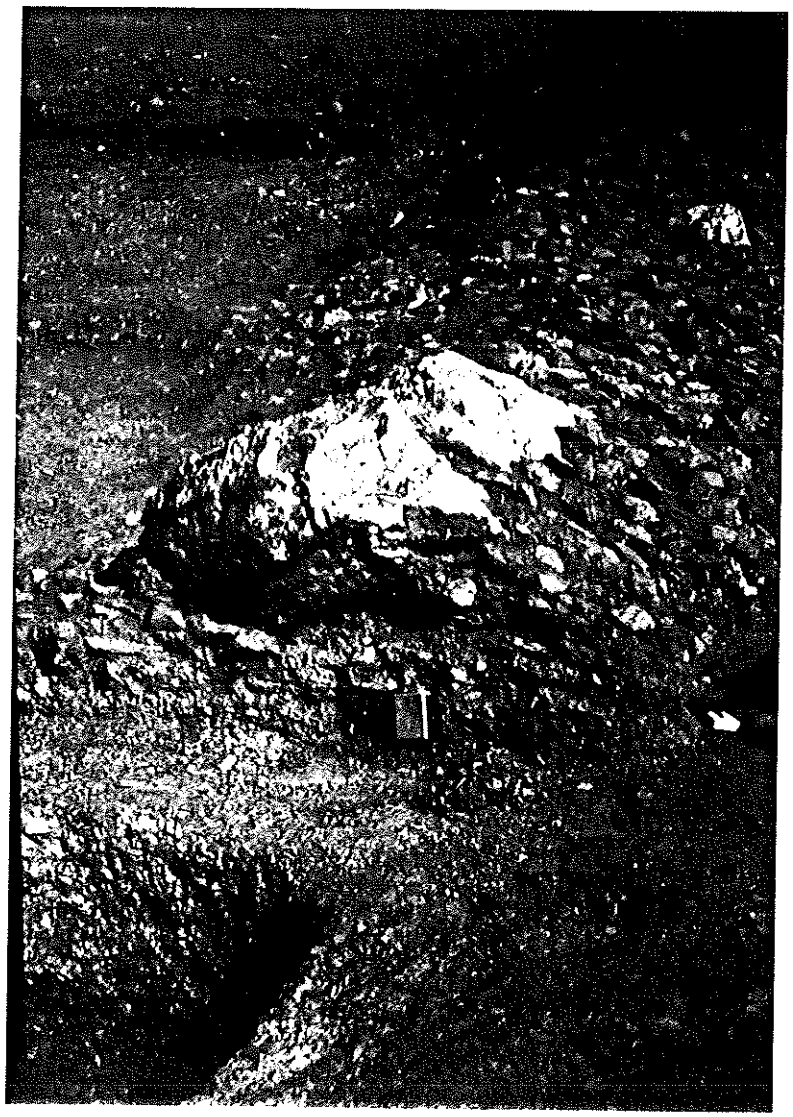


Plate 3. Sample C (2126) in soil in an area of Iron Age burials, buried by a post prehistoric wall (2014).

Plate 4. Sample E (2205) from a thin soil over bedrock, buried by a low bank at the top of the upper scarp.

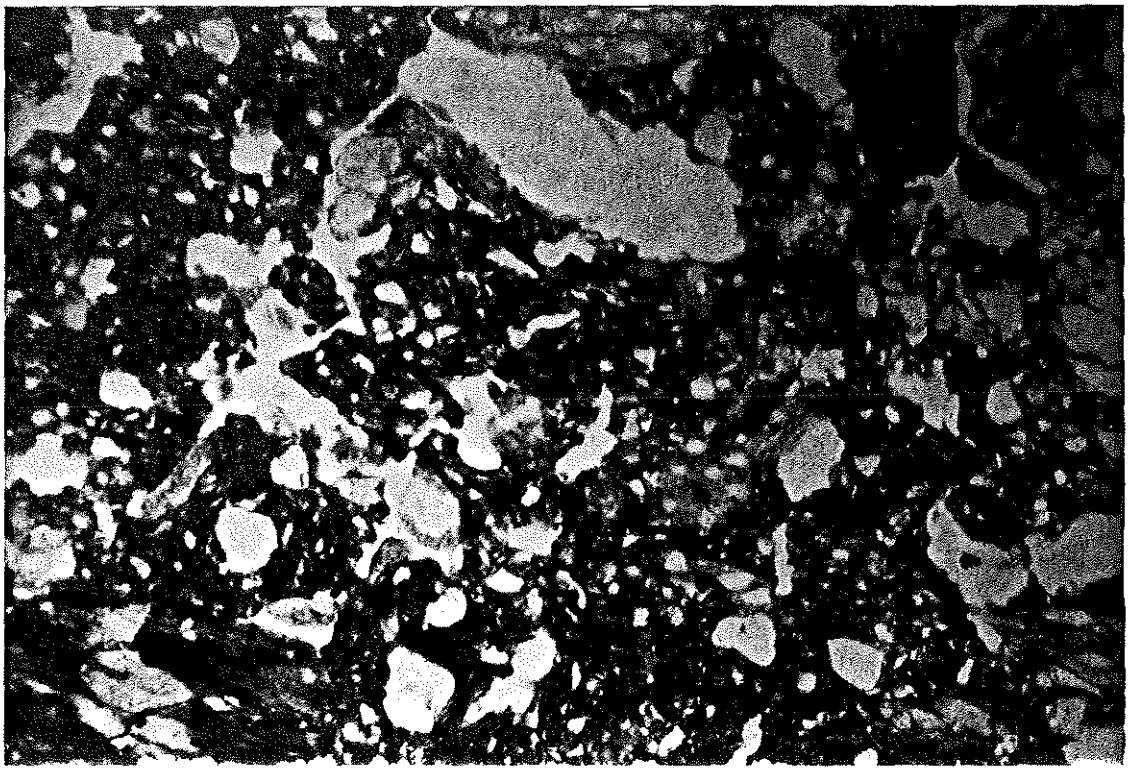


Plate 5. Thin section A: original massive and closed vughy microfabric containing textural features (evidence of total slaking), now strongly reworked by biological activity and displaying a mainly open fabric. Plane polarised light (PPL), frame length is 5.4mm.

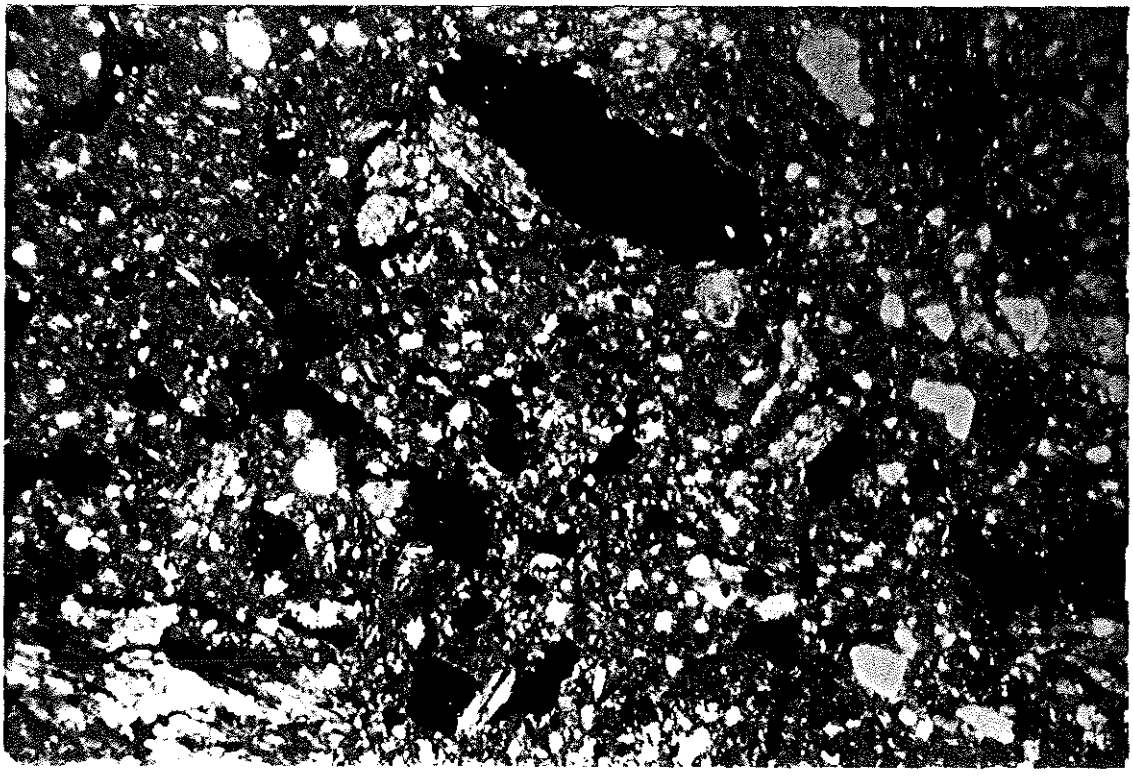


Plate 6. As plate 5, crossed polarised light (XPL).

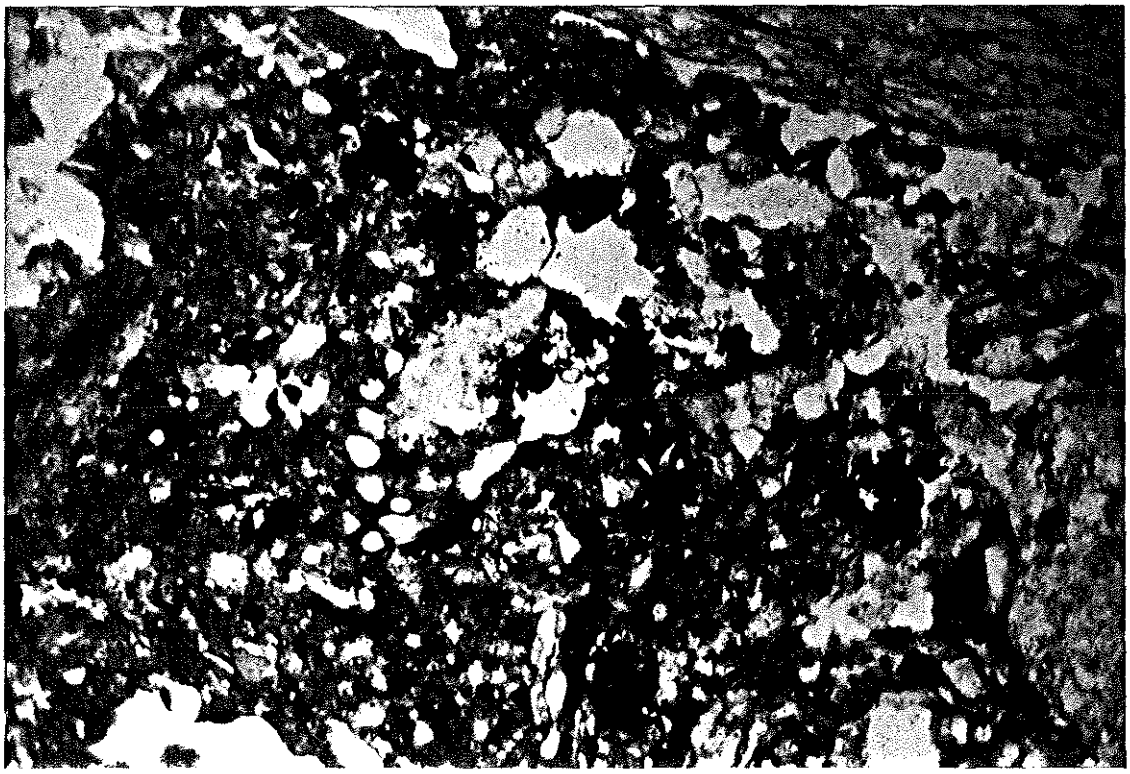


Plate 7. Base of thin section D (earliest deposits [2214] in house 2222); fragment of dark brown soil containing amorphous organic matter, fine charcoal and abundant dusty clay coatings and infills; probably from local natural acid brown soil. PPL, frame length is 3.4mm.

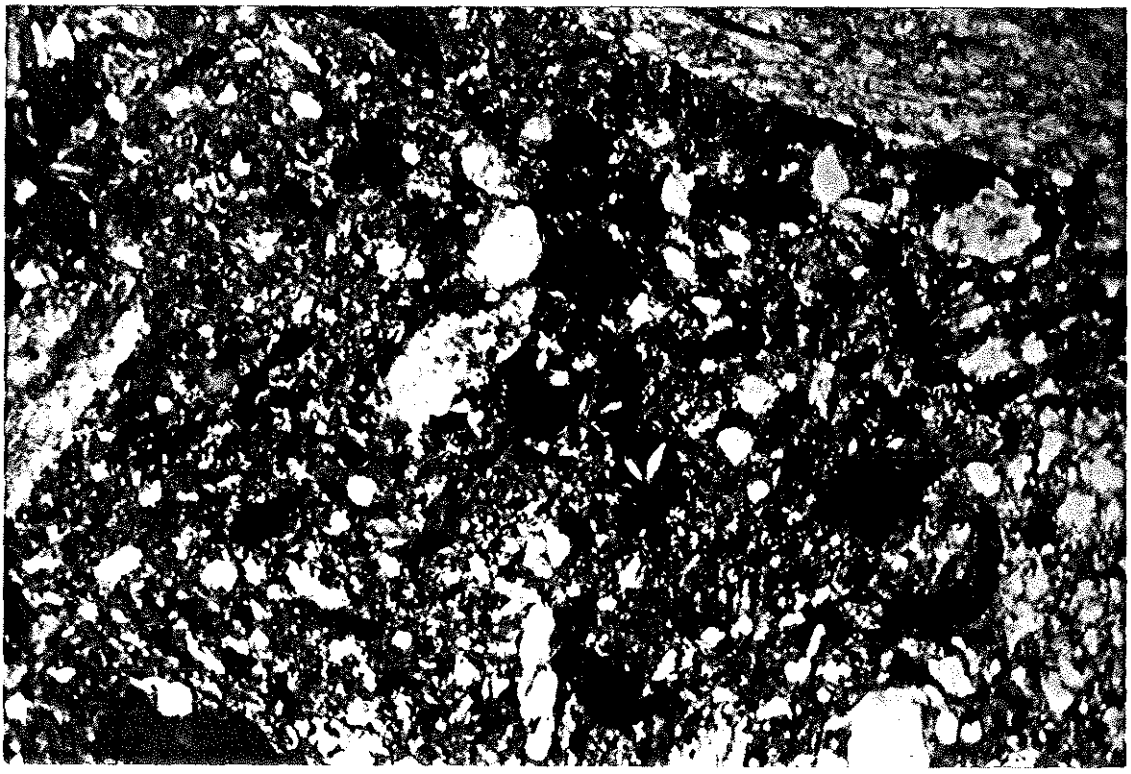


Plate 8. As plate 7, XPL.

Plate 9. Detail of plate 7 shows fine fabric to be mainly pale (depleted) except for areas of dark brown amorphous (acid) organic matter and flecks of charcoal. Clay coatings are finely dusty and "dirty" again suggesting acid conditions. These clay coatings indicate soil disturbance, probably from the digging up of this natural soil and its dumping for, and use as a house floor. PPL, frame length is 0.33mm.

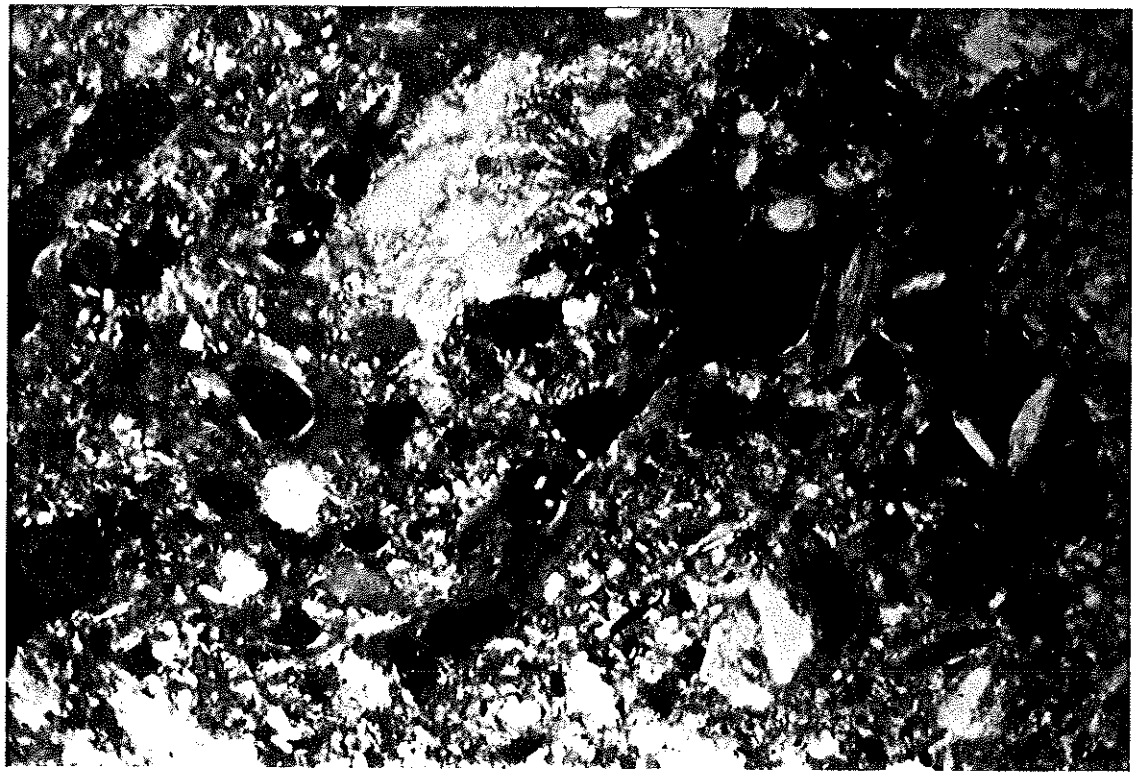


Plate 10. As plate 9, XPL.

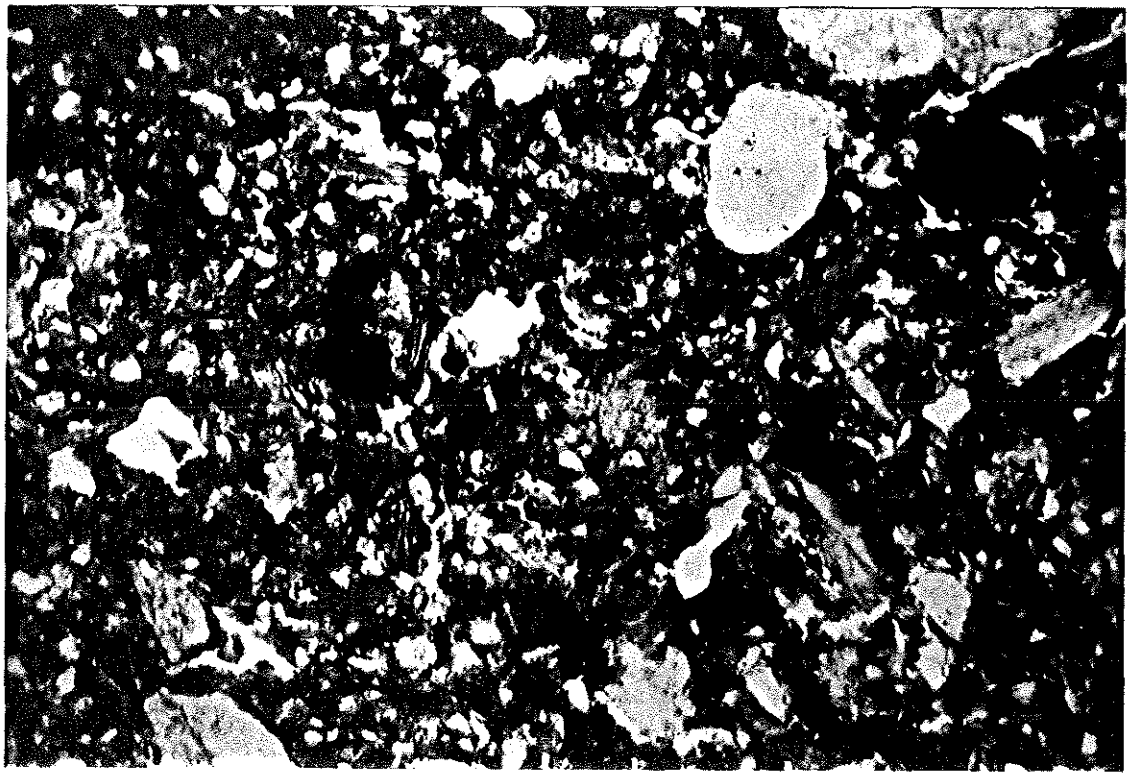


Plate 11. Upper part of thin section D (house deposits; 2214; dense, homogenised soil featuring very dusty coatings and intercalations, and is dark because of the abundant fine charred organic matter present. The fabric has been produced by the mixing (through trampling and slaking) of natural soil (see plates 7-10) and anthropogenic materials eg charcoal and other organic wastes (see plate 14). PPL, length of frame is 5.4mm.

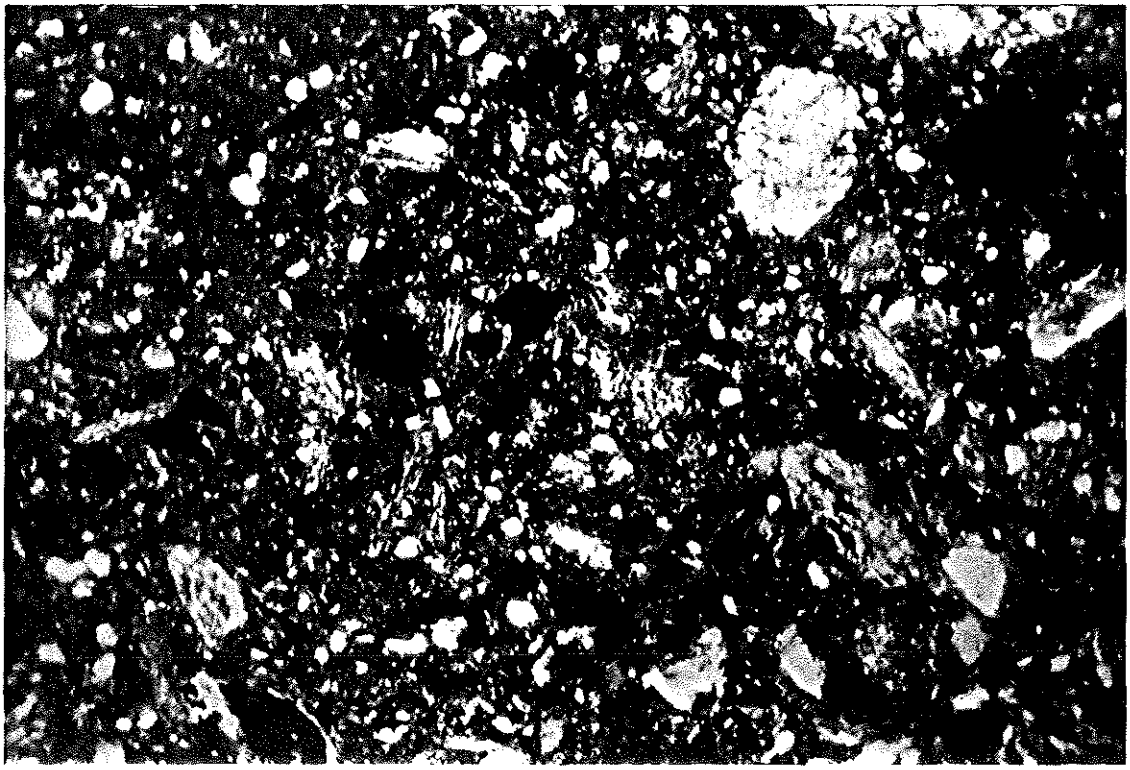


Plate 12. As plate 11, XPL.

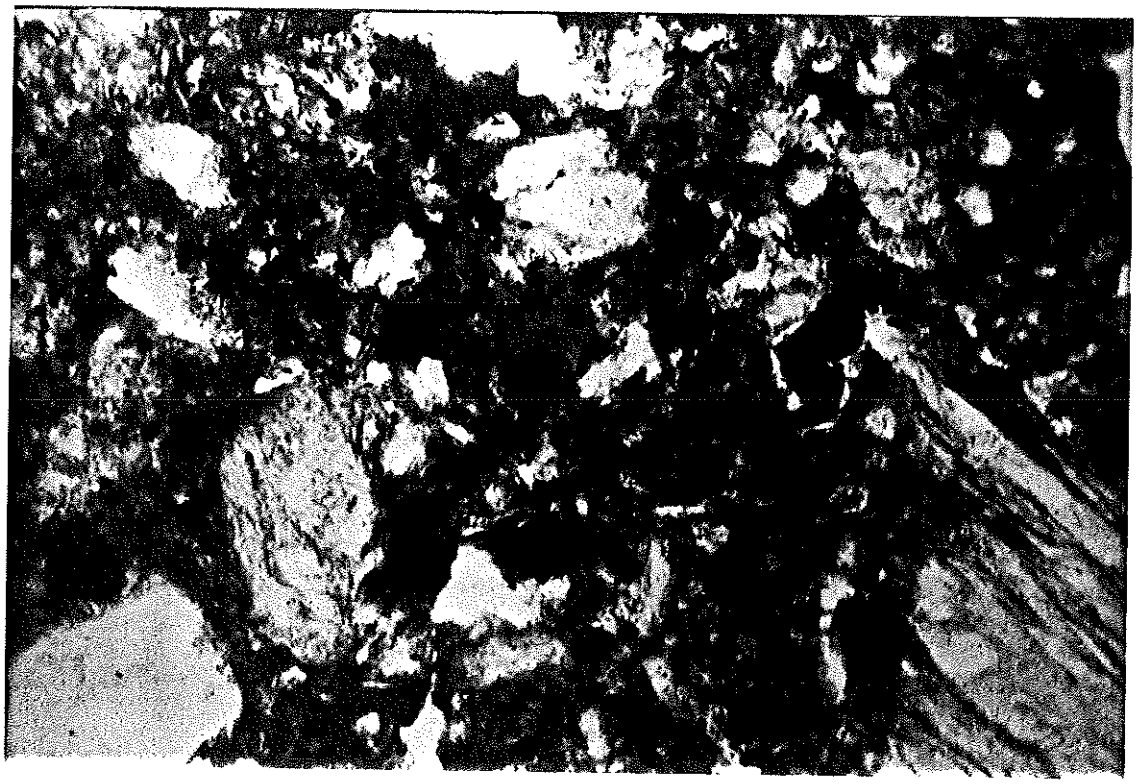


Plate 13. As plate 11; detail of homogenised fabric with, in the centre, a fragment of a clay coating which indicates the disruption of earlier soil microfabrics that is typical of trampled floors. PPL, frame length is 0.33mm.

Plate 14. As plate 11; bone fragment as an example of included anthropogenic material; dull colour (with poor birefringence) suggests that it is burned. PPL, length of frame is 3.4mm.

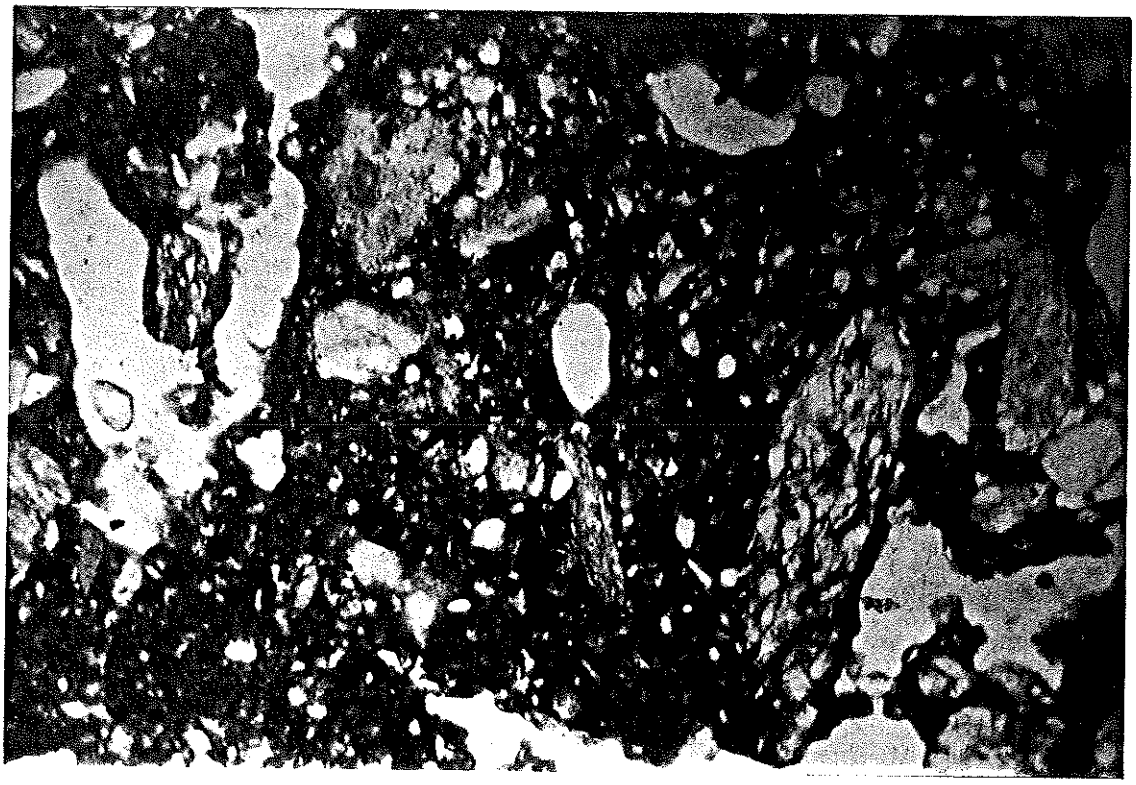


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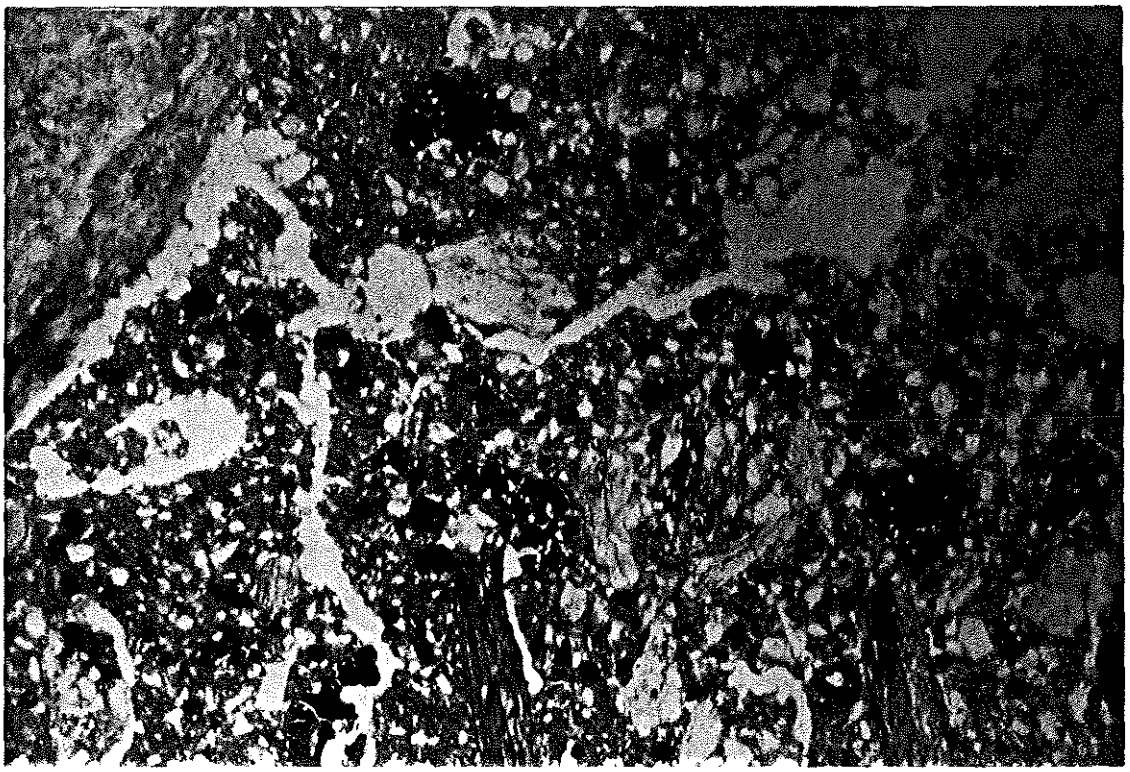
Plate 16. As 15 (XPL).



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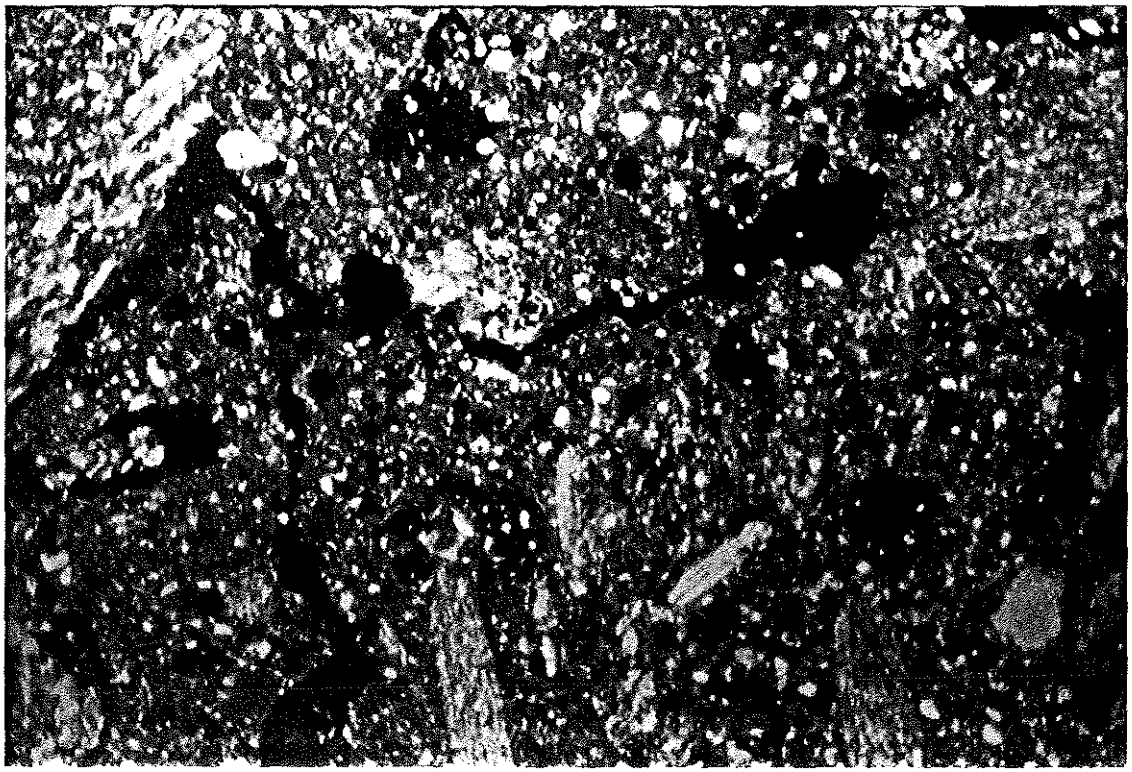

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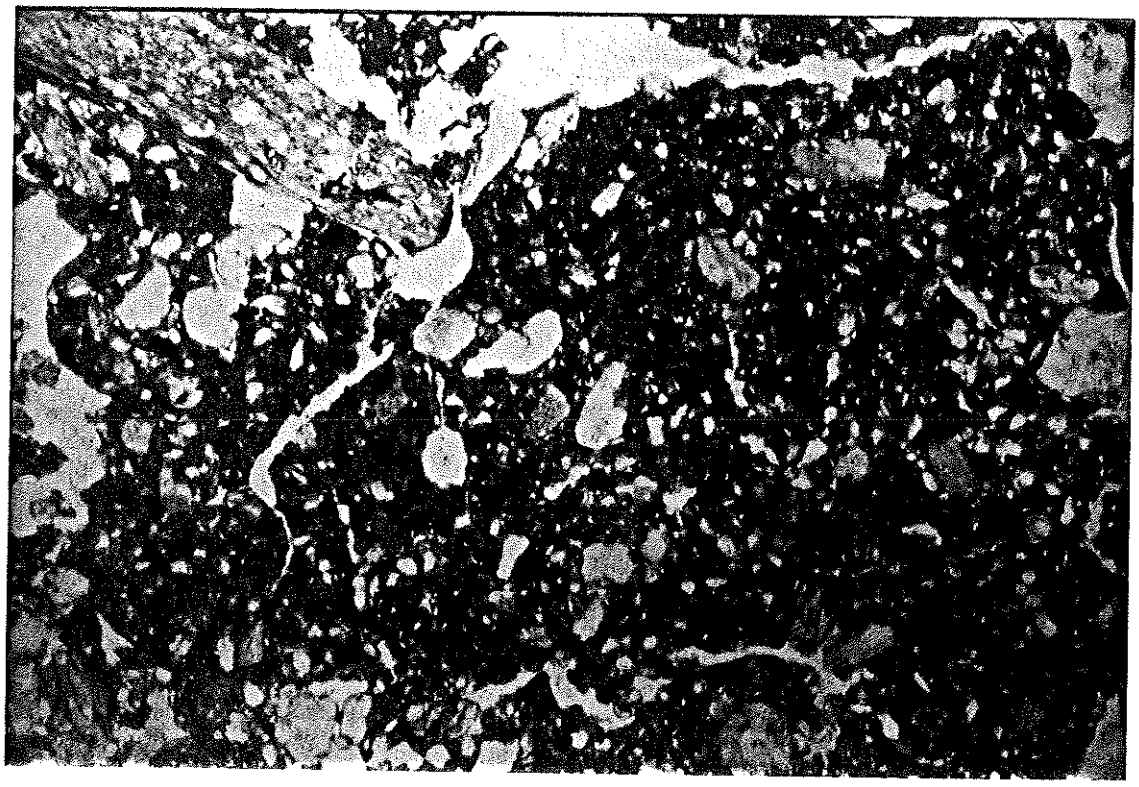

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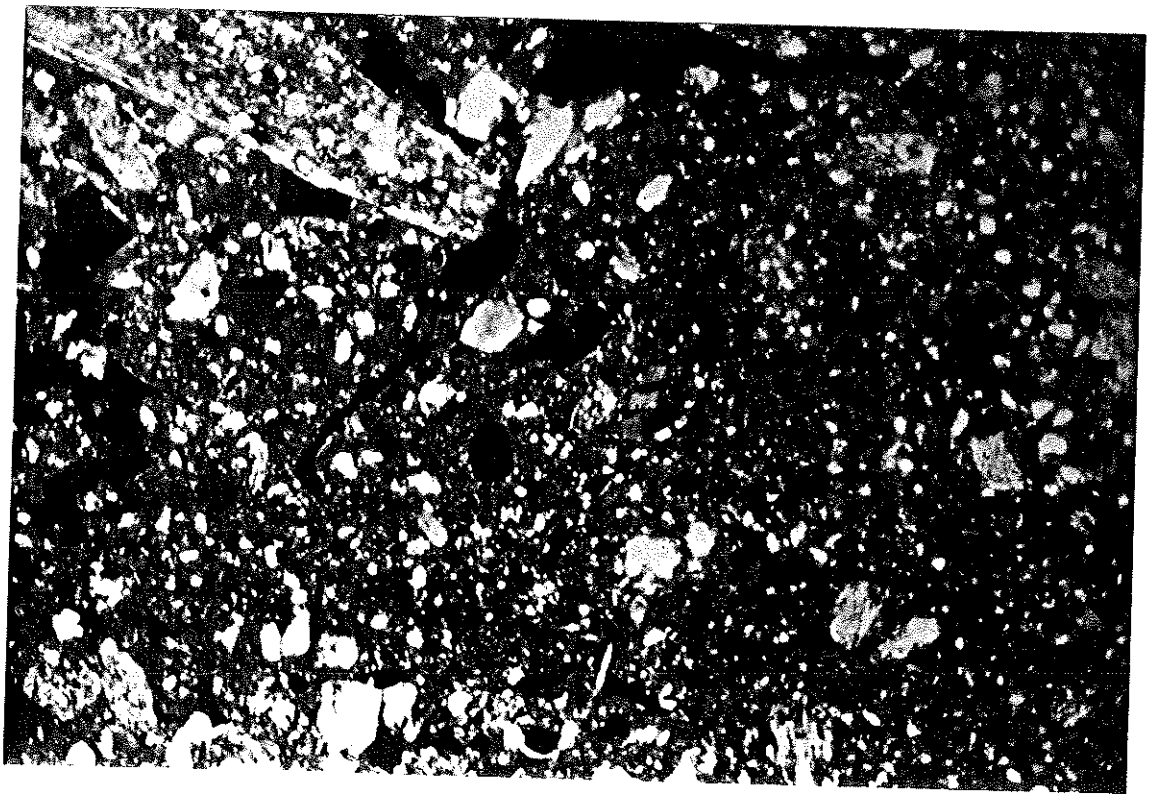


Plate 20. As plate 19, XPl.

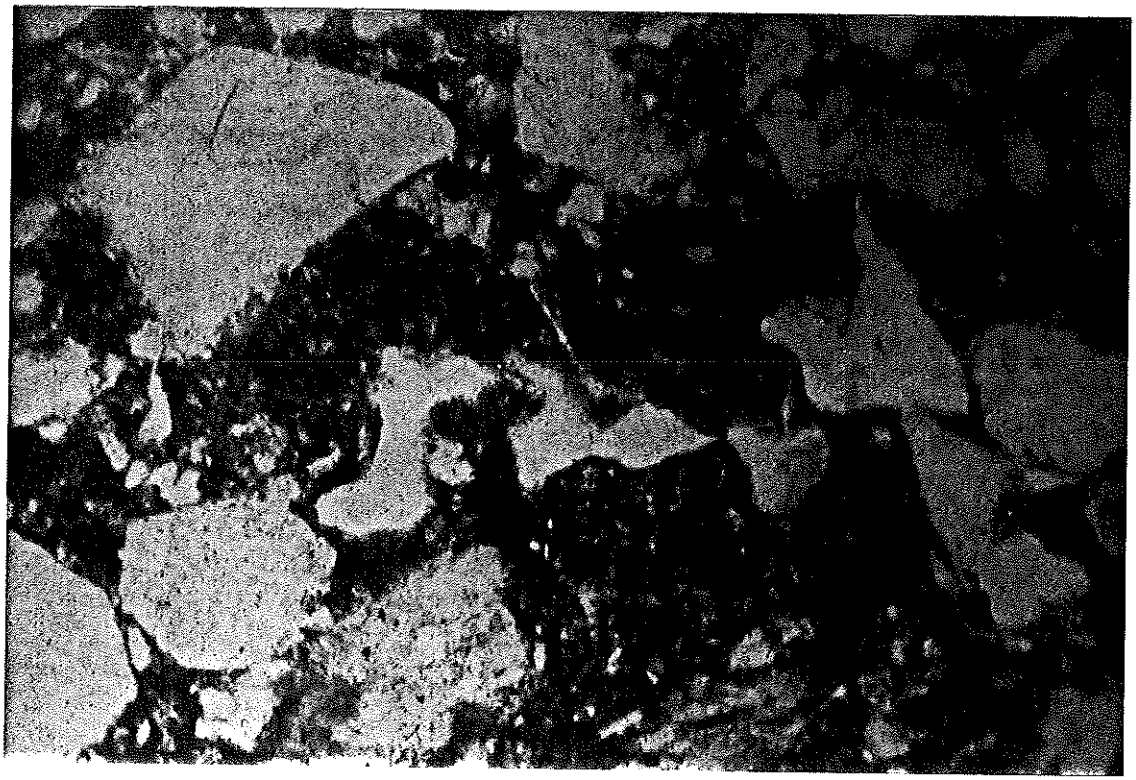


Plate 21. As plate 19; detail of textural features. PPL, frame length is 0.33mm.

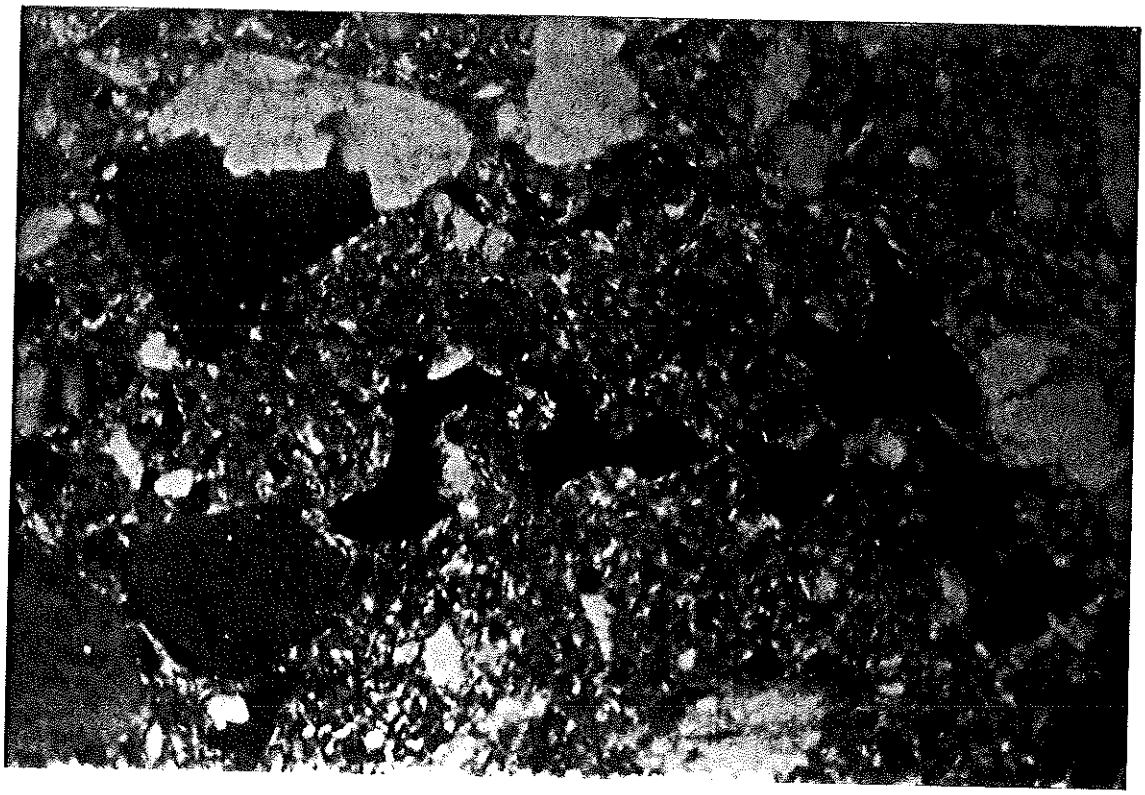
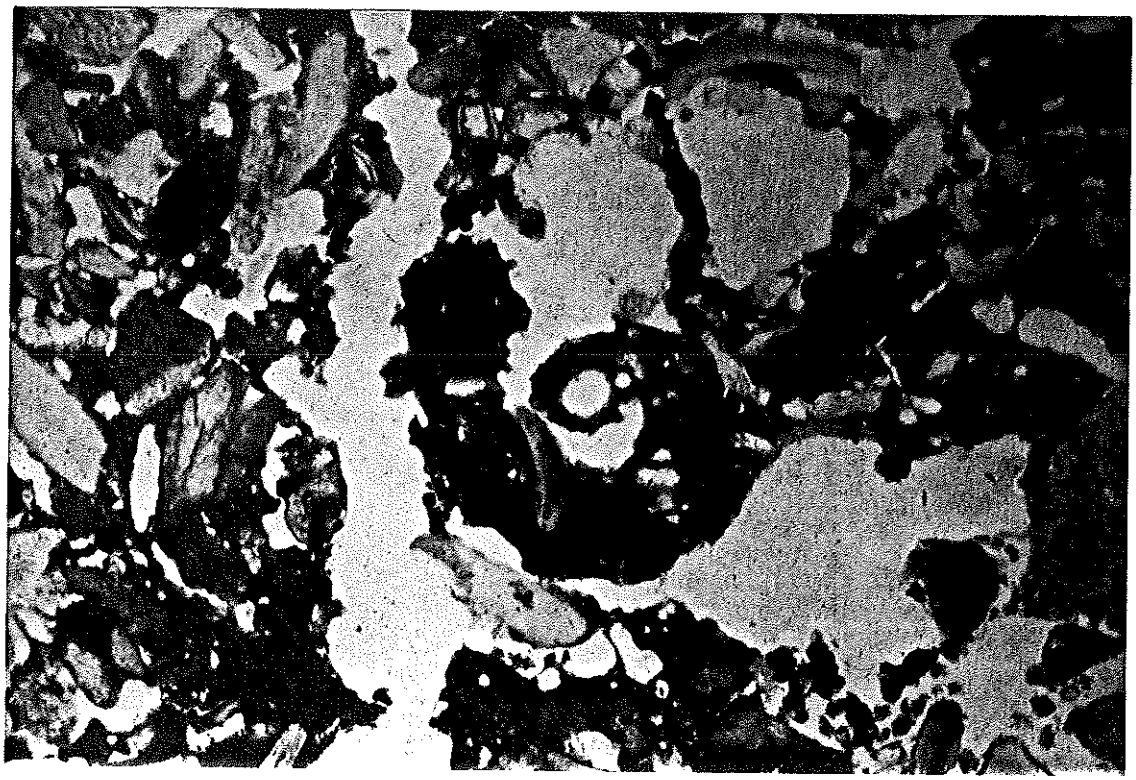


Plate 22. As plate 21, XPL.



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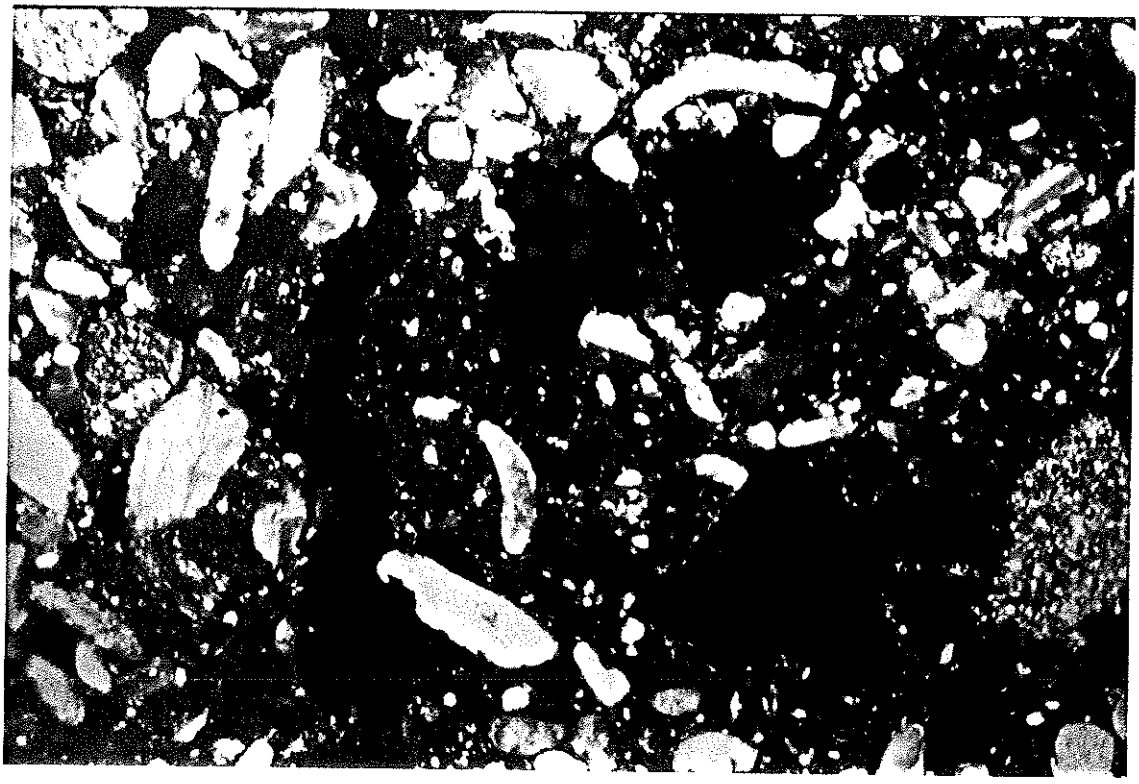

Plate 24. As plate 23, XPL.