

# THE EXCAVATION OF TWO CIRCULAR ENCLOSURES AT DALNAGLAR, PERTHSHIRE

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DALNAGLAR lies in the extreme NE. corner of Perthshire 15 miles N. of Blairgowrie and  $4\frac{1}{2}$  miles S. of the Spittal of Glenshee (fig. 1). At 1075 ft. above sea-level, the site commands an extensive view of the valley of the Black Water. Immediately to the N., the ground rises steeply to the 2000-ft. summit of Cairn Dearg, which forms part of the watershed between Glenshee and Glenisla to the E. To the NW., the view after 5 or 6 miles is blocked by the mountain massif which closes the head of Glenshee and forces the modern road to turn sharply north-eastward to reach Deeside via the

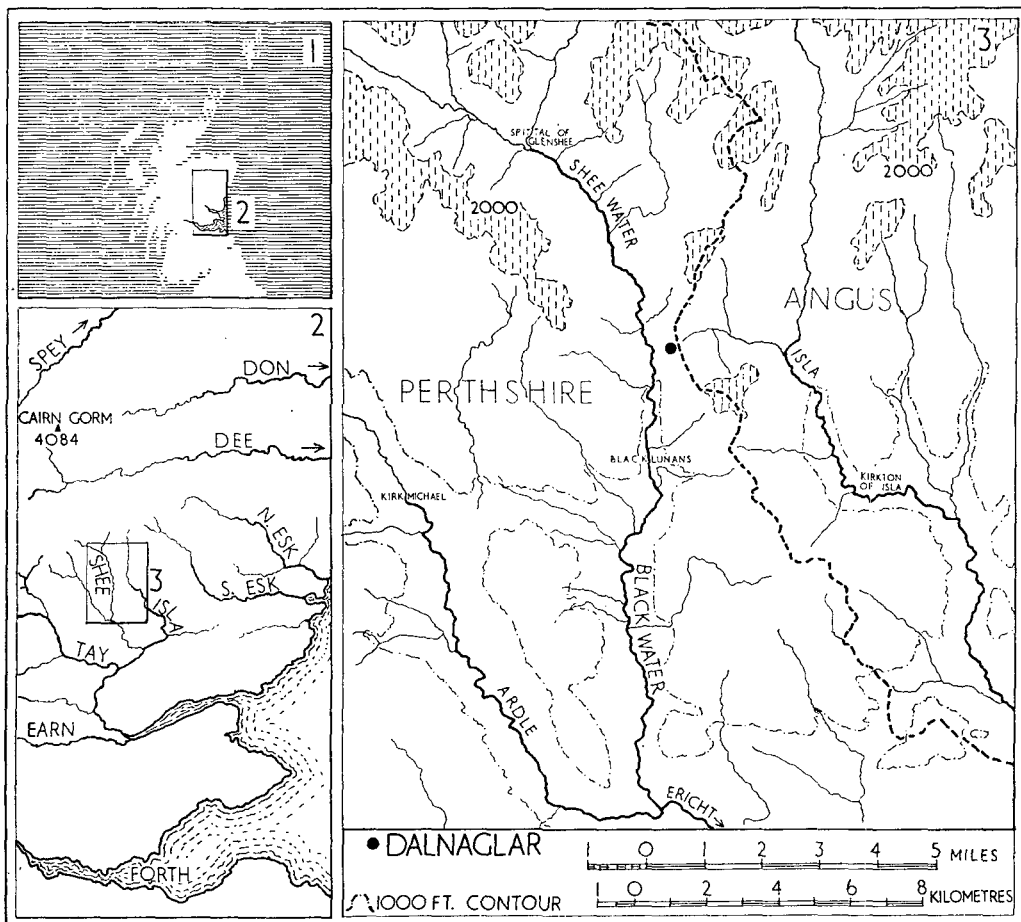


FIG. 1. Location of Dalnaglar





1. Enclosure I before excavation; second enclosure on knoll in middle distance



2. Enclosure I: pottery appearing from under outward wall tumble



3. Enclosure I: Carbon patch against west face of 1958 section



4. Centre of Enclosure I at 'Grey Floor' level; posthole in centre foreground





1. Enclosure I: 1958 section, looking north



2. Enclosure I: wall to eastward of entrance, showing jamb and sill stone in foreground



3. Enclosure I: wall to west of entrance, with outward tumble removed and showing external facing stones



4. Entrance to Enclosure I from outside, showing sill stone and rough cobbling in foreground





1. Enclosure II: wall from inside, with loose tumble removed



2. Enclosure II: wall after removal of turf



3. Enclosure II: external tumble of loose stones from top of wall lying on slope of natural mound



4. Enclosure II: external base of wall after removal of tumbled stones, showing underpinning in packed loam



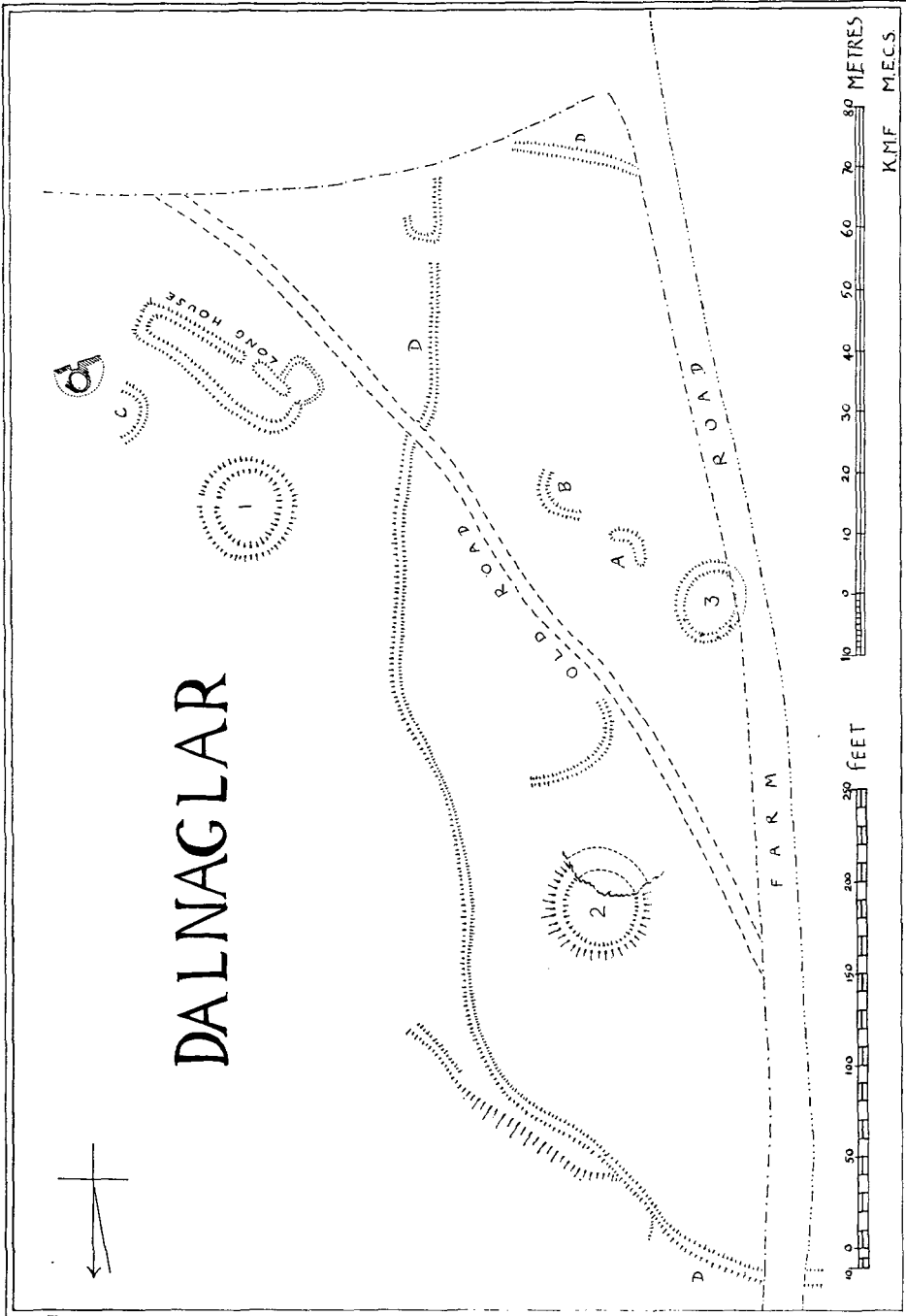


FIG. 2. Sites at Dalnaglar (plane table survey)

Cairnwell and the Devil's Elbow. Westward, the view across the valley is open over treeless moorland for 3 or 4 miles to the low watershed which separates Glenshee from Strathardle. To the S., the site is dominated by Mount Blair. Between Mount Blair and Cairn Dearg a wide pass, rising to 1200 ft., links Glenshee with Glenisla. A modern road crosses this pass, leaving Glenshee at Cray Church and reaching Meikle Forter in Glenisla after 4 miles.

The site of the excavations lies in a triangular piece of ground (N.G.R. NO 150642), two of whose sides are formed by the road to Meikle Forter (B 951) and a farm road leading to Dalnaglar Castle. The third side of the triangle, approximately 600 ft. long, is supplied by the vegetation boundary, the coarse tufty grasses and short heather of the inhabited area contrasting with the further moorland, where the peat achieves a depth of over 16 ft.

Attention was first drawn to the site in 1957 during a search for archaeological material in eastern Perthshire. From the main road half a mile east of Cray Church the outline of a large circular enclosure (I) was clearly visible and further examination disclosed a second circular enclosure (II), the possible remains of a third, and the turfed foundations of a structure 100 ft. long by 20 ft. wide with a small rectangular annexe at one end (fig. 2.) The line of an old trackway crosses the site diagonally from the NW. There is a modern stone-built kiln on the eastern margin and a number of boundary walls which show as low turf-covered banks. The circular enclosures were characterised by a bank of earth, at no point more than 2 ft. high, from which apparently large stones protruded at irregular intervals, tracing circumferences of 50 and 40 ft. respectively.

In 1958, in collaboration with Dr J. M. Coles, a trial section was cut through the wall of Enclosure I.

#### EXCAVATION OF ENCLOSURE I (1958/59)

Before excavation (Pl. II:1) the surrounding bank was 6 ft. wide and 1 ft. above the level of the ground outside and 1 ft. 6 in. above the level of the interior.

The 4-ft. wide section (Pl. III: 1) extended from the limit of the outward fall of the bank on the S. as far as the centre of the enclosure. After deturfing, the bank was found to represent a tumbled wall of natural boulders up to 1 ft. in diameter. These stones mixed with dark peaty soil extended downwards for a foot. Below this again there were larger stones, up to 3 ft. in diameter, bedded in a brown sandy loam. On a level with the foot of this wall in the sandy loam and under the outward wall tumble were fragments of carbonised wood and pieces of pottery (Pl. II: 2). These finds ceased abruptly at just that point where the larger stones forming the foundations of the wall began. These large stones must at one time have constituted an exposed wallface.

Inside the enclosure the collapse of the wall was neither so marked nor so extensive. Only one sherd of pottery was found in the brown sandy loam. Pieces of carbonised wood were also rare but patches of greasy carbonised material were found staining the base of the loam (Pl. II: 3 and fig. 4).

The results of this preliminary examination, particularly in terms of pottery,

were so encouraging that it was decided to resume work on the site in the following year.

In the SW. quadrant a break in the surrounding bank seemed to indicate a pos-

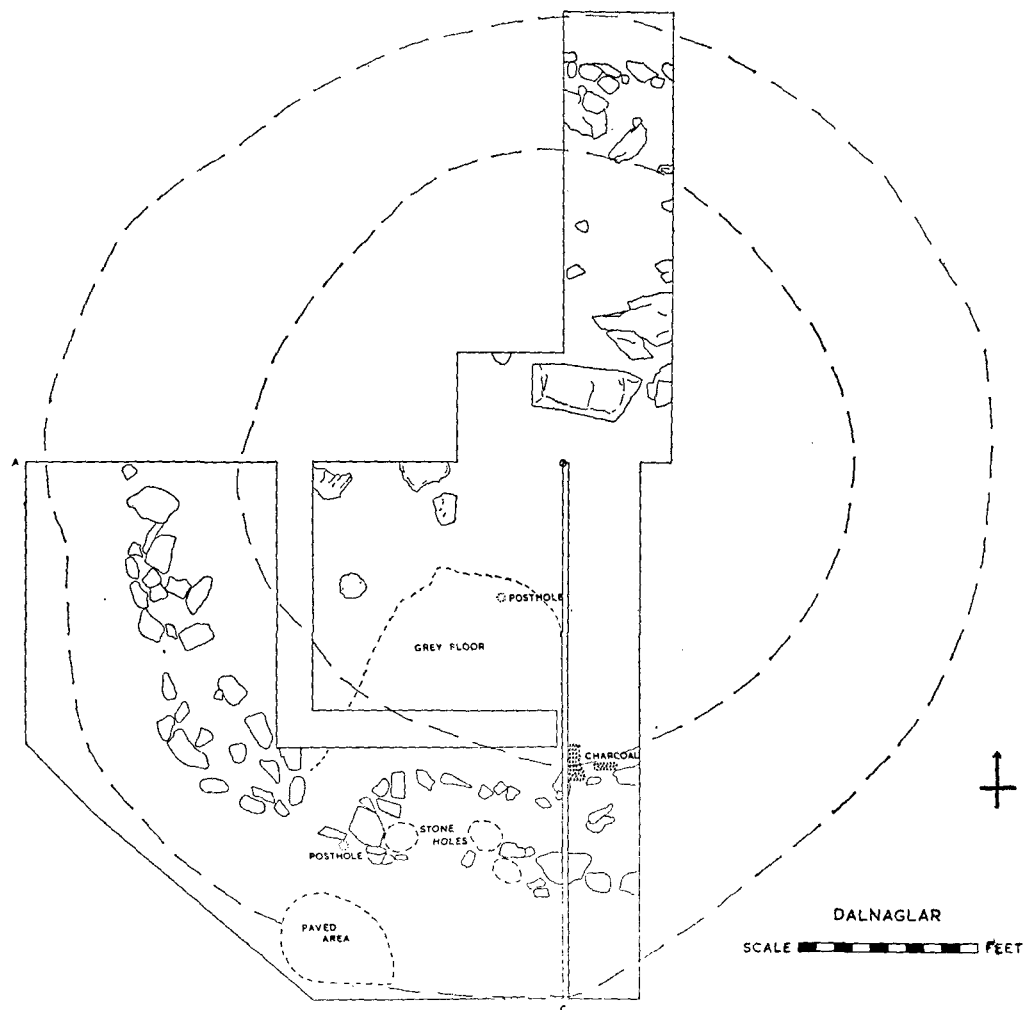


FIG. 3. Enclosure I, plan

sible entrance and in this area four 14-ft. squares with intervening baulks of 2 ft. were opened.

Inside the enclosure several fairly extensive rock outcrops protruded through the brown sandy loam which immediately underlay the humus. This band of loam was shallow, not more than 5 in. in depth. It contained a few flakes of carbon but proved on analysis to have a low organic content. Below this there was an abrupt

soil change. A dark grey sandy loam with a medium to high organic content appeared. This level had an undulating boundary both in depth and in area. Averaging  $1\frac{1}{2}$  in. in thickness it died out towards the centre of the enclosure. On the surface of this floor 8 ft. SW. of the centre of the enclosure and extending downwards to rest directly on undisturbed glacial sand was a post-hole 8 in. in diameter. To the N. and S. of this post-hole the surface of the grey floor was stained by patches of dark soil. Below the dark grey sandy loam there was again a sharp soil change to a

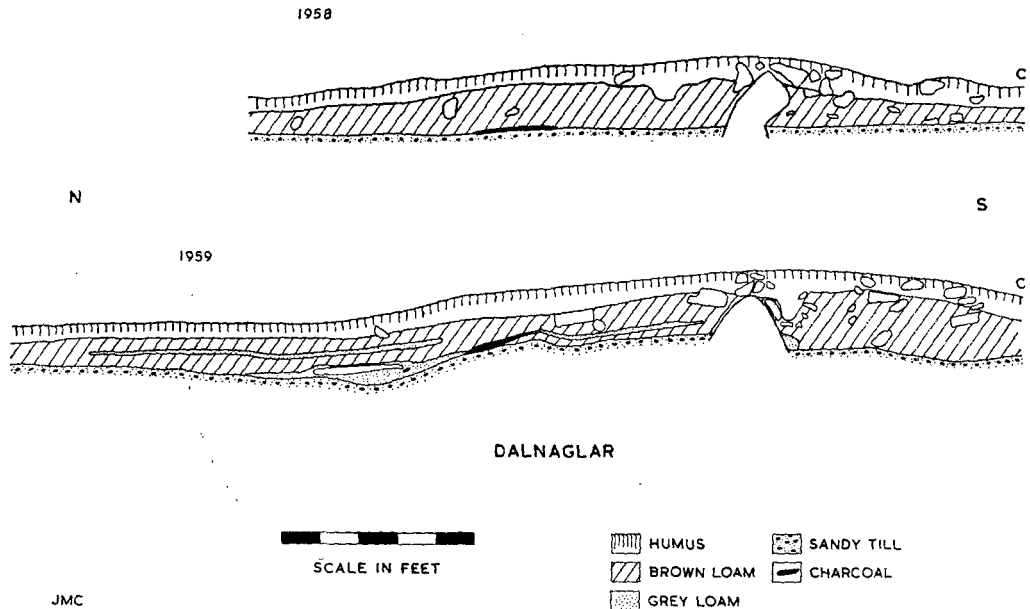


FIG. 4. Enclosure I, section; 1958, west face (reversed), 1959, east face

dark brown loam  $4\frac{1}{2}$  in. in depth with a medium organic content. Below this was a discontinuous band of dark loam with a high organic content overlying thin iron pan on top of partially leached glacial sand.

When the turf and loose stones were cleared from the top of the collapsed wall in the SW. quadrant the curve of the wall towards the interior of the enclosure indicated an entrance (fig. 3). On the E. side of the entrance a large boulder 2 ft. square acted as a jamb (Pl. III: 2). Close up against its western face was a post-hole 8 in. in diameter. A stone 18 in. long lay at right angles to the axis of the entrance and one end of this stone rested midway between the eastern jamb and the post-hole. Immediately to the N. of this 'sillstone' and E. of the entrance close behind the wall there were extensive patches of the grey floor. The grey floor also extended across the entrance towards the outside where a roughly cobbled area stretched eastwards for 6 ft. (Pl. III: 4).

As in the previous year an extensive outward tumble of the wall was discovered. Under this fall many fragments of pottery and a quantity of carbonised wood were



found. The large stones forming the core of the wall had been buried in sockets dug out of the underlying glacial sand. The material thus extracted had been packed round their bases to give stability. Several of these large boulders had been removed, no doubt to help in the building of the adjacent kiln. The overall width of the wall E. of the entrance was 5 ft., which would seem to be a minimum for this type of structure involving the use of loose stones built over and around a core of set boulders. To the W. of the entrance seven stones of an inner and eight stones of an outer wall facing were visible. This was the only section of the wall where built faces could be identified (Pl. III: 3). As elsewhere there was practically no internal fall of loose stone.

The grey floor was found intermittently inside the wall and where it appeared it contained pieces of pottery and fragments of carbonised wood.

When the extensive outer-wall tumble was removed pottery was found beneath it but the quantity was in no way comparable to that found E. of the doorway. There was no corresponding western jamb to the doorway which on that side was poorly defined.

A trench 6 ft. wide laid out for 25 ft. N. from the centre of the enclosure and using the N. to S. alignment of the 1958 section was deturfed and the surface soils removed. Immediately S. of the inner margin of the wall, which here was built up on a single core with no signs of facing, large areas of rock outcrop were exposed which extended as far as the centre of the enclosure. There was no sign of the grey floor. A slight natural rise in the ground-level had caused a considerable inward fall of stones from the wall.

A test section (not shown on the plan) was opened in the SE. quadrant and included the wall. It suggested that at this point the boundary of the enclosure consisted only of a low bank of earth and small stones without any central core.

There are extraordinary inconsistencies in the building of the wall of the enclosure. These range from a well defined inner and outer face with a central core of loose boulders to a low bank of earth and small stones. Midway between these two extremes is a wall consisting of a central core of large boulders bedded into specially dug sockets packed with glacial sand with smaller boulders built up and around the core. The most carefully built stretches of walling were to either side of the entrance and it is in this area too that the grey floor was most evident. If we are dealing with a habitation then the living space had been immediately to the right of the entrance under the shelter of the wall. Elsewhere inside the enclosure the rock outcrops would have interfered with living space and this may be reflected in the flimsiness of the wall to the N. and E.

The height of the stone jamb at the entrance and the adjacent post-hole indicate a probably greater height to the wall than would be possible with loose boulders, even allowing for the replacement of the tumbled material. It suggests that on top of the wall there may have been a wooden fence or wattle paling. Along the crest of the wall on both sides of the doorway at more or less regular intervals of 5. ft there were pockets of dark peaty soil up to 6 in. in diameter. These are not post-holes but could represent the turf packing used to hold stakes in position. The carbonised

wood underlying the outward wall tumble lends support to the idea of a wooden structure along the top of the wall.

The soil profile inside the enclosure indicates that the builders first removed the turf and the top leached horizons from the interior. The lower discontinuous band of dark grey loam with a high organic content seen in section at 17 ft. N. of Point C, where the glacial sand dips for one foot, probably represents the base of the leached horizon forming part of the original podzol profile present on the site before the enclosure was built.

Soil samples were taken from a control pit immediately outside the wall. They revealed a phosphate content 100 per cent higher than in the equivalent level inside (B3).<sup>1</sup> One explanation of this may be that cattle were tethered outside the wall and tied perhaps to the wooden structure which it has already been suggested ran along the crest.

There was no evidence of a hearth.

#### EXCAVATION OF ENCLOSURE II (1960)

It was decided to examine the second enclosure in September 1960. The work was carried out in collaboration with Mrs R. W. Feachem, F.S.A. Scot.

This circular enclosure was situated 50 yds. NW. of the first and had been set on top of a well drained conspicuous natural mound consisting of turf covered rock. Unfortunately the south-western quadrant of the mound had been quarried away, thus obliterating that part of the structure where on the analogy of the previous year's excavation an entrance might have been situated. Work therefore was concentrated on the north-eastern quadrant where a 30-ft. square was deturfed and examined (fig 5).

The wall of the enclosure consisted of a core of large boulders averaging 1½ ft. in diameter (Pl. IV: 1). These stones had been set into a bright orange coloured loam which formed the original podzolic B2 material. Over and around the large boulders were the tumbled remains of a wall of loose stones averaging 1 ft. in diameter (Pl. IV: 2). The base of this wall was narrow; it measured on an average only 4 ft. Perched as it was on the lip of the natural rise the wall could never have been secure and a commentary on its instability is the mass of fallen stones strewn all over the outer slope of the mound (Pl. IV: 3). At one point there had been a deliberate attempt to underpin the wall (Pl. IV: 4) and it was noticeable that where the orange loam had not been washed out after the collapse of the wall it had been rammed hard between the stones of the lowest course.

There was virtually no internal fall of stone from the wall. The very extensive scatter on the outer slope of the mound was removed in the hope of finding pottery and carbonised wood but there was nothing except a few flakes of carbon.

The soil profile of the interior of the enclosure is not that of a normal podzol. The B horizon is absent and has been replaced by a dull coloured 'fill' material similar to the local morainic debris. This material may possibly have been brought to the site by the builders of the enclosure in order to enlarge and level the site (fig. 6).

<sup>1</sup> See Appendix I.



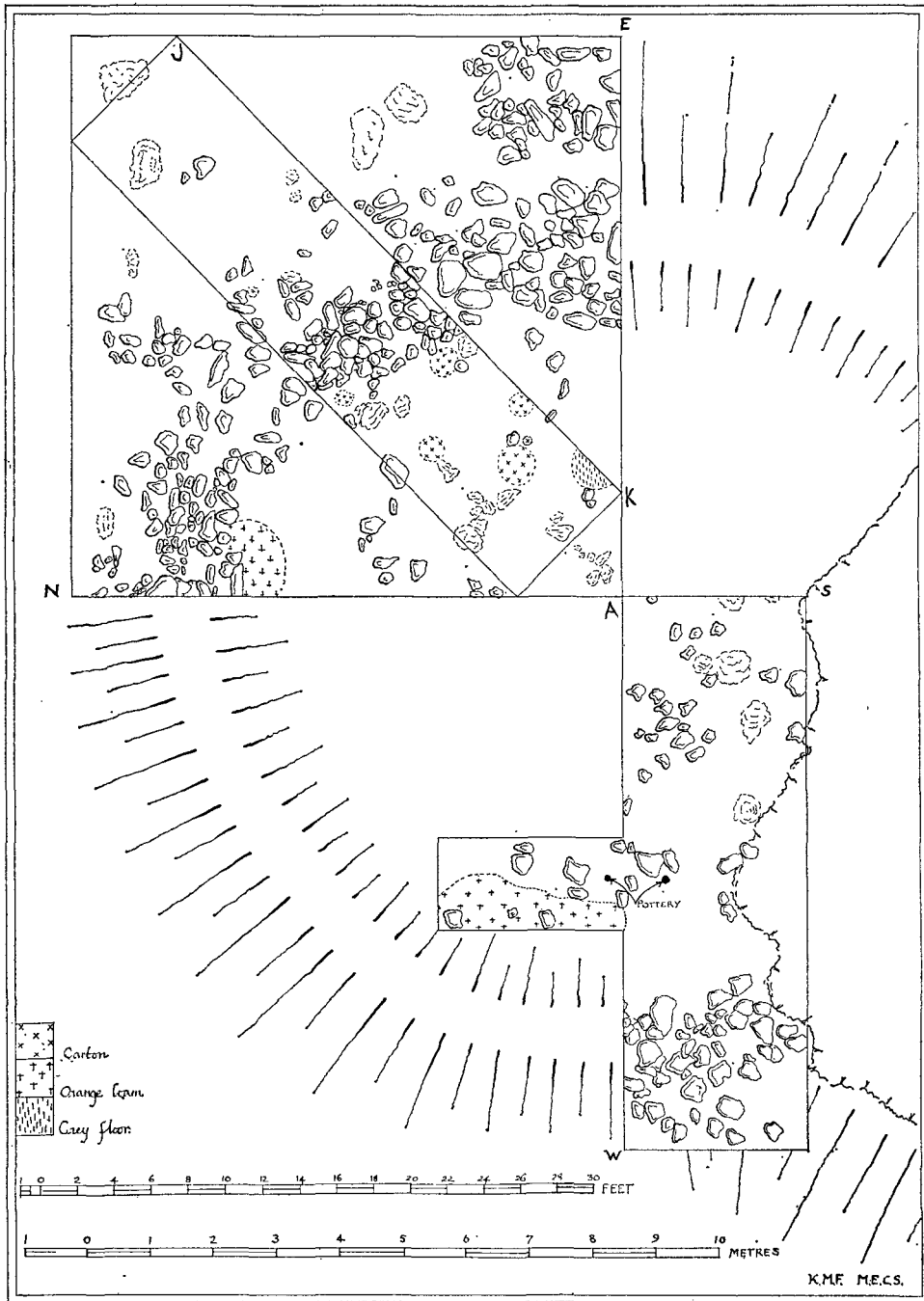


FIG. 5. Enclosure II, plan

The overall phosphate content of the enclosure is only half that of the first enclosure. There is virtually no grey floor and numerous rock outcrops must have limited the use of the structure. Below turf level there was a 3 in. band of dark grey leached material under which there was a sharp soil change to a dark brown sandy loam.

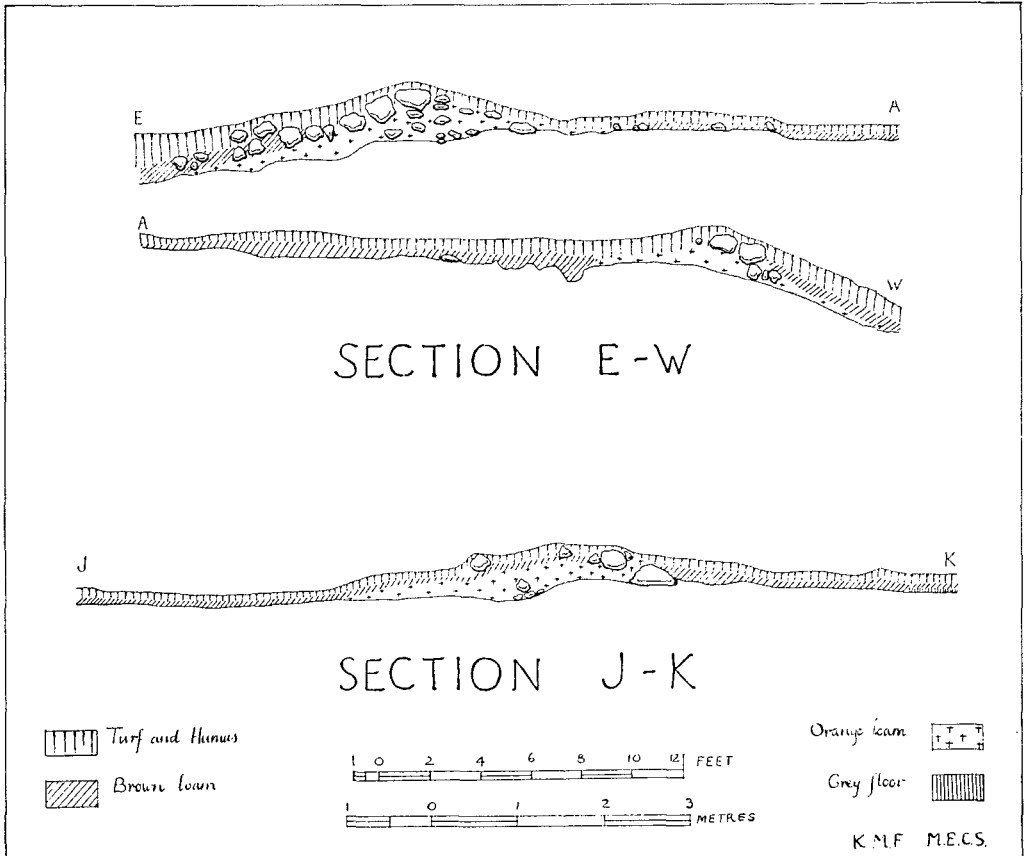


FIG. 6. Enclosure II, section

At 7 in. this merged into a dark yellowish brown loam which persisted to a depth of 21 in. without significant change. The upper levels of this dark to dark yellowish brown loam represent a 'floor' and the accumulated debris therefrom. From 3 in. to 10 in. the phosphate content is significantly high. On the surface of the 'floor' there were patches of discolouration and carbon but no hearth was found.

What remained of the SW. quadrant was deturfed and the area was once again found to be studded with the tops of outcropping rock. Towards the western end of the section pockets of darker soil at 'floor' level yielded a few very small fragments of pottery but no rims or bases. The ware is similar in character to that found in association with the first enclosure. A northward extension of the section just within the wall showed that a considerable area of the original A/B profile had been left



here and that the steep declivity of the natural mound below the lip had been strewn with boulders.

#### EXCAVATION OF THE ANGLED BANK

The plane table survey of the site had shown three and possibly four low angled banks. These did not appear to be the partial foundations of an otherwise ruined

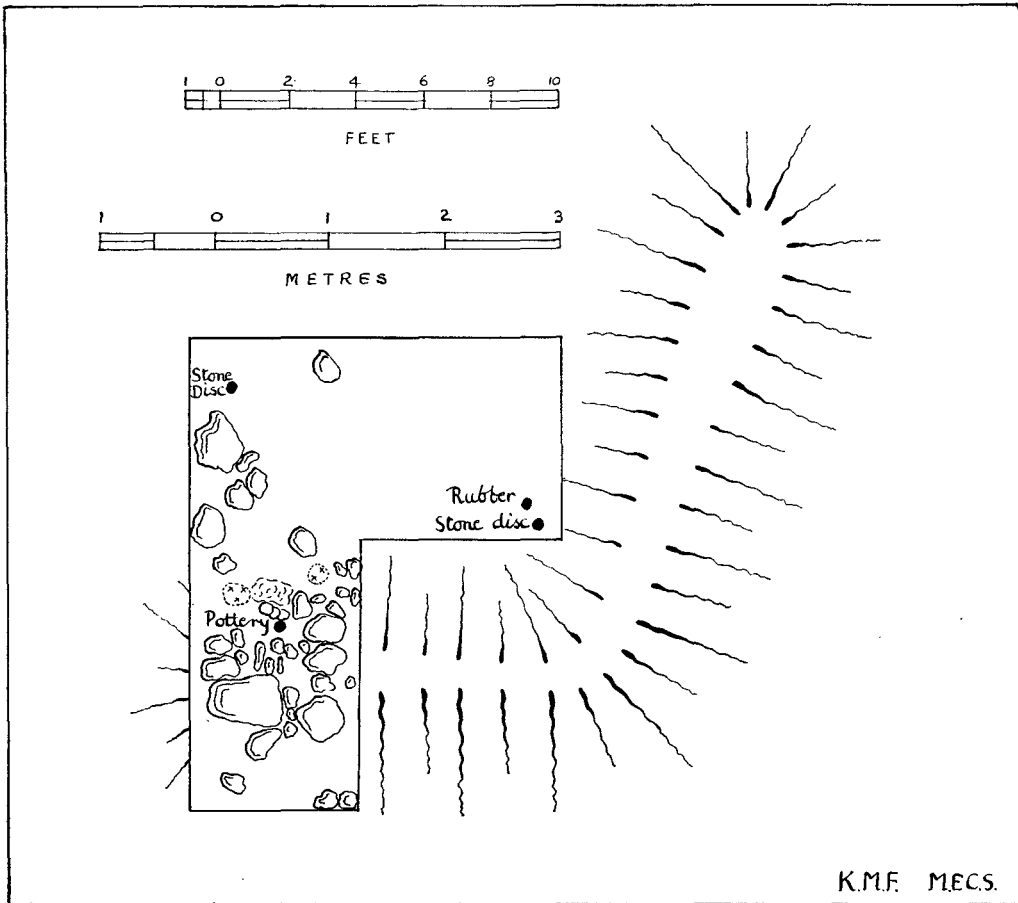


FIG. 7. Angled enclosure, plan

structure, so before terminating the season's work it was decided to make a trial excavation in one which lay approximately 50 ft. SE. of the centre of the third and unexcavated circular enclosure (fig. 7). Visible on the ground was a low angled mound 12 ft. in one direction and 14 ft. in the other, at no point more than 1 ft. above the surrounding ground level. A trench 5 ft. wide and 14 ft. long was opened across the northern end. This revealed a wall of collapsed boulders up to 2 ft. in diameter. The collapsed material had spread out for an overall distance of 8 ft. but

the number of stones involved was small. The wall had either been a very flimsy one on a narrow base or else the broader foundation for a wooden structure. Carbon of willow and birch was found among the wall stones as was also a thin fragment and some small sherds of pottery (fig. 8). A well-made stone disc or 'pot-lid' was found at the eastern end of the section. The section was then carried southwards for 6 ft. and on a similar width, and from the extreme south-western corner of the extension came a second stone disc and a grainrubber.



FIG. 8. Rim fragment of pottery from angled enclosure ( $\frac{1}{8}$ )

#### DISCUSSION

So far seventeen groups of circular enclosures have been identified between the valley of the Garry and Glenisla (fig. 9). Eight of these are referred to in a paper read to the Society in 1933 by the late Mr Wallace Thorneycroft, who excavated two of the group at Dalrulzion.<sup>1</sup> Ten of the seventeen groups have been visited since then and one group at Whitehouse has been surveyed in detail. With one exception – Heatheryhaugh – all groups lie at or about the 1000-ft. contour, but apart from this they show no uniformity. Even at Dalnaglar the method of wall building in Enclosure I is radically different from that used in Enclosure II.

At Tom Liath, 3 miles S. of Dalnaglar, there are two large enclosures of approximately 50 ft. in diameter which have originally been outlined by large carefully selected boulders, and this method occurs again in two enclosures at Merklands above Strathardle.

Mr Thorneycroft identified tangential circular enclosures at Dalrulzion, Kingseat and Drumderg. The same type occurs in Glen Derby.

At Rannagulzion, where there is a very large group, some enclosures show expanded ends resulting in an extended entrance passage. This feature occurs among circular enclosures in Sutherland.

Double walled enclosures occur at Dalrulzion, Rannagulzion, Corb, Kingseat and Drumderg.

These seventeen sites are probably only a fraction of the total in eastern Perthshire, for no systematic search of the ground has been made. Even so they show a remarkable concentration in a relatively small area and immediately raise the question as to their function. Until now it would have been normal to refer to these enclosures as hut circles, but such a designation presumes a role for which there is very little evidence. Until more of these sites have been excavated and proof of their use as habitations well established it would seem best to use the term 'circular enclosure' when referring to them. At Dalnaglar, although the pollen chart indicates the destruction of the forest and the presence of cultivation weeds, there is practically

<sup>1</sup> *P.S.A.S.*, LXVII (1932-3), 187-208.



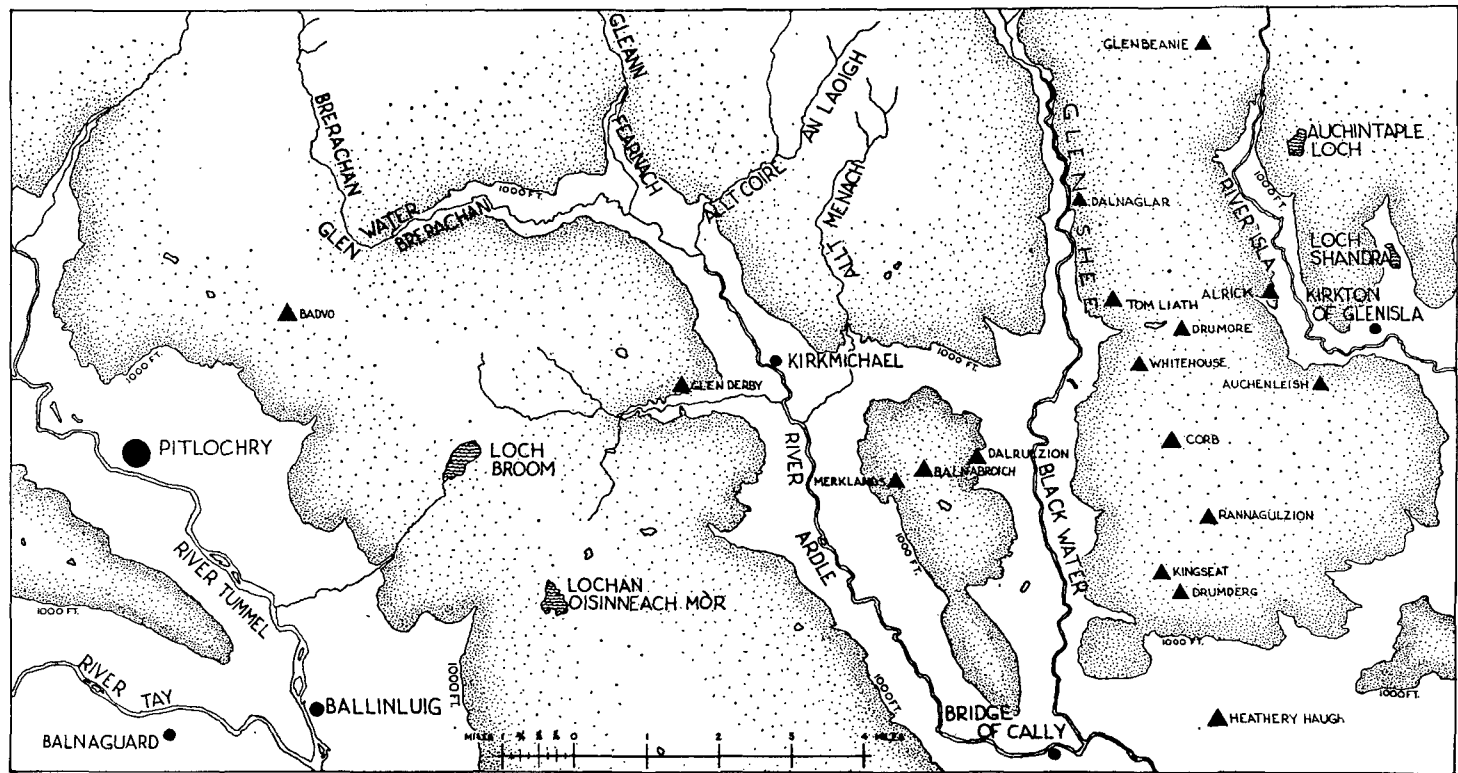


FIG. 9. Distribution map of Circular Enclosures in East Perthshire

no evidence of occupation inside the enclosures. Nearly all the pottery is found without the wall and there is no evidence of a hearth.

A concentration such as exists in eastern Perthshire is conspicuously absent W. of the junction of the Garry and the Tay. On the comparable uplands of Strathtay groups like those at Dalnaglar or Dalrulzion are not found.

#### ACKNOWLEDGMENTS

Thanks are due to many individuals and organisations who have contributed to this report; to the Society of Antiquaries of Scotland who generously financed the project, to the Department of Prehistoric Archaeology at Edinburgh University for financial and other assistance, to the Macaulay Institute for Soil Research for soil and pollen analysis, to Miss Henshall of the National Museum for undertaking the examination and preservation of the pottery and to the Forestry Commission, Scotland East Conservancy, for permission to excavate.

#### APPENDIX I

##### *The Soils of the Dalnaglar Circular Enclosures, Glen Shee, Perthshire*

by B. M. SHIPLEY, B.SC. and J. C. C. ROMANS, B.SC.

The site of the Dalnaglar Circular Enclosures is in lower Glen Shee, at an altitude of approximately 1075 ft. above sea-level. The underlying rocks are quartz-mica-schists, mica schists and slates of the Dalradian Series of Highland Schists, which, in this district, give rise to a fairly uniform olive-coloured till or moraine. These form the parent materials of the soil.

The dominant soil of this hill area is a well-developed freely-drained podzol. On relatively flat sites, however, peaty podzols with poorer drainage and often an iron pan do occur, and on very flat or basin-like sites, peaty gley soils or deep peat may be present. The soils described and sampled at the excavated site are characteristic of the podzol and peaty podzol groups.

#### INVESTIGATIONS, SEPTEMBER 1959

Three soil profiles were described and sampled. The first (Dalnaglar No. 1) was within the walls; the second (Dalnaglar No. 2) was immediately outside the wall near the assumed entrance; and the third (Dalnaglar No. 3) was sited some 100 yds. to the N. of the enclosure area. The following are the descriptions of the three profiles. Soil colours are taken from Munsell Soil Color Charts.<sup>1</sup>

##### (1) *Enclosure I Interior*

*Topography:* Gentle 1-2° slope

*Aspect:* West of south

*Vegetation:* *Calluna-Nardus* heath with some *Juncus squarrosus*, *Festuca ovina*, *Anthoxanthum odoratum* and some moss.

*Drainage:* Imperfect generally but free below the discontinuous iron pan.

*Description:*

AoL & F	1-0"	Black fibrous <i>Calluna</i> , grass and moss litter
A <sub>1</sub>	0-1"	10YR 2/1 black humic loamy sand, dry and granular, compact but friable breaking readily to single mineral grains and small crumbs of organic matter, high organic content, frequent contemporary roots, no mottling, fairly sharp change into:

<sup>1</sup> Munsell: *Soil Color Charts 1954* (Munsell Color Company Inc. Baltimore 2 Maryland, U.S.A.)

A <sub>2</sub>	1-3"	10YR 4/2 dark grey-brown fine sandy loam, compact but friable breaking readily to small crumbs, medium organic content, frequent contemporary roots, slightly moist, small distinct ochreous mottles around root channels, undulating boundary merging into:
B	3-8"	10YR 5/4 yellowish brown to 10YR 4/4 dark yellowish brown fine sandy loam, compact but friable breaking to small and medium sub-angular blocks, low organic content, frequent roots, slightly moist, frequent small distinct ochreous mottles around root channels, sharp change into:
Floor	8-9½"	10YR 4/2 dark grey-brown organic fine sandy loam, compact and firm, medium to high organic content, occasional contemporary roots, slightly moist, occasional small distinct ochreous mottles around root channels, undulating boundary but fairly sharp change into:
	9½-14"	10YR 4/3 dark brown fine sandy loam (feels silty but this may be due to organic matter), compact but friable breaking to small crumbs, medium organic content, frequent roots, slightly moist, frequent small distinct ochreous mottles throughout, merging into:
A <sub>2</sub>	14-16"	10YR 4/2 dark grey-brown to 10YR 2/2 very dark brown organic loam to compact and firm organic fine sandy loam, high organic content, frequent roots, moist, no apparent mottles, undulating boundary but sharp change into:
B <sub>1</sub>	16-16¼"	Discontinuous thin iron pan
B <sub>2-3</sub>	16¼-20"	5Y 4/3 olive silty fine sandy loam, very compact becoming slightly indurated towards the base, moderately developed platy structure, rare roots, moist, occasional diffuse medium ochreous mottles around rotting rock fragments, merging into:
C	20" +	5Y 4/3 olive silty fine sandy loam till, compact and otherwise similar to the above horizon.

(2) *Enclosure I Exterior**Topography:* Gentle 1° slope*Aspect:* West of south*Vegetation:* *Calluna-Nardus* heath with *Anthoxanthum odoratum*, *Agrostis* species, *Festuca* species and some *Vaccinium myrtillus*.*Drainage:* Free*Description:*AoL & F 1½-0" *Calluna*, grass and *Vaccinium* litter.AoH-A<sub>1</sub> 0-2" 10YR 2/1 black organic sandy loam to loamy sand, dry and granular, friable, breaking to single mineral grains and very small crumbs of organic matter, high organic content, frequent contemporary roots, no mottling, fairly sharp change into:A<sub>2</sub> 2-4½" 10YR 4/2 dark grey-brown fine sandy loam, compact but friable breaking to small crumbs, medium organic content, frequent roots, slightly moist, no apparent mottling, sharp change into:B<sub>2</sub> 4½-10½" 7.5YR 5/6 strong brown fine sandy loam to loam, compact and firm, moderately developed small sub-angular blocky structure which breaks to fine crumbs under pressure when dried out, low organic content, abundant roots, moist, no mottling, sharp change into:B<sub>3</sub> 10½-20" 5Y 4/3 olive fine sandy loam, compact, weakly developed platy structure in upper part becomes sub-angular blocky lower down, moist, no mottling, merging into:

C 20" + 5Y 4/3 olive silty fine sandy loam till, compact and otherwise similar to the above horizon.

(3) *Control Profile**Topography:* Almost level site on gentle 1° slope*Vegetation:* *Calluna*-heath with subordinate *Agrostis* and *Festuca* species and *Vaccinium myrtillus*.*Drainage:* Free



AoL & F	1/2-0"	<i>Calluna, Vaccinium</i> and grass litter
AoH-A <sub>1</sub>	0-2"	10YR 2/1 black greasy humus with some mineral grains towards the base, firm and moist with weakly developed small sub-angular blocky structure, merges into:
A <sub>2</sub>	2-6"	10YR 4/2 dark grey-brown fine sandy loam, compact but friable breaking to small crumbs, high organic content, abundant roots, slightly moist, no mottling, merges into:
B <sub>2</sub>	6-12"	7.5YR 5/4 brown fine sandy loam, firm but friable breaking easily to small crumbs, low organic content, frequent roots, moist, no mottling, sharp change into:
B <sub>2</sub>	12-20"	7.5YR 5/6 strong brown silty fine sandy loam, soft and friable breaking very easily to small crumbs, low organic content, frequent roots, moist, no mottling, merges into:
B <sub>3</sub>	20-24"	5Y 4/3 olive fine sandy loam, slightly indurated but breaks fairly readily to crumbs, occasional roots, slightly moist, no mottling, merges into:
C	24" +	5Y 4/3 olive stony fine sandy loam till, indurated and otherwise similar to the above horizon.

N.B. The whole profile is very stony; stones varying in size from small pebbles to large angular boulders are common at all levels.

#### INTERPRETATION OF THE MORPHOLOGY OF THE SOIL PROFILES

The general morphology of the soil profiles corresponds to that of a well-developed podzol. To illustrate the features described, a brief summary of the process of podzolisation and the resulting soil morphology is given below.

The leaching process of podzolisation starts with the accumulation on the surface of an acid raw humus (organic layer). The subsequent downward percolation of acid humic solutions gradually breaks down the clay mineral content of the upper horizon into 'bases' (K, Na, Mg, Ca, etc.) and sesquioxides of iron and aluminium. The bases are gradually washed out of the soil profile, but the sesquioxides accumulate lower down the profile in the bright coloured B horizons (particularly the B<sub>2</sub> horizon), leaving a silica-rich grey and bleached layer above. The longer the process continues the more grey and bleached the leached layer appears and the brighter the sesquioxide enriched B horizons become.

##### (1) *Enclosure I Interior*

There are present in this profile three grey layers which could be of archaeological interest.

The first at 1-3 in. below the surface is the result of normal soil forming factors in operation during the podzolisation of the soil, after occupation of the enclosure had ceased. The layer from 14-16 in. below the surface represents the base of the leached horizon forming part of the original podzol profile present on the site before occupation.

The grey layer from 8-9½ in. below the surface appears to be a mixture of the soils which formed the upper layers during the time the enclosure was occupied, and thus should be described as due to occupation and not to natural soil forming processes. The fact that this layer is of limited extent, and thickens down the slope to the SE., would suggest that it is a result of the piling up of occupation refuse within the enclosure interior, rather than an end product of leaching.

##### (2) and (3) *Enclosure Interior and Control*

All the layers present in these two soil profiles appear to be the result of normal soil forming processes similar to those described very briefly above; there is nothing of archaeological significance to be noted from them.

#### INTERPRETATION OF THE CHEMICAL ANALYSES OF THE SOIL PROFILES

The chemical analyses, taken generally, show very little of an unusual nature; the variations present are well within the accepted limits for similar soil profiles elsewhere. The only significant feature is the high phosphate content of the enclosure profiles. Table 1 shows the phosphate content

I. TABLE OF PHOSPHATE CONTENT IN DALNAGLAR SOIL PROFILES

<i>Horizon Sample Depths</i>	<i>Dalnaglar No. 1 Interior</i>		<i>Horizon Sample Depths</i>	<i>Dalnaglar No. 2 Exterior</i>		<i>Horizon Sample Depths</i>	<i>Dalnaglar No. 3 Control Profile</i>	
	Total P <sub>2</sub> O <sub>5</sub> mg/100gr soil	Readily soluble P <sub>2</sub> O <sub>5</sub> mg/100gr soil		Total P <sub>2</sub> O <sub>5</sub> mg/100gr soil	Readily soluble P <sub>2</sub> O <sub>5</sub> mg/100gr soil		Total P <sub>2</sub> O <sub>5</sub> mg/100gr soil	Readily soluble P <sub>2</sub> O <sub>5</sub> mg/100gr soil
AoL-F 1 - 0"	469	29.6	AoH/A <sub>1</sub> 0 - 2"	329	1.5	AoH/A <sub>1</sub> 0 - 2"	173	4.9
A <sub>1</sub> 0 - 1"	579	7.1						
A <sub>2</sub> 1 - 3"	371	0.7	A <sub>2</sub> 2 - 4½"	481	1.7	A <sub>2</sub> 2 - 6"	167	0.6
B 4 - 8"	373	0.5						
Floor 8 - 9½"	355	2.0				B <sub>2</sub> { 7-12" 12-16" 16-20"	154	0.5
Sub floor 9½-14"	426	3.0					176	0.8
A <sub>2</sub> 14 - 16"	330	4.5	B <sub>2</sub> 4½-10½"	680	5.4		167	0.8
B <sub>2-3</sub> 16½-20"	228	2.9	B <sub>3</sub> 10½-20"	455	6.6	B <sub>3</sub> 20-24"	146	1.8
C 20 - 24"	173	5.5	C 20 - 24"	255	6.7	C 25-30"	147	3.3

of the three profiles at various levels: less than 100 milligrammes of  $P_2O_5$  per 100 grammes of soil is recognised as a low phosphate content, and more than 300 milligrammes of  $P_2O_5$  per 100 grammes as high. It is generally accepted that phosphate once emplaced in the soil profile does not move<sup>1</sup> under soil conditions which are applicable to the profiles described here.

The following comments regarding the phosphate content of the different soil horizons in each soil profile are significant:

(a) The phosphate content of the  $B_3/C$  horizons of each profile is of the same order, and within the limits normally accepted for similar soils elsewhere, except that there is a higher % of phosphate at the enclosure exterior (Dalnaglar No. 2).

(b) At the  $B_3$  level (which is below the original floor level) the amount of phosphate in the exterior profile (Dalnaglar No. 2) is 100% higher than that in the interior (Dalnaglar No. 1) and 200% higher than that in the control (Dalnaglar No. 3).

(c) At levels above the  $B_3$  the % of phosphate in the floor occupation debris and top infill material is consistently lower than the % of phosphate in the  $B_2/A_2$  levels of the exterior profile, but two to three times greater than that of the control.

(d) The highest value of all occurs in the  $B_2$  horizon of the exterior profile where the presence of illuviated iron oxide might be expected to 'fix' a high % of any supplementary supply of phosphate.

These results reflect the accumulation of organic debris and litter within the floor, and the characteristic external sanitary arrangements of the period. The very high figure for the exterior may also reflect the presence of domestic animals congregated around the wall.

#### INVESTIGATIONS, SEPTEMBER 1960

This second enclosure some 50 yds. NW. of the previous one has a more complex foundation than the other one described. It appears to be built partly on a mound of till-covered rock, and partly on loose moraine-like debris which is either a normal 'crag and tail' effect due to glacial action, or else man-made with loose material brought in to enlarge and level up the site. The presence of moraines and other glacial features nearby in the glen would support the former explanation. Unfortunately a small quarry has obliterated the area of the assumed entrance to the enclosure.

Two soil profiles were described and sampled. The first (Dalnaglar No. 4) was within the walls although not in the assumed living space; the second (Dalnaglar No. 5) was immediately outside the wall away from the assumed entrance. In addition samples were taken from the interior (Dalnaglar No. 4A) from the assumed occupation debris of the living space. The following are the descriptions of the two profiles. Soil colours are again taken from Munsell Soil Color Charts.

#### (4) Enclosure II Interior

*Topography:* Top of morainic mound with rock and till core

*Vegetation:* *Calluna* - *Deschampsia flexuosa* heath with *Anthoxanthum odoratum* and *Polytrichum* moss.

*Drainage:* Free

*Description:*

AoF/A <sub>1</sub>	0-3"	10YR 3/2 very dark grey-brown to 10YR 4/2 dark grey-brown rooty fibrous turf with fine crumbs of sandy loam among the roots, rare small stones, worms present, slightly moist to moist, sharp change into:
Floor	3-7"	10YR 3/3 dark brown slightly humose fine sandy loam, firm but friable breaking readily to fine crumbs, moderate stone content of angular 4 in. schist fragments, abundant roots, worms present, moist, no mottling, merges over 2 in. into:
Sub-floor and fill	7-21"	10YR 4/4 dark yellowish brown, 10YR 5/8 yellowish brown and 10YR 3/4 dark brown in light and dark patches of fine sandy loam, soft and friable breaking easily to fine crumbs, abundant large and small angular schist fragments, frequent roots, old

<sup>1</sup> The Retention of Phosphate by Soil. A Review by Alan Wild (*Journal of Soil Science* Vol. I, No. 2, pp. 221-35).



- worm channels present, moist, no apparent mottling but occasional rusty patches of decomposed rock are present, merges over 2 in. into:
- B<sub>3</sub> 21-24" 10YR 4/4 dark yellowish brown to 10 YR 5/4 yellowish brown fine sandy loam, slightly compact but friable breaking to small sub-angular blocks, abundant large and small angular fragments of hard and soft schist, occasional roots present but dying out at base of horizon, worms not seen and probably absent, moist, a little diffuse rusty and grey mottling, fairly sharp change into:
- C 24" + 5Y 5/3 olive sandy loam, massive but fairly soft breaking to small sub-angular blocks, abundant angular schists, no roots, moist, no apparent mottling but general dull aspect.

(5) *Enclosure II Exterior*

*Topography*: 2° slope near top of morainic mound with rock and till core.

*Aspect*: East

*Vegetation*: *Nardus* - *Deschampsia flexuosa* - *Eriophorum vaginatum* heath with *Calluna* and *Vaccinium myrtillus*.

*Drainage*: Free

*Description*:

AoF & H & A<sub>1</sub>

0-2" 10YR 4/2 dark grey-brown fibrous turf with some mineral matter in small crumbs between the roots.

A<sub>2</sub> 2-3½" 10YR 2/2 very dark brown humose fine sandy loam, almost massive breaking to very fine crumbs and single grains, no stones, abundant roots, worms not seen but probably present, slightly moist to moist, no mottling, sharp change into:

Wall

debris 3½-11" 10YR 3/2 very dark grey-brown humose fine sandy loam, slightly compact but friable breaking to fine crumbs, frequent large angular and sub-angular boulders (wall debris of schists and occasional granite) abundant roots, worms not seen, moist, no mottling, merges over 2 in. into:

A-B 11-23" 10YR 4/3 dark brown to 10YR 4/4 dark yellowish brown fine sandy loam, large firm crumbs breaking easily to fine crumbs, moderate stone content with fewer large boulders than above, frequent roots, moist, no mottling, sharp change into:

B<sub>2</sub> 23-27" 7.5YR 5/8 strong brown fine sandy loam, soft large crumbs breaking easily to fine crumbs, moderate stone content of angular schist fragments, frequent roots, no worms seen, moist, no apparent mottling, sharp change into:

B<sub>3</sub> 27-34" 10YR 5/6 yellowish brown fine sandy loam, soft sub-angular blocks breaking to fine crumbs, moderate stones as above, frequent to occasional roots dying out at the base of horizon, no worms, moist, no mottling, fairly sharp change into:

C 34" + 5Y 4/3 olive sandy loam, compact and massive, frequent angular hard and soft schist fragments, roots rare at top of horizon - absent below, moist, occasional patches of diffuse rusty mottling.

## INTERPRETATION OF THE MORPHOLOGY OF THE SOIL PROFILES

(1) *Enclosure II Interior*

The general morphology of this soil profile is not that of a normal podzol. The upper leached horizons are present in a modified form, but the usual bright coloured B horizon is absent. This has been replaced by a dull coloured 'fill' material very similar to the local morainic debris. The morphology of this profile does not show any obvious likely floor levels as did that of the other enclosure.

(2) *Enclosure II Exterior*

The podzol profile developed here is fairly normal except for the abundance of wall debris and

## II. TABLE OF PHOSPHATE CONTENT

Horizon Sample Depths	Dalnaglar No. 3 Control Profile		Horizon Sample Depths	Dalnaglar No. 4 Interior	
	Total P <sub>2</sub> O <sub>5</sub> mg/100gr soil	Readily soluble P <sub>2</sub> O <sub>5</sub> mg/100gr soil		Total P <sub>2</sub> O <sub>5</sub> mg/100gr soil	Readily soluble P <sub>2</sub> O <sub>5</sub> mg/100gr soil
AoH-A <sub>1</sub> 0-2"	173	4.9	Recent		
A <sub>1</sub> 2-6"	167	0.6	Turf 0-3"	288	1.0
			Floor 3-7"	268	0.5
			Sub- floor 7-10"	256	0.8
	154	0.5			
B <sub>2</sub> 12-16"	176	0.8	12-15"	188	1.0
	167	0.8	'Fill' 15-17"	197	0.6
B <sub>3</sub> 20-24"	146	1.8	B <sub>3</sub> 21-24"	145	1.9
C 25-30"	147	3.3	B <sub>3</sub> /C 24-27"	120	1.9

boulders just above the original profile horizons. It is quite comparable with the exterior profile of the other enclosure.

## INTERPRETATION OF THE CHEMICAL ANALYSES OF THE SOIL PROFILES

Only the phosphate results have been calculated. Bearing in mind the experience gained with the previous set of chemical analyses, only the phosphate results are likely to be significant. Table II shows the phosphate content of the two profiles and that of the control profile at various levels, together with the phosphate content of the occupation layers of the interior.

The following comments on the phosphate results obtained may be made:

(a) The overall phosphate content of this enclosure is approximately half that of the previous one, and in the lower half of each profile approaches very closely to what one would expect in a normal profile, for example the control profile (Dalnaglar No. 3).

(b) At the 3-7 in. level in the interior (Dalnaglar No. 4) the phosphate content is significantly high and almost identical with the result obtained from the occupation debris at an equivalent depth (Dalnaglar No. 4A). This level probably represents the last floor.

(c) At the 7-10 in. level in the interior the phosphate content is again significantly high and again almost identical with the result from the occupation debris at an equivalent depth. This level probably represents the sub-floor.

(d) The phosphate content of the exterior profile (Dalnaglar No. 5) is also significantly high, but again not as high as that of the exterior profile of the other enclosure (Dalnaglar No. 2).

## IN DALNAGLAR SOIL PROFILES

<i>Horizon Sample Depths</i>	<i>Dalnaglar No. 4a Occupation Layers</i>		<i>Horizon Sample Depths</i>	<i>Dalnaglar No. 5 Exterior</i>	
	Total P <sub>2</sub> O <sub>5</sub> mg/100gr soil	Readily soluble P <sub>2</sub> O <sub>5</sub> mg/100gr soil		Total P <sub>2</sub> O <sub>5</sub> mg/100gr soil	Readily soluble P <sub>2</sub> O <sub>5</sub> mg/100gr soil
Occu- pation debris 2-4" 8-12"	266  246	0.4  0.6	Recent { 0-2" 414 8.4		
			A <sub>1</sub> -A <sub>2</sub> { 2-3½" 354 1.5		
			Wall { 4-6" 262 0.8		
			debris { 9-11" 220 0.2		
			Origi- nal { 12-15" 186 0.5		
			A-B { 18-22" 197 0.4		
			B <sub>2</sub> 23-27" 154 0.2		
			B <sub>3</sub> 28-32" 194 0.7		
C 36-40" 157 1.4					

Whilst these phosphate results reflect the same conditions as were present in the other enclosure, the considerably lower phosphate content of the second site would strongly suggest that it was occupied later than or for a much shorter period than the first one.

## ACKNOWLEDGMENTS

Grateful acknowledgment is made to Dr H. G. M. Hardie and the staff of the Soil Analysis Section of the Department of Pedology of the Macaulay Institute who did the analyses of the soil profiles so quickly at very short notice.

## APPENDIX II

*The Pottery*

by J. M. COLES, M.A., PH.D., F.S.A., F.S.A. SCOT.

The pottery (fig. 10) from Enclosure I at Dalnaglar consists of several hundreds of sherds, mostly small, which have come from 7 or 8 pots. All the pots are bucket-shaped, varying in height from 7 in. to an estimated 12 in., and in rim diameter from 6 in. to 11 in. Their rims are of different forms, the smaller pots with plain rounded rims, the larger vessels with thickened flattened rims. Several of the pots have cordon decoration, produced by running the fingers around the pot just below the rim.



Probably parts of the same pot had different numbers of these finger cordons, depending on the pressure exerted at any one particular spot. One sherd has a peculiar shouldered profile.

The fabric is generally coarse, but shows considerable variation. Some of the smaller pots are buff-coloured with a sandy surface, others have been slurried; the larger cordoned pot or pots are grey with a similar slurried surface. These have all been only moderately well-fired, tempered with medium to coarse grits. There are also several sherds of a very hard thick pot with smoothed or slurried surface.

The cordoned pots are the only vessels possessing any sort of distinctive character at all, the plain bucket urns having analogies at many sites of differing ages.<sup>1</sup> All we can say about these is that their fabric seems to recall some Bronze Age pottery, but this can hardly be taken to exclude some examples of Iron Age hill-fort ware.

The fabric of the Dalnaglar pots is not comparable to that of the Late Bronze Age Covesea ware<sup>2</sup>; this latter has well-marked internally bevelled rims and is harder fired with much small to medium sized grit. Surprisingly enough, the Dalnaglar pots are also totally dissimilar to those few surviving sherds from the hut-circles at Dalrulzion, only a few miles away; these are much harder and some have deeply bevelled rims.<sup>3</sup>

Finger cordons are not a common decoration on north British pottery, but a few examples are known. A group from northern Ireland has a Scottish representative at a Muirkirk, Ayrshire, hut-circle, but these are generally thinner and harder than the Dalnaglar ware.<sup>4</sup> The Dalnaglar pottery seems to belong to an east-central Scottish group which partakes of both Late Bronze and Iron Age traditions. The group includes a sherd from Braco, Perthshire, apparently found in a cairn in the nineteenth century,<sup>5</sup> some sherds from Tents Muir, Fife,<sup>6</sup> from North Berwick, East Lothian,<sup>7</sup> as well as some from Traprain Law itself.<sup>8</sup> All of these sherds are of comparable fabric to the Dalnaglar ware, with Traprain possibly slightly harder-fired. Of these, only Traprain Law can be employed for dating purposes, and in its context suggests a date certainly not much before the fifth century B.C., and possibly well down towards the second and first centuries B.C. The sherd with everted rim from the angled bank in the same field at Dalnaglar, if contemporary with the enclosure, would point to an occupation of the site not far removed from the first century B.C.

### APPENDIX III

#### *Pollen Analysis of Peat*

by S. E. DURNO, B.Sc.

In 1941 Iversen, in Denmark, published his first paper on prehistoric land reclamation from primeval forest which he called 'landnam' (literally land take). Since then other pollen analysts in NW. Europe have looked for and found comparable features in their pollen diagrams to those demonstrated by Iversen. A favourable Scottish site for attempting to discover palynological evidence of 'landnam' was observed at Dalnaglar in Perthshire where a group of prehistoric enclosures under archaeological investigation is situated close to a peat moss.

The peat deposit at Dalnaglar is of the raised moss basin peat type lying at approximately 1000 ft. O.D. The depth of peat at the point of sampling was 5.4 metres, and using a Hiller peat borer samples were taken at intervals of 5 cm. Preparation of the peat for pollen counting was done after the method of Erdtman (Erdtman, 1943). A count of at least 150 tree pollen grains (excluding hazel)

<sup>1</sup> Lough Gur, *P.R.I.A.*, LVI c (1954), 297. Cush, *P.R.I.A.*, XLV c (1940), 167. Largs, *Arch.*, LXII (1910), 239. Mullaghmore, *U.J.A.*, XIX (1956), 24.

<sup>2</sup> *P.S.A.S.*, LXV (1930-1), 188.

<sup>3</sup> *P.S.A.S.*, LXVII (1932-3), 187.

<sup>4</sup> *P.S.A.S.*, LIV (1919-20), 210. Comparable finger-cordon decoration occurs on a vessel in the museum at Dunrobin Castle, presumably a local find. I am grateful to Miss I. McInnes for noting this find.

<sup>5</sup> *N.M.A.Scot.* EA 218.

<sup>6</sup> St Andrews Museum.

<sup>7</sup> *P.S.A.S.*, XLII (1907-8), 284; near Gullane, *ibid.*, 314.

<sup>8</sup> *N.M.A.Scot.* 1924, 326; I.16.17; II.15.440.

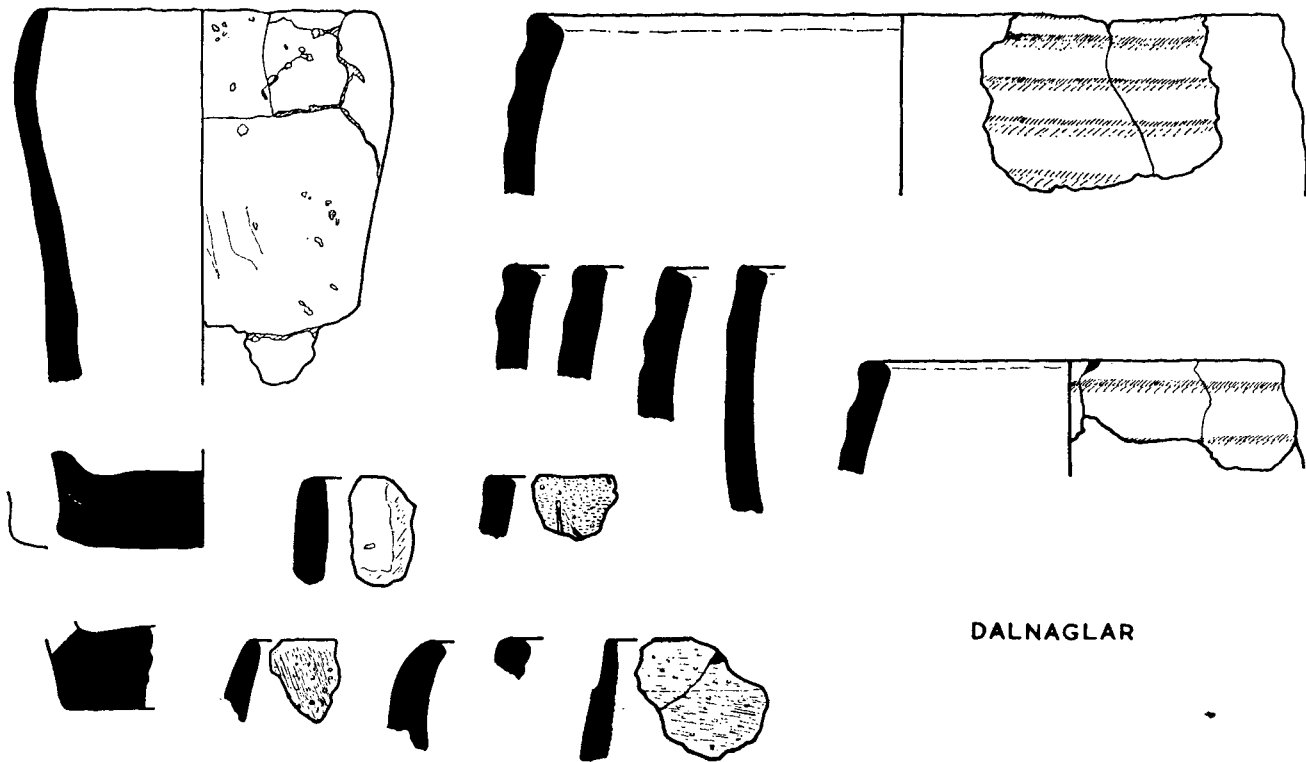


FIG. 10. Pottery from Enclosure I ( $\frac{1}{8}$ )

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was possible in most of the samples and diagrams of the conventional type (figs. 11 and 12) were prepared based on these counts.

According to many authorities (Troels-Smith, 1960, and Heybroek, H.M., 1963) the leaves and shoots of the elm tree were used in prehistoric time (and also more recently) as winter fodder. This practice reduced flowering and pollen production, which shows in pollen diagrams as a lowering of the proportion of the pollen of elm at certain levels. In the Dalnaglar diagram this feature is first discerned at 3.2 metres depth coinciding with the first record of plantain pollen (*Plantago lanceolata*).

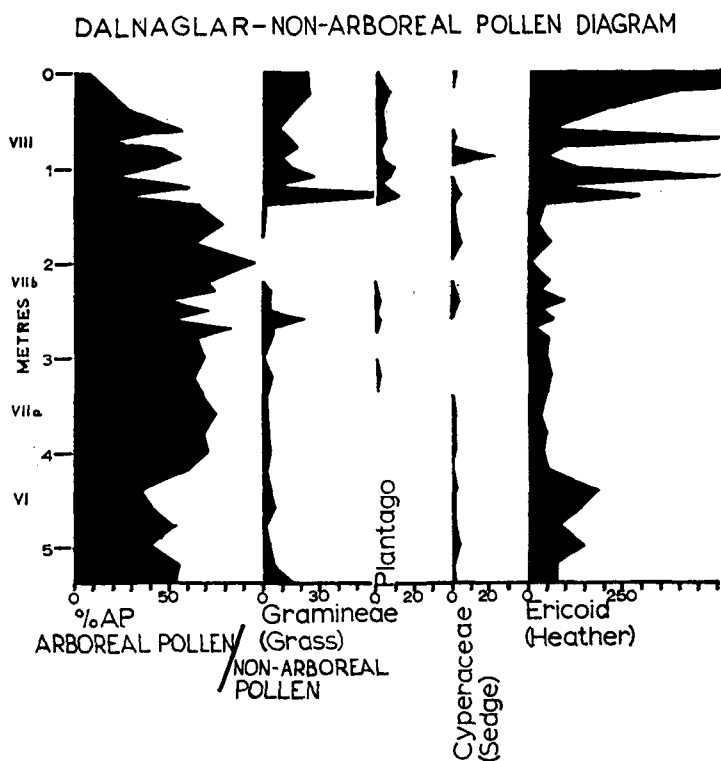


FIG. 11

The plantain is a weed of cultivation characteristically occupying ground which has been disturbed, and it is therefore regarded as a reliable sign of primitive agriculture. Further examination of the records of elm and plantain show that their pollen frequencies are largely reciprocal. At 2.4 to 2.6 metres there is a second record of plantain again accompanied by a marked reduction in elm. Above this level plantain disappears until 1.3 metres during which period elm continues irregularly never rising to values as high as those recorded at 3 metres and lower. At 1.2 metres a further reduction of elm is seen at the same depth as the re-occurrence of plantain which from then on continues to be present in every sample. During the final phase of the plantain record elm remains at low frequencies. Also associated with the plantain pollen is that of grasses with peaks at 1.3 and 2.6 metres. It is difficult to avoid the conclusion that these species are reacting to the same influence - the efforts of early settlers to start some kind of primitive farming.

Examination of the curve for total tree pollen shows where there have been changes in the extent of forest. Below 3.6 metres there is no evidence of any anthropogenic factor influencing the vegetation.

The total tree pollen does decline a little at the level of the first plantain occurrence, but a more marked fluctuation takes place at 2.6 – 2.4 metres, i.e. at the second level of plantain occurrence where arboreal pollen is sharply reduced. The total tree pollen graph shows a high peak at 2.0 metres which is seen to be due almost entirely to birch which at this point dominates all other trees and indeed the entire vegetation. A peak of birch in this context has been explained by some as due to the

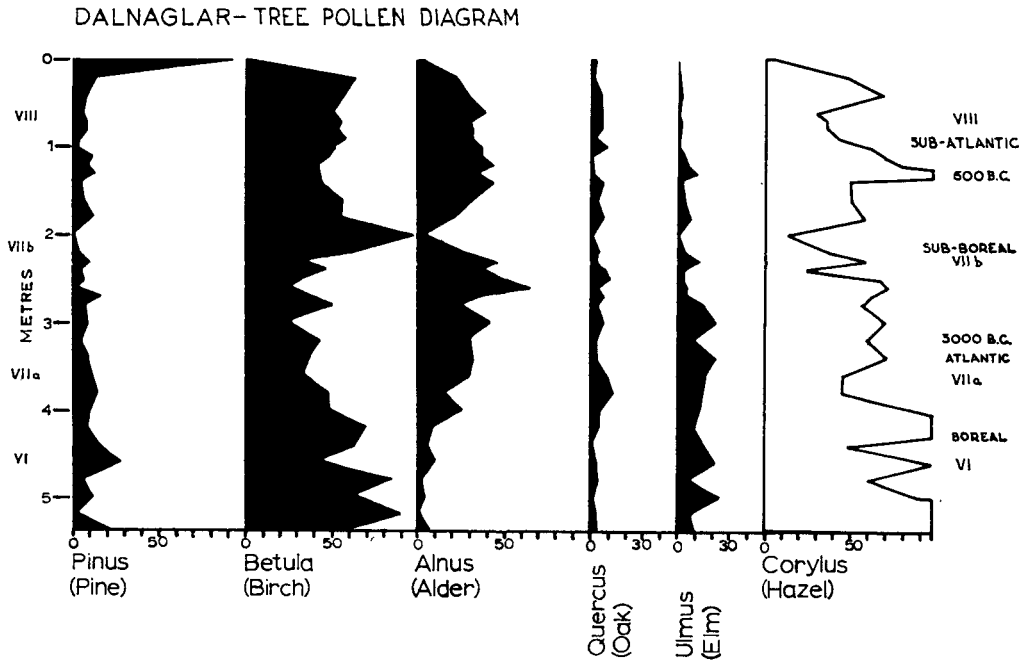


FIG. 12

rapid regeneration characteristics of certain members of the genus after clearance of forest by fire. During the upper part of the diagram when plantain pollen is continuous, the total tree pollen is significantly falling.

The first evidence of human influence on the vegetation occurs about the transition from the Atlantic to the sub-Boreal period (i.e. zone VIIa to zone VIIb). This is dated 3000 years B.C. (Godwin, Walker and Willis) within the period of Neolithic culture. From this level onwards there appears to have been intermittent clearing of the forest, perhaps by the primitive system of 'slash and burn' still used in many parts of the world today. At 1.3 metres there is evidence of a considerable intensification of reclamation: this level dated at 500 B.C., corresponds with the beginning of the sub-Atlantic (zone VIII) and with the Late Bronze Age.

Conclusion: the evidence of palynology suggests that in the Dalnaglar area there was human influence on the vegetation in times probably corresponding in age with the Neolithic and again with the Bronze Age, and intermittently between these periods.

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