

CORNISH ARCHAEOLOGY

No. 29 1990



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CORNISH ARCHAEOLOGY

No. 29 1990

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Editorial

The last number of *Cornish Archaeology* consisted mainly of one lengthy article with much technical detail. This volume attempts to redress the balance, with shorter contributions covering a broad spectrum of interests. Topographically the subjects range from a suspected fogou on the Isles of Scilly and menhirs in West Penwith to Tintagel Churchyard and silver-lead working at Calstock. It might even be said that the range extends vertically from excavation underground to photography high in the air. Chronologically there is a time span from mesolithic flints on Trevoze Head, by way of Bronze Age pottery and the Iron Age or Romano-British enclosure at Bury Camp, to 14th century mining and a 19th century antiquary rescued from comparative oblivion. The manner of the work varies too, from straightforward observation by the human eye to the use of new techniques such as magnetic susceptibility testing. It is noticeable however that the greater part of the work reported here consists of survey and observation on the surface, in contrast to the many excavation reports of former years. This reflects the Society's tendency nowadays to concentrate on field-walking, survey and field visits (as well as its series of winter lectures by distinguished speakers) rather than on excavation, which had always been a regular activity in the past. This is a policy dictated by the cost of modern excavation, the increasing need to rely on technical reports from specialists outside the Society and/or expensive radiocarbon dating, and the availability of excavations outside the county where volunteers can expect subsistence or travelling allowances. The dearth of excavation by the Society is perhaps to be regretted, but seems inevitable in modern conditions.

Members of the Society who took part in the Lizard Project on the source of the much used gabbroic clay will be interested to see the results of Michael Parker-Pearson's petrological study of Bronze Age pottery. Many more vessels have now been examined microscopically than ever before and a detailed picture of the Lizard pottery industry in this period can now be seen. It is no surprise that food vessels, collared urns, and the pots of the Trevisker series (or the clay to make them) should have been exported from the gabbroic area of the Lizard peninsula to places all over Cornwall. What is more unexpected is that Beakers were not. It seems that almost all the beakers tested were made of clay local to the area where they were found, and this is borne out by examination of the little beaker recently discovered at Harrowbarrow and reported in this volume. The five beakers excavated at Poldowrian, all of gabbroic clay, were of course no exception, being found on the gabbro itself. One wonders why a pottery industry on the Lizard which provided vessels for much of Cornwall over several millennia, from the Neolithic to the Roman period, with no obvious gap, and which certainly flourished during the Bronze Age, should not have been utilised by the makers of beakers. There appears to have been a break in tradition. Can it be that the Beaker folk were different from the rest, after all?

The Society's next journal, *Cornish Archaeology* 30 (1991) will contain the index for numbers 21–30 as an integral part of the volume. The two previous indexes have been published separately. As a good many copies of the index for numbers 11–20 still remain, it has been thought suitable to distribute these with the present volume. By this time next year therefore all members will be able with little trouble to find references to any aspect of the work published during the last twenty years of the Society's journal.

The Production and Distribution of Bronze Age Pottery in South-Western Britain

M. PARKER PEARSON

A petrological study of the fabrics of Bronze Age pottery shows that different modes of production and distribution were employed for the various styles of Beakers, Food Vessels, Collared Urns and Trevisker ware. Beakers were made from a diversity of clays, most of which contained mineral inclusions that could be found in their immediate locality. Food Vessels and Collared Urns were similarly made from a variety of fabrics but a significant number were made from the gabbroic clay of the Lizard peninsula. The Cornish Trevisker series, originating from the gabbroic Collared Urns and Food Vessels, was predominantly made of gabbroic clay. Three of these gabbroic Trevisker wares have been found outside Cornwall; on Dartmoor, in Wessex and in North France. Trevisker ware in Devon, though stylistically similar, was made from different sources.

The change from a local mode of production and distribution of wide-ranging pottery styles to centralized production of a strongly regional style appears to have overlapped with some of the stylistic distinctions. Manifestations of a regional identity are found in other forms of material culture but slightly later. The Trevisker style appears to have coincided with the widespread development of permanent settlements before the coaxial field systems of the uplands were constructed. An examination of the typology for Trevisker ware indicates that decorative traits are closely linked to functional diversity rather than purely chronological differences. The existing typology devised by ApSimon (ApSimon and Greenfield, 1972) is modified and expanded to take account of these observations.

Chronology

Patchett's typology for Bronze Age pottery from Cornwall (Patchett, 1944, 1951) has now been largely replaced by other schemes (though her catalogue numbers are used here). Although the terms Food Vessel, Collared Urn and Trevisker series are used throughout the text, a recent reworking of the typological framework combines all three as variants of the Food Urn series (ApSimon and Tomalin *pers comm*) which succeeded Beaker styles. The chronological ranges of the main pottery styles of the British Early Bronze Age are now well supported by radiocarbon dates (Gibson, 1982, Longworth, 1984, Burgess, 1974), though these chronologies still lack detailed sample analysis and interpretation. The regional Trevisker series (ApSimon, 1959; 1969; ApSimon & Greenfield, 1972) also has a reasonably coherent chronological range, although the internal chronology of Trevisker ware is still uncertain. Comparison can also be made with dates and sequences for metalwork and land use changes in the south western sequence (Christie, 1986, fig 2).

The radiocarbon dates associated with South-Western ceramics, referred to below, are given as calibrated BC dates (Cal-BC) to two standard deviations, as recommended by the Trondheim Convention. Pearson and Stuiver's calibration curve (1986) and Stuiver and Reimer's calibration program (1986) have been used.

Beakers

Beaker pottery from South-West Britain mainly belongs to the later styles of the group (Gibson, 1982, figs 1-3). There are radiocarbon dates for two Beaker associations in the region, both from Poldowrian on the Lizard peninsula in Cornwall. Calibrated dates (Cal-BC) of 2041-1609 BC (HAR-2892) and 1882-1508 BC (HAR-3107) were obtained from a stone layer beneath mound material containing sherds of Middle Style Beaker (Harris, 1979,

30; ApSimon, *pers comm*). It is possible that these sherds were incorporated in turf layers which formed the mound, their residual context thereby explaining these late dates (ApSimon, *pers comm*). Pit 5 at Poldowrian contained a pot associated with charcoal dated to 2910-2140 BC (HAR-3108); it had no stratigraphic connection to the Beaker mound and the pot is considered by the excavator to be possibly undecorated Grooved Ware (Harris, *pers comm*).

Food Vessels and Enlarged Food Vessels

Associated radiocarbon dates for Food Vessel styles in the south west are in relative agreement with their wider distribution (Burgess, 1974, fig 25). Associated radiocarbon dates from Tregiffian of 1974-1680 BC (BM-935) (Christie, 1985, 108) and from Watch Hill of 1977-1624 BC (HAR-654) and 1925-1525 BC (HAR-655) (Miles, 1975) fall within the middle of this range.

Quinnell has drawn attention to a date calibrated to 2201-1734 BC (NPL-75) for another Enlarged Food Vessel from the Earls Farm Down Barrow (Amesbury G 71) in Wiltshire (Miles, 1975, 18).

Collared Urns

Burgess' review (Burgess, 1986) of Longworth's Collared Urn chronology (Longworth, 1984) presents a scheme of Early, Middle and Late forms. This scheme has been updated by Tomalin's recent reworking of Collared Urns and Food Vessels within a Food Urn series (Tomalin, 1988, fig 6). Tomalin's scheme places the south-western Collared Urns (largely Middle and Late styles) in the period after 2000-1650 BC.

The only relevant South-Western radiocarbon date for this group is of 2143-1739 BC (HAR-2991) from mature oak charcoal in a burial pit predating a turf stack (Griffith 1984, 76) in which a Collared Urn style pygmy cup was found at Colliford Reservoir, Site IVC (Ellison, 1984, 81).

Trevisker Series

Trevisker styles have been considered to overlap chronologically with Food Vessel and Collared Urn assemblages (ApSimon & Greenfield, 1972); recent radiocarbon dates and associations seem to bear this out. A plain, four lugged pot of Trevisker form (similar to Patchett's C12 and C13) from Trelan 2, site 41, Goonhilly Down on the Lizard, was found in the upper fills of a barrow ditch, the lower fills of which were dated to 2470-1880 BC (HAR-4540) (Smith, 1984, 16). A sequence of dates from a group of six Trevisker urns found at Chysauster ranges from 2510-1900 BC (HAR-6549) for the oldest and 1780-1442 BC (HAR-6654) for the youngest (Christie, 1986, 94; Smith *pers comm*; ApSimon, *pers comm*). Other radiocarbon dated funerary contexts are the Crig-a-Mennis vessels, dated to 2046-1643 BC (NPL-193) (Christie, 1985), and the Upton Pyne vessel, dated to 1748-1515 BC (BM-402) (ApSimon, 1970). A date in the late first millennium for the Stannon urn has been rejected as unacceptable by the excavators and the vessel has been dated by association with a bone ring-headed pin to Wessex I/II transition-Wessex II (Harris, Hooper & Trudgian, 1984). Similar Wessex II artefact associations exist for Trevisker pots from Angrouse, Fore Down, Harlyn III and Rosecliston within Cornwall and for Winterbourne and Winterslow in Wessex, all of which are similar forms to that from Stannon (Style 1). There are no sound Wessex I associations though this may be due to scarcity of metal goods or even the exclusion of grave goods in this period. A vessel from Bromfield in Shropshire (Stanford, 1982, fig 16.39, 315), which would not be out of place as Trevisker Style 3/4, is associated with a radiocarbon date of 2340-1430 BC (Birm-64), though it was definitely not a Cornish product.

Radiocarbon dates of 1530-1010 BC (NPL-21) from Gwithian layer 5 site X and 1520-1039 BC (NPL-134) from Trevisker House A overlap with the Wessex II funerary associations. The deposition of Taunton phase metalwork (of a similar date) at Tredarvah was unfortunately not in association with the deposit of Trevisker pottery, but is considered to be roughly contemporary (Pearce & Padley, 1977). A decorated Trevisker sherd came from the old land surface under the enclosure wall at Shaugh Moor, dated to 1744-1410 BC (HAR-2986) and to 1676-1383 BC (.98) (HAR-3418) (it is described as double cord impressed but is illustrated as incised chevron decoration; Wainwright & Smith, 1980, 71-72, 96, fig 18: P2).

The plain jar from a pit burial at Lower Ashmore Farm, Rose Ash, Devon has a date of 1406-1022 BC (HAR-2992) (Wainwright, 1980) while the latest Trevisker date of 1131-898 BC (BM-1148) comes from sherds with incised chevron and fingernail decoration in a barrow at Bratton Fleming (King & Miles, 1975,30; Quinnell *pers comm*).

Finally, the Wessex Biconicals from the South-West may be considered to date after 2000-1650 BC (Tomalin, 1988). The Biconical assemblage from Shaugh Moor has been associated with radiocarbon determinations which would place it between 1870 and 1167 BC (Wainwright and Smith, 1980) or, in Tomalin's minimal view, between 1650 and 1250 BC (Balaam *et al*, 1982, 231-3).

Summary

Imprecision with radiocarbon dating prevents any detailed insight into the chronological relationships of Beakers and Food Urn series (Food Vessel forms, Trevisker series and Collared Urns) in the South-West, other than that the Food Urns broadly succeed Beakers. Trevisker styles are dated to the period 2500-1300 BC in funerary contexts, continuing until 1500-1000 BC according to Wessex II associations.

ApSimon has suggested that Trevisker pottery was essentially a local development in the Food Vessel/Collared Urn/Cordoned Urn series (quoted in Christie, 1986,105) and there are indications of a period of overlap of these styles of Food Vessel, Collared Urn and Trevisker series.

Trevisker ware: its decorative and functional diversity

Patchett's groups B, C, F, and G were reworked by ApSimon on the basis of stratified sherd assemblages from Trevisker into his styles 1-4, a chronological scheme for ordering sherd material (ApSimon & Greenfield, 1972). The scheme does present a number of anomalies (Ellison, 1975, 219-24) both in terms of different style motifs on the same vessels or of different styles from the same contexts, both funerary and domestic (Pearce and Padley, 1982, 38). In view of these problems, an attempt was made to produce a new classification according to differences in form, size and decoration.

Two types of analysis were carried out; a comparison of vessel height and rim diameter and a principal components analysis of vessel shape. The analysis of vessel height and rim diameter was used for three purposes; to test the correlation between the two variables (and hence the usefulness of measuring rim diameter in sherd assemblages where vessel heights are difficult to reconstruct; Longworth, Ellison and Rigby, 1988, figs 22-23); secondly to discover whether discrete size groups existed; thirdly to discover whether different styles of surface decoration were linked to certain size ranges.

Figure 1 shows that, for vessels under 34 cm high and 28 cm wide at the rim, the divergence between height and rim width may be as much as seven cm. on any single vessel. A statistical test of correlation (Pearson's *r*) produces a value of 0.91277 for the relationship between the two variables indicating a significant correlation between vessel height and rim

diameter. A clustering of small vessels is apparent between 9-17 cm in height and 8-16 cm in width. The remaining vessels form three loose clusters (20-27 cm high, 15-22 cm wide; 27-34 cm high, 22-28 cm wide; 35-54 cm high, 28-46 cm wide) which might form a continuous distribution between 20-54 cm high and 15-46 cm wide.

A computer-generated Principal Components Analysis of vessel form (Shennan & Wilcock, 1975; Wishart, 1978) was carried out on all pots where full profiles could be recorded. The resulting differences in shape were then compared against size and decoration. Although this analysis faced the very problems that ApSimon's stylistic typology was attempting to avoid (high proportions of vessels representative of funerary but not settlement use) it did have an advantage in being able to quantify precisely the differences in vessel shape.

The technique of measurement use on European Beakers (Shennan & Wilcock, 1975) was used in this instance. Measurements of the vessel width at seven points (base, rim, maximum width and four intermediate locations equally spaced between rim and base) were expressed as ratios of the vessel height. The Principal Components Analysis of these ratios demonstrated that 88% of the variation in measurements was accounted for by two

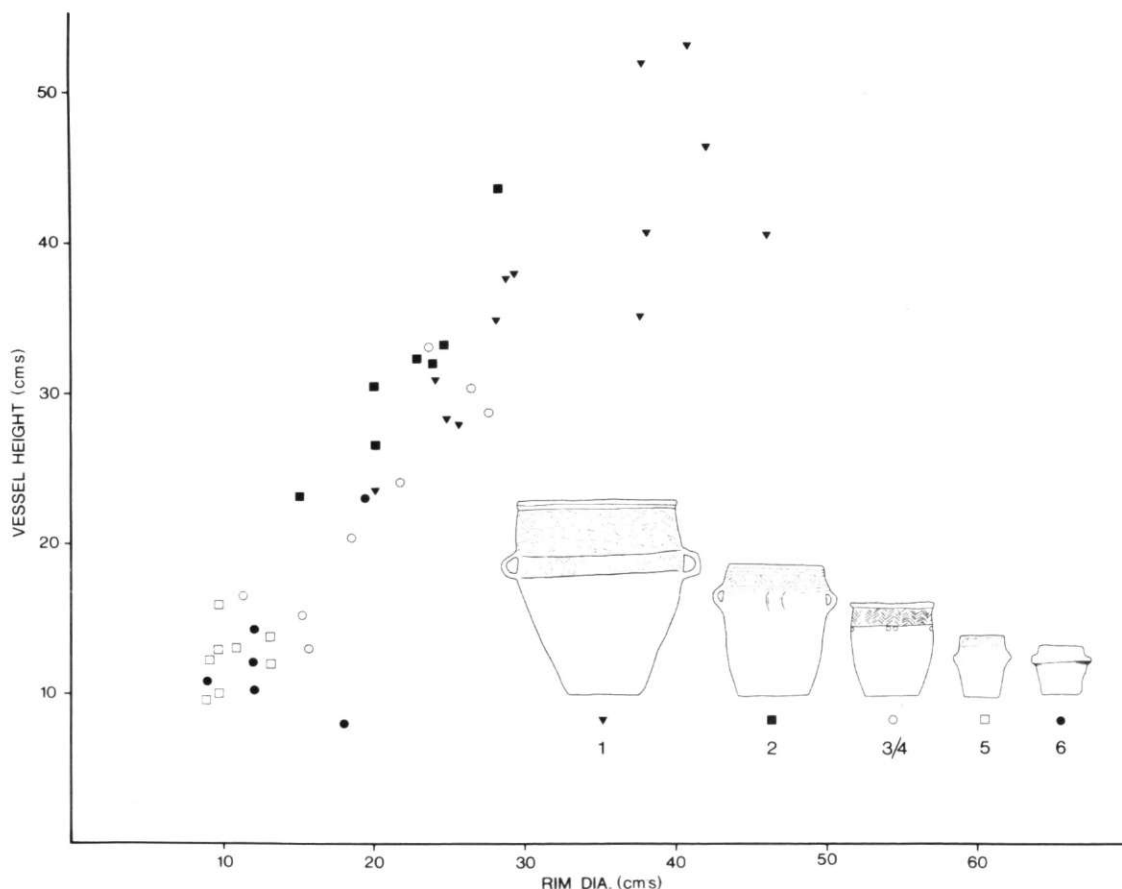


Fig 1

The relationship between vessel height and rim diameter for different decorative styles of Trevisker Ware

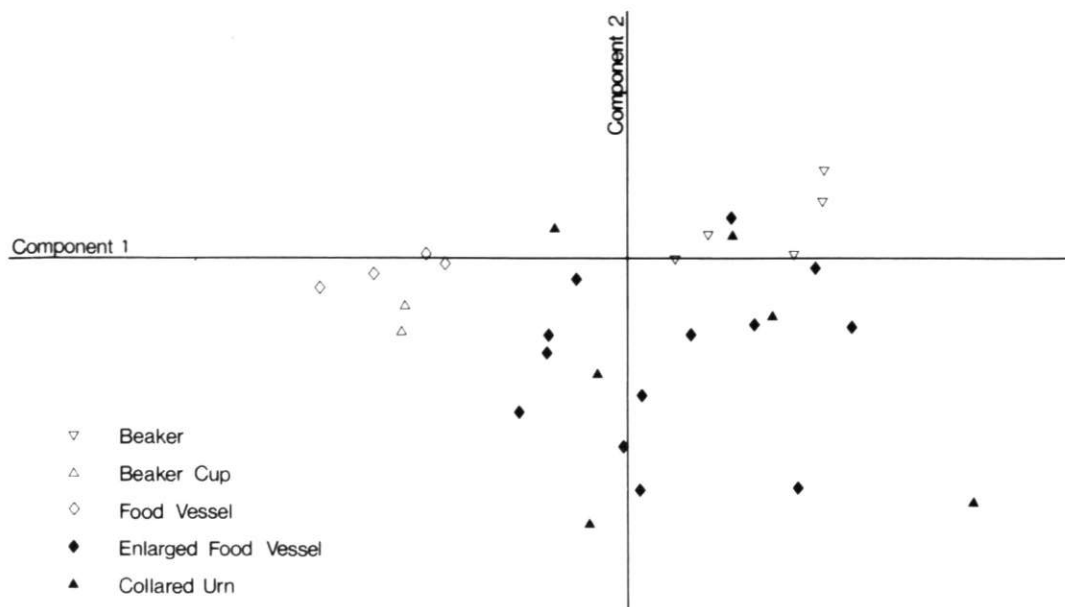


Fig 2
Principal components for variation in shape of Beaker, Food Vessel and Collared Urn styles

components, the ratio of height to maximum width (71%) and the ratio of base width to maximum width (17%). When these two components were plotted (Fig 2), Beakers, Beaker cups and Food Vessels produced clearly differentiated groupings whilst the Enlarged Food Vessel and Collared Urn groups overlapped considerably. The Trevisker forms showed similar associations between shape and decorative traits (Fig 3). These decorative traits were used to identify five different style types, not entirely discrete in terms of shape or size but partially overlapping (Fig 1).

The five styles can be described as:-

- 1) Impressed cord-decorated from rim to shoulder (largely 3 cord plait in vertical and horizontal chevron) with two large handles below the shoulder. From biconical to bucket shape. Height varies between 23 cm and 55 cm though most are over 35 cm. Rim width varies between 20 and 46 cm, most being over 24 cm. This is largely Patchett's Group B and ApSimon's style 1 and 1a and includes all the Trevisker urns associated with Wessex II gravegoods of daggers, beads, a razor, an awl and a bone ring-headed pin. The three 'exports' from Sturminster Marshall, Hardelot and Winterslow are all of this type (no handles were found with the incomplete Hardelot vessel though these would be predicted on a vessel of this size, shape and decoration). As well as this high status funerary association, these vessels are also found in settlement contexts at Ash Hole (ApSimon, 1969), Tredarvah (Pearce & Padley, 1977) and Trevisker (ApSimon & Greenfield, 1972, fig 141). From the early context for this form within the Trevisker settlement ApSimon has argued that the type was out of use by the end of the sequence. These would appear to be large storage vessels.

- 2) Impressed cord decoration limited to just below the rim. Four, but sometimes three or two, small lugs, normally pierced, also located below the rim. These vessels are bucket-shaped and tall, ranging from 23 cm to 44 cm in height and 15-29 cm in rim width. These cross-cut Patchett's classification (including vessels such as C3 and G4) and ApSimon's style 1 and 2. These would appear to be smaller storage or cooking vessels.
- 3 & 4) Incised or stamped decoration. Slightly concave bucket-shaped vessels which vary in height between 12 and 34 cm with rim widths between 10 and 28 cms. Most fall within 13-31 cm high and 11-28 cm width at the rim. They include ApSimon's styles 3 and 4. They would appear to be small storage or cooking vessels and eating and drinking wares.
- 5) Impressed cord decoration on the upper part of the vessel. The vessels may have small handles, pierced lugs, unpierced lugs or dimples. Heights vary between 17 cm and 9 cm. Some of these are small versions of type 1. These would appear to be eating and drinking vessels.
- 6) Undecorated vessels, occasionally with small handles or lugs. These range in size from 8 to 23 cm in height and from 8 to 20 cm in rim width though most lie within the height range of 9-17 cm and rim width of 8-16 cm. These appear to be eating and drinking vessels.

From these analyses, we can identify an assemblage comprising a variety of stylistic groups which broadly conform to functional differences. The large, two handled, cord decorated vessels of Style 1 (largely Patchett's group B and ApSimon's style 1) may be considered the largest, finest and the highest status (from their funerary associations) of the assemblage. This may well have implications for the symbolic status of storage, the stored contents and the people responsible for storage. Smaller than Style 1 are Styles 3 and 4 (incised). These form a smaller range of cooking and storage wares. The smallest vessels tend not to be so well made and their decorative finish is in impressed cord (Style 5), incised (Styles 3 & 4) or plain (Style 6). These small vessels would appear to be for eating and drinking. There is no firm evidence that these styles might be chronologically arranged. It is possible that Style 2, with their tall bucket-shaped forms, are later than Style 1, which are more biconically shaped, as can be found in Wessex where Biconicals are replaced by Deverel-Rimbury styles (Tomalin, 1988). Indeed the plain cremation urn from Rose Ash, Devon, with a late date of 1415-1000 BC (Wainwright, 1980), falls within the shape and size range of this group. The stratigraphic relationships of incised wares and cord impressed wares from settlement contexts at Trevisker, Gwithian and Stannon Down also suggest some chronological distinction between these decorative motifs. In the absence of further stratified sequences we can only conclude that the styles identified (which modify ApSimon's styles 1-4) are better explained as functionally different components of a single assemblage rather than chronologically successive styles.

Petrological identification

The varied geology of South-West Britain, the restricted location of gabbro and serpentine on the Lizard peninsula, and the importance of gabbroic clay for prehistoric potters (Peacock, 1968, 1969, 1988; Quinnell, 1987) combine to provide exceptional circumstances for studying the distribution of pottery from source. A petrological microscope was used to examine 184 thin section slides which had been prepared by David Peacock. The slides had been prepared from samples of the fabrics of complete or fragmentary pots. Minerals were

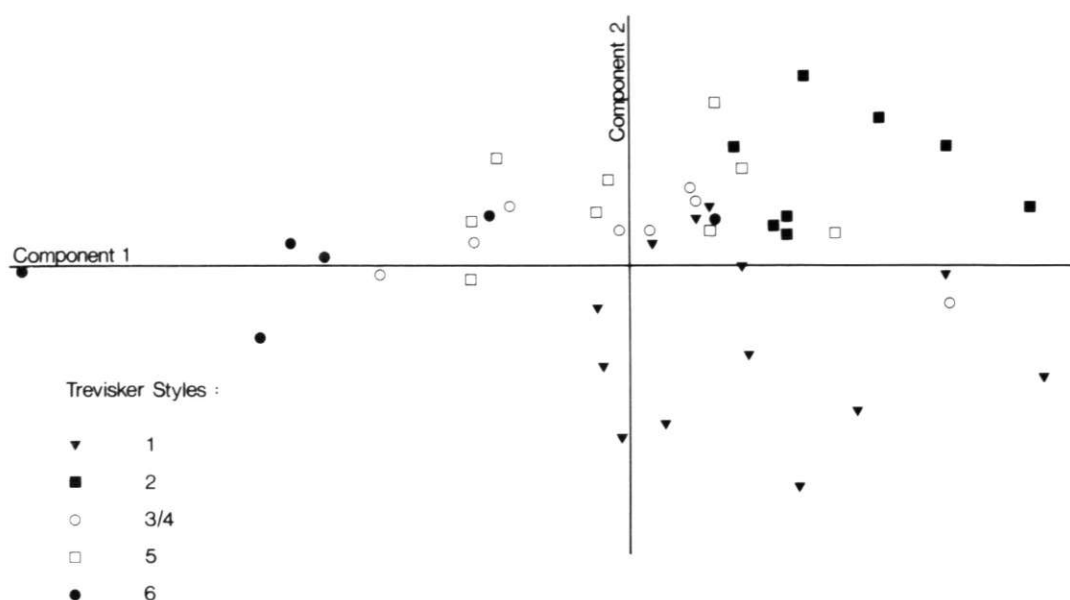


Fig 3
Principal components for variation in shape of the five Trevisker decorative styles

identified on a presence-absence basis within each thin section (table 1) and the various suites of minerals could be characterized as particular lithologies (gabbro, granite etc) in most instances. The results were checked against preliminary identifications by David Peacock. The large rock inclusions in many of the vessels made such identifications relatively simple. The slides are identified by their numbers B1-B186 and are lodged with the Department of Archaeology at Southampton University. Each is from a separate vessel with the exception of the French find from Hardelot. Photomicrographs of gabbroic and serpentine inclusions were attempted but were not successful, due to the thickness of the slides.

Beakers

Whilst Beaker fabrics of gabbroic clay have been identified macroscopically from a vessel found on the gabbro at Poldowrian, St Keverne (Harris, 1979, 23) and from Gwithian (Christie, 1988, 97) there is little indication that this source on the Lizard was regularly exploited for such vessels. The Beaker forms microscopically analysed in thin-section all indicate a diversity of mineral suites which can be located in all but two cases close to the vessels' place of deposition. The Tregiffian Beaker (Patchett's A10) comes from a granite source, the Creen cup (Patchett's F20 but in fact a Beaker form), the Praa Sands and Trevedra Beakers from quartz sands, and the Try Beaker from an area of sedimentary rocks with possible greenstone inclusions. Although the fine fabric of these vessels caused rock inclusions to be small (and the clarity of the sections of the Tregiffian and Trevedra fabrics was poor) it is certain that none were made of gabbroic clay and that they come from a diversity of sources. The handled Beaker cup (A12) from the Denzell Downs contained chert, quartz, feldspar and amphibole and might have a gabbroic origin but positive identification was not possible. Petrological analysis of Beaker sherds from Seaton, Devon suggests that some were of a local fabric and that sherds from the base of a Beaker vessel contain feldspars, quartz and amphiboles, like gabbro, but also quartzitic sandstone, indicating a source at some distance to the west (Darvill, 1981, 59-60), probably in South Devon. It is apparently not

gabbroic (Darvill, *pers comm*), as Quinnell has stated (1987, 11). Williams' analysis of Beaker sherds from the Lousey barrow, St Juliot, also identifies two further fabrics, one of grog and shale and another of grog, sandstone, mica, quartz and sericite (Christie, 1985, 109-11), all of which may be found locally. Another sherd from a ?late Beaker pot on Davidstow Moor (Site XXVI(22) P6) contains sandstone, greenstone and possibly chert; this also implies possible local production (Williams, *in press*).

All the Beaker vessels discussed appear to have been produced in the South-West (though it is just possible that the quartz fabrics of the vessels from Creen, Praa and Trevedra might also derive from further east in Southern England). The gabbro was not a principle source of clay in their production and, for fifteen different vessels or groups (including Gwithian) some nine different fabrics have been identified (Fig 4). This evidence points to dispersed production of Beaker wares; the matching of fabrics with local lithologies in all cases except Gwithian and Seaton also suggests that they did not move far from their places of manufacture, as Gibson concluded for Beaker pottery from the Millfield Basin in Northumberland (Gibson, 1986). The production of Beaker pottery in the South-West may be characterized as dispersed and localized, at a domestic or local level of production.

Food Vessels and Food Vessel Urns

Thirteen Food Vessel forms were thin sectioned. Both these and the Collared Urns sectioned were all Cornish examples, though others are known from Devon (Fig 5). Six were made of gabbroic clay. Two (Colroger I & II) were found on the Lizard peninsula, one across Falmouth Bay at Trethem and three on the North Cornish coast at Carnkief, Perranzabuloe

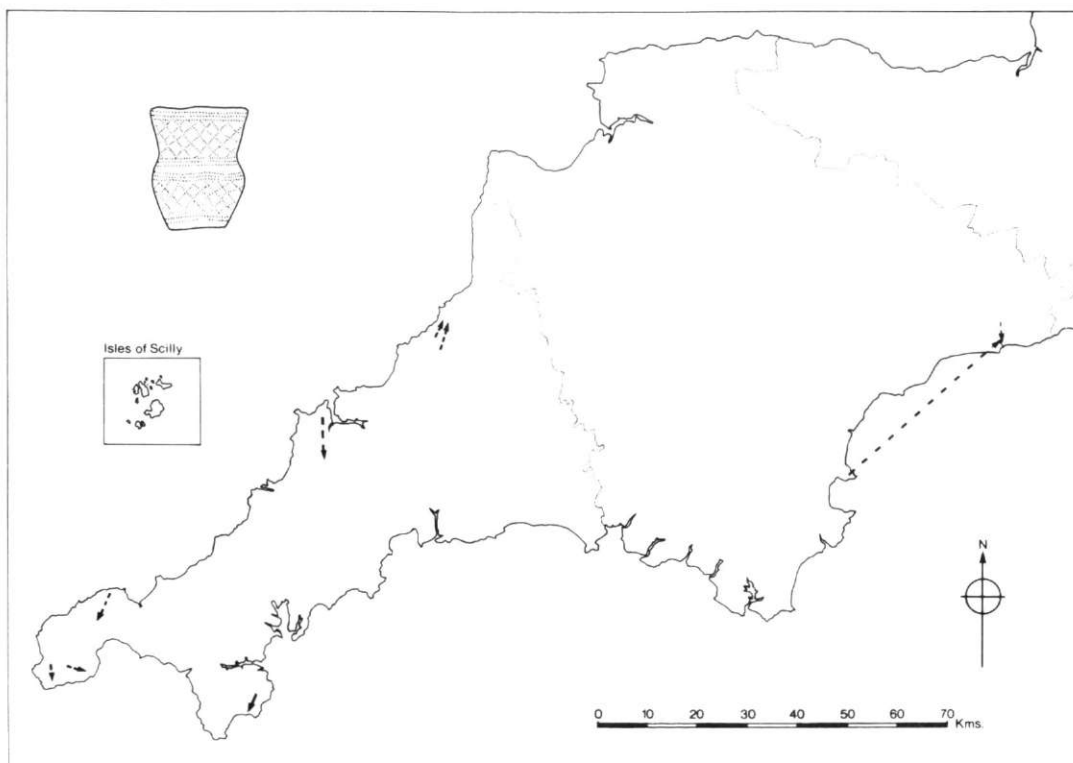


Fig 4

Sources for Beaker pottery production (solid arrows show known source to destination; dashed arrows show nearest likely source to destination)

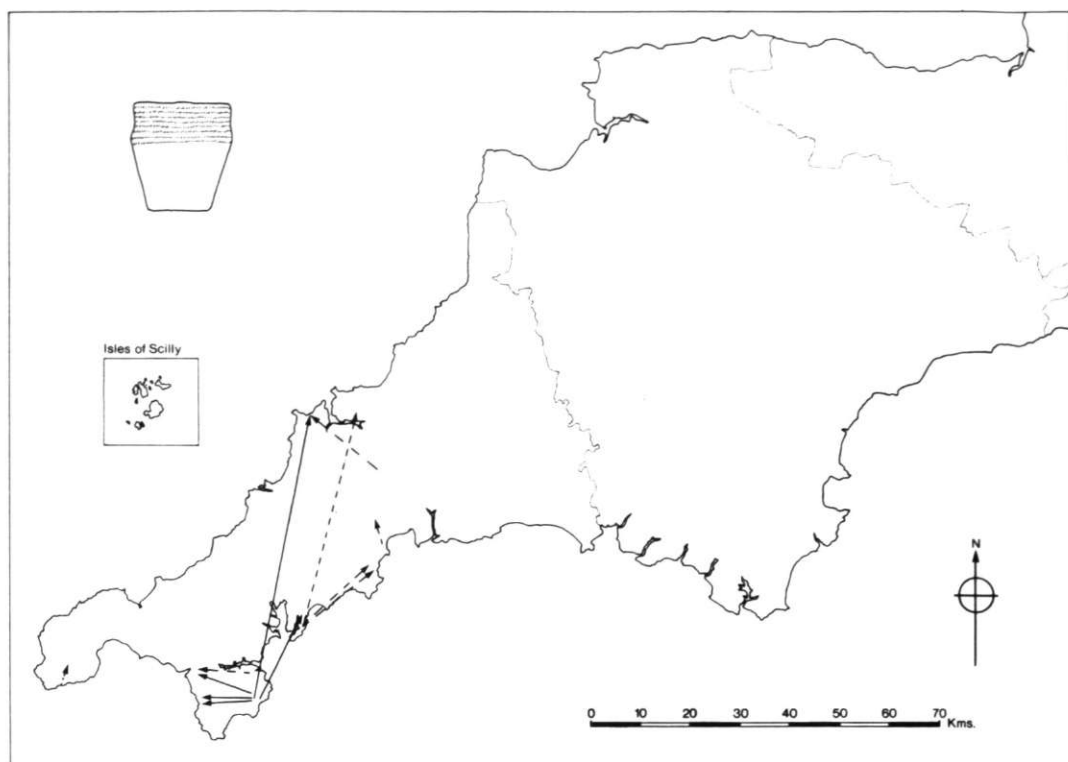


Fig 5

Sources for Food Vessel pottery production (solid arrows show known source to destination; dashed arrows show nearest likely source to destination)

and Cataclews. A Food Vessel and Enlarged Food Vessel from Treworrick and a Food Vessel from Pentire Glaze contained keratophyres; the nearest source is the igneous rock of the Roseland peninsula. The Tregiffian Enlarged Food Vessel (on the West Penwith granite) contained granitic inclusions while the Carminowe II vessel contained fragments of greenstone; in both cases these rocks are located nearby.

The Watch Hill Enlarged Food Vessel, with its inclusions of quartz, pyroxene and lava, had come to the St Austell granite from an igneous source, the nearest a few miles away around the granite margins (Miles, 1975, 17). Further analyses include a probable Enlarged Food Vessel from Poldowrian (Smith & Harris, 1982, 49) and a probable Food Vessel from Carnoon Bank (McAvoy, 1979, 43), both on the Lizard and both of gabbroic clay. Other possible Food Vessel sherds from Treligga (cist F1) contained grog and unidentified stone (Christie, 1985, 109-11).

The reduction of thirteen or fourteen vessels to three or four lithologies, one of them gabbroic, is a considerable contrast (Fig 5) to the Beaker pattern (Fig 4). The gabbroic wares travelled various distances (10, 15, 30 and 60 km) possibly by water across Falmouth Bay and up the River Fal or even around Lands End and up the North Cornish coast. Such localized movement may not be particularly surprising. It does not necessarily indicate large-scale centralized production yet demonstrates a renewed exploitation of the gabbroic clay. Furthermore the thin sections show gabbroic clay within additional components such as serpentine, mica schist and possibly greenstone. This mixing is also found in Collared Urns and Trevisker series pottery and is discussed below.

Collared Urns

The Collared Urns of Cornwall exhibit a similar pattern of production and distribution (Fig 6) to the Food Vessel forms but a greater proportion of those analysed, seven out of eleven, contain gabbroic clay. Five of these had travelled at least 20-50 km, across Mounts' Bay to the Penzance area (Trannack and Tresvenack) or up to the north coast (Connor Downs, Cataclews and Denzell Downs). Granite inclusions in urns from Trannack and Brane suggest local origins on the West Penwith granite. An urn from Pendennis contained greenstone and sediment inclusions, which could be matched with local geology. The other Collared Urn containing greenstone was found on the Normandy Downs on the Isles of Scilly and is an undoubted import to those islands, clear evidence of transport in a sea going vessel. All but one of the thin sections of the gabbroic vessels contained mixed inclusions of other rocks.

There has been little further to add from new discoveries in recent years. A pygmy cup of Collared Urn style from a barrow at Colliford Reservoir contained grog tempering (Ellison, 1984) but no further evidence for its place of manufacture. Another grog tempered miniature collared vessel from Davidstow Moor (Site V(2) P5) also contains a little fine-grained quartz sandstone which can be compared to Upper Devonian rocks in its locality (Williams, in press).

Trevisker Series in Cornwall

In contrast to the Cornish bias in the petrological sampling of Collared Urns (Fig 6) and Food Vessel Urns (Fig 5) within the South-West (Fig 7), samples of Trevisker ware were



Fig 6

Sources for Collared Urns production (solid arrows show known source to destination; dashed arrows show nearest likely source to destination)

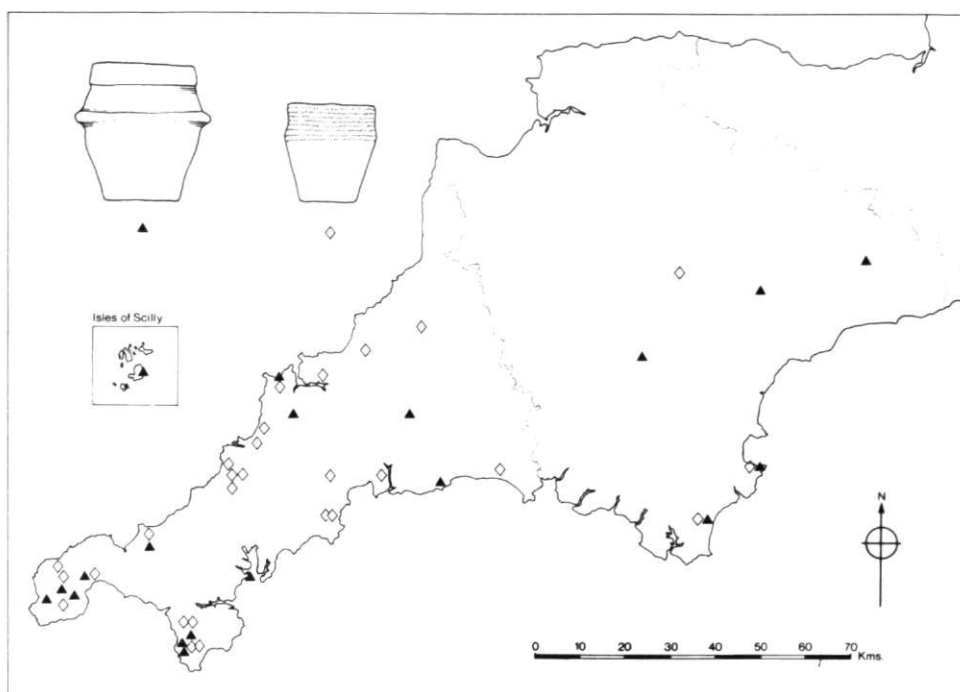


Fig 7
Findspots of Food Vessels (open diamonds) and Collard Urns (filled triangles)

taken from throughout the region. Twenty-four of the thirty thin sectioned Trevisker vessels from non-settlement contents (i.e. excluding Kynance Gate, Gwithian and Trevisker) were made of gabbroic clay, half of them containing mixed inclusions from other rocks. They are distributed from the tip of the Cornish peninsula to Bodmin Moor (Fig 8). The Style 1 large biconical vessels (large paired handles below the shoulder, three cord plait from the rim to the shoulder) from Cornwall are gabbroic with the exception of the Stannon vessel from Cairn 3, composed of a weathered granite (Harris, Hooper and Trudgian, 1984) and Leskeys B8 and B9 (with metamorphic inclusions). Other Trevisker Style vessels of non-gabbroic origin are small and either plain (Chykarne II F3, Carncreis III C12) or cord-decorated (Chykarne I F2, Bosvargus F10). They have inclusions of granite and are poorly manufactured with the exception of Chykarne I. They belong to Styles III and V (though Chykarne I is a small vessel in Style I). There is a small concentration of these granite and greenstone fabrics on the West Penwith peninsula (Fig 10). All the non-gabbroic Trevisker vessels from Cornwall contain inclusions that can be found in their immediate locality, indicating a local mode of production. Fifteen of these twenty-six non-gabbroic vessels come from the margins of the gabbroic distribution area, around 100-150 km from the gabbro outcrop.

The full range of Trevisker Styles 1-6 are found in gabbroic fabrics in funerary contexts. Recent excavation reports have analysed further Trevisker series pottery from Trelan 2 site 41 (Smith, 1984), Higher Polcoverack (Harris & Smyth, 1983), Craig-a-bella (Hartgroves & Harris, 1985), Bodwen, Lanlivery (Harris, 1977, 53), Poldowrian (Smith & Harris, 1982, 58), Carngoon Bank (McAvoy, 1980, 43) Treligga 2 and 5 and Cataclews (Christie, 1985,

109-111), Davidstow Moor Sites 1, 16/23 and 22, Foredown St Cleer (Williams, in press) and possibly Killibury, (Miles, 1977, 107), all identified as being of gabbroic origin, some mixed with other rocks. One of the group of enigmatic miniature pots with cord decoration from the Bronze Age-Iron Age settlement of Nornour on the Isles of Scilly has been identified as probably made of gabbroic clay by Williams (in Butcher, 1978, 73). Their dating is uncertain though they appear to be related to the Trevisker Series.

The Cornish settlement contexts, though of later date than many of the burial groups, provide a similar pattern. All the sherds analysed from Kynance Gate (on the Lizard) were of gabbroic manufacture. Out of seven thin sections from Gwithian, one (Gwithian 422) may not have been gabbroic, and from the Trevisker settlement two sherds (Trevisker 40 and 59) out of 12 were non-gabbroic, respectively granite with metamorphic inclusions and quartzite. The former belonged to Style 3/4 and the latter to Style 5. The entire assemblage from the settlement at Trethellan Farm, near Newquay, appears to be gabbroic or gabbroic admixture (Williams, *pers comm*).

Trevisker Series in Devon

The predominance of the gabbroic fabric in Cornwall is not matched in Devon where only one certain gabbroic identification has been made from a cord decorated sherd at Smallacombe Rocks (Radford, 1952, fig 31.1). The rouletted gabbroic sherd from Shaugh Moor Enclosure 15 is considered to be an Iron Age intrusion and cannot be considered as a Trevisker form (Tomalin, 1982, 231). There are two main fabrics for the Trevisker Series

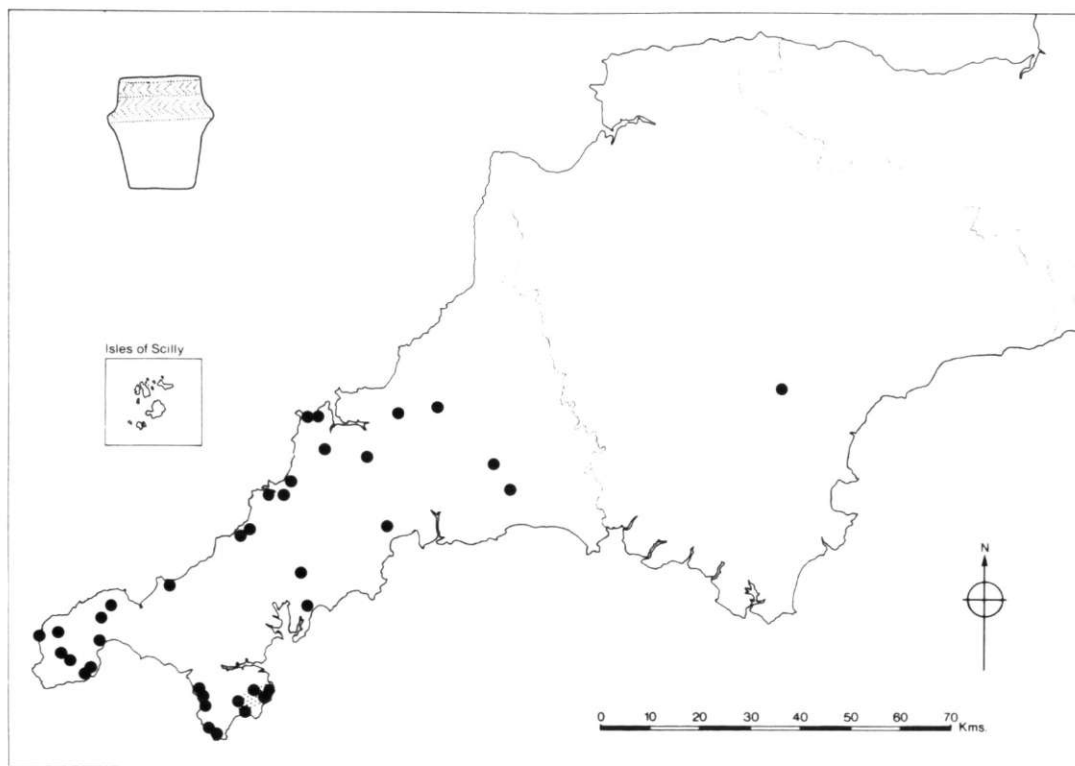


Fig 8
Distribution of Trevisker pottery produced from the gabbroic clay of the Lizard



Fig 9

Distribution of Trevisker pottery containing greenstone inclusions; nearest likely sources are stippled

pottery from Devon, with the exception of granite and sandstone inclusions in sherds from West Dart Head. One of these fabrics contains greenstone inclusions (more than 5 per sq cm) with quartz and felspar and occasional mica, mica schist, amphibole and sediment. It is hypothesized that greenstone filler was added to a granite derived clay which may have been sorted by fluvial action, so losing much of its micaceous component. The other main fabric has a clay matrix with varying densities of rounded quartz grains and inclusions of doleritic and spilitic origin.

The former group of greenstone dominated clays, found at Ash Hole, Kent's Cavern, Dean Moor, Berry Field, Yes Tor Bottom and Raddick Hill (Fig 9), are similar to William's Group II from Shaugh Moor (confined to a single sherd from a post-enclosure context; Wainwright and Smith 1980, 95-6, Balaam *et al*, 1982, 229). The latter group are found in the northern part of the moor at Watern Oake, Whiten Ridge, Smallacombe Rocks, Foales Arishes, Tunhill Rocks, Raddick Hill and Legis Tor (Fig 11). They contain dolerite rather than spilitic in contrast to William's Groups V, VI and VII, the dominant ware of the Biconical Urn assemblage from Shaugh Moor. No certain sources for these greenstone inclusions have been identified but the greenstone outcrops to the west and south-east of the moor in the South Hams seem likely candidates. It is interesting that the post-Trevisker / Deverel-Rimbury assemblage from Dainton in the South Hams is composed of very different fabrics and inclusions except for Howard's Group 1 which contains greenstone additions (Howard, 1980, 38-42).

Since specific sources for these two greenstone fabrics have not yet been found, we do not know whether they were both produced from a single clay source or from many different clay outcrops. It is clear, however, that Trevisker styles (of all forms from 1 to 6) were being produced separately to the gabbroic industry. Biconical styles at Shaugh Moor were also produced at an entirely different source nearby off the moor. There is only one certain import of a Deverel-Rimbury vessel from outside the South-West peninsula; a flint-gritted jar with stabbed incisions from Foales Arrishes (Radford, 1952, fig 13.6).

Plain Wares

Whilst some of the plain vessels are dated by association or by radiocarbon dating to Beaker, Trevisker and even later contexts, a small number from Kerrow, Lelissick, Cape Cornwall, Trevedra, Treryn, Ballowal II and Hannafore cannot be dated any closer than the late third and 2nd Millennium BC. The date of 2910-2140 BC (HAR-3108) (Smith & Harris 1982, 49) for charcoal associated with a plain vessel from Pit 5 at Poldowrian on the Lizard (Harris 1979) can be contrasted with a large plain vessel and associated date of 1406-1022 BC (HAR-2992) for oak charcoal from a pit burial at Rose Ash, Devon.

The fabrics of Ballowal II (greenstone & chert), Hannafore F14 (greenstone and slate) and Kerrow G7 (grog and granite) can all be compared with nearby sources. Only the Treryn F6 vessel may have been a gabbroic form, travelling from the Lizard to Zennor. This pattern of dispersal, probably localized production of these small plain wares, is characteristic of Beaker assemblages and a few of the Trevisker styles.



Fig 10
Distribution of Trevisker pottery containing granitic inclusions

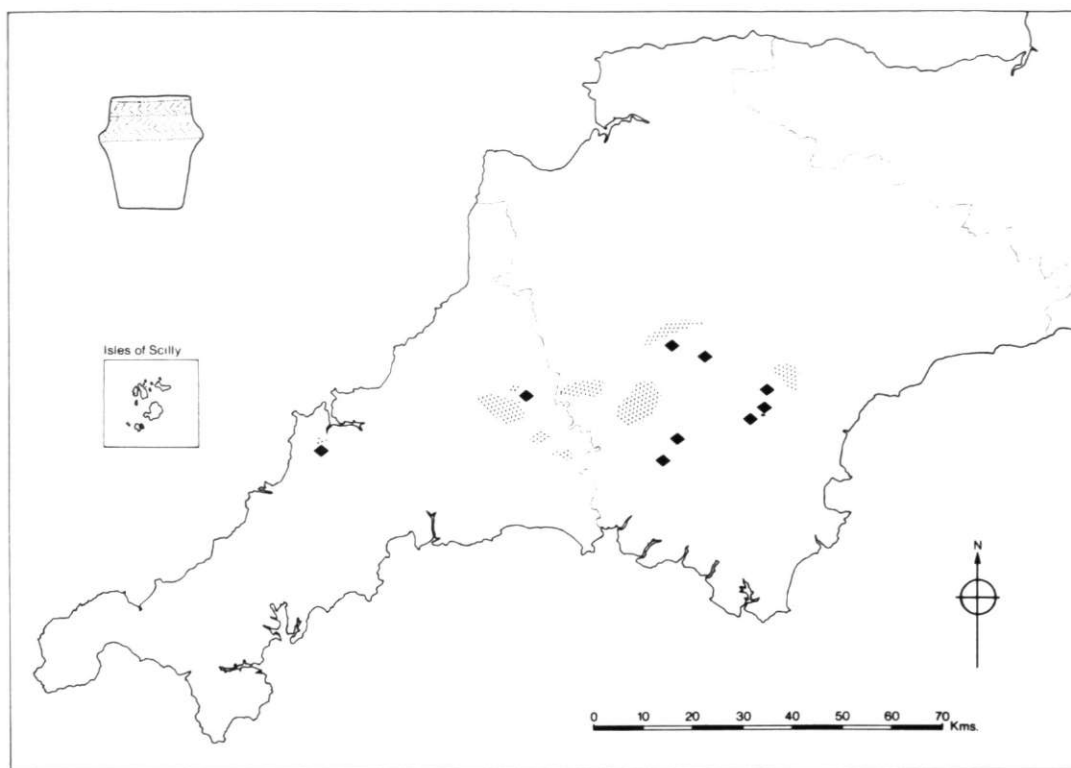


Fig 11

Distribution of Trevisker pottery containing greenstone and rounded quartz inclusions; nearest likely sources are stippled

Mixing of gabbroic clay with other inclusions

The mixing of inclusions such as serpentine, hornblende schist, granite, mica schist, greenstone, hornblende, lava, spilite, sandstone and mica in the gabbroic clay is a phenomenon not found with the Earlier Neolithic Hembury ware or Late Iron Age Glastonbury ware manufactured on the Lizard (Peacock, 1968, 1969 and 1969a). As noted above, it occurs in the Collared Urn, Food Vessel and Trevisker styles. ApSimon and Greenfield suggested that the additional minerals were evidence of local inclusions from the Trevisker area with gabbroic clay which was collected in periodic and seasonal visits to the Lizard (1972, 355-6). They considered a less likely possibility of itinerant potters carrying gabbroic clay to be mixed with inclusions at each settlement visited. Williams has also remarked on the mixing of gabbro, serpentine and sandstone in the Trevisker Series vessel from Craig-a-bella on the Western side of the Lizard, 8 km from the gabbro, suggesting that the sandstone is that of the locality to imply a domestic mode of production (in Hartgroves & Harris 1985, 157).

The transport of raw clay over many miles is documented ethnographically (Blackmore *et al*, 1979; Peacock, 1979) and it is not impossible that inhabitants of settlements like Trevisker and Gwithian might travel the 30 to 50 km by land or even sail around Land's End to collect raw clay. One particular mineral, serpentine, occurs regularly in these fabrics and is restricted to a 20 square mile area on the Lizard adjacent to the gabbro (Flett, 1946, 16). The natural mixing of serpentine and gabbro inclusions must have occurred in the eastern area of the Lizard where the two rocks are found. The sandstone in the Craig-a-bella urn

might just as easily have come from outcrops adjacent to the gabbro, rather than being mixed in at the place where it ended up, five miles to the west. The variety of geologies on the Lizard within a couple of miles of the edge of the gabbro encompasses the whole range of inclusions found within Bronze Age gabbroic clays (Flett, 1946). In contrast to the Neolithic and Iron Age potting traditions, there would appear to have been many settlements over a large area of the eastern Lizard exploiting a variety of clay sources. We may hypothesise that these sources on and around the gabbro had various minerals mixed naturally into the clay. There were also deposits of clay containing only gabbroic minerals. It is unlikely that these other minerals were added to the gabbroic clay by the potters since this clay does not require filler (Peacock, 1968, 146; Quinnell, 1987). The Bronze Age remains that have been identified in the area of the gabbro (Johnson, 1979, fig 5) may well have been involved in pottery manufacture but Smith's recent survey (Smith, 1987) was unable to confirm this. The Lizard survey project unfortunately failed to reveal any ceramic production sites but Bronze Age settlement on the Lizard peninsula was dense (Smith, 1987; Johnson, 1980).

Trevisker styles outside the South-West

ApSimon and Greenfield documented some 29 findspots of Trevisker style vessels outside Devon and Cornwall (1972, 371-375) of which only two, the Style 1 urns from Sturminster Marshall, Dorset and Hardelet, Pas de Calais, are examined in thin section. Both are gabbroic, the former including greenstone and possibly serpentine inclusions. The macroscopic identification of cassiterite in the Style 1 vessel from Winterslow, Wiltshire adds a further case of a South-Western origin for a Wessex find (Tomalin, 1988, 215).

No further microscopic work has been done on the petrology of Trevisker vessels outside Devon and Cornwall but macroscopic analysis of fabrics from stylistically similar vessels such as Lords Down (Dewlish), Upwey (Winterbourne St Martin), the Dorset Downs, Winterslow and Hengistbury Head (Ellison, 1975; Tomalin, *pers comm*; Cunliffe, 1987, 55-6) indicate grog, quartz grains and flint inclusions rather than South-Western mineral suites. One vessel from 'a site near Weymouth' (Dorchester Museum 1885 21.1) is indistinguishable from the Cornish Trevisker Style 1 pots; closer examination would reveal whether it is truly from Cornwall.

The claim for the inclusion of pottery from the Isles of Scilly within the Trevisker series is not upheld by their petrology. Thin sections of pottery from English Island and Knackyboy Cairn showed a granite origin, supported by visual inspection of sherds from Obadiah's Barrow, Porth Hellick, Par Beach, Halangy Porth and the remaining vessels from Knackyboy Cairn. It is most likely that these fabrics are derived from the Scilly granite. Their distinctive horizontal denticulate decoration (though occasionally with horizontal cord impressions) is not normally found on Trevisker pottery (but see Megaw, 1976, fig 4.7) and the group is best considered as a separate regional ceramic style.

The evidence for long distance sea transport of Trevisker pottery along the coast to Dorset (and Wiltshire), across the Channel to northern France and probably across to the Isles of Scilly (the Nornour miniatures) is complemented by the evidence of the Normandy Down Collared Urn on the Isles of Scilly, the distribution of the Armorican 'Vases à Anses' in Wessex (Tomalin, 1988, 208), a Food Vessel Urn from Kervigan Plage, Plomodiern, Finistère, the boat ballast of Bembridge stone in barrow G1 at Puncknowle in Dorset, the Kimmeridge origin of the Caergurle bowl (Tomalin, 1988, 212), the continental metalwork in the wreck at Langdon Bay, Dover, and the possible wreck site at Moor Sand, Salcombe (Muckleroy, 1981). This growing body of evidence indicates that there was a not unimportant sea traffic using the English coasting route from the South-West to the straits of Dover, if not also the direct route run between Finistère and the South-West coast (Muckleroy, 1981,

290). Tomalin interprets the Hadelot pot as part of a boat cargo, but this raises the difficult problem of whether Trevisker pots were carried such distances for their contents or for their use as containers. It is possible that the voyages out of the South-West, on which these pots were brought, were made in the pursuance of fishing, goods exchange, marriage exchange, alliance formation or returning the remains of the dead. It seems more plausible that the large containers found at Hadelot, Sturminster Marshall and Winterslow held shipboard stores of food or fresh water to be consumed on the voyage. The discovery of what might be traces of mead in a small cup from Treligga (Evans in Christie, 1985) raises the possibility that such liquids might also have proved worthwhile contents to transport over some distance. A programme of residue analysis on these long distance exports, as well as other funerary and settlement pottery, might help to resolve this issue.

Exchange and ethnicity

The exchange patterns of Beaker, Collared Urn, Food Vessel and Trevisker pottery are fairly complex; none of these patterns is similar to that of gabbroic Hembury ware from the Neolithic (Peacock, 1969; Hodder, 1974), interpreted as down-the-line prestige gift exchange. A whole series of changing and overlapping processes have to be considered; their passing from hand to hand (either for their contents or for the pots themselves) in down-the-line exchange, redistribution or market distribution or even as transported personal items on a journey or expedition, particularly by sea and river. For Beaker ceramics an interpretation of a domestic mode of production in a wide variety of locations is supported by the evidence. Most of these vessels were certainly made in the South-West and probably did not end up far from the places where they were produced, in contrast to the wide ranging exchange networks found in Britain and Europe for other Beaker associated items such as flintwork, amber, jet, gold and copper (Champion et al, 1984, 163). The decorative styles on Beakers had a wide ranging currency but the pots themselves were of local origin, at least for later Beakers in South-West Britain. Few of the Collared Urns and Food Vessels from the South-West may be considered early forms and it is not possible to see if those contemporary with Beaker fabrics exhibited a similar pattern.

The majority of Food Vessels and Collared Urns are of styles equated with Tomalin's Biconical Urn Horizon or Burgess' Middle and Late phases). Those made of gabbroic clay are largely decorated or possess handles, while those that are plain tend to be made from different clays. This accords well with ApSimon's reappraisal of Trevisker as essentially a local development in the Food Urn, collared Food Urn and cordoned Food Urn series (rather than descending directly from Beaker styles; ApSimon & Greenfield, 1972, 359-64). Indeed, it was amongst the potters of the Lizard that these innovative decorated and handled designs developed, eventually to become a full-blown Trevisker style. By the second half of the 2nd millennium BC there was considerable dependence on a single clay source in Cornwall. Four fifths of the Cornish Trevisker Style vessels were produced from gabbroic clay. Mixing with other inclusions is most satisfactorily explained as production of pottery at a variety of locations on the western part of the Lizard. Whether they were produced by specialized potters living on the clay source or by potters coming seasonally from different settlements in the Cornish peninsula is not known. The high ratios of gabbroic pottery in settlement assemblages many miles away in North Cornwall indicates that substantial quantities were moved long distances. The fall-off of gabbroic Trevisker pots from their Lizard source is of a pattern interpreted as redistributive or marketed (Renfrew, 1977), with a rapid decline from source over 10 km and a considerable rise in numbers between 30 and 50 km away in West Penwith and on the north Cornish coast. It is most likely that this pattern is due more to biases in archaeological retrieval rather than to trading patterns, though water transport to these

areas along the coast and up the River Fal is very likely. The pattern falls within the range for distance-decay indices of various British Iron Age and Roman pottery distributions (Hodder, 1974), and we may infer a zone of large-scale distribution, perhaps as bartered commodities or gifts, extending some 80 km from source. The transport of four, possibly five, vessels between 150 and 500 km indicates a different form of exchange, of a more infrequent nature and perhaps with more emphasis on the contents of the pots.

The manufacture of the same Trevisker style in two different fabrics produced in West and South-East Devon supports the notion of a common stylistic identity shared over some distance and propagated from a number of sources. Curiously there was little geographical overlap between the Cornish gabbro fabrics and the Devon greenstone fabrics.

The transition from universal styles of ceramics and metalwork to expressly regional forms at this time has been noted by Bradley & Hodder (1979) who proposed a change from hierarchical to more territorial relationships. In contrast to Wessex, where ceramic style zones and regional distributions of metalwork styles overlap (Ellison, 1980, Fig 2), the distribution of Trevisker pottery is very closely matched by that of Crediton palstaves (Pearce, 1983, 295-6, fig 6.18) dating several centuries after early Trevisker forms, around 1400-1000 BC. Correspondingly, very few palstaves of other styles are found within the Trevisker Style area (Pearce, 1983, maps 4, 6-9). Ellison has also noted the restricted distributions of Middle Bronze Age Tumulus pins in Cornwall as a further expression of regional identity (Ellison, 1980, fig 2).

The boundary between Trevisker styles and Biconical and Deverel-Rimbury styles is centered on Dartmoor and shows a degree of permeability (Fig 12), as exemplified by the almost exclusively Biconical assemblage from Shaugh Moor (Balaam *et al*, 1982), the Deverel-Rimbury import from Foales Arrishes, the Deverel-Rimbury vessel from Markham and the Biconical Urn from Upton Pyne (Fig 12). The convergence of these two styles with some degree of overlap across the moor suggests a frontier zone rather than a closely demarcated boundary. The construction of a wall around the Shaugh Moor settlement is also an interesting feature in this respect. The archaeological evidence from the Shaugh Moor project would support this hypothesis of a permeable frontier exploited possibly seasonally for its grazing and minerals (Balaam *et al*, 1982, 272-3). It is interesting that no Deverel-Rimbury styles (or imports) passed further west than Dartmoor (the plain vessels ascribed to Deverel-Rimbury by Patchett appear to be accessory vessels within the Trevisker assemblage), yet Trevisker styles and imports certainly passed the other way. This differential permeability hints at a strongly regionalised ethnicity within the South-West, with a rejection of outside styles. Such patterns might be explained by restricted market distribution or by a change from wide-ranging to small-scale interlocking exchange networks accompanying the change from pastoralism to balanced subsistence (Ellison, 1980, 136).

One explanation for these patterns of regionalization of styles may be found in theories of ethnicity and social stress (Hodder, 1979; Blackmore, Braithwaite and Hodder, 1979; Bradley and Hodder, 1979). It is postulated that in situations of resource competition relatively acephalous and decentralized societies may adopt strategies of ethnic or group identity, conformity and solidarity and express these through stylistic devices that distinguish geographically between insiders and outsiders. Although the claim for territorial ethnicity in the case of Late Iron Age Glastonbury ware was a contentious one (Peacock, 1979) there is a clearer case for Trevisker styles. The decline of Wessex and the West of Britain at the end of the Early Bronze Age, and its eclipsing by the Thames area (Bradley, 1984) has been explained by the ecological crisis in marginal settlement, as on Dartmoor, where soil impoverishment and later climatic change had profound effects on local populations (Bradley, 1984, 91-5). The construction of field boundaries in stone on Dartmoor has been dated to

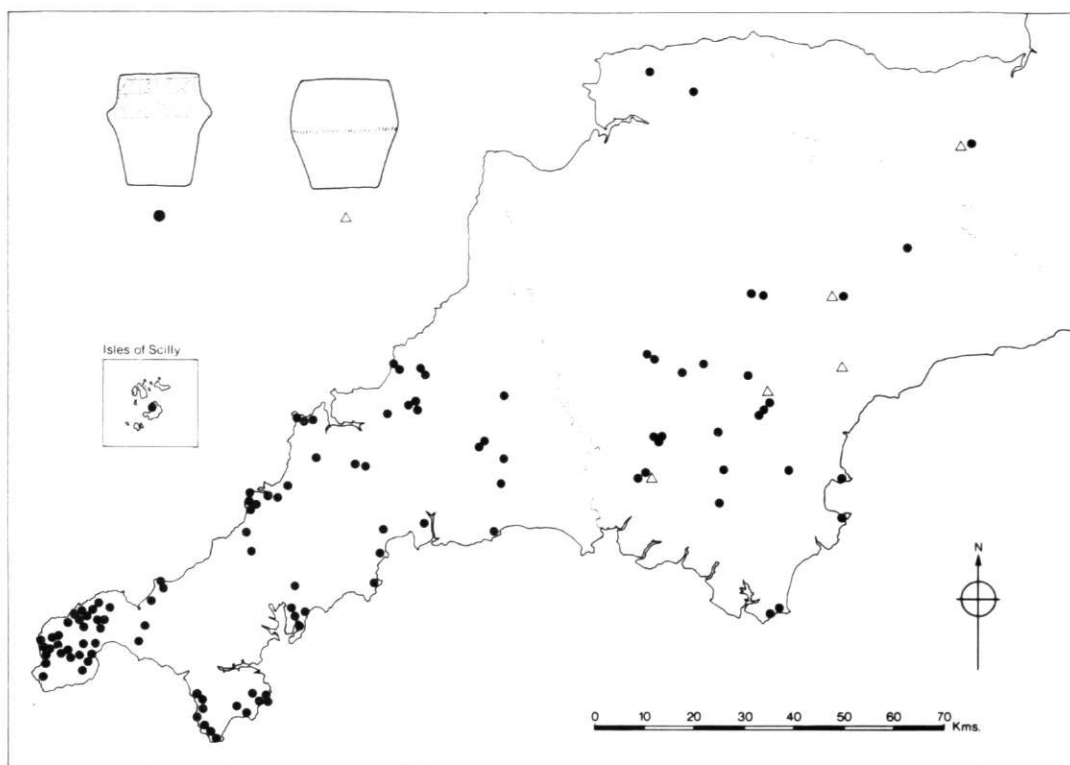


Fig 12

Distribution of Trevisker ware (filled circles) and Wessex Biconicals or Deverel-Rimbury forms (open triangles) in the South-West

1600-1500 BC, following greatly increased clearance after a period of woodland regeneration (Fleming in Todd, 1987). This moorland expansion and its creation of a new land allotment system would have had a major impact on the local population. Internal disputes relating to the demarcation of land might well have been mediated more successfully within a strong regional identity. However, the emergence of the regional Trevisker style considerably predated the stone field systems of the uplands (and possibly even their timber and earth predecessors) and cannot be related to land pressure in the uplands. Of course, we cannot discount a connection with land pressure in the lowlands and a clearance phase in the uplands. The other possible link for the appearance of this distinct regional style is with the opening up of tin and copper exploitation in the South-West. Pearce has suggested that metal exploitation in the region developed in a major way from 2000-1600 BC (Pearce, 1983, 115-124) and Shell has considered that Devon and Cornwall were the major western pole in the European tin supply from the Early Bronze Age (Shell, 1979). More recently, Northover has proposed that the copper deposits of the region were of limited significance to the rest of Britain during the Bronze Age, and that the tin in use was from continental bronze rather than South-Western alluvial deposits (Northover, 1984). However, he does concede that the first part of the Middle Bronze Age was one period when the metal needs of southern Britain were satisfied from the British metaliferous zones. It could be suggested that an influx of metal seekers and traders to the South-West created the need for a regional identity. However, the emergence of the Trevisker style appears to have predated this phenomenon as well.

Recommendations

We may gain further substantial insights into the social significance of these ceramics through systematic programmes of chemical residue analyses of vessel contents, recovery of well-preserved depositional contexts within settlements and investigation of production areas, should they survive.

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Table 1 Minerals identified in pottery fabric by microscopic examination

B = Beaker, Bi = Biconical, C = Collared Urn, D = Deverval-Rimbury

F = Food Vessel, P = Plain, S = Scillonian, T = Trevisker

Vessel Type*	Slide Number		Mica	Quartz	Felspar	Amphibole	Gabbro	Granite	Sediment	Mica Schist	Hornblende Schist	Chert	Serpentine	Metamorphic	Greenstone	Keratophyre	Spilite	Pyroxene	Tourmaline	
F	1	Pentire Glaze, E1	*									?				*				Pillow Lava
T	2	Tunhill Rocks Hut 2 Radford, Fig 11	*												*					Greenstone + Quartz
D	3	Foales Arrishes Radford, Fig 13, 6	*																	Flint Gritted
T	4	Foales Arrishes Radford, Fig 13, 4	*												*					Greenstone + Quartz
T	5	Whiten Ridge Radford, Fig 10, 3	*												*					Greenstone + Quartz
	6	Sancreed Beacon	*	*	*			*												Granite
Bi	7	Upton Pyne D=1		*																Unidentifiable
T	8	Leskeys II, B/8	*	*										*						Metamorphic
T	9	Leskeys I B 9	*	*										*						Metamorphic – Calc Flintas
T	10	Bussow, F11	*	*	*															Gabbro
T	11	Boscawen-Un, C10		*	*								*							Gabbro + Serpentine
T	12	Hustyn, B12	*	*	*			*					*							Gabbro + Serpentine + Granite
T	13	Conquer Down, G4	*	*	*	*	*	*										*	*	Gabbro + Granite
T	14	Rosecliston	*	*	*							?	*							Gabbro + Serpentine
S	15	English Island	*	*	*			*												Granite
T	16	Trebarveth	*	*	*															Gabbro
T	17	Pendennis (Lug)	*	*	*													?		Gabbro
S	18	Knackyboy	*	*	*			*												Granite
T	19	Kynance Gate, F3/RW		*	*	*					*									Gabbro + Hornblende Schist
T	20	Kynance Gate 18		*	*	*														Gabbro
T	21	Kynance Gate 15		*	*	*							*							Gabbro + Serpentine
T	22	Kynance Gate Thomas, Fig 1,1	?	*	*	*							?							Gabbro
T	23	Kynance Gate Thomas, Fig 1,8		*	*	*														Gabbro
T	24	Kynance Gate F3/PW/15			*				?				*							Serpentine + Gabbro?
T	25	Kynance Gate		*	*	*														Gabbro

Vessel Type*	Slide Number		Mica	Quartz	Felspar	Amphibole	Gabbro	Granite	Sediment	Mica Schist	Hornblende Schist	Chert	Serpentine	Metamorphic	Greenstone	Keratophyre	Spille	Pyroxene	Tourmaline	
T	26	Kynance Gate F3/H2/15		*	*	*														Gabbro
T	27	Kynance Gate F3/9W/15		*	*	*				?			*							Gabbro + Serpentine
T	28	Kynance Gate		*	*	*	*													Gabbro
T	29	Kynance Reconstructed Pot		*	*	*	*				*									Gabbro + Hornblende Schist
F	30	Trethem, E15		*	*	*	*													Gabbro
F	31	Colroger II, E4		*	*	*														Gabbro
F	32	Colroger I, E3		*	*	*									?					Gabbro + Greenstone
F	33	Cataclews, E12		*	*	*				*										Gabbro + Mica Schist
F	34	Carnkief II, E14		*	?								*							Serpentine
F	35	Treworricks II, E2		*	*					?						*				Keratophyre
F	36	Treworricks I, E1		*	*				?	*			?			*				Keratophyre + Mica Schist
T	37	Gwallon Downs, G5		*	*	*			?						*					Gabbro? + Greenstone
	38	Carminowe I		*	*	*	*			?			*							Gabbro + Serpentine
F	39	Carminowe II				*								*			*	*		Pillow Lava + Metamorphic
T	40	Tregeseal C2		*	*	*							*							Gabbro + Serpentine
T	41	Chykarne I, F2			*	*									*			*		Greenstone
P	42	Ballawal II, G9	*	*	*	*						*			*					Greenstone
T	43	Merrow, Gerrans, F4		*	*	?				*										Mica Schist
T	44	Sturminster Marshall		*	*	*							?		*					Gabbro + Greenstone
F	45	Carnkief I, D13			*	*							*							Serpentine + Gabbro
T	46	Gwithian, 380		*	*	*				*										Gabbro + Mica Schist
T	47	Gwithian XV 5		*	*	*								*	*					Gabbro + Greenstone
T	48	Gwithian XX, 62		*	*	*														Gabbro
T	49	Gwithian X, 811		*	*	*														Gabbro
T	50	Gwithian X, 819		*	*	*							*		*					Gabbro + Greenstone
T	51	Gwithian X, 839		*	*	*	*								*					Gabbro + Greenstone
T	52	Gwithian 422		*	*	*									*					Greenstone + Gabbro?
T	53	Kynance Gate		*	*	*							*							Gabbro + Serpentine
T	54	Tredarvah			*	*														Gabbro?
T	55	Ballawal I, C11		*	*	*				*						*				Gabbro + Mica Schist + Lava
T	56	Bosvargus, F10	*	*	*												*		*	Granite + Lava
T	57	Trevisker, 17		*	*	*									*					Greenstone + Gabbro?
C	58	Tresvennack II, D3a			*	*	*									*			*	Gabbro + Lava
T	59	Menheniot, B15			*	*	*													Gabbro

Vessel Type*	Slide Number		Mica	Quartz	Felspar	Amphibole	Gabbro	Granite	Sediment	Mica Schist	Hornblende Schist	Chert	Serpentine	Metamorphic	Greenstone	Keratophyre	Spilite	Pyroxene	Tourmaline
T	60	The Dean St Keverne, A5			*	*	*												Gabbro
T	61	Rosemullion		*	*	*	*											?	Gabbro
T	62	Hardelot		*	*	*	*												Gabbro
T	63	Hardelot		*	*	*	*												Gabbro
T	64	Gunwalloe II, F8		*	*	*							*		*				Gabbro + Serpentine + Greenstone
T	65	Gunwalloe III, F9			*	*			*				*						Gabbro + Serpentine + Sediment
T	66	Harlyn III, B2		*	*	*	*												Gabbro
P	67	Chykarne II, F3	*	*	*													*	Granite
T	68	Boleigh, B5		*	*	*	*												Gabbro + Hornblende
T	69	Place, Fowey, G3			*	*												*	Gabbro
T	70	Glendorgal, F5		*	*	*							?					*	Gabbro
T	71	Boscregan		*	*	?												*	Granite
T	72	Ash Hole ApSimon, Fig 2,6		*	*										*				Greenstone + ?
T	73	Trevisker Style IV		*	*	*	?						*						Gabbro + Serpentine
T	74	Trevisker Style I		*	*	*	*						*						Gabbro + Serpentine
T	75	Trevisker Style II		*	*	*	*						*					*	Gabbro + Serpentine
T	76	Trevisker 46		*	*	*	*												Gabbro
T	77	Trevisker 37		*	*	*	*							?	*				Gabbro + Greenstone
T	78	Trevisker 59		*	*	*									?				Quartz + ?
T	79	Smallacombe Rocks Radford, Fig 13.2		*													*		Lava + Quartz
T	80	Smallacombe Rocks Fig 13.1		*	*	*													Gabbro
P	81	Ligger Point, F23		*	*	*	*												Gabbro
T	82	Crig-a-Mennis Fig 4.2		*	*	*													Gabbro
P	83	Crig-a-Mennis Fig 4.3		*	*	*	*												Gabbro
T	84	Crig-a-Mennis Fig 4.1		*	*	*					*								Gabbro + Hornblende Schist
T	85	Trevelloe I			*	*	*												Gabbro
P	86	Hannafore		*	*									*	*				Greenstone + Slate
T	87	Trevelloe II			*	*											?		Gabbro
P	88	Treryn, F6		*	*	*													Gabbro?
T	89	Angrouse, B7			*	*							*						Gabbro + Serpentine
T	90	Harlyn IV, B17		*	*	*									*				Gabbro? + Greenstone
T	91	Ash Hole ApSimon, Fig 2.4		*	*	*				*					?				Greenstone + Mica Schist + ?

Vessel Type*	Slide Number		Mica	Quartz	Felspar	Amphibole	Gabbro	Granite	Sediment	Mica Schist	Hornblende Schist	Chert	Serpentine	Metamorphic	Greenstone	Keratophyre	Spilite	Pyroxene	Tourmaline	
T 92	Ash Hole ApSimon, Fig 2.11		*	*	*	*									*			*		Greenstone + ?
T 93	Ash Hole ApSimon, Fig 2.7		*	*	*	*									*			*		Greenstone + ?
T 94	Ash Hole ApSimon, Fig 2.9			*	*	*									*					Greenstone + ?
T 95	Ash Hole ApSimon, Fig 2.2		*	*	*										*					Greenstone + ?
T 96	Ash Hole Body Sherd		*	*	*										*					Greenstone + ?
T 97	Ash Hole ApSimon, Fig 2.3			*	*	*									*			*		Greenstone + ?
T 98	Ash Hole ApSimon, Fig 2.5			*	*	*									?					Greenstone + ?
T 99	Ash Hole ApSimon, Fig 1																			Unidentifiable
T 100	Kestor, Fig 12.1			*	*	*									*			*		Greenstone + ?
T 101	Kestor, Fig 12.2			*	*	*									*					Greenstone + ?
T 102	Yestor, Hut 2			*	*	*									*			*		Greenstone + ?
T 103	Yestor Radford Pl VII, No 9			*	*	*									*					Greenstone + ?
T 104	Yestor Style II		*	*	*										*			*		Greenstone + ?
T 105	Raddick Hill Radford 10.15		*	*	*										*			*		Greenstone + ?
T 106	Raddick Hill Hut 10		*	*	*	*									*			*		Greenstone + ?
T 107	Raddick Hill Hut 9			*											*					Greenstone + Quartz
T 108	Bellafield Gate																			Unidentifiable
T 109	Watn Oke			*																Quartz+Unidentifiable
T 110	Watn Oke, 68 C			*										*	*					Greenstone + Metamorphic + Quartz
T 111	Watn Oke, 69 C			*					*						*					Greenstone + Sediment + Quartz
T 112	Legis Tor Radford 10.2			*											*					Greenstone + Quartz
T 113	Legis Tor Radford 10.11			*											*					Greenstone + Quartz
T 114	Legis Tor, Hut 11		*	*											*					Greenstone + Quartz
T 115	West Dart Head		*	*	*				*											Sandstone + Granite
T 116	West Dart Head		*	*	*	*			*	*										Sandstone + Granite

Vessel Type*	Slide Number		Mica	Quartz	Felspar	Amphibole	Gabbro	Granite	Sediment	Mica Schist	Hornblende Schist	Chert	Serpentine	Metamorphic	Greenstone	Keratophyre	Spillite	Pyroxene	Tourmaline
T 117	Berry Field Radford 10.14			*	*	*									*				Greenstone + ?
T 118	Trevisker 21			*	*	*													Gabbro
T 119	Trevisker 25			*	*	*				*									Gabbro + Mica Schist
T 120	Trevisker 1			*	*	*								*					Gabbro + Greenstone
T 121	Trevisker 12			*	*	*			*				?		?				Gabbro + Sediment
T 122	Trevisker 6			*	*	*	*												Gabbro + Grog
T 123	Trevisker 40		*	*	*									*					Gabbro+Metamorphic
T 124	Trevisker 47		*	*	*					*									Granite
T 125	Trevisker 48			*	*	*	*								*				Greenstone + Gabbro
T 126	Trevisker 41			*	*	*									*				Greenstone + Gabbro?
T 127	Trevisker 15			*	*														Unidentifiable
T 128	Trevisker 30		*	*	*	*								*					Gabbro+Serpentine + Mica
T 129	Trevisker 10		*	*	*	*	*			*									Gabbro + Mica Schist
T 130	Trevisker 45			*	*	*	*						*		?				Gabbro + Serpentine
T 131	Trevisker 53			*	*	*													Gabbro?
T 132	Trevisker 50			*	*	*							*						Gabbro + Serpentine
T 133	Trevisker 2 A			*	*	*	*		*										Gabbro + Sediment
T 134	Trevisker 72			*	*	*									?				Gabbro
T 135	Trevisker 56			*	*	*							*				*		Gabbro + Serpentine
T 136	Trevisker 54			*	*	*								*					Gabbro+Metamorphic
T 137	Trevisker 70			*	*	*	*							*					Gabbro+Metasediment
T 138	Trevisker 32			*	*	*							*						Gabbro + Serpentine
T 139	Trevisker 31			*	*	*	*		?										Gabbro
T 140	Trevisker 36		*	*	*	*	*												Gabbro + Mica
T 141	Trevisker 26		*	*	*									*					Metasediment+Granite
T 142	Trevisker 2 C			*	*	*							*						Gabbro + Serpentine
T 143	Trevisker 18		*	*	*									*					Metasediment+Granite
	144 Princetown Rifle Range		*	*	*			*						*					Granite+Metasediment
T 145	Tresawsen, F1			*	*	*						?							Gabbro ?
P 146	Kerrow, G7				*														Grog
	147 Tresawsen Merthyr			*	*	*						?							Gabbro ?
T 148	Paul, B4				*	*	*												Gabbro
P 149	Carncreis, B21		*	*	*			*											Granite
	150 Clahar Gardens, G14			*	*	*							*						Gabbro + Serpentine
T 151	Boskednan, C7			*										*					Metasediment
T 152	Carn Creis III, C12		*	*	*												*		Granite Sand
	153 Colroger III, F18			*	*	*													Gabbro ?

Vessel Type*	Slide Number		Mica	Quartz	Felspar	Amphibole	Gabbro	Granite	Sediment	Mica Schist	Hornblende Schist	Chert	Serpentine	Metamorphic	Greenstone	Keratophyre	Spilite	Pyroxene	Tourmaline	
B 154	Tregiffian Beaker		*	*	*			*										*		Granite
B 155	Tregiffian Beaker		*	*	*			*										*		Granite
P 156	Creen, F20			*																Quartz
B 157	Trevedra Beaker		*	*	*															Granite Sand
B 158	Lelissick			*	*	*								*						Metasediment
B 159	Denzell Downs, A12			*	*	*						*			?					Gabbro ? + Chert
B 160	Praa Sands, A3			*	*	*												*		Quartz Sand
B 161	Try Beaker			*	*	*			*						?					Sediment+Greenstone?
C 162	Trannack, D6		*	*	*	*		*												Granite
C 163	Trannack, D5			*	*	*				*										Gabbro + Mica Schist
C 164	Tresvennack I, D3				*	*														Gabbro
C 165	Connor Downs, D9			*	*	*	*		*											Gabbro + Sediment
C 166	Connor Downs, D9			*	*	*	*		*											Gabbro + Sediment
C 167	Cataclews, D8				*								*							Serpentine + Gabbro?
C 168	Pendennis, D12								*					*						Greenstone + Sediment
C 169	Bochym, D11			*	*	*	*	*												Gabbro
C 170	Brane, D7		*	*	*	?		*												Granite
C 171	Denzell Downs, D1				*	*	?		?	*							*			Gabbro+Mica Schist + Spilite + ?
T 172	Dean Moor Fox Fig 21, 1			*	*	*									*					Greenstone + ?
T 173	Dean Moor Fox Fig 21, 1			*	*	*									*					Greenstone + ?
T 174	Dean Moor Fox Fig 20.3			*	*	*									*					Greenstone + ?
T 175	Dean Moor Fox Fig 20.4			*	*	*									*					Unidentifiable
T 176	Dean Moor Fox Fig 20.6			*	*	*									*					Greenstone + ?
T 177	Dean Moor Fox Fig 20.7			*	*	*									*					Greenstone + ?
T 178	Dean Moor Fox Fig 24.14			*	*	*									*					Greenstone + ?
T 179	Dean Moor Body Sherd, H1				*	*									*					Greenstone + ?
C 180	Normandy Down Collard Urn														*					Greenstone
T 181	Clahar Gardens, C6			*	*	*							*							Gabbro + Serpentine
T 182	Tredinney, C5			*	*	*														Gabbro
F 183	Carminowe II			*	*	*									*					Greenstone
C 184	Mullion, D4		*	*	*	*	*						*		?					Gabbro + Serpentine + Mica
T 186	Kynance Gate			*	*	*					*		*							Gabbro + Hornblende Schist + Serpentine

The Possible Use of West Penwith Menhirs as Boundary Markers

FRANCES PETERS

Introduction

In this study menhirs are defined as single or paired standing stones. There are a large number of these in West Penwith, but apart from stone circles, surveys in this area suggest that there are no groups with more than two uprights (Russell, 1971, 31–5; Barnatt, 1982, 95–102, 226–36, 259–60). Burials have been found at the foot of some of these stones, dating to the Bronze Age (Russell and Pool, 1964, 15–26; Miles and Miles, 1971, 5–31; Russell, 1971, 31–5; Barnatt, 1982, 96–7, 226–7, 259). Similar standing stones are found in most upland parts of the British Isles, but the high concentration in West Penwith is unusual.

A variety of prehistoric uses have been suggested for menhirs. The excavated evidence suggests that some of them may have marked burial places. G. Williams (1988), however, has recently reviewed the information about standing stones from Wales and south-west England. His study concentrated on the excavated evidence and the relationship of menhirs with contemporary ceremonial monuments. He concluded that the standing stones were features of overwhelming ritual significance, that burial was one aspect of some ceremonial activity and that they served possibly as the cult centres of small social groups (Williams, 1988, 54–60).

Williams (1988, 48–53) also pointed out that menhirs were often part of multiphase sites and in some cases were secondary to other features. It is possible that in looking at the position of standing stones the present study is actually considering the placing of earlier pre-menhir features but as, without extensive excavation, these stones are all that is left in most cases, the study concentrates on them.

Rose (1980) describes Welsh menhirs as lowland features related to trackways and water. Barnatt (1982, 100–1) suggests too that the Cornish menhirs may have been connected to tracks. Menhirs could also have been used as boundary markers (Burl 1976, 12). Topography may be one important factor in this theory. Burl (1976, 126) comments that many menhirs in the south of the area stand at the head of little river valleys, near the edge of the downs, as if they had indeed acted as boundary markers. Bird (1972) has suggested that standing stones in Cardiganshire were placed on the edges of a particular type of soil to mark the edge of land belonging to a particular territory.

Analysis

This paper examines the theory that menhirs were used to mark boundaries. Further details are provided by an earlier study by the author (Peters, 1983). Two main sources of information provided the data for that work; the detailed survey of West Penwith produced by Russell (1971, 31–5) and Barnatt's account of the prehistoric ceremonial monuments of Cornwall (1982, 95–102, 226–36, 259–60).

These sources provided the sample used in the paper, but seven stones were excluded, either because they formed part of a wall or because they had been shaped by modern tools. This left a total of 95 menhirs, of which 43 are still standing. 25 of these are over 2.25 m high, and thus are unlikely to be recent features of the landscape. Of the 52 menhirs for which only documentary references exist, 24 were recorded with various degrees of accuracy, and the rest were suggested by field names.

This study considered the menhirs in two groups, the northern menhirs and the southern menhirs, and within each group a further distinction was made. Certain menhirs, now destroyed, and known as 'test menhirs', were separated from the other stones. By excluding these from the original study, and then later comparing the information about them with the main interpretation, it was hoped to provide some indication of the validity of the initial conclusions. In the southern part of the area all the destroyed menhirs were used for this purpose. In the north menhirs which lacked an eight figure grid reference or which were imprecisely located were used in the same way. This exercise was also useful in showing whether part of the distribution of monuments has been removed by local farming. In fact it suggested that this had not been the case.

A major concern of this study was to determine whether the menhirs were intended to be seen from a distance. Unless that was so they would have been ineffective as boundaries. Certainly it is very easy to pick them out among the small hills in the southern part of West Penwith. This study suggested that the menhirs would have been highly visible from a distance, as they tended to lie on the upper parts of the slopes, around the mapped valleys.

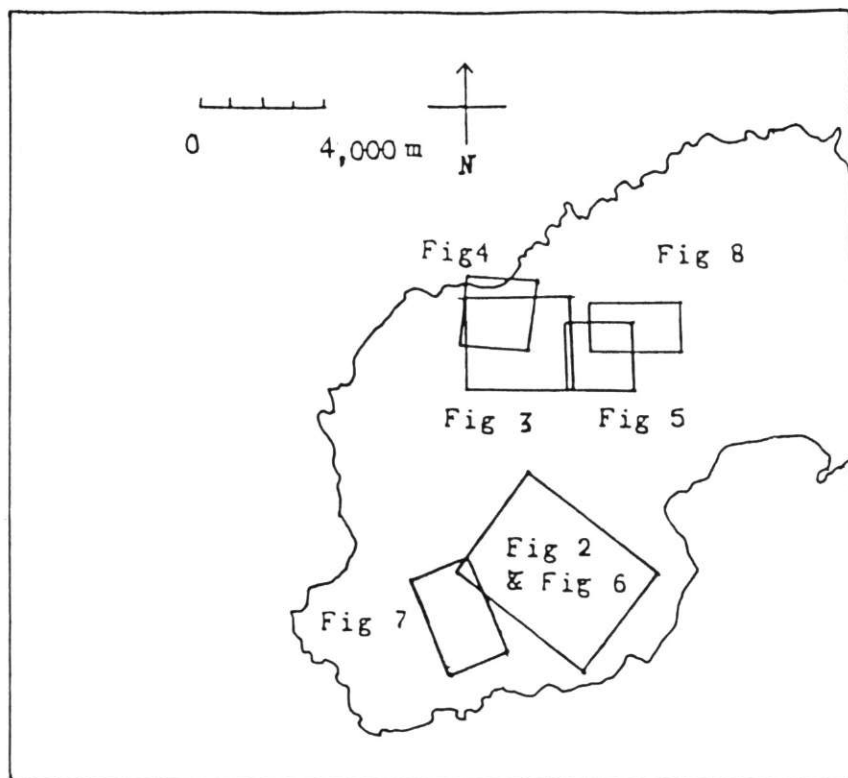


Fig 1
Location of figures 2-8 in West Penwith

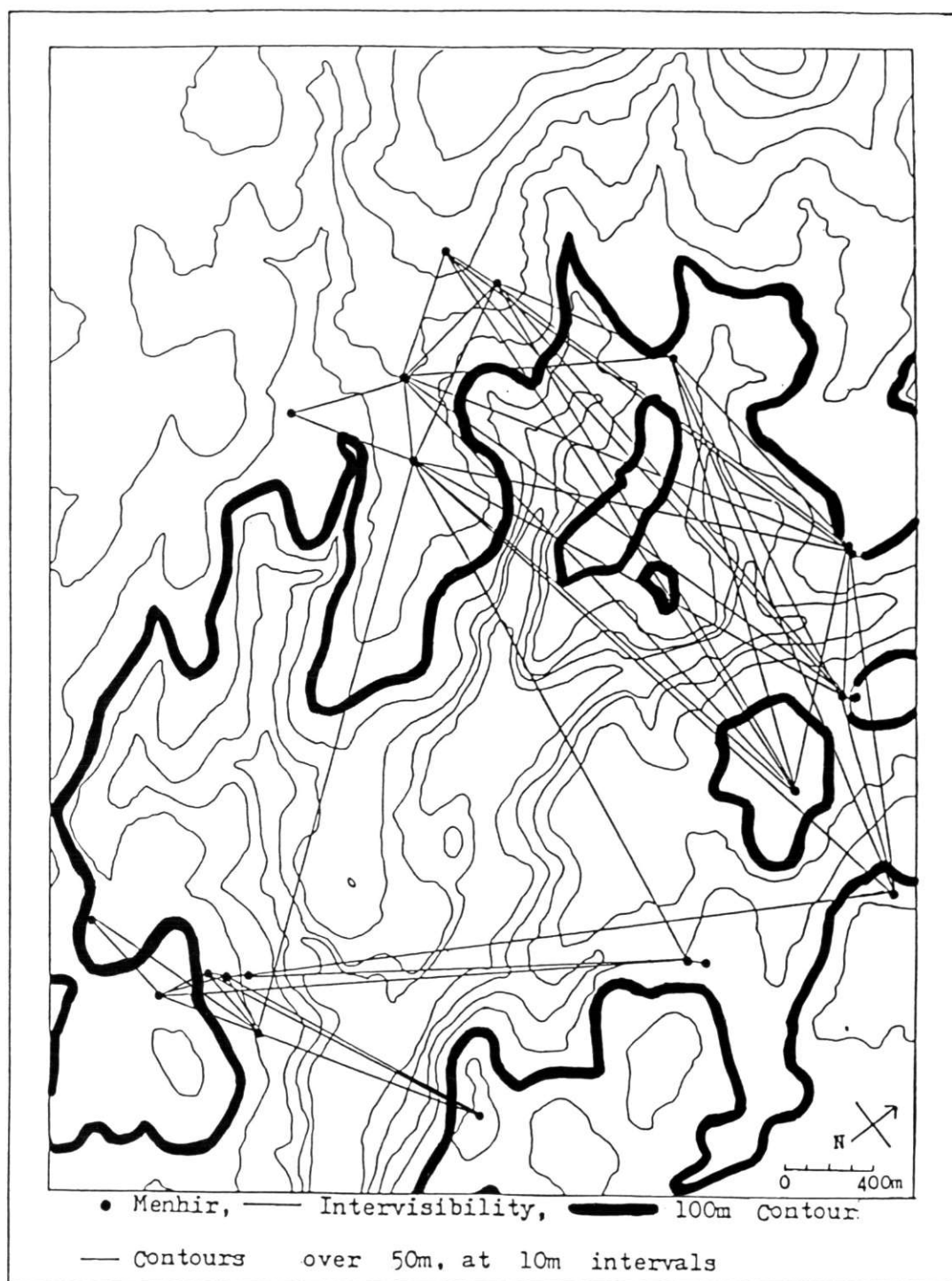


Fig 2
 The Lamorna valley system

These results seem to be different from the conclusions of the Welsh study (Roese, 1980). This may be due to the different methods used in the two surveys. This study looked at the relationship of the menhirs to slope. The Welsh study seems to have considered the positioning of the menhirs within larger blocks of the landscape. It is possible that there were different ways of using menhirs in different areas.

Within each local group the menhirs are clustered at standard heights above sea level (Figs 2–5). In the south, in the Lamorna system (Fig 2), the menhirs are located around the 100 m contour. In the north the Boswens system (Fig 3) focuses on the 190 m contour. The Trevowan system (Fig 4) is found on the 170 m contour except where the valley is truncated by cliffs. In the Carfury system (Fig 5) the menhirs also occur around the 170 m contour. In fact all northern menhirs seem to be located at approximately the same height.

This topographic position could be explained if these menhirs were situated on an ecological boundary. If so, they might mark the upper limit of the better land in the valleys.

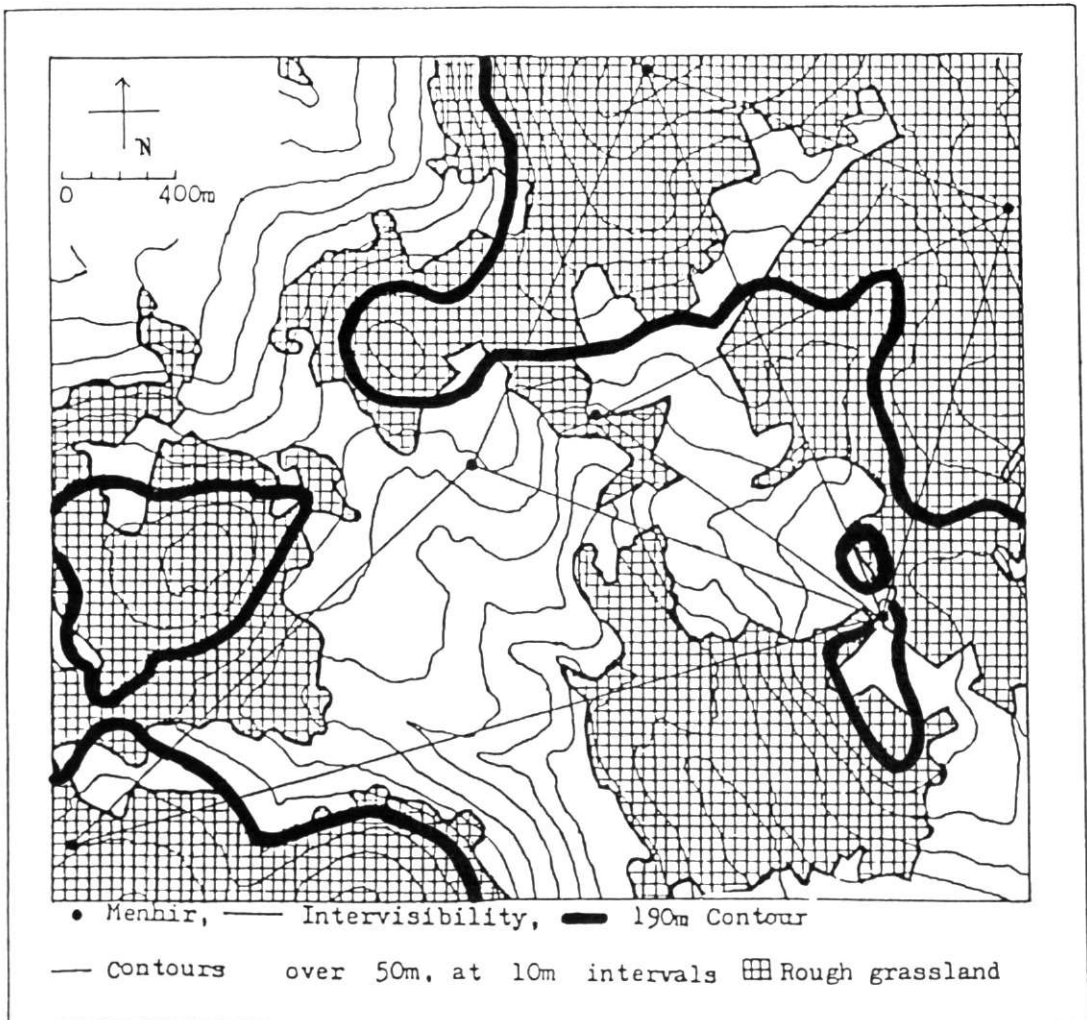
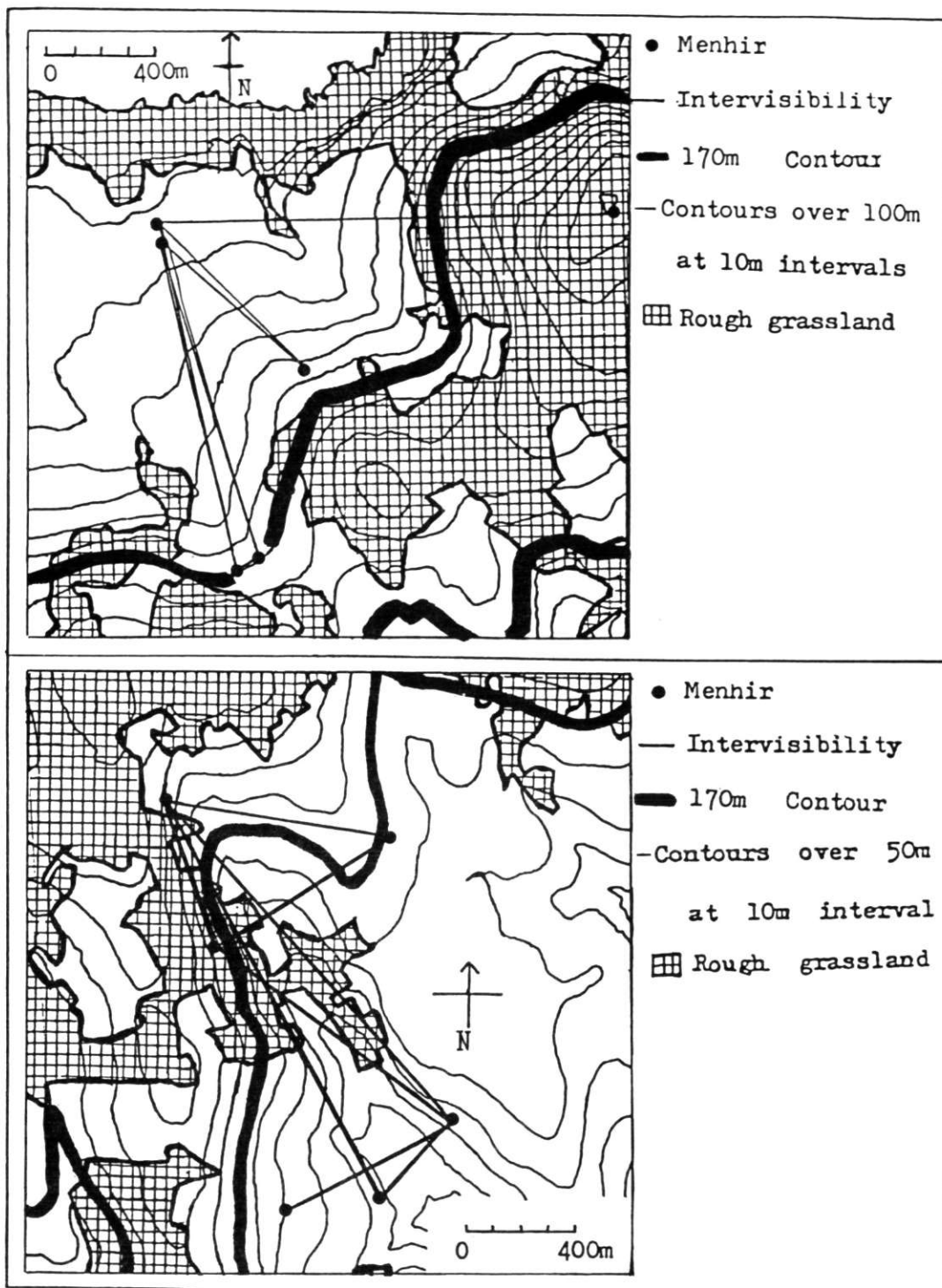


Fig 3
The Boswens system



Figs 4 and 5
The Trevowan system (above) and the Carfury system (below)

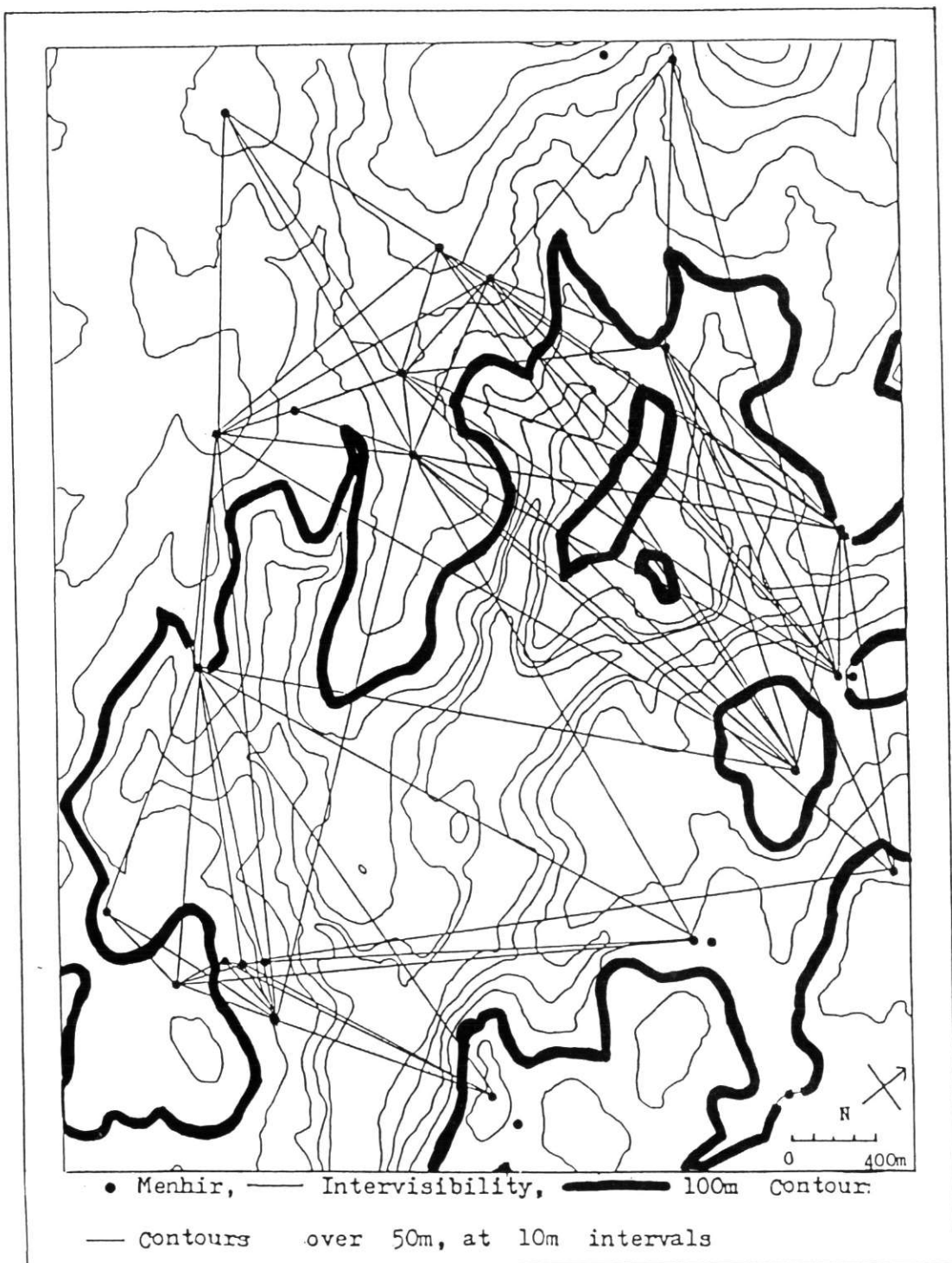


Fig 6
 The Lamorna valley system with test menhirs

In the northern part of West Penwith the modern boundary between farmland in the valley and the moorland on the hills closely corresponds to the position of extant menhirs (Figs 3–5) and it seems possible that these monuments marked a similar division in past land use.

The menhirs may have been used to mark the boundary or they may have been attached to settlements which lay on the boundary. This may be a result of the boundary being a favoured area for settlement, as ecological boundaries are a classic position for settlement (Williams, 1988, 10, 12). Alternatively the positioning of the menhirs may be due to a possible tendency for communities in marginal areas to build more elaborate ceremonial monuments than communities in more favourable areas. These different purposes are not necessarily mutually exclusive.

This characteristic pattern extended to the “test menhirs”, which appear on the same contours as the other examples. To the south, the Lamorna system, was the only area from the first study to contain large numbers of these “test menhirs” (Fig 6), and here three standing stones appeared in the gaps between the surviving monuments around the edge of the valley, and two others were located on the outer edge of the system. As well as strengthening the evidence for southern menhirs being located at the same height above sea level, the positions of these “test menhirs” suggest that destruction by farmers may not have seriously distorted the distribution of menhirs.

The “test menhirs” drew attention to two new areas (Figs 7 and 8). They seem to characterise a new valley system in the south (Fig 7), where the monuments cluster around the 100 m contour. In the original southern system (Fig 6) the menhirs stand on the same contour and it seems possible that this was an important ecological boundary for the southern part of the area.

There was another northern system round Mulfra (Fig 8) but it may be partly destroyed by the development of Penzance, which lies to the south. The menhirs in this system tend to lie on the 150 m contour. The modern land-use boundary lies very close to this contour as it does with other systems to the north of this region.

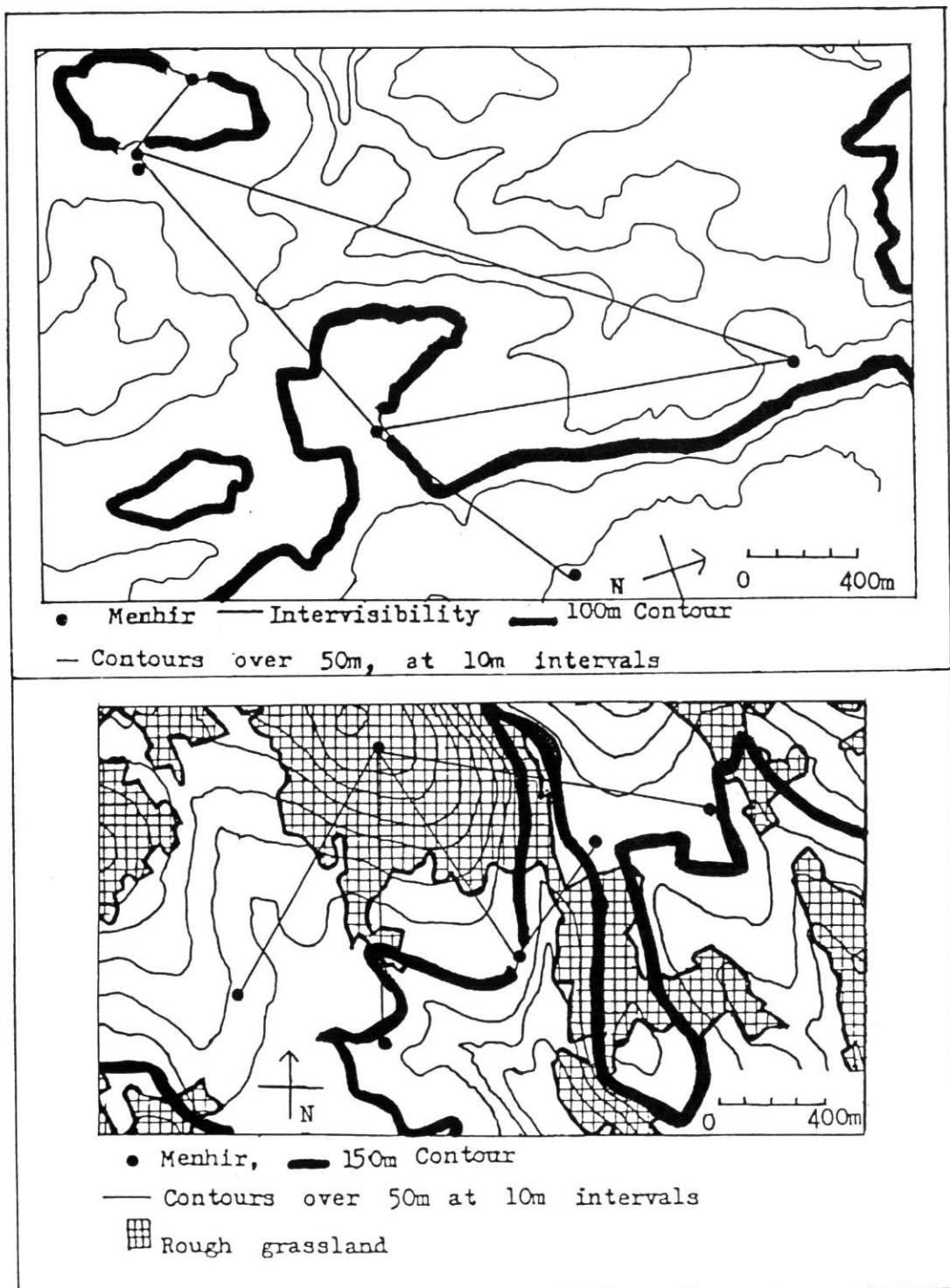
It was not enough to show that the menhirs surrounded the productive land in the valleys. If they were to be interpreted as components of boundary systems it was important to establish how they related to one another. In particular their function as boundary markers would be considerably enhanced if they were intervisible, so that a large part of the boundary could be seen from each stone.

This question was investigated in three stages. After preliminary analysis on the basis of contour maps, menhirs that seemed to be intervisible were visited in the field. Finally the “test menhirs” were examined to see if they contributed to the pattern.

Some assumptions were made in the first stages of the work. Menhirs were only considered if they were less than 2.5 km apart. Where the heights were unknown, the local group average was used and where two stones were very close together only one of the menhirs was employed in the analysis. Most stones were looked at individually (Peters, 1983).

In 73 cases stones that seemed intervisible on the maps could be seen from one another on the ground (Table 1). In several other cases, where fieldwork was inconclusive, and when studying ‘test menhirs’, the results from analysing the contour maps were used; fieldwork had suggested that this provided a reasonably accurate way of predicting whether menhirs were intervisible.

Most relationships of this kind were confined within the river valleys. In the south the menhirs are highly intervisible, partly because of the large number in this system. In the north the situation was not so clearcut, but on the whole the study did show that from one part of any putative boundary other sections could be seen. This would have been useful for planning



Figs 7 and 8
The Trevorgans system (above) and the Mulfra system (below)

future land use and the line of the boundary would also have been apparent to strangers. This tendency to be intervisible could be the result of being on a boundary or of being boundary markers.

It may be useful to consider the relationship of menhirs with other sites. The most numerous Bronze Age monuments now found are barrows, which are confined to the modern moorland. It is possible that the menhirs divided them from the lower better land, but equally likely that they have simply survived better in these areas. This could be checked by further research.

In addition 70% of the Cornish menhirs stand within 1.25 km of stone circles (Burl, 1976, 126). This is particularly interesting as Burl (1976, 123) also comments that the circles are usually more than 100 m above sea level.

Conclusion

Taking all the evidence together it seems the menhirs were purposely positioned along contours, possibly marking the boundary of one type of land or landuse, and that they were placed so that they tend to be fairly easy to see, particularly from other menhirs. None of this would exclude a ritual function. The positioning of the menhir might be part of the ceremonial associated with it. The standing stones could have been erected purely for the use of small local groups, but the fact that they appear to have been positioned with a view to visibility over some distance suggests a more than local significance.

Table 1 Number of intervisibilities defined by fieldwork

Direct Observations	34
One menhir, or its site, directly visible from a second menhir or its site.	
Indirect Observations	17
One menhir, or its site, originally visible from second menhir. They are no longer intervisible due to a more recent obstacle. It can be shown by trigonometry that without the obstacle the menhirs, or their sites, would be intervisible.	
Partial Observations	7
These occur when the location of a destroyed menhir is only known as a field name and only part of the field is visible, directly or indirectly.	
In four cases substantial portions of the fields are visible, (90%, 77%, 38% and 28%). In the other cases, only corners of the fields were visible but the same fields are intervisible from more than one menhir or menhir site.	
Nearby Interisibilities	15
From one menhir, or its site, a point near a second menhir, or its site, is visible, directly or indirectly. The average distance from the points to the second menhirs is 68 m.	

Note: The site of a menhir is either the location of a destroyed menhir derived from documentary sources or a field whose name suggests a menhir once stood there.

Southampton

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Another Flint Site on Trevoze Head

DON CAVE and MARY IRWIN

The Site

The site (TV12) lies on Trevoze Head, east of Stinking Cove. From the triangulation point (74.43 m) the crest of the field runs north-east. North of the crest the land falls away rapidly in the coastal slope to the cliff edge. On the south the land slopes more gently to the south-east towards Booby's Bay and Constantine Bay. Below the road to the lighthouse, which forms the southern boundary to the field, is the mesolithic site described by N. Johnson and A. David in *Cornish Archaeology* 21 (1982).

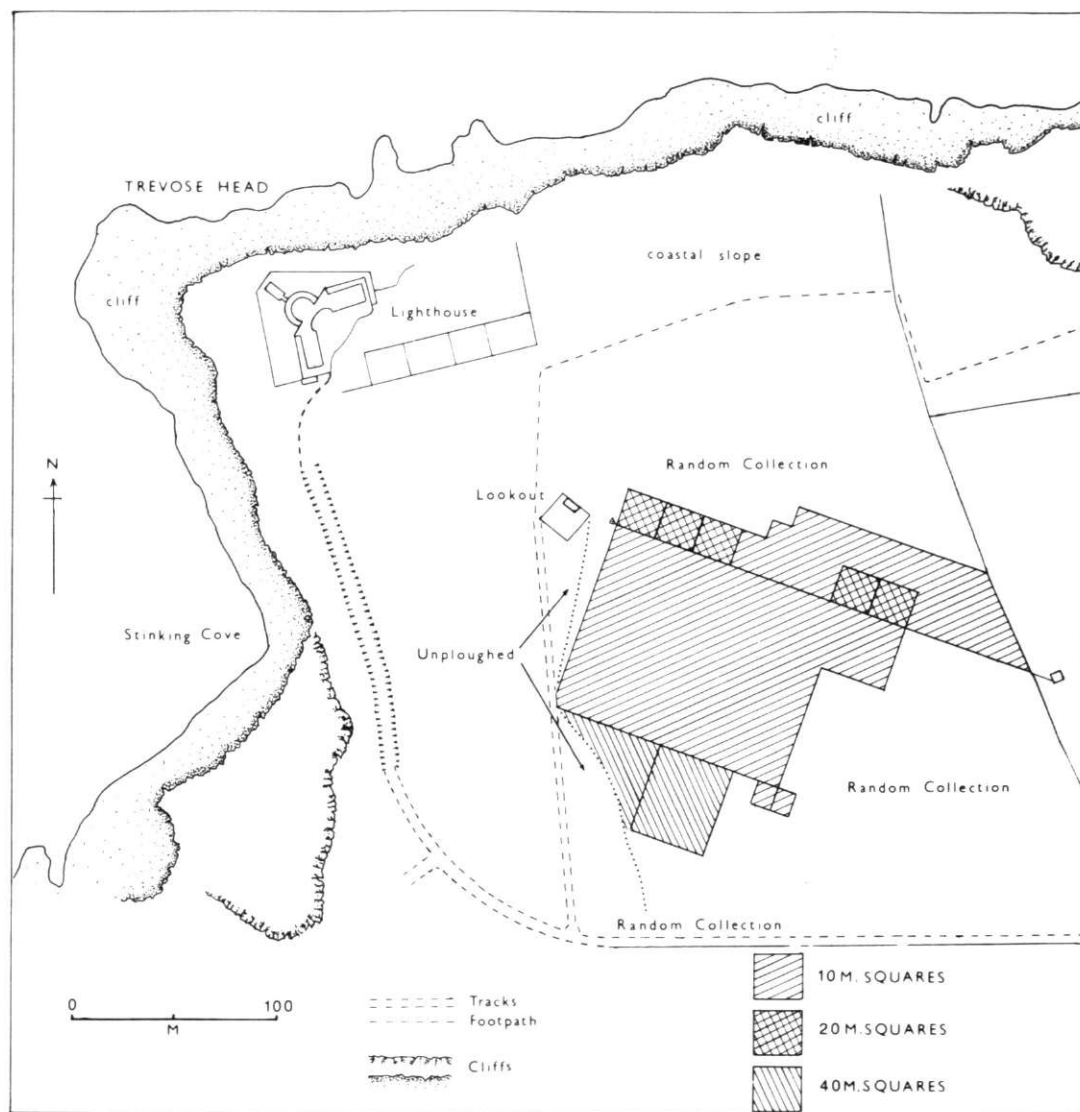


Fig 1
Trevoze head, showing field 2741 and the area of the grid 1987

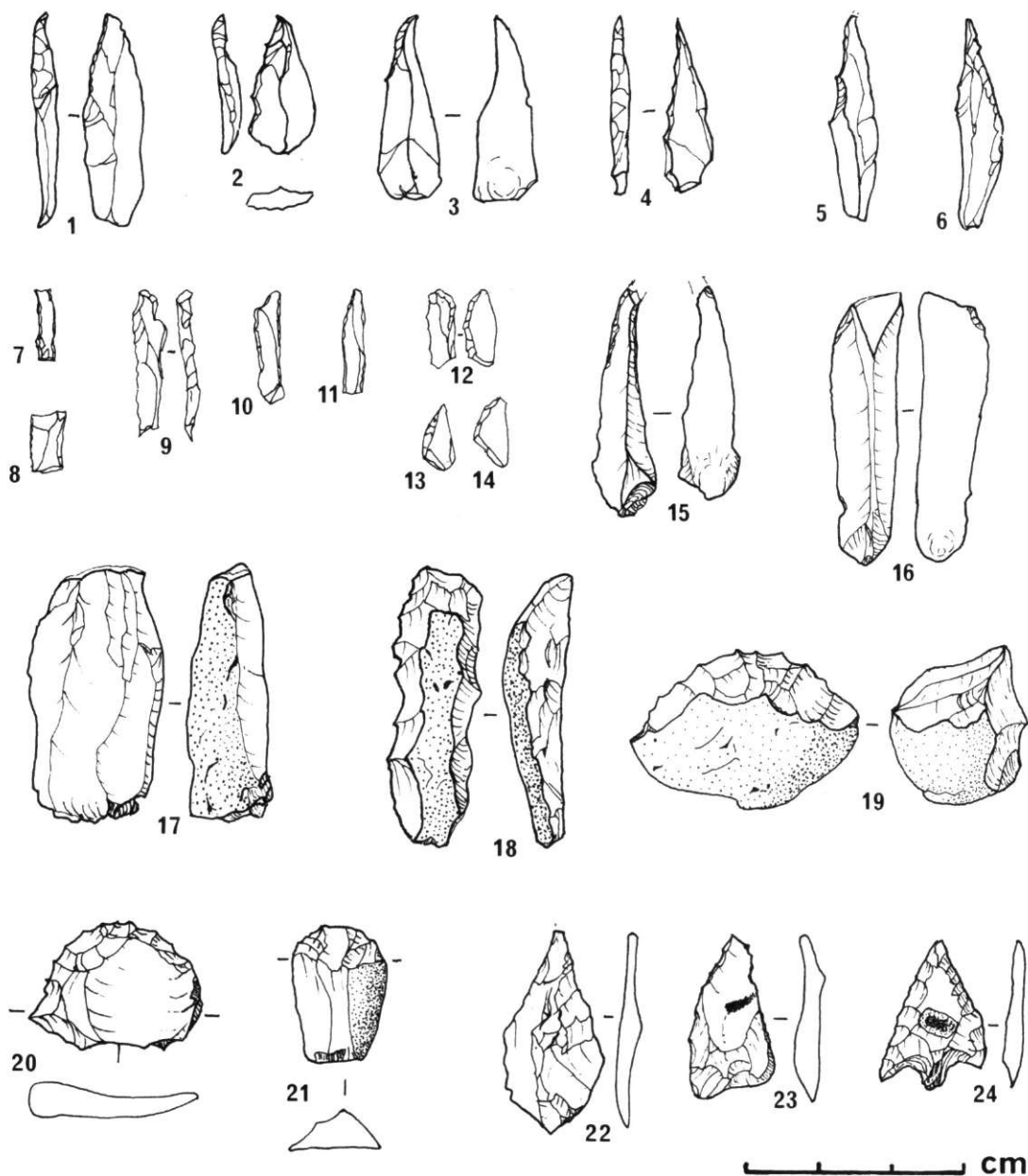


Fig 2
 Flints from Trevoze Head. 1–14 microliths; 15 piercer; 16 blade with bulb of percussion; 17 core; 18 fabricator; 19 pebble scraper; 20 flat scraper; 21 pebble scraper; 22 leaf-shaped arrowhead; 23 PTD arrowhead; 24 barbed and tanged arrowhead

Previous Work

The field was ploughed in about 1947, but for many years after that it was in pasture. In 1983 it was again ploughed. Don Cave began general collecting of flint in the area, and between 1983 and 1986 gathered over 6,000 pieces, including 95 microliths. This field walking distinguished three main areas. The first area was a circular hollow which was below the crest, on the south side and halfway across the field. The surface of the field was stony, with much quartz and shillet, but the hollow was noticeably stone free with a fine silty soil, suggesting the sorting action of water, perhaps a spring. Flints were plentiful on the edge of the basin, and many of the microliths came from this area. A slighter hollow lay to the south-east of the first. The fine silty soil again suggested a spring, but although some flints were found here, there was nothing like the concentration found near the deeper hollow.

A third area where flint was plentiful lay on the east of the field not far from the wall. This area was not noticeably marked on the ground, and the character of the flint and the types of tools differed from those found in the west of the field. Arrowheads, scrapers, knives and fabricators were among the worked flints found from this place.

The crest and the north coastal slope of the field yielded very little flint. The lower part and the eastern and western edges of the field were also almost barren. The flint was good quality beach flint with a few small inclusions. There were many primary and secondary flakes. The colour varied from white, light grey and blue to darker greys and blues. Many pieces had a heavy white patination. The eastern area produced a darker grey flint with iron staining on the cortex.

The 1987 Collection

In 1987 it was feared that the field would be returned to pasture. Systematic collection was attempted by two workers. With the help of the Cornwall Committee for Rescue Archaeology (now Cornwall Archaeological Unit) a baseline was set up from the triangulation point to the corner of a concrete barn in the next field. A grid of 10m squares was laid down over the most productive area. The first part of the grid covered the main spring hollow and the surrounding area. Fieldwork progressed down the slope in a SSW direction, and flint was collected in 10 m squares until the concentration of flint became very low. Three 40 m squares were then laid out and searched with little result: the western and southern edges of the field were finished by random collection which yielded only a few flints. Next the 10 m grid was extended uphill and eastward to cover the eastern concentration. Although work continued systematically from mid-January until the third week in March, time did not allow the whole area to be gridded.

After the field was hoed it was again available for short periods. All areas were field-walked, and the finds were collected in discrete groups as far as was possible. The following autumn, after harvest and ploughing, random collection was again practicable for brief spells.

Late winter and early spring was a difficult time to work on such an exposed site; the varying weather conditions may account for some of the differences between grid squares, but on the whole the pattern established by earlier fieldwalking was well marked in the gridded collection.

The total collection for the year 1987 was 7,567 pieces, just over half of which were systematically collected from the gridded area.

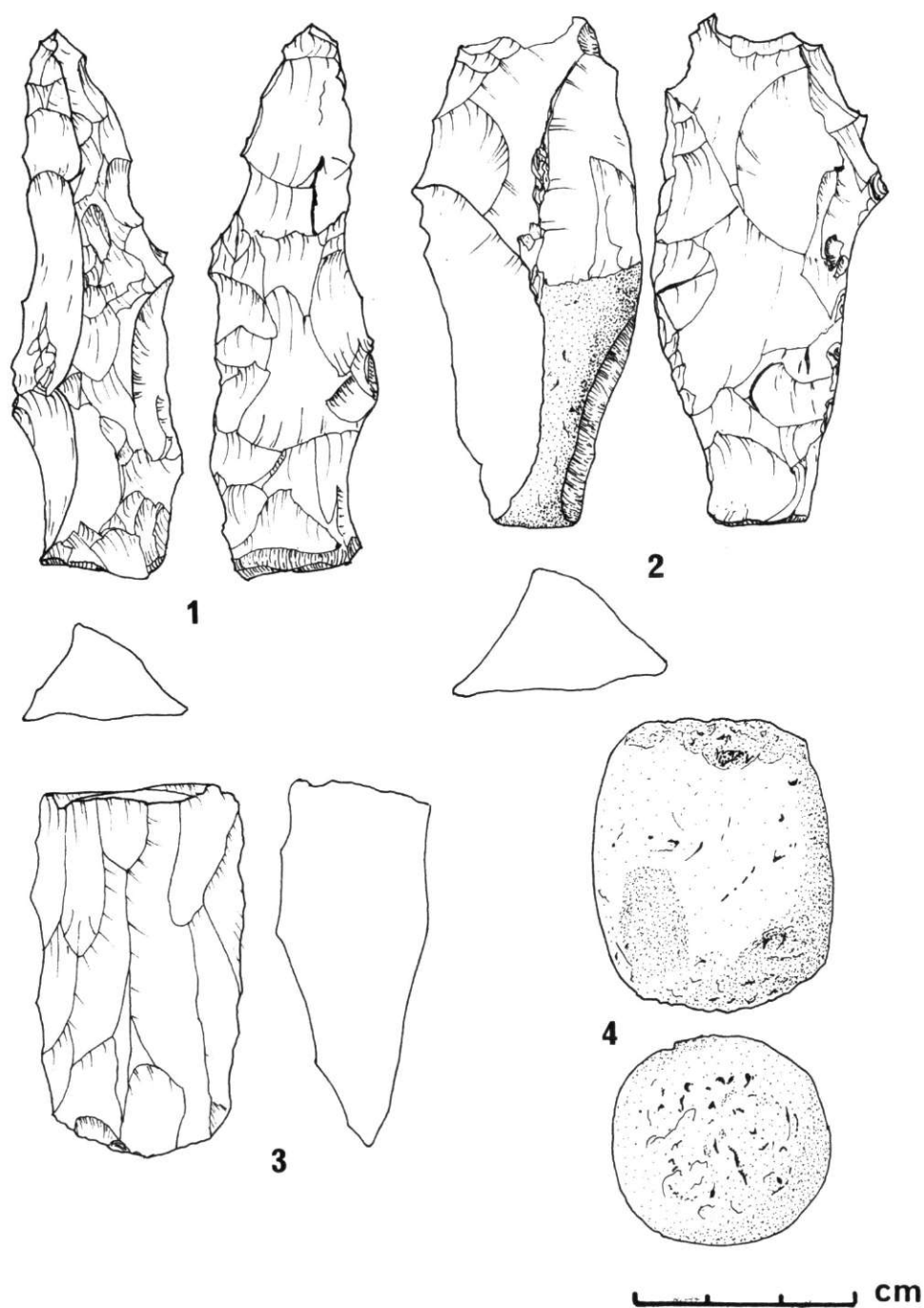


Fig 3
Flints from Trevoze Head. 1 pick; 2 core tool – broken; 3 broken axehead; 4 pebble tool – pounder

*Collected from the gridded area
by systematic fieldwalking*

Microliths	76
Microburins	6
Scrapers	14
Arrowheads	1
Retouched pieces	40
Cores	22
Burnt pieces	562
Waste	3515

Random collection

Microliths	44
Microburins	0
Scrapers	12
Arrowheads	2
Retouched pieces	80
Cores	62
Burnt pieces	398
Waste	2733

The Flints

The flints were scattered over the whole area but the main concentrations did not appear to have been affected by ploughing.

The microlith collection included some very good examples both of large early pieces and smaller late pieces. There were few microliths from the eastern part of the field (Fig 2, 1–14). Two or three of the worked flints suggested reworking of earlier pieces.

The scrapers varied from chunky pebble types with cortex to finer ones made on flakes. Many appeared to be on primary flakes (Fig 2, 19–21).

The cores were mainly single platform types, and many had some cortex remaining. A number were large (Fig 2, 17).

A number of very fine arrowheads had been collected on the site formerly, but, although the collection of 1987 included specimens of leaf, PTD and barbed-and-tanged arrowheads, these were not as good as those gathered in earlier years (Fig 2, 15–16).

The majority of the retouched pieces were blades, generally with retouch on one surface.

The waste included primary and secondary flakes and large pieces of broken pebbles. Much of this was heavily patinated. A great deal of the waste consisted of broken pieces of blades, very thin and without cortex, usually light grey in colour. It suggested waste from tool making.

The degree of burning varied from light pot fracture and fine blue streaks to pieces where the nature of the flint appeared to be changed by heat.

Four core tools were found in 1987 to add to a number found earlier during random collection. They were a chert pick, the heavily burnt base of a pick (not illustrated), and two broken adzes or axes, one of chert and one of flint (Fig 3, 1–3).

As usual on this site, a large number of worked stones were found during the 1987 fieldwalking. They included pieces of ground axes, pounders (Fig 3, 4), whetstones, limpet scoops, polishing stones and similar stone artefacts.

Discussion

In his paper on the mesolithic period in Cornwall (Berridge and Roberts, 1986), Peter Berridge comments on the Trevoze Head sites, including TV12. He stresses the importance of this site, and the fact that the assemblage of material from random collection contains both early and late mesolithic material. The gridded search, which supplied the material for this note, although undertaken under pressure, has shown that there are three distinct areas of concentration, the main spring hollow with early and late mesolithic material, the lesser hollow with some mesolithic material, and the physically unmarked but definitely neolithic area on the east of the field.

In his paper (Johnson and David, 1982) on the sites of Trevoise Head, N. Johnson maps a series of sub-sites which had attracted hunter-gatherers over many generations. TV12 appears to be another one of these sub-sites.

Acknowledgements

Thanks are due to the farmer, Mr W.T. Tummon, for permission to walk the field, to Steve Hartgroves for helping to set up the grid, and to the Cornwall Committee for Rescue Archaeology (now Cornwall Archaeological Unit) for advice and the loan of equipment.

Thanks are specially due to Peter Berridge who gave much useful advice and to Steve Hartgroves and Mrs H. Quinnell for helpful discussion of the site and finds, and to Norman Quinnell who drew the map.

Carlyon Bay and Wells

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A Souterrain on Scilly?

PAUL ASHBEE

Porth Mellon's subterranean structure (SV 90861088, Figs 1, 2) was shown to the present writer by J.H. (Joe) Treneary in November 1949. He considered it as "not quite like a chamber in a cairn" and was at a loss for an alternative explanation. A provisional plan was made on 8 July 1950, as it was rumoured that refuse might be packed into it. The monument was also scrutinised by B.H. St.J. O'Neil who suggested that it might have been a 'fogou', the Cornish name for a souterrain (Thomas, 1972, 75).

Although longer than most cairn chambers it was thought to have their form and approximate proportions. Thus, as St Mary's 19, it was included in a list which extended that by Hencken (1932, 317) and a plan was published (Ashbee, 1963, 16). A similarity to the siting of St Mary's 2a, at the foot of Halangy Down (Ashbee, 1976, 14) was seen and it was considered that the boulders exposed in the sea cliff, above the chamber's entrance might remain from a cairn or stone-girded barrow. This had been shrouded by loam accumulation and the chamber exposed by marine transgression and cliff erosion (Thomas, 1985, 17–64). Some stone walling, on the seaward side of the entrance, thought to be recent because of its small stones, set back from the general chamber wall-line, differed from the boulders used upon the opposite side (Ashbee, 1974, 88–89). Vivien Russell (1980, 28) visited Porth Mellon when engaged upon her survey and her comment was "No. 19 ?Chamber? in cliffside; probably modern".

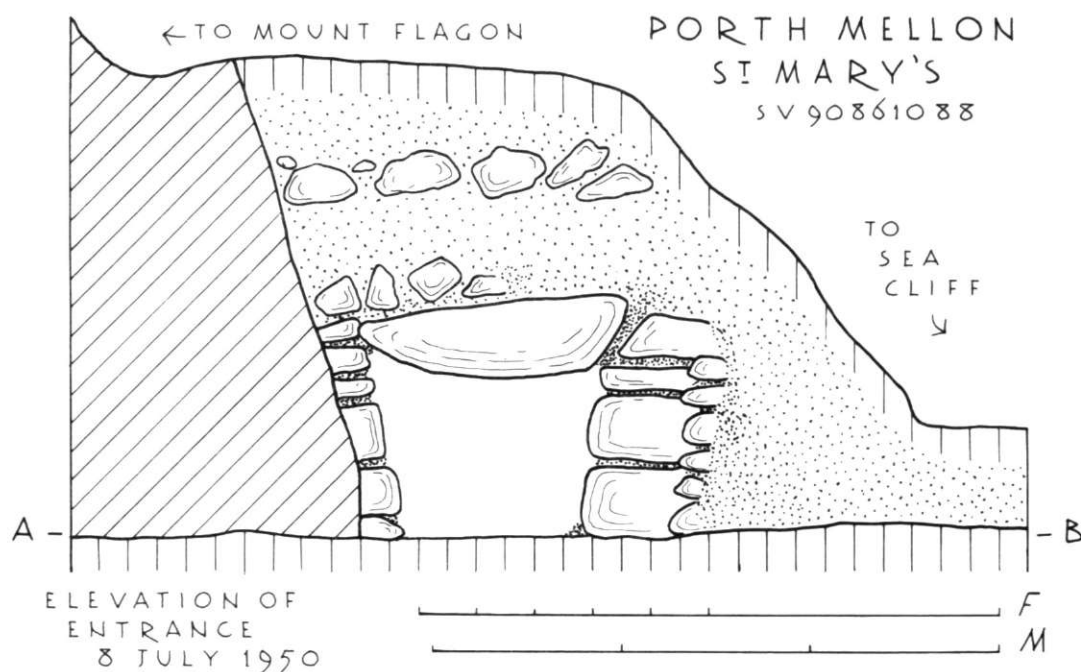


Fig 2

A sectional elevation of the entrance to the possible souterrain exposed in Porth Mellon, St Mary's, Isles of Scilly, 8 July 1950

Clearly, this Porth Mellon subterranean structure is atypical in that it neither conforms to the characteristics of Scilly's many megalithic chambers in cairns and barrows nor is it wholly comparable with the range of, now reconsidered, Cornish souterrains (Christie, 1979). Indeed, if it were thought to be a souterrain and entire, it apparently lacks subsidiary chambers and side passages although structurally it conforms to the characteristics of the series. Nonetheless, in view of the number of souterrains extant and destroyed in Penwith (Christie, 1979, 188, fig 1), a souterrain on Scilly would not be anomalous.

Cornwall's souterrains were given order by Hencken (1932, 139–154) and have been detailed by Clark (1961). Hirst (1937, 78) considered fogous or souterrains as components of the courtyard house complex while Charles Thomas (1966, 79; 1972) gave this premise coherence when he considered them as a Breton innovation rather than as an Irish sea element. Since then the excavation of the Carn Euny souterrain (Christie, 1978) has afforded a precise insight into an exceptional, phased, example, but, as was stressed, each has peculiar qualities and no two are exactly alike. Conclusive dating for this is lacking, though the initial structure could be of the 5th century BC or even earlier (Christie, 1979, 199). The general premise that all souterrains are of Iron Age or later date is based upon slender evidence. A function for some, however, seems, particularly in view of the evidence of Portland's drystone walled beehive chambers (RCHME, 1970, 605–606), to have been storage, for they are found in places from which pits are absent (Fowler, 1981, 229).

With all these factors in mind, the plan (Fig 1) of what may be a souterrain on Scilly, together with an elevation of its entrance (Fig 2), is offered. In view of its situation, deeply buried by a loam accumulation and revealed by cliff erosion, the possibility that it is but one remaining part of a structure whose subsidiary features have been destroyed by the sea should be considered. Thus it could conceivably be the remaining straight passage of a construction

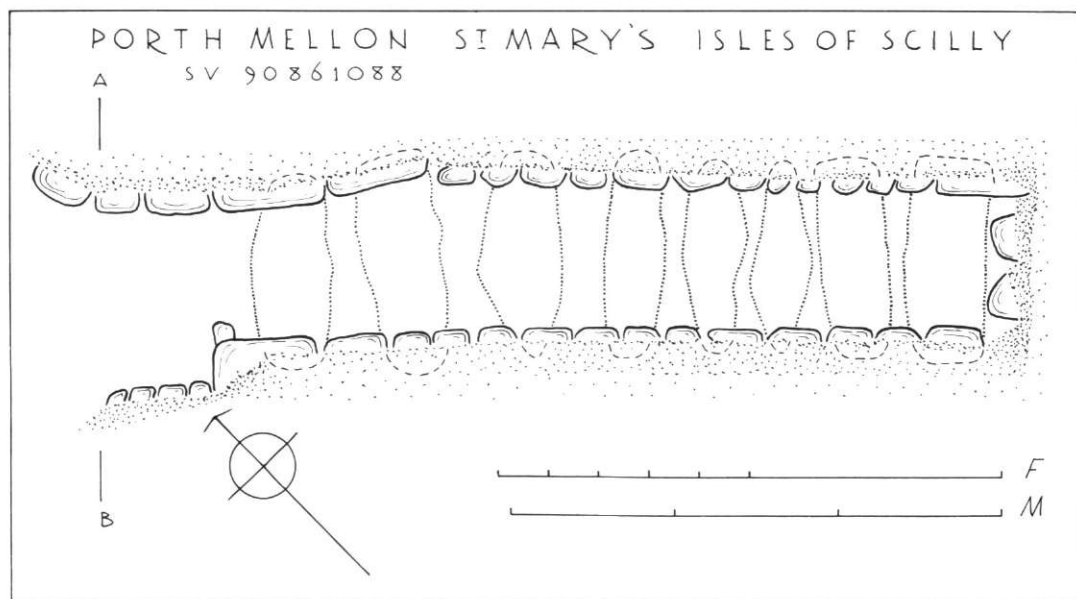


Fig 1
A plan of the possible souterrain, exposed in the cliff of Porth Mellon, St Mary's, Isles of Scilly, made on 8 July 1950

comparable with Boleigh or Pendeen Vau (Christie, 1979, 190 fig 2). Although it might be contended that the Cornish souterrains form a homogeneous group, it is clear that, like 'huts', they may have had specifications determined by local, and even exceptional circumstances, from economic functionality to a continuum of the principles inherent in Scilly's *fana*, the chambered cairns (Ashbee, 1976). Their origins could be similarly diverse and disparate. It remains for Scilly's Porth Mellon *souterrain* to be further investigated, particularly in terms of age and affinity.

Norwich

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A Beaker Cist Grave at Harrowbarrow

N. THOMAS and S. HARTGROVES

A slate cist containing a beaker was discovered during building work at Harrowbarrow in East Cornwall. Excavation failed to demonstrate that a mound had been present. The vessel, 15 cm high and 11.5 cm across the shoulder, was decorated with alternating bands of incised and comb-impressed decoration. It belongs to Case's Middle Style, current in the later part of the 3rd millenium.

The Discovery

On the 6th March 1989, Cornwall Archaeological Unit (CAU) received a telephone call from Mr Geoff Husband who reported the discovery of a stone-lined cist containing a pot, revealed during machine excavation for an extension to Fernleigh House, Harrowbarrow (Grid Ref SX 3975 6982). Work was temporarily halted pending archaeological investigation. At the time of the Field Officer's visit the cist had already been emptied of its fill, and fragments of the pot removed. The cist is situated on a south-facing hillslope at 114 m (370 ft) above Ordnance Datum. There are no other known barrows in this area, but a linear barrow cemetery is sited on the prominent granite ridge of Hingston Down, approximately 1.4 km (1 mile) to the north.

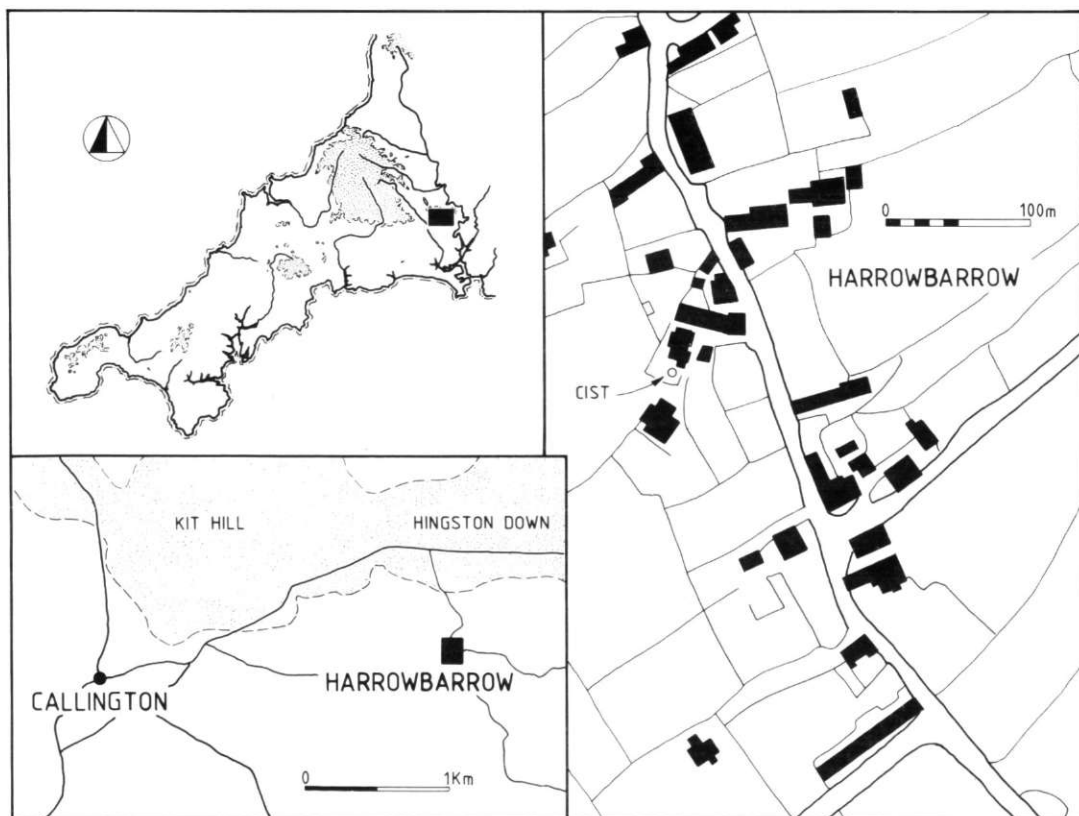


Fig 1
Location map, land over 600 ft (183 m) stippled

The Investigation

The cist was exposed as the JCB was removing soil from a steeply sloping bank at the rear of the house (Figs 1 and 2). A vertical section cut across the long axis of the cist (Fig 3) revealed that a pit had been dug into the natural orange-yellow shillet to a depth of 0.4 m, so that the capstone would have been roughly level with the contemporary ground surface.

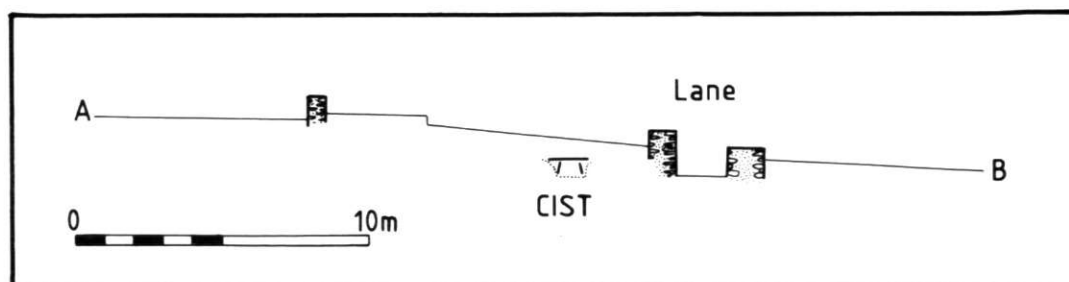
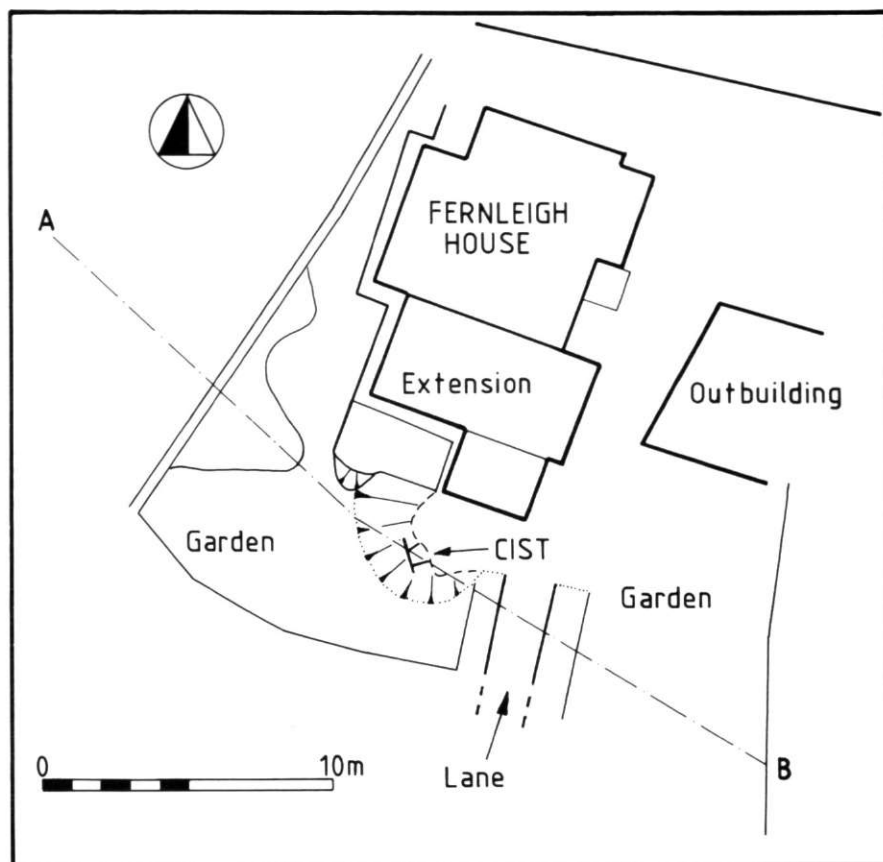


Fig 2
Site plan and profile across the site

The shorter stones were wedged between the longer side slabs and the space between the slabs and the sides of the pit was filled with cobble-sized lumps of quartzite and slate.

The cist (Fig 3) is a sub-rectangular box of blue slate slabs, 0.75 m long 0.4 m wide and 0.5 m high, its longest side oriented NW–SE. One of the side slabs had been displaced by the machine and the capstone had been partially broken away. The cist had not been provided with a base stone.

The interior of the cist had been emptied prior to archaeological investigation, but according to the contractors, the fill had consisted of an orange clay which only partially filled the space, leaving a void beneath the capstone. The beaker came from this clay soil. There was no indication from the material filling the pit or from within the cist of any staining such as might have occurred if quantities of charcoal had been present in the fill. This suggests that the cist was originally constructed to contain an inhumation rather than a

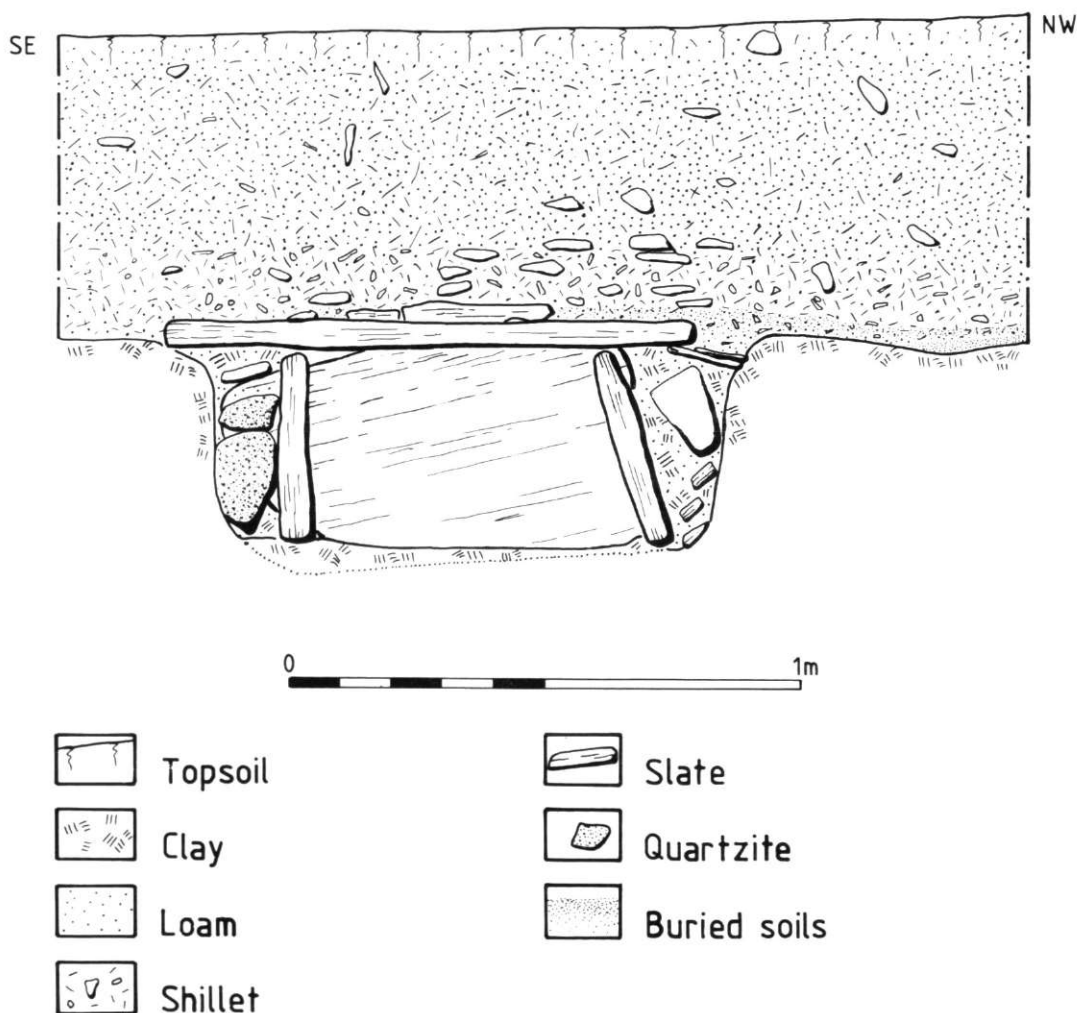


Fig 3
Section through the cist

cremation, though the dimensions of the grave would appear to be too small to have contained an adult, even in a tightly crouched position. Considering the acidic nature of Cornall's soils the total lack of any traces of bone need not occasion any surprise, and certainly does not help to confirm the absence of a burial with the beaker. No other artefacts of any kind were recovered from the cist or the fill of the pit.

A buried soil was noted covering the capstone and extending over the natural shillet on the northern side; at the northern edge of the section (see Fig 3) this soil could be subdivided into an upper stony loam and a thin layer of stone-free soil of red/brown hue. It is possible that this lower layer comprises the remains of a pre-cist soil, whereas the upper stonier layer represents the subsequent build up of soil over the cist. At the southern side of the trench these soil layers were not present, but instead a spread of mixed soil and shillet was recorded, probably representing a spread of soil and stones originating from the excavation of the pit and the construction of the cist.

Sealing these strata was c. 10 cms of stony brown/orange soil which included chips of blue slate similar to that used in the construction of the cist, and also several sherds of medieval pottery. Above this was a thick layer of c. 45 cm of stony brown loam which included medieval and post-medieval pottery, clay pipe fragments, glass, roofing slates and china.

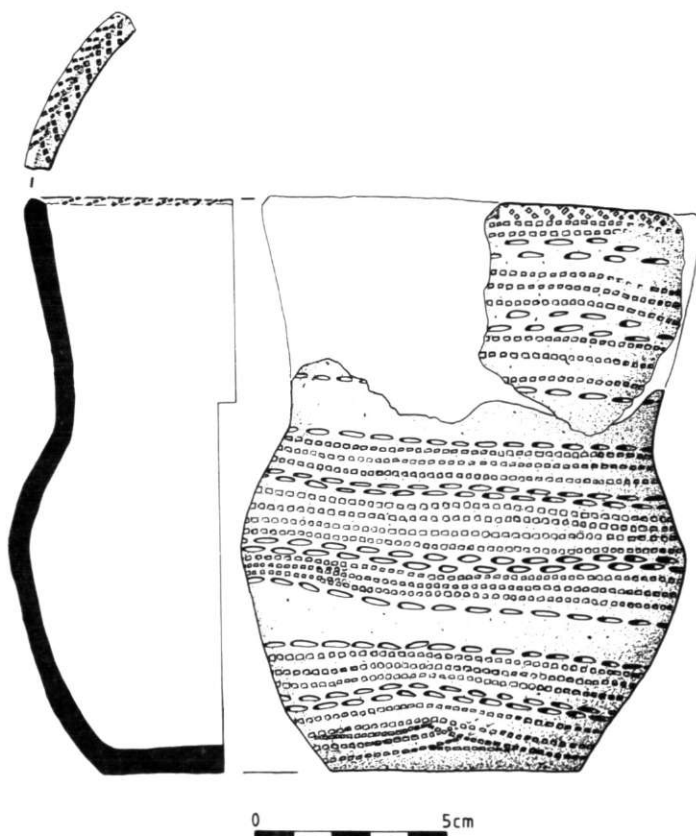


Fig 4
The Harrowbarrow beaker

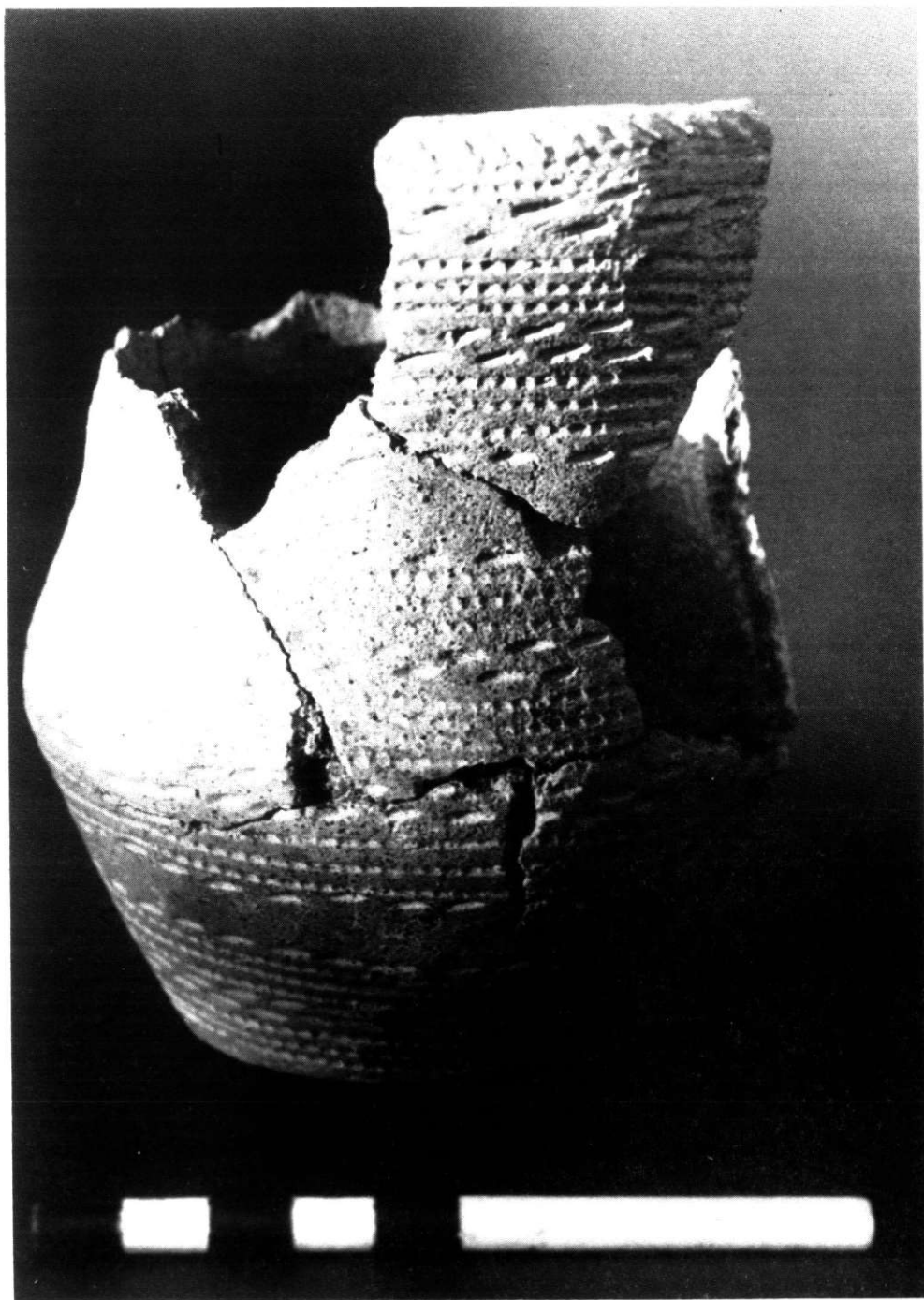


Fig 5
The Harrowbarrow beaker (CAU photograph)

Clearly, both of these upper layers have accumulated in relatively recent times and there is no evidence for an earthen mound contemporary with the cist. However, it remains a possibility that a mound was originally constructed but has subsequently been removed by landscaping, perhaps in the medieval or post-medieval period.

The Beaker

The beaker was recovered from an orange clay soil, which partially filled the interior of the cist. During the machine excavation of the site the pot was broken and only about two thirds of it were subsequently recovered, sufficient however to allow a complete profile of the vessel to be reconstructed (Figs 4 and 5).

Cleaning and conservation treatment was carried out by the CAU; drawings and photographs of the vessel were sent to Dr Richard Harrison and Dr David Williams; in addition a sample of the fabric of the pot was also sent to Dr Williams, and their reports appear below.

Florence Patchett brought together information on Cornish beakers in her survey of Bronze-Age pottery in Cornwall (Patchett, 1944 and 1950) and Daphne Harris updated this to include finds up to 1979, in a recent report (Harris, 1979). The vessel from Harrowbarrow is the only beaker to come to light since that date, and is the first recorded example from south-east Cornwall. Dr Williams' suggestion (below) that the Harrowbarrow pot was made from a clay very local to the findspot in East Cornwall underlines the value of petrological analysis in prehistoric pottery studies. Harris's five beakers from Poldowrian were all found to be made of the local gabbroic clay. The Harrowbarrow beaker, and other Cornish beakers from sites distant from the gabbroic clay source on the Lizard all appear to have been made from clays which originated from close to their individual findspots, pointing to "a dispersed production of beaker wares" which contrasts with other types of early bronze-age pottery in Cornwall and the south-west (Parker-Pearson, this volume).

Report on the Bell Beaker from Harrowbarrow

Dr R.J. Harrison

The beaker has a biconical body from which rises a straight-sided neck, slightly flared to the outside, terminating in a bevelled rim. The decoration is zoned in three broad bands, executed with a coarse square-toothed implement and a thin spatulate instrument. It takes the form of horizontal lines of toothed impressions grouped into bands of three or four lines, alternating with single and double lines of spatula impressions. The rim carries oblique toothed impressions set at an angle to the outer edge of the rim, forming a chevron pattern.

The beaker conforms broadly to Clarke's N2 type; a class of pottery known for its wide variation in shape (Clarke, 1970, 162) and in which zoned decoration is common. Rim top decoration is an important minor characteristic of this type, and Clarke lists (*Ibid*: Appendix 2.9) 16 examples; he considered it to be a late trait. Beakers showing similar decorative features to the Harrowbarrow one are illustrated from Jesmond, Northumberland (*Ibid* No. 683), Scampston, Yorks (1381), and Ord, Aberdeen (1480), but it must be stressed that there are no exact parallels for the Harrowbarrow vessel. Beakers of Clarke's N2 type frequently occur in cist graves or in cists below barrows (52% of the total).

Case's (1977) revision of Clarke's elaborate typology is used today, and the Harrowbarrow beaker would fall into his Middle Style, currently attributed to the later part of the third millennium BC. Greater precision in dating vessels of this type is unfortunately not possible because of fluctuations in the calibration curve for radiocarbon dates around this time.

Department of Classics and Archaeology, University of Bristol

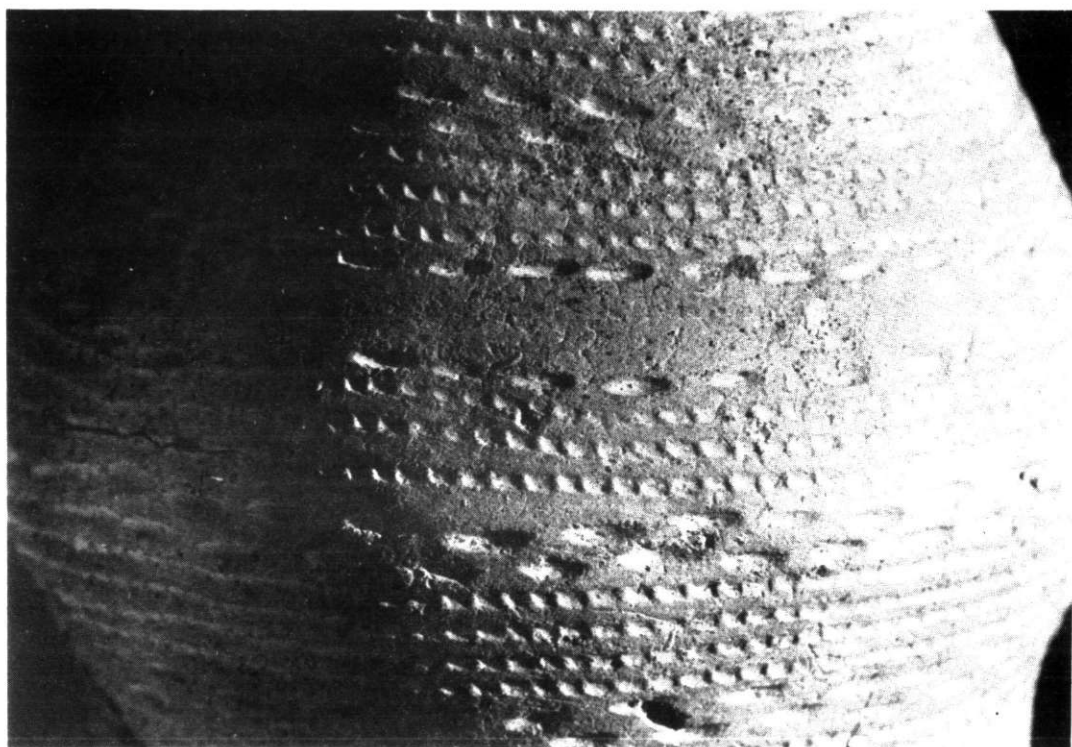


Fig 6
Detail of decoration on the Harrowbarrow beaker (CAU photograph)

A Note on the Petrology of the Beaker

Dr D.F. Williams, FSA

A small sherd from the beaker vessel recovered from Harrowbarrow was submitted for an examination of the clay fabric in thin section under the petrological microscope. The sherd is fairly hard and somewhat rough to the touch, containing frequent small-sized light and dark coloured inclusions scattered throughout the paste, pale brownish-grey surfaces (between Munsell 10YR 7/4 and 7/2) with a dark grey central core sandwiched between two brown layers. Thin sectioning shows a brown anisotropic clay matrix containing frequent non-plastic inclusions of variable composition, made up of pieces of sheared phyllite, metamorphosed shale, hornfelsed killas, altered greenstone and argillaceous rocks, chert and a brown micaceous rock, together with some large discrete grains of fairly large deep brown biotite mica with strong pleochroism, small sherds of muscovite mica, iron oxide, saussurized feldspar, a scatter of small-sized quartz grains and the odd small grain of pyroxene and amphibole. All of these inclusions are fairly evenly spread throughout the clay matrix, and are normally under 0.4/.50 mm in size, though some of the fragments of rock range up to 1.20 mm across.

The find-site at Harrowbarrow, which is situated three miles north-west of Calstock, lies on Devonian slate and thin limestones affected by a metamorphic aureole surrounding a granite outcrop to the north-east of the site, while nearby are carboniferous culm measures of shale, chert and grit, and also small amounts of diabase and proterobase (1" Geological Survey Map of England Sheet no. 337). The highly altered nature of many of the rock fragments in the fabric of the Harrowbarrow beaker would certainly find a home in the area of the metamorphic aureole mentioned above. Indeed, there is nothing which occurs in the non-plastic range of inclusions found in this sherd which would lead one to suggest that the beaker was imported to the site from some distance away. In the absence of any further information, the petrology points to a fairly local origin for this vessel.

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Department of Archaeology, University of Southampton*

Acknowledgements

Excavation of the cist was carried out with the kind permission of Mr and Mrs B. Heighway, the owners of Fernleigh House. Mr Geoff Walford provided considerable practical help on site.

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Bury Camp, St Dominick

ANN PRESTON-JONES and PETER ROSE

Bury Farm in St Dominick (SX 4017 6864) is a farm of apparently recent origin, located within the annexe of an Iron Age or Romano-British hillslope enclosure (Figs 1 and 3). The latter, known as Bury Camp, is a Scheduled Ancient Monument (No. 522). When Scheduled Monument Consent was granted in September 1989 to carry out various improvements within the scheduled area, including lowering a boundary which appears to follow the line of the annexe, two trenches were cut through the boundary hedge (one by hand, the other by machine) to investigate its nature.

The position of the trenches is shown in Fig 1; the section, which was similar in each, is shown in Fig 2. Sandwiched between the natural subsoil (layer F) at the bottom of the section, a layer of earth on the top (A) and a stone facing on the SW, the last two resulting from modern hedge-building, were a number of layers (B–E) which were interpreted as the truncated remains of the rampart. There were no finds: this interpretation was based partly on sheer likelihood and partly on comparison with the form and composition of the surviving rampart. In addition, the nature of layers B to E, with the amount and size of stone generally increasing upwards to a very stony band on top (layer B), seems to reflect excavation first of the subsoil, and then of the bedrock, as one might expect in digging the outer quarry ditch for a rampart. No layer obviously representing an old land surface was seen in this section. One explanation for this may be that the turf was stripped prior to construction, and saved for capping or revetting the rampart.

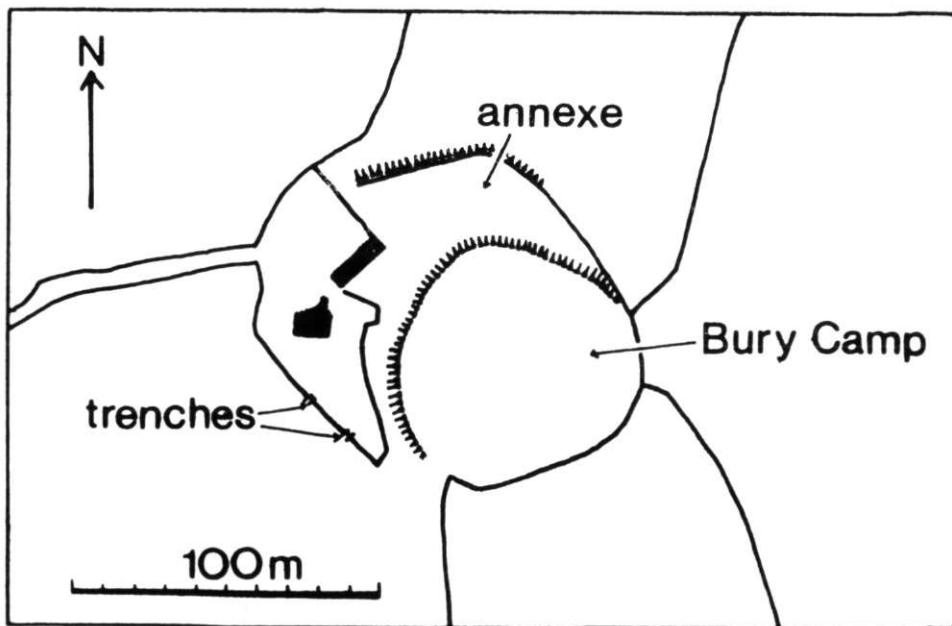


Fig 1
Bury Farm, Bury Camp and location of trenches

Because this investigation was successful in demonstrating the presence of apparently ancient material within the hedge, the owner agreed that only the top, modern part (layer A) should be removed. The surviving portion of the rampart will be preserved as a feature within the garden.

Acknowledgements

We are extremely grateful to Mr B.D. Starks and family of Bury Farm and Mr W.R. Hooper, his landscape gardener, for their great co-operation and enthusiasm.

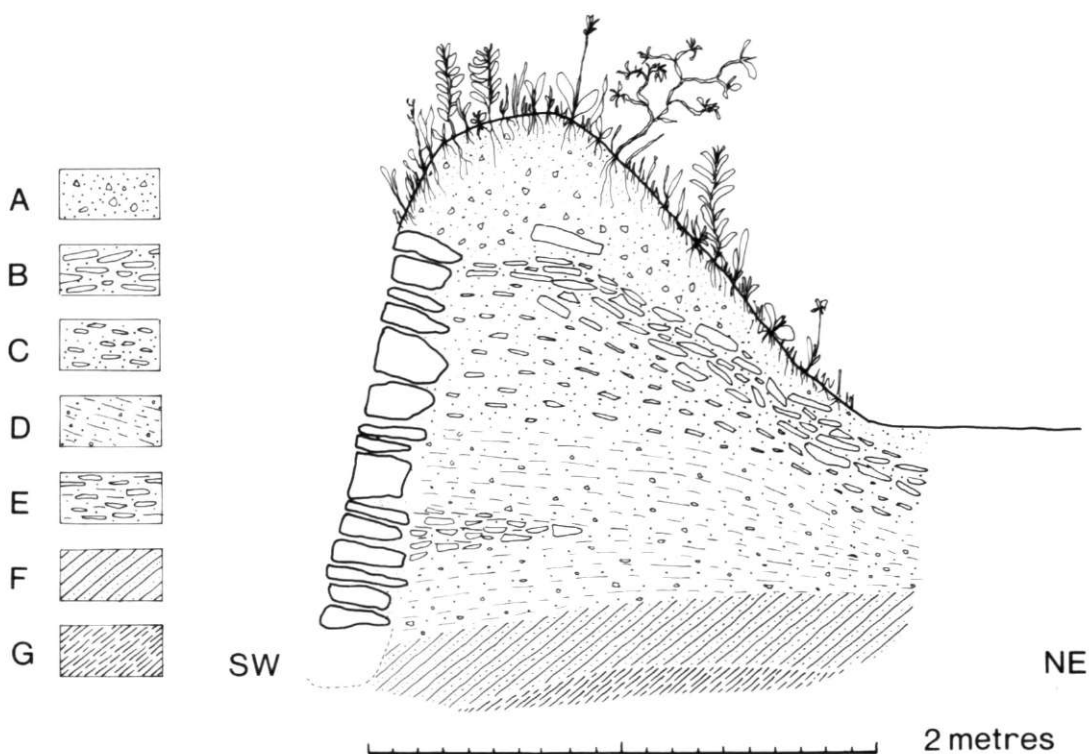


Fig 2

Section through hedge on line of annexe rampart. Layer A, dark brown earth, stone and roots of hedge vegetation. Layer B, densely packed slaty stones in matrix of grey soil. Layer C, similar to B, but with less and smaller stone inclusions. Layer D, yellow-brown silty clay with a moderate amount of stone and grit. Layer E, stony band, similar to D, but with more slaty stones. Layer F, bright yellow-brown silty clay with occasional small stones. Layer G, fine grey stony gravel of weathered bedrock

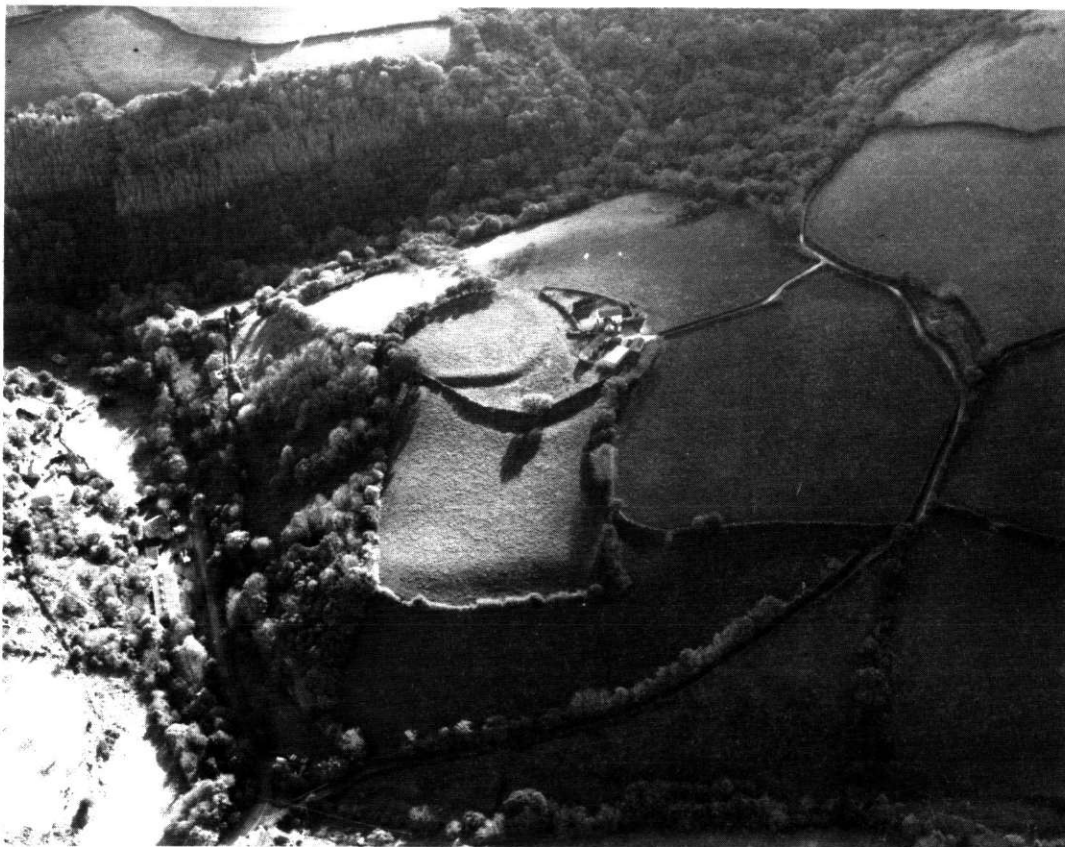


Fig 3
Bury Camp from the air. Photo Steve Hartgroves, CAU

Magnetic Susceptibility Survey as a Method for Assessing Landscape Processes and the Archaeology of Bodmin Moor

MICHAEL S. SECCOMBE

Introduction

Magnetic survey techniques such as the use of magnetometers have been tried on Bodmin Moor by the Cornwall Archaeological Unit (CAU) in the past, but without much success, although they appear to be useful in surveying areas off the granite (Johnson *pers. comm.*). The purpose of the present soil sampling programme was to collect samples for magnetic susceptibility (MS) testing in order to evaluate the use of this technique as an indicator for detecting some of the mechanisms for landscape change on Bodmin Moor.

MS has been used successfully as a method for survey and assessment of archaeological landscapes in dry valley deposits on the chalklands (Allen, 1984a, 1984b, 1986, in press; Allen and Macphail 1987). The work here has shown that MS has a role to play in the assessment of the archaeological landscape of Bodmin Moor also (Fig 1).

Aims

The aims of the research were to investigate the possibility of using magnetic susceptibility readings as a method for survey and the assessment of archaeological landscapes. From this it was hoped to be able to identify landscape processes, and thus understand and evaluate the

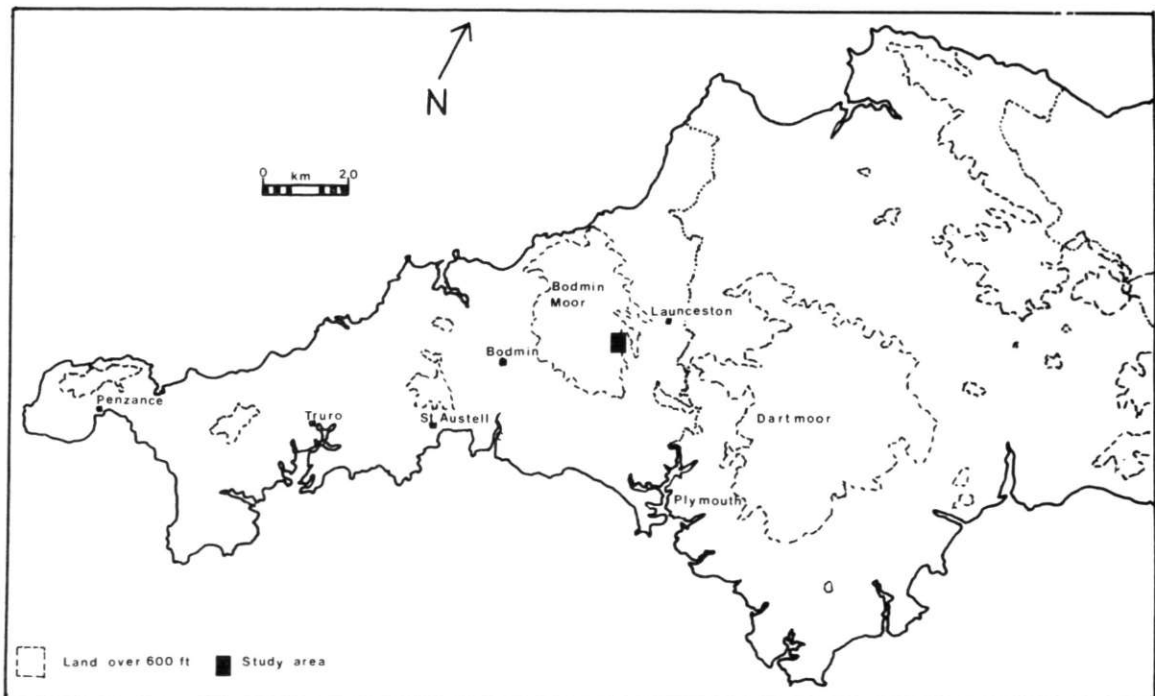


Fig 1

Location of the study area within the south-west peninsula

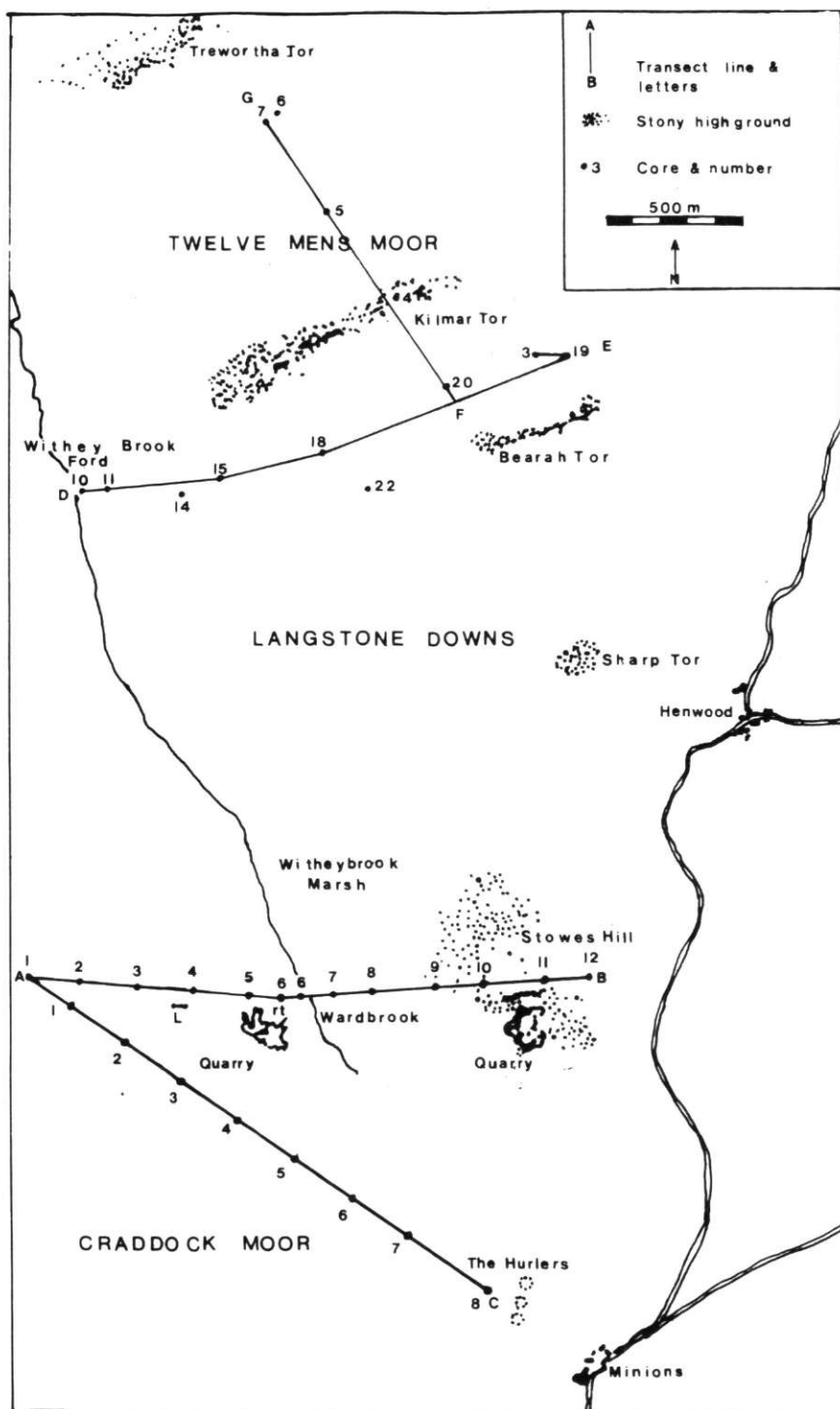


Fig 2
Map of study area with transect locations

archaeological record of Bodmin Moor with a greater degree of confidence. Once the chosen areas were investigated they served as 'type sites' for the discussion of landscape processes/history.

Method

The investigations consisted of a field survey of monuments and topography based on archive and published information from Ordnance Survey, Geological Survey and Soil and Land Use maps as well as other published sources such as the recent survey conducted by the CAU. The field survey information was further supplemented by consultation with the CAU Sites and Monuments Register at Truro.

The fieldwork involved the examination of landscape transects across chosen study areas. Soil profiles were described by means of a screw auger and samples taken at variations in depth. Auger holes were bored along the transects at various intervals at changes in landscape features, e.g. tor tops, slopes, valley bottoms, peat bogs etc. Diagrams were then drawn up to illustrate the topography, soils, and magnetic susceptibility data recorded.

Fieldwork

After considering the information obtained from the archaeological survey, in conjunction with field notes of the topography, Geological Survey and Soil Survey information, it was decided to investigate four areas within the selected archaeological survey area (Fig 2).

1. The transect D-E from the Withey Brook Ford through the settlement and up the slope into the dry valley between Kilmar Tor and Bearah Tor, and F-G from Bearah Tor across Kilmar Tor to the settlement at Trewortha Tor.
2. The transect A-B over Craddock Moor, across the valley and up into Stowe's Hill, an area known to have been cultivated in the past.
3. The Transect A-C across Craddock Moor toward the Hurlers monument, an area in which there is no indication of previous cultivation, this being probably an area of 'ritual ground' (Johnson, *pers. comm.*).
4. The transect L, a more detailed investigation of an enclosure exhibiting possible lynchet formation, found during the field survey.

Fieldwork method

Sampling was carried out by means of a 38 mm diameter auger with an extension bar and handle long enough to probe 1.5 m below the surface. Soil was collected from the thread of the auger and placed into polythene bags which were labelled with details such as sample number, grid position and depth. These details were also recorded in a field note book, as well as general notes on topography, overall soil depth and vegetation. Sampling frequency depended on changes in topography, with some intermediate samples taken in an effort to make the overall data more representative of the area; in fact this worked out at an average interval of c. 200 m, with some samples at c. 100 m intervals near the Withey Brook Ford settlement. This small area had a greater frequency of topographical features, such as the stream-cut alluvial fill in the valley bottom, with Withey Brook marsh, the stream bank, the settlement area and the transition area between marsh and up-slope of the hill.

The lynchet feature in the enclosure on the Gold Diggings site, Craddock Moor, was thought suitable for a finer grained examination using the auger as a probe, with only a few samples being chosen for magnetic susceptibility (MS) evaluation, to save time. So following Doggart (1983), an interval of 2 m for two transects through the centre of the feature was

chosen. Further, in order to test the resolution of this technique, some intermediate samples of the lynchet were taken at 1 m intervals. The transects A–B and A–C were sampled at intervals of c. 200 m, this proving to be adequate as all topographical features and areas near surface archaeological features were sampled.

On site sketches of the soil profile found on the auger after each probe were made, the colour change and depth of each band being noted. For the lynchet feature these were then redrawn to scale as graphs, to aid comparison (Fig 3).

On completion of the fieldwork the samples were taken back to the Environmental Laboratory at the University of Southampton for preparation and magnetic susceptibility ratio testing.

Laboratory Analysis

The samples were re-bagged and left open, in a well ventilated area of the laboratory, to air-dry for two weeks. Each dried sample was then crushed by hand, using a mortar and pestle, and sieved through a 2 mm mesh sieve, weighed into 100 g units, placed in plastic bags, and passed through the sensor. The equipment used consisted of a Bartington MS1 meter coupled into a MS1B sensor coil calibrated for 100 g soil samples following Allen (1988). The results were then noted and tabulated (tables 1–4) for each sample and transect.

Magnetic susceptibility enhancement

Magnetic susceptibility is the parameter which expresses the ratio between the magnetisation induced in a sample and the magnetising field (Thompson *et al* 1975; Oldfield *et al* 1978; Allen 1988; Allen and Macphail 1987). Magnetic susceptibility enhancement is due to the conversion of iron oxides in the soil from weakly ferromagnetic types to strongly magnetic forms, for example the conversion of haematite to the strongly magnetic form maghaemite, which has a strong positive aligned moment if placed in a magnetic field; it is also capable of retaining magnetic remnence when removed from that field (Allen 1986; Allen and Macphail 1987).

It has been shown that enhancement can take place through burning (Le Borgne, 1955, 1960; Longworth and Tite 1977) and through pedogenic processes (Allen and Macpail 1987). The usefulness of MS as a technique in environmental archaeology has been indicated by Oldfield and Dearing (Oldfield *et al* 1978; Dearing *et al* 1981) in studies of lake sediments, and by Allen (1988) in dry valley deposits on the chalklands. This work has suggested that 'magnetic susceptibility measurements seem to reflect vegetational and pedogenic regimes, and if MS values are preserved in archaeological situations then potentially we have an additional palaeoenvironmental technique to aid the growing suite of determinants' (Allen, forthcoming).

The samples

A few problems in processing the samples were encountered in the drying and measuring stages. Some of the samples were lost accidentally in the laboratory when they were tipped over; these blanks are denoted by x symbols in the tables and by the discontinuity of the sample numbering of the Withey Brook transect results table. Loss of bulk occurred as a result of the processing itself, caused by the drying out of the wet samples and the sieving process, necessary for the removal of pottery fragments greater than 2 mm diameter which could have artificially enhanced the MS readings, and rock fragments greater than 2 mm diameter which would have tended to lower the MS readings.

It was found that an average sample weight of c. 260 g, a full 14 x 14 cm collecting bag, would yield c. 108 g of dried sieved soil suitable for testing. This was the measure used in the field.

The use of statistics

MS results from samples less than 100 g in weight were transformed mathematically, by using the ratio property of MS, into a meaningful statistic representing the value for a 100 g sample, to aid in making comparisons. However samples less than 50 g will produce a much less meaningful statistic than those of 50 g and above. All cases which have been transformed, and those less than 50 g, are indicated in the tables; the calculated values were also rounded up or down, as appropriate, to the nearest integer.

In order to get an indication of the general MS reading for a particular soil and a particular depth band, the results of all the MS readings from all the transects were brought together by soil type, for example type Princetown or type Hexworthy, and depth band A, B or C; the medians and means were then calculated at a 95% confidence interval, assuming a normal distribution. Depth bands A, B and C were chosen because they offer the best sample population to work with, being the most frequently occurring (tables 5–8). When graphed the results show a skewed distribution, and for this reason the median may be the best measure of what is a typical value and range of values. It is realised that other mathematical transformations could be used to bring the results in line with the normal distribution and to test for various correlations, and it has to be pointed out that there are many complex statistical relationships represented in these results, the analysis of which lies beyond the scope of this work. The use of the statistical values that have been calculated must be set against this background.

Results and Discussion

Archaeological field survey

Settlement evidence from neolithic to medieval times bears witness to the early start of agriculture in the area and its continuity into other periods. The similarities with other settlements such as Carn Brea, Rough Tor and the various sites of Dartmoor and West Penwith indicate that this phenomenon is not a localised event. In general it can be seen from survey information that this area was very densely settled and represents a very different kind of topography from that of Dartmoor, a region with which it is often wrongly compared. The topography of Bodmin Moor consists of discrete areas of relatively low lying down and tors, compared with Dartmoor's large areas of high plateaux. In these discrete areas man did not require the use of artificial barriers to delineate territory in the same way as on Dartmoor, as evidenced by the extensive reave systems found there. Thus remains of field systems may indicate some sort of land management role, possibly connected with efforts to stem soil loss by erosion, and in the process forming lynchets.

Landscape processes

Allen (1984, 1988) has done work on colluviation and other landscape processes at work on the South Downs. He argues persuasively that the effects of anthropogenic activity through time has caused landscape changes. Such changes are both environmental and topographical; environmental, in that such changes as the cutting down of Britain's heavily wooded cover to make way for agriculture in prehistory affected the local fauna and flora, and topographical in the effects that such human activity has on the depth and distribution of soil by leaving it exposed to erosion.

These environmental and topographical changes affected, in due course, the settlement pattern and the visibility within the landscape of the remains of such settlement. It is a common observation among archaeologists that most of our prehistoric monuments are found on high ground. Allen (forthcoming, 13) commenting on the South Downs notes that 'they

probably show taphonomic factors of archaeological site preservation rather than the whole spectra of past activity areas'. Such is the case of the sites on Bodmin Moor, which represent a similar fossilised landscape.

Transect studies

Cores driven down through the soil profiles were sampled at 23 cm intervals, as indicated in tables 1–8. The depth bands referred to here correspond to the soil horizons found at each of these intervals, band A being the surface soil horizon, band B the next deepest and so on.

In general it was observed that depth band A produced lower MS readings than bands B and C. Band B produced the highest readings consistently over all the transects and soil types, C producing readings higher than A but lower than B.

The other depth bands were not used in these calculations as their occurrence in the sample population was infrequent; there is need for further sampling in this area. The point made above about sample size with regard to soil depth also holds good for soil types. The other two soil types represented in the study area are Crowdy, of which there is one sample (AB6RT), and Mortonhamstead, of which there are two samples, AB11 and AB12. Even though there is only one sample of the Crowdy peat it is thought that the MS values are typical, as peats from the surface of other cores produced similar readings and are indicated by the MS value of 1 and 0 in the tables. The statistical significance of the MS values as a general indicator for the Mortonhamstead soil profile is doubtful, though the variation in values adheres to the general observation made above.

Variations in overall MS values were noted between different soil types, peat and peaty soils having the lowest values, as for instance Crowdy. Further, the Princetown generally produces lower values than the Hexworthy and Mortonhamstead types.

Using these values as a standard for variation in soil type and depth the results obtained for each of the transects and depth bands were then compared to it, values above and below the expected range being noted. The low values obtained for the upper A band for all soil types were probably a result of mixing with the peat forming the surface of the moorland soil. The mixing agency is not clear, but could have been the trampling of the soil surface by sheep and cattle grazing over the area, or earthworm activity, and also general activity of soil biota in this horizon. It is often stated in the literature (e.g. Maltby and Caseldine, 1982, 399) that earthworms cannot exist in the acid soils of the moor. However it was noted that earthworms were often present on the surface of the soil during the coring operations, especially in the region of the ancient field system and possible lynchet feature on Craddock Moor. This is now an area of Hexworthy series soil, a soil type probably derived from an earlier brown earth type under oak forest (Maltby and Caseldine, 1982, 399).

The soils in the study area, apart from the Crowdy peat, are ancillary subgroups of each other, and have been previously referred to in the literature as the Hexworthy series, though the Soil Survey recognises them as distinct. The description of the present-day soil profile as a distinctive iron pan stagnopodzol consisting of 6–10 cm peaty surface, a variable but stony Ah, grey mottled or pallid E(g) above a thin but wavy indurated iron pan (Bf) bounding ochreous then brown Bs horizons which merge at c. 46 cm into paler B/C material, conforms to the basic description of soils found at Colliford, 6 km to the west, by Maltby and Caseldine (1982).

The process of podzolisation may be the reason for the general variance in MS values observed above, as the enhancement follows a similar pattern to the iron oxide enrichment of the soil at Colliford. However it is the variations from the norm that interest archaeologists, and the reasons behind those variations. In each of the transects particularly high and low MS values have been recorded for each of the depth bands.

Differential enhancement of the surface A band may be due to burning; small heath fires are a common occurrence during the summer months on the moor. The reason for differential enhancement of the other depth bands above the expected range for the pedogenic process above is more problematical, and will be dealt with transect by transect. Low readings may be the result of differential hydrological processes leaching out the soluble iron compounds within the soil.

The lynchet feature (Figs 3, 4; table 3)

This feature was detected in the fieldwalking survey. The general structure was made apparent by using the auger to probe at set intervals as described above.

The diagram of the soil horizon changes indicates a negative lynchet feature 30 m upslope from the positive lynchet. The enclosure is part of a system of Bronze Age enclosures described in the field survey above, and measures approximately 60 m by 31 m. Where the stone boundary walls have been breached there are noticeable fans of colluvial material.

These erosion events are probably of recent origin and are similar in appearance to the events observed by Allen (1988) at Ashcombe Bottom. Such events may have been responsible for the loss of much of the moorland soil, especially during periods when there was no vegetative ground cover, either in the form of woodland or of grass and heather. The MS values in the positive lynchet show some higher values than the intervals calculated for the median and mean, and may indicate the presence of colluvial deposits and possible archaeological features worth further investigation. Such observations are in line with those of Allen on the chalklands.

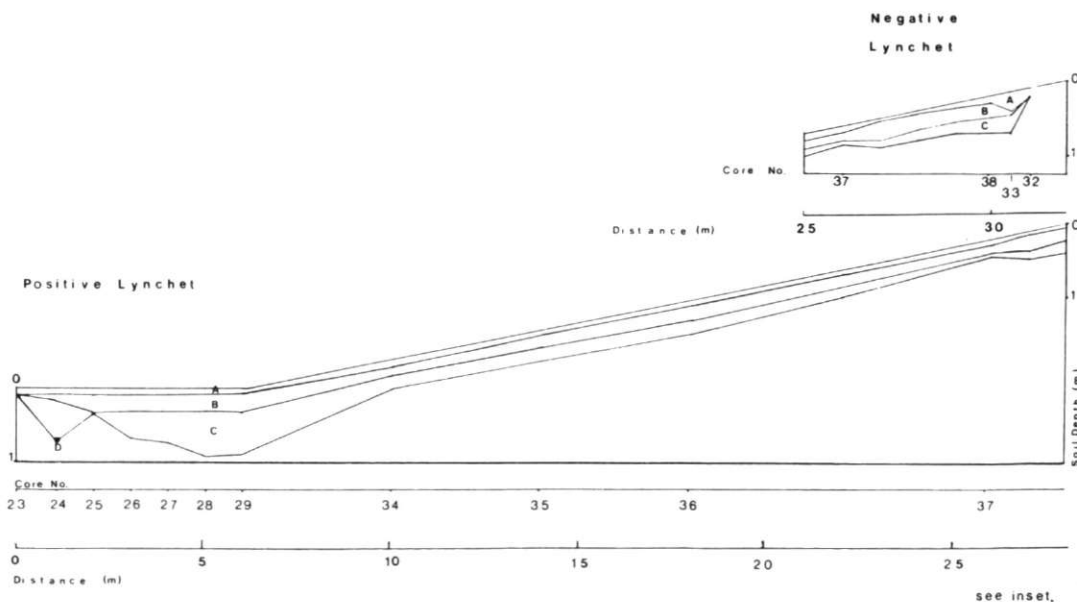


Fig 3
Plot of 'lynchet feature' soil core data

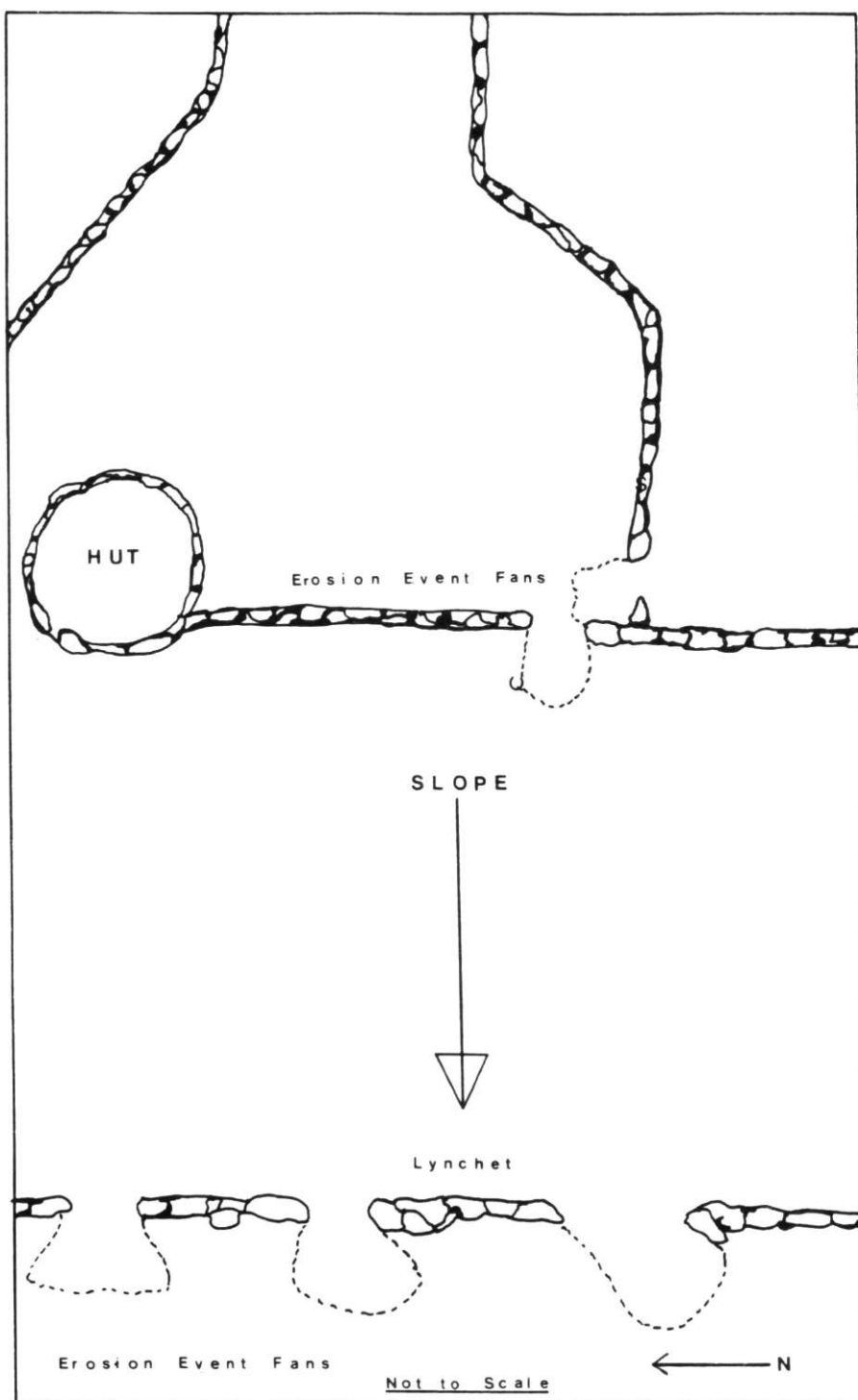


Fig 4
Sketch of fields and erosion events on Craddock Moor

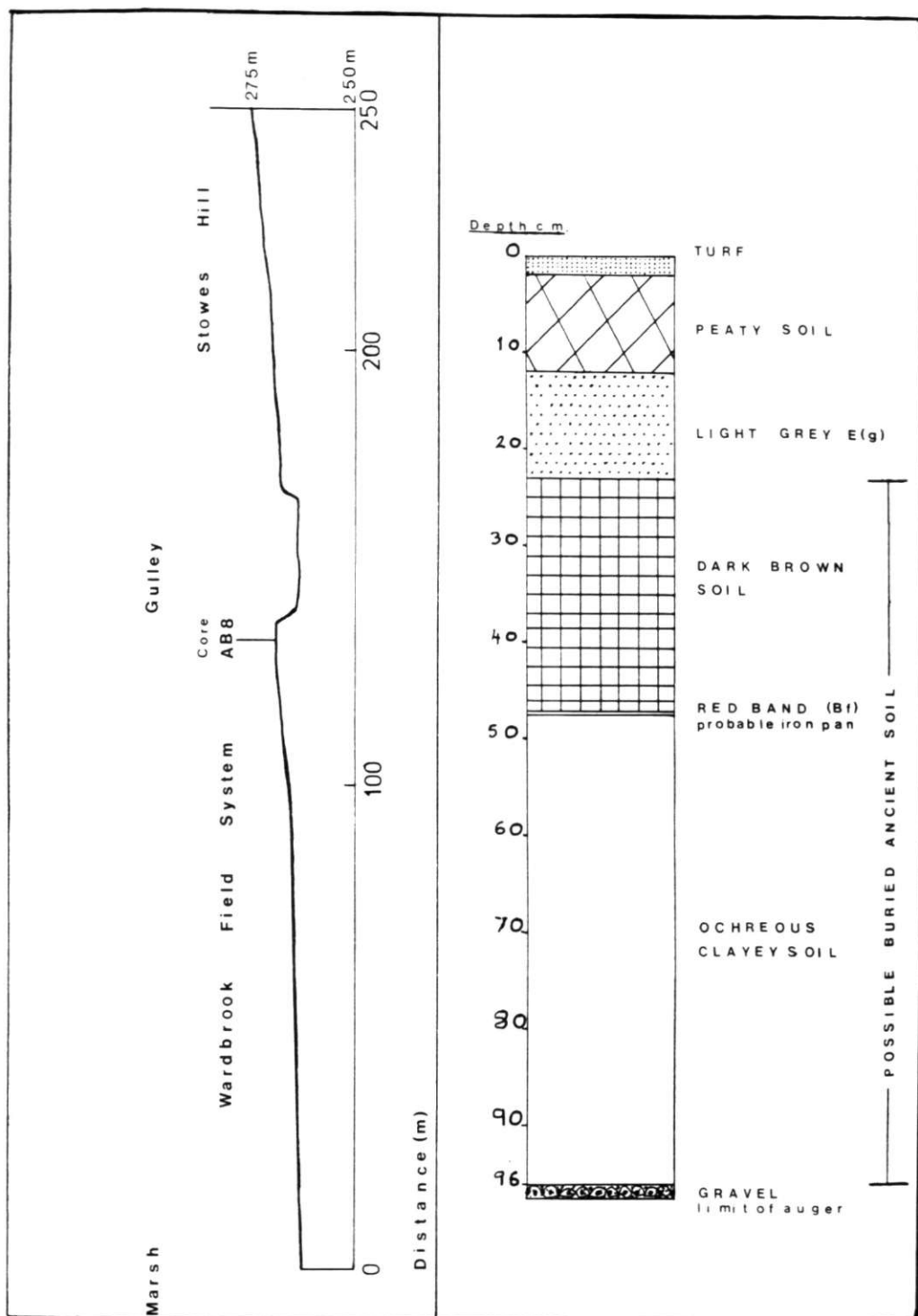


Fig 5
Wardbrook field system and soil profile of core AB8

Table 1 MS readings for transect A–B

Core number	Depth band (cm)						Total soil depth (cm)
	0–23	24–46	47–69	70–92	93–115	116–120	
AB1	2*	7					57
AB+	1	17	13				68
AB3	3	9*					34
AB4	0	6					47
AB5	1	1*					28
AB6	0	–3*	24	4	2	x	120
AB6RT	1	1	1	1	1	1	116
AB7	9	10*					30
AB8	33	12	24	15			96
AB9	2	3					48
AB10	13	6					44
AB11	6	27	23				68
AB12	4	11					47

* Calculated MS values from samples less than 100g but greater than 50g

x Samples lost in preparation

Transect A–B (Fig 5; table 1)

Transect A–B produced variations in MS values especially at depths greater than 23 cm and in the valley bottom between Gold Diggings and Stowe's Hill, at Wardbrook (see results for cores AB6 and AB8 in table 1). In this isolated field system core AB8 (Fig 5) produced some very high MS values. The fields were under grass at the time of the sampling and had been throughout living memory, and have therefore not been disturbed by modern deep ploughing techniques.

This core AB8 also produced an unusual soil profile, and indicates a possible buried ancient soil. The bulk of this soil came from the Stowe's Hill side of the valley, as this has the longer and steeper slope, thus having more soil available to contribute to erosion events; and higher energies are involved in erosion events on steeper slopes. These high energy events could carry quite large amounts of colluvium and archaeological materials down to the valley floor. This area of Stowe's Hill has the remains of ancient field systems on it. It is possible that the surviving fields in the valley where the sample was taken might be a reservoir of archaeological artefacts washed down from the slopes above.

The valley in general has suffered from the effects of tin streaming and mining activities, but these few fields represent an isolated island in the present day valley floors, surrounded on one side by the Withey Brook Marsh which shows signs of the tanners' activities, and on the other side by a deep 'rift valley' like cutting, also of mining origin. The intramural surface of the fields is over 1 m above the present day extramural land surface, and represents a considerable volume of colluvial deposit.

Transect A–C (table 2)

By comparison with transect A–B, A–C shows very little variation in MS values and none outside the statistical limits calculated for the 95% confidence interval for the natural pedogenic processes thought to be occurring in the soil. This may reflect the fact that this area of the moor was used for ritual purposes in antiquity and was not subject, as far as we can tell, to much cultivation or any settlement. It is overlooked by the nearby settlement of Stowe's Hill, the inference being that man's influence here was probably minimal after the initial deforestation, an open grassland environment being maintained by cattle or other grazing animals.

Table 2 MS readings for transect A-C

<i>Core number</i>	<i>Depth band (cm)</i>						<i>Total soil depth (cm)</i>
	0-23	24-46	47-69	70-92	93-115	116-120	
AC-	1*	12	11				70
AC2	1*	3					46
AC3	5*	13	11				58
AC4	1	9	8				66
AC5	1*	10	7				62
AC6	2	4	3!				54
AC7	2	8	7				78
AC8	x	8	5				60

* Calculated MS values from samples less than 100g but greater than 50g

x Samples lost in preparation

! Calculated MS values from samples of less than 50g

Table 3 MS reading for lynchet feature

<i>Core number</i>	<i>Depth band (cm)</i>						<i>Total soil depth (cm)</i>
	0-23	24-46	47-69	70-92	93-115	116-120	
L23	0						17
L24	-3*	12	18	21			72
L25	3	8					33
L26	3	18					42
L27	9*	31	10				47
L28	4	12	16				66
L29	3	10	9				64
L30	0	1	4				33

* Calculated MS values from samples less than 100g but greater than 50g

Table 4 MS readings for Withey Brook transect

<i>Core number</i>	<i>Depth band (cm)</i>						<i>Total soil depth (cm)</i>
	0-23	24-46	47-69	70-92	93-115	116-120	
WB2	0						9
WB3	2*	4	4				71
WB4	23						22
WB5	8	16					44
WB6	23						22
WB7	4	9					46
WB10	2						10
WB11	3						18
WB15	2	3					44
WB14	2						10
WB18	17!	2*	6*				58
WB19	-3*	2					47
WB20	1	18	2	3	3		106
WB22	0	5	7	8			

* Calculated MS values from samples less than 100g but greater than 50g

! Calculated MS values from samples of less than 50g

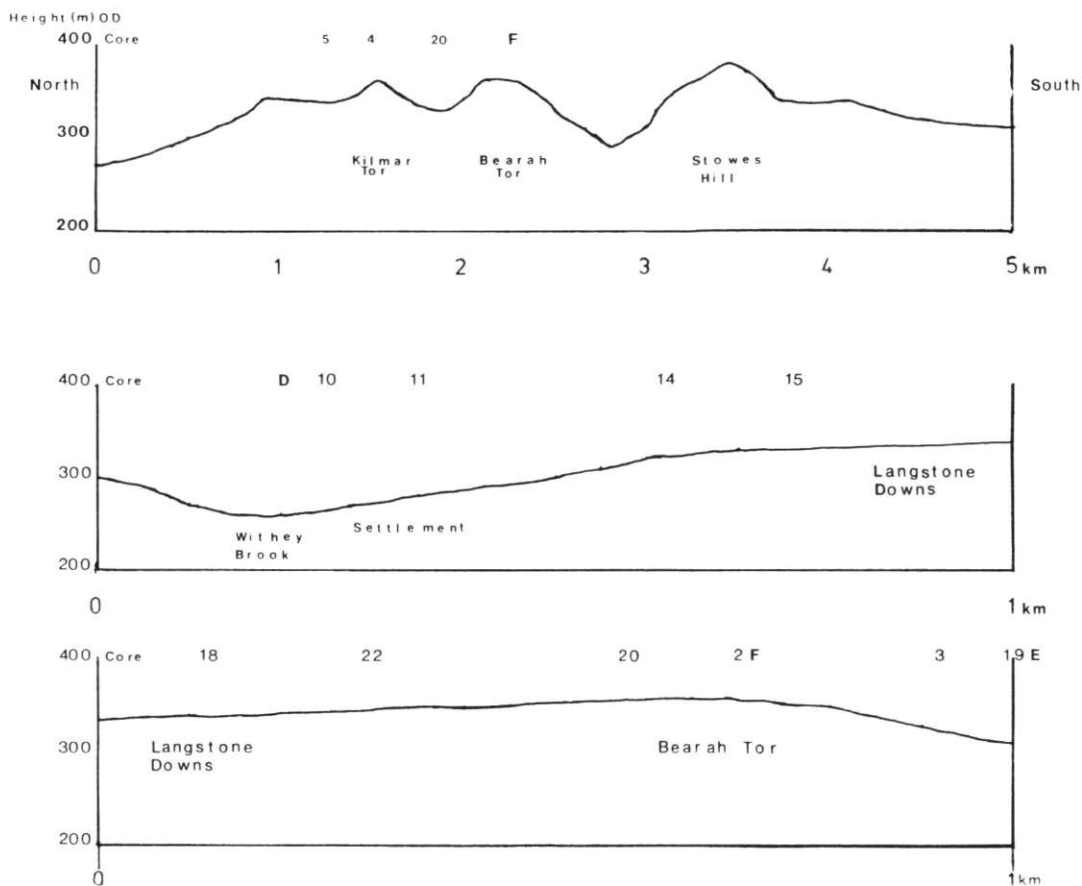


Fig 6
Section through the Withey Brook transect, showing the relative positions of the cores

Withey Brook transect D-E, F-G (table 4)

This transect produced some high MS variation in the A and B depth bands, similar to that observed in transect A-B. Cores WB20 and WB5 gave high values in depth band B. Core WB20 was taken from the head of a small dry valley between Kilmar Tor and Bearah Tor. It is this area that numerous clearance cairns were noted. Core WB5 was taken from a platform on the north side of Kilmar Tor, and this too contains the remains of cairns. As can be seen from the section through the topography (Fig 6), cores WB5 and WB20 were taken from locations that would tend to collect debris from small scale erosion events on the hillsides before it was washed down the axis of these high valleys and into the Lynher river valley below. The high MS values may be related to past human activity in this area.

Samples taken near known settlement sites however did not produce any high MS values. In fact near these sites cores WB6, WB7, WB10 and WB11 gave low readings, though it will be noted that the soil at these points was very shallow. The readings would be consistent with a new peaty soil being laid down over rock, the inference being that the old soil has been eroded away. The high values recorded in the A depth band could be due to recent localised burning of the moor. It must also be borne in mind that MS enhancement can also occur as a result of the inclusion of pottery fabric within the soil, and although no pottery fragments

were recognised in the sieving of the samples, decomposed pottery fabrics may still have been present and could be responsible for the enhancement of some of the samples. There is no proof for this speculation, but further work may provide the necessary data for an answer. If this supposition should be proved, then MS survey would have an additional utility as a tool for archaeological prospecting on the acid moorland soil.

Conclusions

By augering and MS analysis it has been shown that parts of Bodmin Moor are blanketed by superficial deposits and it is possible that such deposits bury archaeological sites, as seen at the Wardbrook field system in transect A–B (Fig 5).

The MS values recorded from this core, in the valley bottom between Gold Diggings and Stowe's Hill, point to archaeological activity in locations not previously recorded. We must bear this in mind when interpreting the prehistoric landscape of Bodmin Moor, and not limit our search to the wealth of easily accessible and recordable archaeological features at other locations in the landscape.

Implications

The work of Allen (1984, 1988, Allen and Macphail, 1987) and Bell (1981, 1983) has shown that methods developed originally by other disciplines can be successfully adapted to archaeological research. Their work has built a data base for the chalk and limestone regions of southern Britain that can be used to aid in reconstruction of palaeoenvironments. This paper has shown that MS survey methods are applicable to areas off the chalkland, though the range of expected MS enhancement values is much smaller, and exact interpretation awaits the gathering of more and wider data, linked to specific and datable archaeological contexts.

Table 5 MS readings for soil type 721a Princetown (all transects)

Core number	Depth band (cm)						Total soil depth (cm)
	0–23	24–46	47–69	70–92	93–115	116–120	
WB2	0						9.5
WB3	2	4	4				71
WB4	23						22
WB19	–3	2					47
WB20	1	18	2	3	3		106
WB22	0	5	7	8			77
AC5	1	10	7				62
AC6	2	4	3				54
AC7	2	8	7				78
AC8	x	8	5				60
Median:	1	6.5	5				
Int.	(0–8)	(4–10)	(2–7)				
Mean	3.1	7.4	5				
±	4.98	3.49	1.54				

Rounded means: Band A = 3 ± 5 , Band B = 7 ± 3 , Band C = 5 ± 1

Table 6 MS readings for soil type 651b Hexworthy (all transects)

<i>Core number</i>	<i>Depth band (cm)</i>						<i>Total soil depth (cm)</i>
	0–23	24–46	47–69	70–92	93–115	116–120	
AC1	1	12	11				70
AC2	1	3					46
AC3	5	13	11				58
AC4	1	9	8				66
AB1	2	7					57
AB2	1	17	13				68
AB3	3	9					34
AB4	0	6					47
AB5	1	1					28
AB7	9	10					30
AB8	33	12	24	15			96
AB9	2	3					48
AB10	13	6					44
WB5	8	16					44
WB6	23						22
WB7	4	9					46
WB10	2						10
WB11	3						18
WB14	2						10
WB15	2	3					44
WB18	17	2	6				58
L23	0						17
L24	–3	12	18	21			72
L25	3	8					33
L26	3	18					42
L27	9	31	10				47
L28	4	12	16				66
L29	3	10	9				64
L30	0	1	4				33
Median	3	9	11				
Int.	(2–4)	(8–10)	(4–16)				
Mean	5.24	9.58	11.8				
±	2.78	2.68	3.38				

Rounded means: Band A = 5 ± 3 , Band B = 10 ± 3 , Band C = 12 ± 4

Table 7 MS readings for soil Crowdy (all transects)

<i>Core number</i>	<i>Depth band (cm)</i>						<i>Total soil depth (cm)</i>
	0–23	24–46	47–69	70–92	93–115	116–120	
AB6RT	1	1	1	1	1	1	116

Table 8 MS reading for soil type 611b Mortonhampstead (all transects)

<i>Core number</i>	<i>Depth band (cm)</i>						<i>Total soil depth (cm)</i>
	0–23	24–46	47–69	70–92	93–115	116–120	
AB11	6	27	23				68
AB12	4	11					47

Magnetic susceptibility as an archaeological tool

MS survey is a technique that does not cause damage to farmland, an important consideration to farmers; unlike fieldwalking, where a recently ploughed surface is considered optimal, it can be carried out over areas of permanent pasture, a feature of the South-West dairy economy. Understanding landscape processes and their effect on the environmental context of archaeological sites is an important part of the archaeological interpretation of settlement pattern. Any method which can further this understanding must be a valuable addition to the range of techniques at the archaeologist's disposal. This work has shown that MS survey methods are of value in this role within the South-West.

Aerial photography and field survey provide much information about the location of settlement sites, but the use of MS sampling can furnish valuable additional information, and may lead to the location of previously unsuspected settlement sites, as it has done on the South Downs (Bell, 1983, Allen, 1984a).

Summary

This work has established that large areas can be surveyed for MS enhancement, using very simple techniques and relatively cheap equipment, and that this form of survey can detect features that would not have been apparent from surface observation alone. Differences in MS enhancement occur in association with archaeological contexts and are detectable; this variation cannot be wholly explained by differences in soil type and the pedogenic process of podzolisation which appears to play a part in MS variation with depth.

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Plymouth

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Calstock and the Bere Alston Silver-Lead Mines in the First Quarter of the 14th Century

PETER J. MAYER

Introduction

The Bere Alston silver-lead mines, based on two parallel lodes running north-south along the peninsula (Fig 1), are thought to have been discovered in the late 13th century by workmen digging up lead coloured stones. The king claimed ownership of the silver by medieval custom and started mining there. The first account known to us is from the year 1290, although mining may have begun before that. As production increased, workmen had to be brought in from traditional lead-mining districts. In the years 1292–8 the mines yielded £5,496 of silver (at this time a 'pound sterling' was equal to a pound weight of silver). The mines were leased in 1299 to the Florentine merchants, the Friscobaldi, as security for a loan they had made to the king, but they gave up the lease when they realised they were making a loss. In 1301 Thomas de Sweyneseye was granted the keepership of the mine together with the wood of Calstock for the mining operations, and within a few years all the smelting and refining of ore was done at Calstock, and continued to be so for the next 15–20 years, until

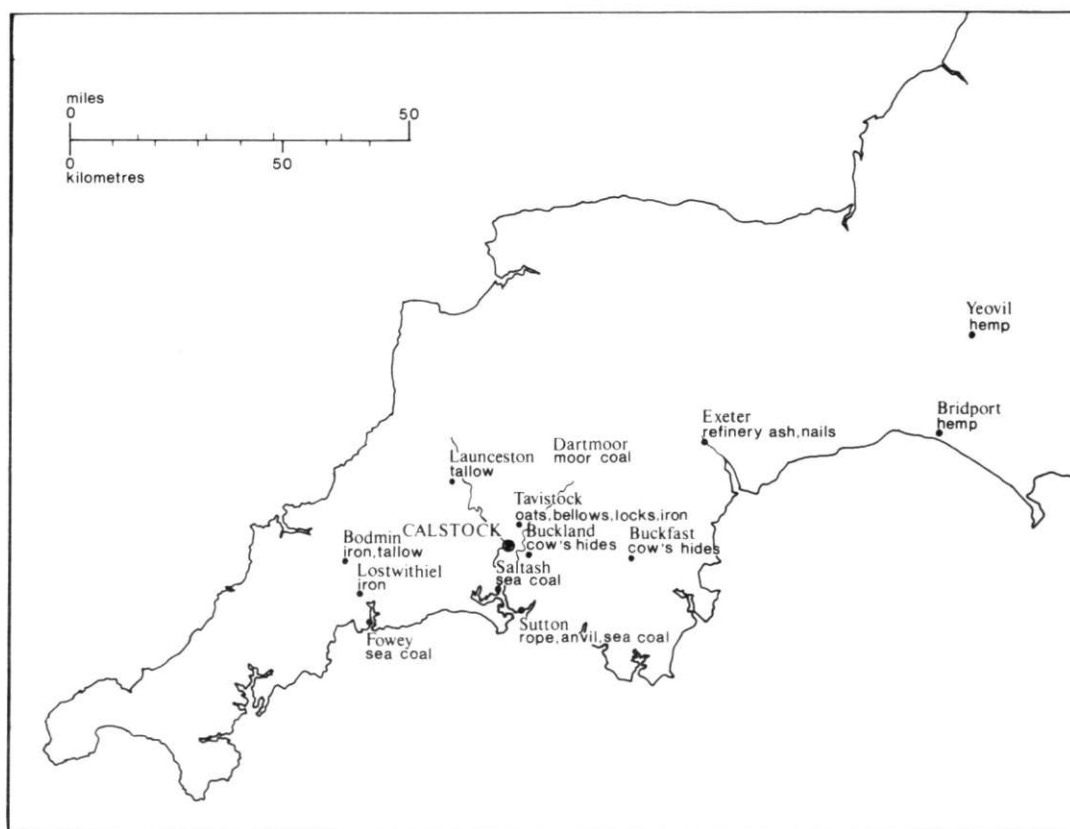


Fig 1

Map of SW England showing places named in the mining accounts of 1302–17 as sources of raw materials

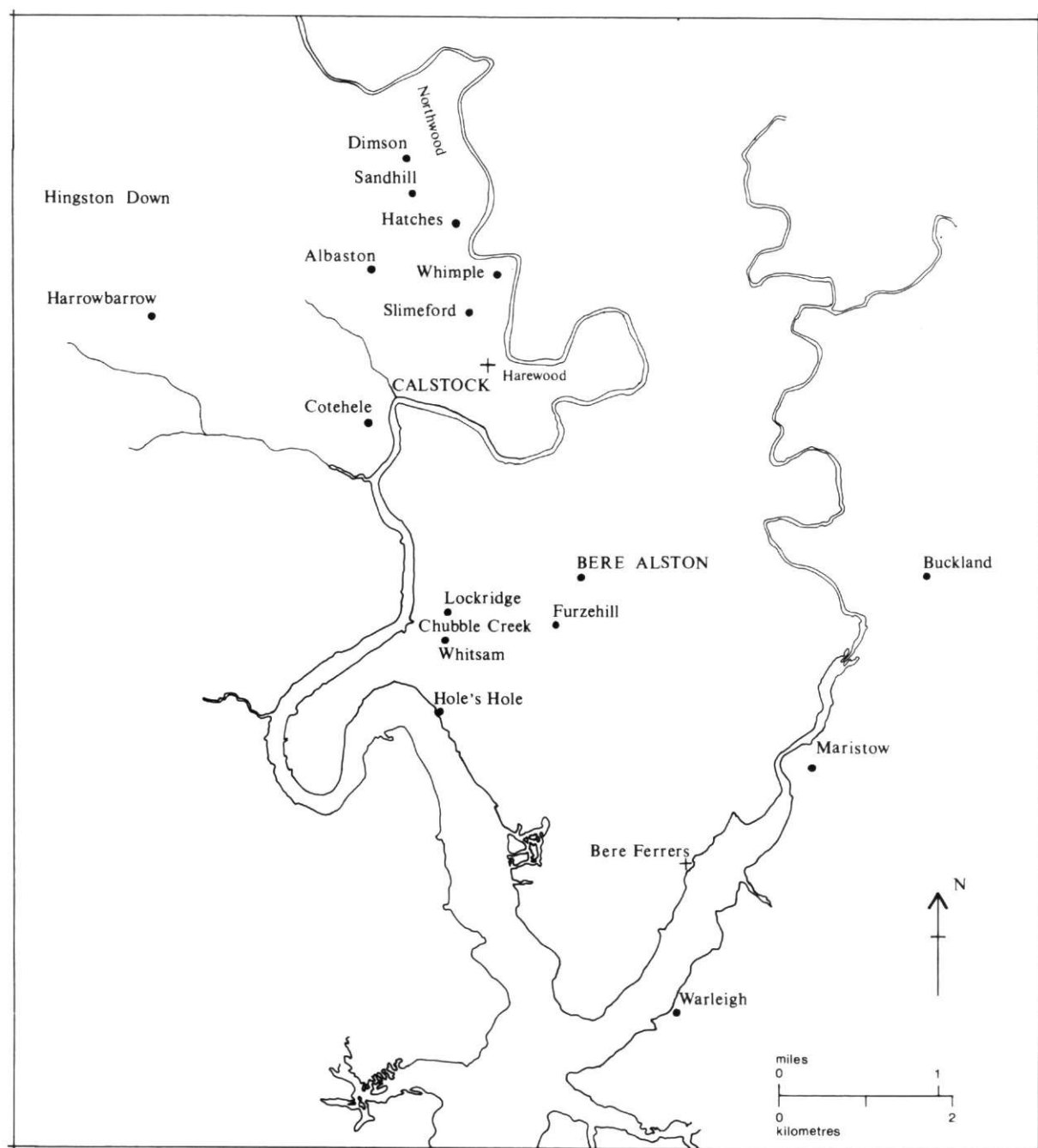


Fig 2
Map of Calstock and the Bere Alston peninsula. Places named are mentioned in the mining accounts of 1302–17

another source of wood came to be used, on the Devon side of the river. The exact date for the end of operations at Calstock is not known, but it is some time between 1317 and 1322.

The mine was run by a comptroller and warden or keeper (*custos*), who were appointed by the king. The keeper had an official residence at Calstock and was responsible for the day to day running of mining operations; he made the weekly payments to the workers, and it was his task to make sure that the miners and other workers were supplied with raw materials and tools for the jobs, and that enough cash was provided to pay them. The keeper also ran the court that had sole jurisdiction over the miners. The comptroller was responsible for checking the keeper's accounts.

From the records that survive for this period, it appears that these accounts were meticulously kept, the most complete series being the annual accounts for the keeper and comptroller, which were sent to the exchequer. However the most detailed, and the most interesting for the local history of Calstock, are the weekly wage lists that survive for the years 1302–4 and 1306. They list the names of the workmen paid each Saturday, and what they were paid for. A list of the translated documents in the Calstock Community Archive is given in Appendix 1.

This essay is divided into two parts: 1) an account of operations from the mining of the ore to the dispatch of the refined silver to London, and 2) a more detailed look at some of the references to Calstock. Numbers in brackets refer to notes (below).

Mining and Processing of the Ore

The accounts mention four mines at Bere Alston: the South Mine, Old Mine, Middle Mine and Fursehill (Furzehill). They suggest that the South Mine and Old Mine were situated near Hole's Hole (Fig 2). Unlike Cornish tin mining of this date, which was usually surface 'streaming', these were underground workings, into which the miners were lowered by rope, and where the mined ore and water were put into buckets to be hauled out. Large quantities of tallow were bought at Bodmin, Launceston and Tavistock, and a chandler, Robertus Palk, was paid to make candles for the miners. Most of the miners had to be summoned by the king's orders from the lead mining districts of Wales and especially the Peak District in Derbyshire. Gough (1930) suggests that a downturn in the Mendip lead mining industry in 1302 may have been caused by the miners there going voluntarily to Devon. Certainly the name of the mine's chief buyer of raw materials (until his death in 1310), Henricus de Pridie, indicates a Mendip origin, as Priddy is a lead mining district there. The miners were freed by charter from all indirect taxes, and were under the sole jurisdiction of the keeper of the mine, that is, they could only be pleaded against in the court of the keeper. A pit was dug in 1302/3 as a prison,¹ but it is unlikely to have been much used since, to judge by the accounts, the number of people pleaded against was negligible. The four mines were large employers; in 1307 there were 700 miners employed at Bere Alston.

One of the main problems facing the mines was water. It rotted the timber supports, making the mines dangerous, and in the early days the mines had to be closed in winter. This problem was to a great extent solved by 'avidods' or adits, which were horizontal galleries driven into the side of the hill as far as the base of the mine, allowing the water to drain freely away. However, even this did not do away with the need for manual draining by leather buckets. In 1315 sixteen people were employed to drain water.

The accounts say little else about the actual process of mining, usually mentioning only special tasks, such as the penetration of rock blockages and the driving of adits. The process of dressing the ore for smelting seems to be little different from the preparation of ore in Derbyshire described by Blanchard (1981). There the larger stones were set aside, and the smaller ore was crushed with a bucker on a knocker stone. The ore was then washed in

troughs by a man with a long handled scrubber, and graded in a series of sieves. An inventory of the mine tools made in 1325 mentions 'handbuckers' and 'broadbuckers'.³

The ore was also measured. A measure of capacity called the 'load' (lada) was used, which consisted of nine dishes. A standard dish measure made in Derbyshire in 1512 contains about 60 lbs of ore. The miners were paid 5s per load. The rector of the parish church of Birland (Bere Ferrers) also received as tithe 2s for every tenth load; before 1307 he received less because he had to pay 9d per load for washing the ore.

Originally the ore was processed on the Devonshire side of the river Tamar, mostly at Maristow and Honyrode in Birland; but once the wood at Calstock was granted to the mine, the processing operations moved gradually to Calstock. Presumably this was because it was thought to be cheaper to move the lead ore to Calstock than to move the bulkier, lower-value wood to Bere Alston. Certainly large amounts of wood would be needed for smelting; lead smelting at the Holywell mines in Flintshire had to be stopped in 1305/6 for lack of wood. Nearly all the ore was taken by land to the Tamar, where it was loaded onto a barge. The accounts mention several landing places near the mines: Halshole (Hole's Hole), the pool of

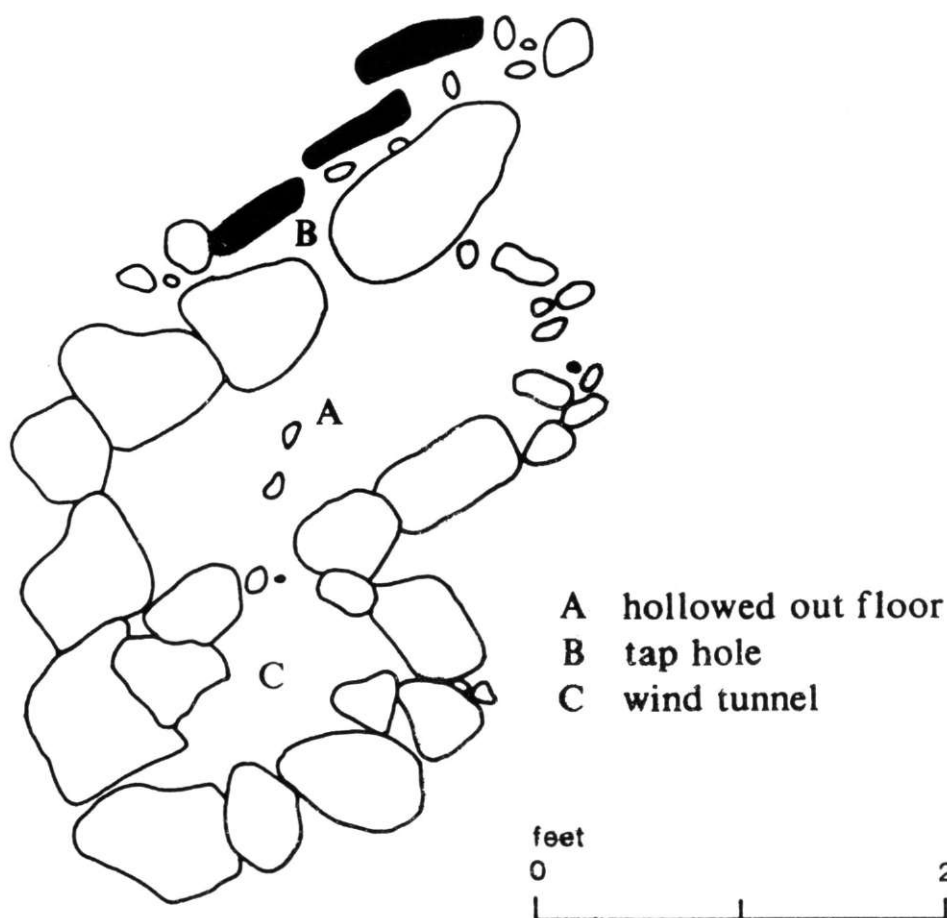


Fig 3

Bole excavated at Beeley, Derbyshire (reproduced from Blanchard, 1981, and adapted from information in Radley, 1969; by kind permission of both editors). A - hollowed out floor; B - tap hole; C - wind tunnel

Wyttesham (Whitsam), Chubbehole (Chubble Creek?) and, above all, from about 1306, Luxeruggepulle (Lockridge?). Occasionally small amounts of ore were taken all the way by land 'for the sake of speed', but this cost 1d per load, compared with ½d per load for taking it to the barge.

The first stage in processing the lead ore was smelting, done in either a 'bole' or a furnace. Most of the ore mined was 'black ore' or galena (lead sulphide), and the smelting of this seems usually to have been done in the boles,⁴ presumably because they were cheaper to run and because they achieved a greater rate of extraction of silver lead.⁵ Excavations of a medieval bole at Beeley in Derbyshire have shown that the bole was a stone structure like a cairn, placed on an exposed hilltop. A floor, about two feet wide, was hollowed out. Within the wall facing the prevailing wind (usually the south-west) was a wind tunnel, and on the opposite side was a tap hole (Fig 3). To smelt the ore a layer of logs was placed over the hollowed out floor; brushwood was laid on top of this, densely interwoven to prevent the ore sinking to the bottom before it was oxidised; finally the ore was placed on top. When the wind was blowing in the right direction, the bole was lit. The natural draught created a temperature sufficient to oxidise the galena at the top, which then reacted with the rest of the galena to produce lead and sulphur dioxide ($2\text{PbO} + \text{PbS} = 3\text{Pb} + \text{SO}_2$). The lead collected in the bowl-shaped hollow, where it was ladled out of the taphole with a large spoon. The yellow slag and charred wood collected on the blocks and was shovelled out.

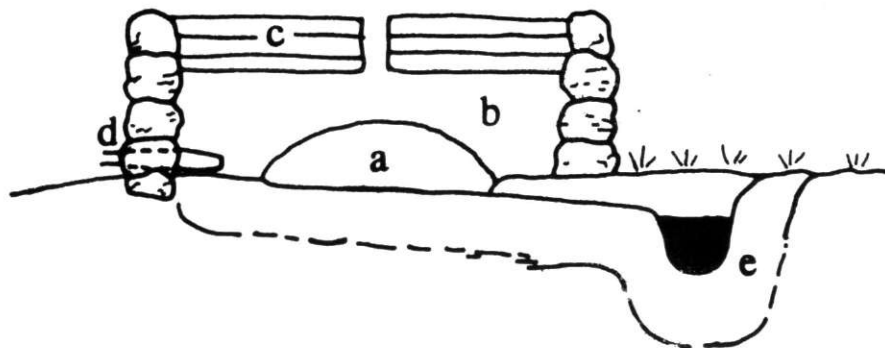
The descriptions of the boles at Calstock and Birland often agree with this account. Two boles, built at Calstock in September and October 1303, were of similar construction. Mention is made of digging a pit for the bole, building the walls with quarried stone using lime as a mortar, and bringing in the wooden 'blocks', as well as of buying sand and sawing timber. The week's account for 2 February 1303 includes the repair of a bole in Birland with tiles, lime, planks of wood, sand and clay.⁶ However there are other references (see below) to 'earthen boles' and 'low boles'.

At first boles continued to be used also on the Devon side of the river, at Buckland and Honyrode in Birland, but gradually they came to be concentrated at Calstock. The bole at Buckland was dismantled in the week ending 31 August 1303, and the last reference to the bole of Honyrode is 9 May 1304;⁷ the counter roll of the Abbot of Tavistock in 1307/8 says that all the ore was taken across the Tamar to Calstock.⁸ At Calstock there is mention of several boles: at Sandholk (Sandhill, near Gunnislake) a pit was dug 'to build a bole';⁹ at Dynesham (Dimson) 'low boles' were built;¹⁰ and there were 'earthen boles' at 'the old castle of Calistock'¹¹ (the site might be Castlewood, but at this date 'Calstock' is used either of the town or of the parish as a whole). The most important boles however were at Calstock itself. Of the two that were built in September and October 1303, one is said to have been built next to Calstock church,¹² and the other was probably nearby. Next to these was the other type of smelter — the furnace. It is uncertain whether all these were in use at the same time. The lack of further reference to the former three areas suggests that their use may have been shortlived. It is possible that several boles were needed, to take advantage of the wind when it blew in different directions.

The problem with smelting by boles is that they need a steady wind blowing in a constant direction to create the draught to reduce the ore; an Exchequer commission on lead hearths in the Mendips in 1582 found that smelting had to be stopped in fixed hearths (boles) when the wind changed direction. However, an improvement on the bole, called a turnbole may have been used at Calstock. Basically it was a hearth which was placed on a timber platform that could be turned, enabling the smelters to take advantage of the wind from any direction. Turnboles are attested in Devon in 1300¹³ and 1325.¹⁴ It may be that the boles at Calstock

in the accounts are understood to be turnboles, for mention is usually made of timber being used in their construction. There is a reference to a 'turning furnace' (*fornellus versitilis*) that was built 'next to the bole',¹⁵ and Roger Bonde was paid for 'roofing a building beyond the turning furnace next to the bole'.¹⁶ Some of the information is problematical, for although it was called a furnace it apparently used wood, not charcoal (reference is made in the account of 3 September 1306 to sticks being used for the 'new device'). The turning device may also have used bellows,¹⁷ although by the 16th century in the Mendips the boles also had bellows. The boles do not seem to have been able to smelt the 'white ore' of the mine (lead carbonate), and the smelting process left large amounts of 'blackwork' — yellow-coloured lead-rich slag. They were therefore supplemented by another smelter called a 'furnace', which seems to have been located near the boles, at least at Calstock church. Excavations by Raistrick at Gunnerside in Yorkshire in 1927 show that the furnace was a circular stone structure, about five feet in diameter and two feet high. The floor was of clay with a bowl-shaped hollow at the centre into which the ore or slag was placed. Charcoal was packed around, and it was sealed with clay. When the charcoal was lit it was kept at a high temperature by bellows, whose nozzles passed through the sides of the hearth. The molten lead then ran down a channel into a mould (Fig 4).

The earliest reference to a furnace at Calstock is 8 June 1303, when Phillipus de Yal made a furnace and broke white ore there. The week's account for 23 November 1303 pays Walterus Smalye for making a furnace to smelt slag.¹⁸ As in the boles, the walls were often built of tiles¹⁹ with lime used as a mortar. The bellows were operated by foot power at Calstock, each week's account usually paying a furnace man and his three bellow blowers;



- a** slag or ore
- b** charcoal
- c** clay
- d** hole for nozzle of the bellows
- e** mould for molten lead

Fig 4

Diagram of a furnace (reproduced from Blanchard, 1981, by permission of the editors; and based on information in Raistrick, 1927, copyright the Newcomen Society, by permission of the Society's Council).

a — slag or ore; b — charcoal; c — clay; d — hole for nozzle of bellows; e — mould for molten lead

however an earlier furnace at Maristow used water-powered bellows. The blackwork or slag coming from the boles was first crushed, either manually by a man with a hammer, or in a device, originally brought from Buckland,²⁰ where the ore was crushed by mill stones turned by draught animals.²¹ It was then washed. This work seems mainly to have been done by women, often members of the mining families; for example, Matilda Bate washed slag, while Ricardus Bate was the boler. However when men did this same work they were usually paid at a higher rate. To provide the water to wash the slag, a water course was built close to the boles, furnaces and refineries.²² It was lined with clay²³ and seems to have run from a natural fountain.²⁴ There was not always enough work for the furnaces; in 1307/8 some of the bellow-blowers had to break and wash slag for up to six weeks 'because of a lack of work at the furnace'.²⁵

The result of smelting was to leave a silver-lead mixture called 'fertile lead', which was then given to the refiners who would separate the silver from the lead. This was done by an ancient process called 'cupellation' (a process mentioned in Jeremiah chapter 6, vv 29–30). A hearth was made of absorbent material (at Calstock 'ashes of tan' — refuse oak bark from tanneries was used, which came from Exeter and, to a lesser extent, from Buckland), and the fertile lead and fuel put into a hollow made in the centre. The fuel was lit, and a blast of air from bellows created temperatures of 1650 — 1800°F (900–1000°C), sufficient to oxidise the lead, which was then absorbed into the hearth, leaving the silver on top. The ashes were then resmelted in the furnaces to produce 'barren lead'.

The silver was cast into plates or ingots and taken periodically to the Tower of London by land. If it was sent by land because a sea journey was considered too hazardous, the land journey was hardly less so. One reference mentions that an archer, paid to accompany the silver²⁶ and a patent roll dated 27 April 1299, demanded safe passage for the silver from the sheriffs whose counties it passed through.

The desilverised lead ('barren lead') was sold locally, and usually to local buyers. A roll, dating from Thomas de Sweyneseye's keepership of the mine (1302/7), lists all the purchasers of barren lead.²⁷ Easily the biggest buyers were the mine workers themselves, but the local churches and gentry also purchased the lead, probably for use in building. Local buyers included the keepers of the treasury of the churches of Calstock (2,100 lb), Southill (298 lb) and Stoke Climsland (455 lb); Radulfus de Cutehele (70 lb), Willielmus de Ferrariis, rector of the church of Bere Ferrers (5,040 lb). Some of the lead however did go further afield; Petrus Addy from the island of Guernsey bought barren lead from the mine in 1317.²⁸

These years were the most productive and profitable for the mine. The figures for production, revenue and profit and loss from the extant accounts are tabulated in appendices 2, 3 and 4. Some caution should be taken with the crude profit and loss figures, especially where the account does not cover a whole year. Even annual figures can be distorted by extraordinary expenses, and all the losses recorded in appendix 4 barely exceed the profit of just one year, 1305–6. The Exchequer at this time did not look at the balance sheet for just one year; in 1317 Ricardus de Wygorn offered £200 per annum for the keepership of the mine to be given to him, adding that the previous year had seen a loss of £108.3s.10d for the Exchequer, because of extraordinary expenses. But the Exchequer refused to farm out the mine, when they saw how the profits varied wildly from year to year and that profits way in excess of £200 were possible.²⁹ The records make clear that production reached a peak in 1305/6, when £1,793 of silver was sent to London. This figure was exceptionally high. The ten months to Michaelmas 1308 yielded £792, and after this a definite downward trend in production and profitability is discernible. By 1347 only £70 of silver was mined, but by 1450 the average yield was £250 annually.

The Bere Alston Mines and Calstock: some further aspects

The accounts make it clear that, from the initial grant of Calstock wood in 1301 right up to the end of processing operations around 1317, Calstock was the major source of wood, a vital raw material. Vast quantities of wood would have been needed for operations on this scale: timber was needed for building, supports for the mines, boat building etc, and brushwood was used for the boles. Wood was also needed by the charcoal burners, making the charcoal required for the furnaces and refineries. Charcoal would have been made in a charcoal kiln. This was built with a triangular flue in the centre, with wood laid around and over it. The kiln was then thatched and covered with earth to exclude the air. Once lit with burning charcoal put into the flue, it was left to burn for about three days. The only unused part of the oak trees felled for this operation was the bark, which was sold at around 3d per seam.³⁰ Within the woods large numbers of people were employed in felling and sawing trees, and carrying wood to the river or to the boles etc in a cart or by horse. Until 1307 Calstock Wood was managed by a separate forester, but after that a supervisor of all the works at Calstock was responsible. In the week ending 30 July 1306, Walterus de Tamerton and seven others were paid 5s 4d for cutting wood for 4½ days, 21 men broke slag and carried wood and ore to the boles with their horses, Galfridus the carter carried wood to the boles with the king's cart, and Hugo the forester was paid 10d per week.³¹ The accounts often mention how the king's horses were catered for (they were mainly employed pulling the king's cart). A stable was provided for them near Calstock manor house,³² oats were bought for them at Tavistock, and there is a reference to roofing a haystack for the King's horses.³³ Additionally 4 acres of pasture was bought for 10s to feed the horses in winter,³⁴ and finally, lest the horses were tempted to stray when pasturing, 5 ropes were bought to tether them.

The names of the woods are rarely mentioned. Only Harewood (Herierne, Hergerne) is named in the earlier accounts, and it was also implied by a reference to taking wood to the bole at Calstock 'up the hill'.³⁶ The account for 1317 mentions 'le Northwode' (Northwood, on the site of Gunnislake), perhaps suggesting that Harewood, more conveniently sited for the processing works at Calstock, was by then largely exhausted. This is not at all unlikely, given the large quantities of wood bought from secondary sources: in 1303/4 £140 of timber was bought from the Abbot of Buckland,³⁷ and from 1307 timber was regularly bought from Willielmus de Chivereston at Warleigh, for example 6 acres in both 1307/8 and 1309/10. The number of people regularly employed in felling trees at Calstock also suggests that large quantities of wood were always needed. 1317 was the last year that the king's woods at Calstock were mentioned. The account of 1323 says that Radulfus de Cotehel was paid 30s for 1½ acres of wood to repair the gutters at the mine; the wood was shipped from Cotehele.

With the mines on the Devon bank and the woods and smelting operations at Calstock, there was considerable river traffic on the Tamar between the landing places near the mines and Calstock. Two types of craft are mentioned: the 'boat' (batellus) and 'barge'; the ore and other items are said to go by barge.³⁸ It is difficult to know how many boats were used (at least three barges are mentioned), or what they were like, as little is known of medieval boats. In 1307/8 a new barge was built, with 867 feet of timber, 150 boards, a barrel of pitch, and three oars; four carpenters worked for 32 days on it and another four for 20 days; the total cost was £4 7s 5d.³⁹ Another barge bought in 1304 cost 103s 4d.⁴⁰ These barges must have been quite large, since a new ferry boat bought for Calstock in 1339/40 cost only 10s 6d.⁴¹ The repair of damaged boats was usually carried out at Calstock; there are references to damaged boats being taken from Birland⁴² and Wereton⁴³ to Calstock. About a month after the latter came to Calstock, Radulfus de Fallynges was paid to make a ditch at Calstock for

a boat, perhaps to facilitate repairs.⁴⁴ It seems that the boats would normally be moored on the river banks.⁴⁵ Use was also made of the manorial ferry at the Hacche; in 1303/4 the keeper paid 12d for one year's passage at the Hacche for refinery ash and other items;⁴⁶ and in 1323 when wood was bought at Cotehele, the keeper and miners crossed by ferry to cut the wood.⁴⁷

There is also some mention of buildings utilised at Calstock. The most important of these was the manor house of Calstock. Its location is uncertain, though it was not at Harewood,⁴⁸ and it was probably somewhere near Calstock church. The accounts make it clear that the 'manor' was a complex of buildings called the 'court' (curia), of which the hall (aula) or manor house was the main building. During 1304/5 the manor was fortified by the digging of a ditch or bank⁴⁹ (unfortunately the Latin word 'fossatus' can mean either), and enclosed with a hedge by Luke, priest of Birland, and Henricus Pycher;⁵⁰ the effect of this was to divide the court from the garden. The main hall had a tiled roof,⁵¹ and the manor house had a solar — an upper storey at one end of the hall, normally used as living quarters, though at this time it was used to store rope and hemp.⁵² The accounts talk of plastering the walls of the solar. This suggests a wattle and daub construction, where woven branches (wattle) were placed between the timber posts and then plastered with clay (daub). The hall itself was also used to store reeds for thatching,⁵³ and also iron and wooden boards.⁵⁴ There is also mention of a room 'above the hall'. Other buildings within the court were lodging houses for the workers,⁵⁶ a lead house,⁵⁷ and a refinery house.⁵⁸ There may also have been a gate house to the court; Willielmus Luxi is said to have roofed a building 'beyond the door/gate' (ultra portam).⁵⁹ Just outside the court were the stables for the king's horses, situated next to the gate of Calistock.⁶⁰ Some of the other buildings mentioned in these accounts may have been part of the court, but often little or no clue is given as to their whereabouts.

The other buildings include the comptroller's house,⁶¹ the keeper's residence⁶² and exchequer.⁶³ Their location is uncertain, but they are likely to be at or near the court. The keeper and comptroller kept the coffer, which was a chest with two locks in which the refined silver and cash to pay the workers was kept; hence perhaps the need to purchase locks at Tavistock for the comptroller's residence⁶⁴ and to fortify the keeper's residence by placing a ditch and perhaps an earthen wall around it.⁶⁵

The smithy at Calstock is a building for which we have a considerable amount of detail. It was built for the master smith Willielmus de Lichfeld in 1303, was of wattle and daub construction (three men were paid to plaster the walls), and had a thatched roof.⁶⁶ An anvil was bought for it at Sutton, and bellows at Tavistock.⁶⁷ It caught fire in the week ending 5 August 1304, when the week's account records that an unspecified number of men were paid 12d to extinguish the fire.⁶⁸ Their efforts appear to have been largely in vain, since the account for 24 October 1304 mentions that Willielmus Seriant was paid 5d 'to collect twigs (virga) for a new smithy at Calstock'.⁶⁸

Near the bole and furnace at Calstock, probably at Calstock church, stood a building to keep charcoal,⁶⁹ a building 'beyond the turning furnace next to the bole',⁷⁰ and a house for the workers next to the furnace.⁷¹ Near the refinery was a storehouse for refinery ash and lead,⁷² and a small building for the refiners was moved from Maristow to Calstock 'next to the king's wood'.⁷³ Finally there was a forester's house on the hill (contra montem) at Calstock, suggesting a location at Calstock church, which is on a hill above Harewood.⁷⁴

Most of these buildings seem to have been of wattle and daub, for mention is often made of collecting 'virgas' (twigs or small branches), and the walls were 'plastered' or daubed. All but the manor house would have had thatched roofs, Calstock marsh being the main source of reeds for thatching. Most of the buildings took only a short time to build.

Needless to say, with the processing operations based at Calstock, there were many opportunities of employment for local people. Appendix 5 contains the names of all workers who can with reasonable certainty be said to come from Calstock. Some of them are named after places in Calstock, for example Phillippus de Womple (Whimble). Some of the other names appear in the contemporary Minister's Accounts for the manor of Calstock, while for the rest the family name can be found in the Minister's Accounts or other 14th century records (Assession Rolls, Court Rolls, Memoranda Rolls). The list is unlikely to be complete for the accounts do not always name those whom they pay, many of whom would come from Calstock. For example, the man who mowed reeds at Calstock marsh and the four women who carried them to the manor house for one day in the week ending 3 August 1303⁷⁵ are not likely to have travelled a great distance for work of such a casual nature. The accounts regularly pay unnamed people to cut down trees and to cut up wood for the boles and refineries, and to carry wood with their horses; many of these would have come from Calstock, and indeed many of the people in appendix 5 are paid for just such work. It should be borne in mind, however, that appendix 5 covers a period of fifteen years, and few of the names feature for any great length of time; some, for instance Radulfus clerk of Harebere (Harrowbarrow), appear in one week's account only.

The residents of Calstock were generally not employed for the more specialised tasks, such as mining, smelting and refining. They are found cutting down and sawing up trees, thatching, mowing reeds, looking after the king's boat, carrying wood and other items, and doing general labouring duties. One worker, Robertus Joyberd from Albaston, proved to be very versatile, being paid at different times for roofing a building, digging a water course (with the help of another man from Albaston), making the walls of a bole, plastering a building with daub, and digging a ditch. It is likely that many of the workers from Calstock would be drawn from the pool of landless labourers that existed on most manors of this date, though nevertheless the families of many of the workers appear on the Caption of Seisin of 1337 as landholders.

The upper echelons of Calstock society also appear. The parish priest Robertus de Berkhamstede was comptroller in 1311–12.⁷⁶ Radulfus de Cotehel sold wood at Cotehele for the mine in 1323 and also bought barren lead in 1305/6, presumably as building material for Cotehele.

Conclusion

Calstock's prosperity was to be shortlived. The last reference to ore processing there is on 5 August 1317, when Johannes de Foxle was sent by the Exchequer to sell slag 'left at Calstock around the boles and furnaces'.⁷⁷ The next surviving account, in 1323 has the ore being processed on the Devon bank. The crucial factor is that between these dates Calstock ceased to be used as a source for wood, probably because supplies were exhausted. Without wood there was no reason to smelt ore at Calstock, for it would be totally uneconomic to transport both ore and wood there.

The mining operations at Calstock may have lasted only fifteen years or so and made little impact on the landscape, but the surviving records reported here give us one of the earliest detailed accounts of medieval Calstock and its people.

Acknowledgements

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Dartford, Kent

Notes

1. PRO E101 260/19.
2. PRO E101 261/15.
3. PRO E101 262/4.
4. PRO E101 260/23. This is an account of the silver-lead issued to the refiners between 1303 and 1307. The account for some of the years is more detailed and seems to suggest that the other smelter, the furnace, was used mainly to smelt slag from the boles.
5. The Pipe Roll of 28 Edward I (1300) says that one load of galena smelted in a bole yielded 3½ feet (245 lb) of silver-lead, whereas one load of galena smelted at the furnace yielded only 3 feet (210 lb) of silver-lead.
6. PRO E101 260/22.
7. PRO E101 260/26.
8. PRO E101 261/10.
9. PRO E101 260/22 week ending 30 November 1303.
10. PRO E101 260/22 week ending 20 July 1303.
11. PRO E101 260/22 week ending 3 August 1303.
12. PRO E101 260/22 week ending 14 September 1303.
13. PRO E372 145.
14. PRO E101 262/4.
15. PRO E101 260/22 week ending 21 December 1303.
16. PRO E101 260/22 week ending 1 February 1304.
17. PRO E101 260/26 week ending 4 July 1304. The week's account mentions making bellows, while at the same time Johannes Coppynghofd was paid 3s 6d for sawing 700 feet of boards for the 'turning device' and Rogerus Crune was paid for making the walls of the furnace 'on the new device'.
18. PRO E101 260/22.
19. PRO E101 260/19.
20. PRO E101 260/22 week ending 26 October 1303.
21. In 1307/8 (E101 261/10) there were two of these devices turned by four draught animals.
22. PRO E101 260/22 week ending 5 October 1303, PRO E101 260/26 week ending 3 May 1304.
23. PRO E101 260/26 week ending 18 July 1304.
24. PRO E101 260/27 week ending 3 October 1304 (this mentions repairing the head (capud) of the fountain).
25. PRO E101 261/10.
26. PRO E101 260/26 week ending 18 July 1304.
27. PRO E101 261/2. Other local buyers were William atte Welle of Clymmeslonde, the canons of Plympton, the Abbot of Tavistock, the Dominican friars of Exeter by the gift of John Godelegh, the church of St Thomas, Glasney and an unnamed person from Saltash (Essch).
28. PRO E101 261/21.
29. PRO E159 91. f110.
30. Ricardus de Yolde received 6d for extracting 18 seams of oak bark (PRO E101 260/22, week ending 17 August 1303).
31. PRO E101 260/30.
32. PRO E101 260/22 week ending 9 November 1303.
33. PRO E101 260/22 week ending 21 September 1303.

34. PRO E101 260/22 week ending 27 July 1303, surely at Calstock. It may have been similar to a 15th century barge found at Blackfriars in 1970 (and now at the Shipwreck Heritage Centre, Hastings), which was an open shallow boat, about 50 feet long and 15 feet wide. However this barge had a sail, and no sails are mentioned in the above account (P. Marsden, *The Historic Shipwrecks of South-East England*, Norwich, 1987).
35. PRO E101 260/26 week ending 27 June 1304.
36. PRO E101 260/22 week ending 22 February 1304.
37. PRO E101 260/19.
38. PRO E101 260/19.
39. PRO E101 261/10.
40. PRO E101 260/26 week ending 18 April 1304.
41. PRO SC6 816/12.
42. PRO E101 260/22 week ending 30 June 1303.
43. PRO E101 260/22 week ending 7 September 1303.
44. PRO E101 260/22 week ending 5 October 1303.
45. PRO E101 260/26 week ending 18 April 1304, has the following entry: 'For one rope, which is called a cable, for the same barge, 3s 6d.
46. PRO E101 260/19.
47. PRO E101 261/22.
48. PRO E101 260/22 week ending 23 November 1303, talks of taking timber from Harewood to the manor house.
49. PRO E101 260/19 the ditch and hedge were repaired and the gates rebuilt at a cost of 66s 9½d (PRO E372/161, f52).
50. PRO E101 260/26 week ending 13 June 1304, 4 July 1304.
51. PRO E101 260/27 week ending 24 October 1304 mentions 5 seams of tiles to roof the hall being taken from Troghcombe.
52. PRO E101 260/22 week ending 30 November 1303.
53. PRO E101 260/22 week ending 3 August 1303.
54. PRO E101 260/22 week ending 7 December 1303.
55. PRO E101 260/27 week ending 14 November 1304.
56. PRO E101 261/10.
57. PRO E101 260/22 week ending 26 October 1303.
58. PRO E101 260/27 week ending 15 August 1304.
59. PRO E101 260/22 week ending 5 October 1303.
60. PRO E101 260/22 week ending 7 December 1303.
61. PRO E101 260/22 week ending 6 July, 3 August 1303. The Comptroller's house burnt down in 1313/14, and was rebuilt the following year at a cost of £5 11s 2d (PRO E372/161, f52).
62. PRO E101 260/22 week ending 7 September 1303.
63. PRO E101 260/22 week ending 5 October 1303.
64. PRO E101 260/22 week ending 10 August 1303.
65. PRO E101 260/19 for the year 1303/4 mentions that 57s 7½d was spent 'for the repair and mending of diverse buildings with ditches and earthen walls for the keeping of lead and the whole treasury there'. PRO E101 260/22 week ending 7 September 1303 mentions that Robert Joyberd made a ditch around the keeper's residence. The first reference does not mention the keeper's residence, but the reference to the treasury seems to imply this; the reference to the lead may imply that the keeper's house was part of the court, since a lead house was part of the court. By 1314 the manor house was the keeper's residence (PRO E372/161, f52).

66. PRO E101 260/22 week ending 27 July, 3 August 1303.
67. PRO E101 260/22 week ending 20 July, 27 July 1303.
68. PRO E101 260/27.
69. PRO E101 260/22 week ending 1 February 1303.
70. PRO E101 260/22 week ending 1 February 1304.
71. PRO E101 260/27 week ending 12 September 1304.
72. PRO E101 260/22 week ending 5 October 1303; PRO E101 261/10.
73. PRP E101 260/22 week ending 1 June 1303.
74. PRO E101 260/30 week ending 4 June 1306.
75. PRO E101 260/22.
76. PRO E159/85.
77. PRO E159 92 folio 96.

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Appendix 1 **Documents in the Calstock Community Archive relating to the Bere Alston mines** **All references are to PRO**

E101

260/19 Account of Thomas de Sweyneseye (1301–7)
 260/22 Wage roll (1302–4)
 260/23 Issues of lead to the refiners (1303–7)
 260/26 Wage roll (1304)
 260/27 Wage roll (1304)
 260/30 Wage roll (1306)
 261/2 Account of lead sold (1303–7)
 261/10 Counter roll of the Abbot of Tavistock (1307–8)
 261/12 Counter roll of Robertus de Thorpe (1309–10)
 261/13 Counter roll of Robertus de Thorpe (1311–12)
 261/15 Account of Robertus de Thorpe (1312–13)
 261/21 Account of Robertus de Wigornia (1316–17)
 261/22 Account of Johannes Suge (1322–3)
 262/4 Inventory of goods (1325)
 262/13 Inquisition as to the working of the mine (1327)

E159

85 Appointment of Robertus de Berkhamptede as comptroller (1311–2)
 91 f110. Request of Richardus de Wygorn to be appointed keeper of the mine (1317)
 92 f96. Commission sent to Calstock to sell slag (1317)

E372

155B, f5 Account of Robert de Thorpe (1307–1310)
 159, ff33, 34 Account of Robert de Thorpe (1307–1313)
 161, f52 Account of William Duyn (1313–1316)
 162, f38 Account of Stephen de Bradwode (1316–1317)

Appendix 2 **Total amount of ore mined in the surviving accounts 1301–17**

The accounts usually differentiate between black ore (galena) and white ore (lead carbonate), but only the total is included here (most of the extracted ore was galena). The measure used in the accounts is the load, consisting of nine dishes. This is a measure of capacity; however a standard dish from Derbyshire, dated 1512, could contain about 60 lb of ore; the measures used in Devon were similar, but caution should be used with the tonnage figures.

Date of account				Total ore mined	Approx tonnage (if 1 dish = 60 lb)
from		to			
26 February	1301	Michaelmas	1301	nil	nil
Michaelmas	1301	Michaelmas	1302	nil	nil
Michaelmas	1302	Michaelmas	1303	159 loads 5 dishes	39 tons
Michaelmas	1303	Michaelmas	1304	411 loads 2 dishes	99 tons
Michaelmas	1304	Michaelmas	1305	676 loads 4 dishes	163 tons
Michaelmas	1305	Michaelmas	1306	1311 loads 3 dishes	316 tons
Michaelmas	1306	13 May	1307	545 loads 2 dishes	131 tons
26 November	1307	Michaelmas	1308	681 loads 1 dish	164 tons
Michaelmas	1308	Michaelmas	1309	658 loads 1 dish	159 tons

Michaelmas	1309	Michaelmas	1310	631 loads 5 dishes	152 tons
Michaelmas	1310	Michaelmas	1311	274 loads 3 dishes	66 tons
Michaelmas	1311	Michaelmas	1312	608 loads 6 dishes	147 tons
Michaelmas	1312	Michaelmas	1313	406 loads 7 dishes	98 tons
Michaelmas	1313	Michaelmas	1314	390 loads 4 dishes	94 tons
Michaelmas	1314	Michaelmas	1315	378 loads 1 dish	91 tons
Michaelmas	1315	Michaelmas	1316	237 loads 8 dishes	57 tons
Michaelmas	1316	1 July	1317	200 loads 3 dishes	48 tons

Appendix 3 Revenues of the Bere Alston Mine 1302–1317

The following revenues are included:

1. Sales of silver at the Exchange in the Tower of London.
2. Sales of desilverised lead.
3. 'Foreign receipts' (but not cash given to the keeper by various people and tax collectors, on the king's orders; or the revenues of manors given over to the mine, because this would distort the figures as regards the profitability of the mine). This figure includes sales of oak bark from Calstock Wood, brushwood from the wood at Warleigh, profits of the court at the mine (beremote), and sales of slag.

Date of account				Revenues from:		
from		to		Silver	Lead	Foreign receipts
26 February	1301	Michaelmas	1301	nil	nil	nil
Michaelmas	1301	Michaelmas	1302	nil	nil	13s
Michaelmas	1302	Michaelmas	1303	nil	nil	4s
Michaelmas	1303	Michaelmas	1304	£ 288 4s 0½d	£ 39 0s 3¾d	9s
Michaelmas	1304	Michaelmas	1305	£ 866 2s 6½d	£136 12s 11d	16s
Michaelmas	1305	Michaelmas	1306	£1793 0s 2¼d	£166 9s 4d	£ 1 15s
Michaelmas	1306	13 May	1307	£ 546 19s 9d	£ 95 15s 10d	nil
26 November	1307	Michaelmas	1308	£ 796 14s 0½d	£162 10s 4½d	£ 2 8s 8d
Michaelmas	1308	Michaelmas	1309	£ 762 6s 2½d	£158 18s 0d	£ 1 10s 8d
Michaelmas	1309	Michaelmas	1310	£ 697 15s 1d	£155 19s 3¾d	£ 2 2s 10d
Michaelmas	1310	Michaelmas	1311	£ 312 12s 11d	£ 73 17s 1d	£ 1 17s 10d
Michaelmas	1311	Michaelmas	1312	£ 600 9s 2d	£138 8s 8d	£ 2 4s 9d
Michaelmas	1312	Michaelmas	1313	£ 440 17s 1d	£ 90 0s 4d	£ 2 16s 3½d
Michaelmas	1313	Michaelmas	1314	£ 420 4s 11¼d	£ 95 8s 0d	£ 9 6s 2d
Michaelmas	1314	Michaelmas	1315	£ 363 12s 2½d	£ 96 8s 11¾d	£15 12s 3½d
Michaelmas	1315	Michaelmas	1316	£ 212 6s 6½d	£ 66 2s 0d	£ 2 10s 0d
Michaelmas	1316	1 July	1317	£ 106 0s 0d	£ 57 6s 0d	£ 6 1s 4d

Appendix 4

Costs/revenues of the Bere Alston mines 1301–1317

This table lists the total revenues attributable to the mining operations (the sum of the revenues in appendix 3) and the total of all expenses involved during the period of that account. This should be read with some caution, particularly the accounts that cover less than one year; and some years have extraordinary 'one off' expenses, or profits from refining silver and lead mined and paid for the previous year, that can distort a particular year's figures (as the Exchequer was well aware of).

Date of account				Total	Total	Profit/loss
from	to			revenue	expenses	
26 February 1301	Michaelmas 1301	Michaelmas 1301	Michaelmas 1301	nil	£118 2s 7½d	–£ 118 2s 7½d
Michaelmas 1301	Michaelmas 1301	Michaelmas 1302	Michaelmas 1302	13s	£423 12s 7½d	–£ 422 19s 7½d
Michaelmas 1302	Michaelmas 1302	Michaelmas 1303	Michaelmas 1303	4s	£455 4s 6½d	–£ 455 0s 6½d
Michaelmas 1303	Michaelmas 1303	Michaelmas 1304	Michaelmas 1304	£ 327 13s 4d	£703 17s 3¼d	–£ 376 3s 11¼d
Michaelmas 1304	Michaelmas 1304	Michaelmas 1305	Michaelmas 1305	£1023 11s 5½d	£817 3s 3¼d	+£ 206 8s 1¼d
Michaelmas 1305	Michaelmas 1305	Michaelmas 1306	Michaelmas 1306	£1961 4s 6¼d	£727 8s 8½d	+£1233 15s 10¾d
Michaelmas 1306	13 May 1307	Michaelmas 1307	Michaelmas 1307	£ 642 15s 7d	£337 2s 3d	+£ 205 13s 4d
26 November 1307	Michaelmas 1307	Michaelmas 1308	Michaelmas 1308	£ 961 13s 1d	£428 0s 5¾d	+£ 533 12s 7¼d
Michaelmas 1308	Michaelmas 1308	Michaelmas 1309	Michaelmas 1309	£ 922 14s 10½d	£418 12s 3¼d	+£ 504 2s 7¼d
Michaelmas 1309	Michaelmas 1309	Michaelmas 1310	Michaelmas 1310	£ 855 17s 2¼d	£379 6s 10¼d	+£ 476 10s 4d
Michaelmas 1310	Michaelmas 1310	Michaelmas 1311	Michaelmas 1311	£ 388 7s 10d	£253 19s 0¾d	+£ 134 8s 9¼d
Michaelmas 1311	Michaelmas 1311	Michaelmas 1312	Michaelmas 1312	£ 741 2s 7d	£378 9s 1d	+£ 362 13s 6d
Michaelmas 1312	Michaelmas 1312	Michaelmas 1313	Michaelmas 1313	£ 533 13s 8¼d	£302 17s 9¾d	+£ 230 15s 10¾d
Michaelmas 1313	Michaelmas 1313	Michaelmas 1314	Michaelmas 1314	£ 524 19s 0¾d	£334 6s 5½d	+£ 190 12s 7¼d
Michaelmas 1314	Michaelmas 1314	Michaelmas 1315	Michaelmas 1315	£ 475 13s 5¼d	£380 13s 8d	+£ 94 19s 9¼d
Michaelmas 1315	Michaelmas 1315	Michaelmas 1316	Michaelmas 1316	£ 280 18s 6½d	£342 0s 7¼d	–£ 61 2s 0¾d
Michaelmas 1316	1 July 1317	Michaelmas 1317	Michaelmas 1317	£ 169 7s 4d	£242 1s 9d	–£ 72 14s 5d

Appendix 5

List of probable Calstock residents employed in the mining operations at Calstock 1301–1323

Name	Reference	Job, and evidence of residence
1. Robertus de BERKHAMSTEDE	E159/85	Rector of Calstock, comptroller of the mine (1311–2)
2. Rogerus BONDE	E101 260/22 E101 260/30	Roofer; mentioned in the Minister's accounts of 1301–2 (SC6 811/2)
3. Walterus CAPERON	E101 260/22	Charcoal maker; the Minister's accounts of 1304–5 mention a Margeria Cappron (SC6 811/6)
4. Radulfus de COTEHEL	E101 261/2 E101 261/22	Bought barren lead (1305/6; sold wood (1323); mentioned in Minister's accounts of 1301–2 (SC6 811/2)
5. T? CRUTELE	E101 260/30	Wood carriers; Walterus Crutele is mentioned in the Minister's account of 1296–7 (E119/1; in the Caption of Seisin of 1337, the Crutele family come from Metherell (120/1)
6. Walterus CRUTELE		

7. Willielmus DRAK	E101 260/26	Carried sand, clay and lime; mentioned in the Minister's accounts of 1305–6 and 1314–15 (SC6 811/7, 13)
8. Willielmus atte HACCHE	E101 261/12 E101 261/15	Boatman, looked after the king's boat; takes his name from the place
9. Nicholaus le HERDE/HYERDE	E101 260/22	Mowed reeds; the 1356 Assession Roll mentions the 'Hurde' family at Chilsworthy. However his name simply means 'the hired', so it might not be a family name
10. Hugo, Clerk of Calistok	E101 260/30	Carried wood with his own horse
11. Hugo, clerk of Slymeforde	E101 260/26	Cut wood for the boles
12. Robertus JOYHERD	E101 260/22 E101 260/26	Came from Alineston (Alboston), made walls of a bole, roofer, ditch digger, plasterer; mentioned in the Minister's account of 1304–5 (SC6 811/6)
13. Willielmus de LOVEHULL	E101 260/22	Sawyer; mentioned in the Minister's account of 1304–5 (SC6 811/6)
14. Galfridus MORRI	E101 261/21	Broke slag; mentioned in the Minister's account of 1306–7 (SC6 811/8)
15. Radulfus, clerk of Harebere	E101 260/30	Carried wood with his own horse
16. Johannes le REDE	E101 260/30	Helped at the refinery; a Johannes le Rede is mentioned in the minister's account of 1287–8 (SC6 816/9)
17. Willielmus SARGANT/SERIAN	E101 260/22 E101 260/27	Roofer
18. Johannes le SLEGH	E101 260/27	Carried wood; a David Slegh is mentioned in the 1366 Court Roll (SC2 158/10)
19. Ricardus de SLYMPFORD	E101 261/10 E101 260/26	Cut wood
20. Ricardus de SLYNFORD	E101 261/12	Cut and carried wood; both take their name from the place (Slimeford)
21. Rogerus UNDERDON	E101 260/27	Carried wood; of Willielmus Underdon (below); they take their names from the place (Underdon)
22. Willielmus UNDERDON	E101 260/26	Carried sand, clay and lime; mentioned in the Minister's accounts of 1303–4 and 1304–5 (SC6 811/4, 6)
23. Phillippus de WOMPOLE	E101 260/30	Helper at the cart; mentioned in the Minister's account of 1308–9 (SC6 811/10)
24. Ricardus YOLDE/le YOLDE	E101 260/22 E101 260/26	Carried wood; worked on the water-course; of Rogerus le Yolde below
25. Rogerus le Yolde	E101 260/30	Cut wood; mentioned in the Minister's accounts of 1304–5 and 1307–8 SC6 811, 10

Recent Work: Excavation

Tintagel Island Evaluation Excavations

By 1989, high visitor pressure at Tintagel had burdened the unpaved footpath system to the point where the surface was rapidly degrading, and management works were proposed by English Heritage on an area of particular damage near the Island Ward. In view of the known significance of the site, Cornwall Archaeological Unit (CAU) were commissioned to undertake a small evaluative excavation to determine the archaeological impact of the proposed works. Two trenches were excavated in the areas felt to have the best potential for preservation of undisturbed stratigraphy.

The results confirmed our suspicion that there had been several episodes of soil movement on these slopes. The uppermost material was clearly associated with the construction of the nearby curtain wall, and contained considerable quantities of builders' rubble. The wall itself was found to have been constructed directly onto levelled bedrock at or near the present ground surface. The lower soil layers contained surprisingly large quantities of abraded post-Roman pottery. This was mainly type Bi (similar to assemblages from elsewhere on the Island), but there was also a single 4th century Roman coarse-ware rim. This, presumably discarded material, may originally have derived from the house platforms upslope.

At the base of the trench, on a polished bedrock surface over 1m from the present ground surface, a small charcoal-rich spread was found. This awaits dating and analysis before it can be interpreted.

Adam Sharpe (C.A.U.)

Pendennis Castle

As part of a re-assessment of the presentation of the whole site, Cornwall Archaeological Unit were commissioned to undertake some evaluative excavations in the chemise surrounding the Henrician Keep. Although the principal aim was to try to identify the nature and extent of the former surfacing of this area (on which cannon shown in early prints must have stood), it was hoped that the investigations would also throw some light on the development sequence of the structures in this area: it being to some extent uncertain what the relative phasing of the keep and chemise were. In addition, geophysical survey was tried in an area of the parade ground (between the barracks and the keep), and in the Hornworks car park, to see if the technique would indicate the survival of the footings of structures known to have been formerly located in these areas.

The evaluation trenches showed that the even, grassy surface of the chemise hid a convoluted stratigraphy, the material immediately below its surface being composed almost entirely of a considerable depth of Victorian and later rubbish. Although no trace of the original chemise surface was found, the presence of a layer of granite scalplings over much of the area pointed at the former existence of a slabbed surface on which the guns would have stood. This in turn covered considerable amounts of tip material, which was retained by the chemise wall. Outside the wall, a radial trench revealed the rock-cut base of the ditch not far from the present ground surface. Most of the counter-scarp for this feature has been removed over the centuries during modifications to the defences of the castle.

The relationship between the keep and the chemise was shown to have been more complex than had previously been thought. Results from the present work strongly suggested that the two may have been constructed in phase with each other, despite the fact that the upper parts of the chemise wall clearly made redundant the embrasures on the lower gun deck of the keep.

The results of the geophysical survey showed the value of this method at Pendennis, picking up not only more recent cables and pipes laid across the site, but also the footings of buildings that should be identifiable on archive plans.

A report outlining the findings of the two elements of the project and suggesting means by which the management aims could be achieved was prepared for English Heritage.

Adam Sharpe (C.A.U.)

Tintagel Churchyard Excavations 1990

A successful four-week campaign of excavation within Tintagel Parish Churchyard was recently completed by the Cornwall Archaeological Unit and Institute of Cornish Studies. The principal aims of this preliminary season were to test for the presence of Early Christian activity within the churchyard following up a research programme proposed by Thomas (1988).

Excavations centred on the re-opening of one of the grass-covered mounds which lie in the "old" part of the churchyard in order to examine its character and to assess its age. Mound C was subjected to a limited examination by the Rev E.D. Arundell during the war, when two long cist-graves and an enigmatic slate-built structure were discovered at the bottom of a very long and narrow trench which had sliced into the heart of the mound (Thomas, 1988). During this recent season these features were rediscovered. A fallen granite menhir close to Mound C was re-erected and closely inspected for inscription although none was found. In addition two smaller slot trenches were cut through selected parts of the enigmatic earthwork which embraces the present churchyard with a view to determining its age and function.

The make-up of Mound C was shown to be the result of three main phases of activity, showing that these features have complex histories. The upper layers almost invariably consisted of dumped material demonstrating from the post-medieval period at least that Mound C appeared to have been a dump for church débris. This behaviour continued after the Second World War when the hollow created as a result of the Rev Arundell's excavations became the obvious target for a dump. Lying within the middle layers, were the footing stones for a wall which had lain well concealed within the mound. This wall was roughly aligned east-west and only part of it was uncovered although it was substantial and in places stood up to two courses high. One side of an out-turned entranceway was found at its eastern end. Its solid character suggested that it formed part of an earlier enclosure wall although exactly when it had been built was not clear. It is possible that it belongs to a phase of re-modelling witnessed by the church during the 13th to 14th centuries (Canner, 1982), although whether these structural changes affected the churchyard as well is unknown. During this recent season, work on this aspect of the site was limited to making a detailed record. Future work on site might confirm the hypothesis that the wall belongs to the medieval period and that the northern alignment of the entranceway was partly influenced by earlier behaviour in the area and possibly by the contemporary occupation of Tintagel Castle.

The lowest layers produced the main focus of interest and clear evidence for Early Christian activities. Despite having been partly disturbed, the three features uncovered by the Rev Arundell were rediscovered. The two long-cist graves are of a known character documented for the medieval period in the South-West and appear to represent a burial tradition which may extend back to the 5th century AD (Preston-Jones, 1984). The third feature, a slate-built chamber, which earlier had been interpreted from a very murky photograph as being possibly "polygonal" in shape (Thomas, 1988, 87) was shown to be

the inner chamber of a more complex grave of an altogether different character. This chamber lay under a compact covering of slate apparently bonded by clay which formed an impressive mound of some scale and proportion. The war-time investigation had only partly penetrated into the chamber leaving its overall structure intact. A large slate slab found higher up in layers of backfill may have once been part of a chamber lid covering: a tiny cross was discovered scratched on one of its rough faces. A second similar "mound grave" was found alongside these other burials, the two long-cist graves having been deposited in the small gap between the two larger graves. This second impressive "mound grave" appears intact having been missed by the war-time diggers. At its western end lay a large dressed piece of greenstone into which a socket or "libation" hollow had been carefully fashioned. The traces of an undisturbed old land surface contemporary with the burials was located in a small area of the trench. This produced sherds of Bii amphora together with traces of what appeared to represent a graveside fire. The clarification of the chronological sequence and interpretations outlined above will form the basis for a second longer campaign of work at Tintagel Church in the spring of 1991.

Two slot trenches cut through selected parts of the curvilinear earthwork did not give positive evidence of Early Christian origin. However, directly under topsoil, the remains of a stone wall (probably 18th century in date) were found at the junction between the "old" and "new" part of the churchyard and this was shown to have been built above an earlier ditch, as if fossilising an earlier boundary. Further excavation needs to clarify this sequence and will form a major part of future work at Tintagel.

The work was sponsored by Mobil North Sea Ltd without whose generosity this first season would not have been possible and who have happily agreed to fund a second phase of excavation scheduled for Spring 1991. The enthusiasm and interest of the Parochial Church Council and local parishioners was invaluable to the success of this first season and we are extremely grateful for their support. A fully illustrated interim report outlining the results of the first season is now available from Cornwall Archaeological Unit, The Planning Dept., Old County Hall, Station Road, Truro TR1 3EX. (Price £3 includes postage and packing).

Jacqueline Nowakowski – Cornwall Archaeological Unit
Charles Thomas – Institute of Cornish Studies

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Henry Crozier and the Discovery of Chysauster

P.A.S. POOL

The purpose of this note is to describe the role of Henry Acheson Crozier (c. 1801–1875) in the recording of antiquities in West Penwith, and especially in the discovery of Chysauster and other courtyard house sites.

Little is known of Crozier's life. He qualified as a surgeon in 1833 and practised in Penzance from c. 1840 until 1855, when he went to Exeter. He died in London on 9 July 1875, aged 74 (Boase and Courtney, 1874, 99; 1882, 1142). Nothing is recorded of his family, but it is probable that he was the son of Capt. Acheson Crozier of the Royal Marines, whose daughter Nicholina married Capt. James Pascoe of the Royal Cornwall Light Infantry, son of James Pascoe (1747–1827) a solicitor of Penzance. Capt. Pascoe died in 1822, and his widow Nicholina in 1852 aged 59; she was thus about eight years older than her putative brother Henry (Boase, 1890, 656).

As an antiquary Henry Acheson Crozier was a loner and a non-publisher. He was not a member of the Penzance Natural History and Antiquarian Society (founded in 1839), and published nothing except notes on Madron well and Cape Cornwall chapel (Crozier, 1855, 1856).

It appears that Crozier explored the whole of West Penwith, and adjoining parishes to the east as far afield as Illogan and Crowan, noting and measuring prehistoric and later sites and jotting down details on odd scraps of paper, often in execrable handwriting, sometimes with rough sketches or plans. Frequently in West Penwith he found hitherto unknown 'elliptical enclosures', often with complex series of interior compartments, which he correctly identified as prehistoric habitations.

When he left Cornwall in 1855, Crozier entrusted his notes to John Thomas Blight (1835–1911), the son of a Penzance schoolmaster. Blight made good use of this material, but what should have been his brilliant archaeological career was ended in 1871 by the tragedy of his incurable insanity (Michell, 1977, 62). His papers, including Crozier's, passed to his father, Robert Blight, who in 1879 gave them to William Copeland Borlase (1848–1899), who recorded the gift as follows:—

In June 1879 Mr Blight senior of Penzance placed in my hands a considerable number of drawings, extracts and scraps belonging to, and for the most part the work of, his son Mr J.T. Blight. I have assorted and arranged them in the best manner I could, in the pages of this book, which had already been prepared by Mr J.T. Blight for the reception of scraps. In the earlier pages will also be found some rough pen and ink sketches of cromlechs, long-stones etc. by Mr H.A. Crozier formerly of Penzance, a gentleman who seems to have been indefatigable in searching after and chronicling the whereabouts of the antiquities of West Cornwall. A few more of his drawings, together with his manuscript notes, mostly written on the backs of used envelopes, are preserved in another volume in my Library, entitled 'Miscellaneous Drawings, Extracts and Prints'.

In 1887, following Copeland Borlase's bankruptcy, his library was sold and dispersed. The book containing the note above is now in the Library of the Society of Antiquaries of London, and the other book mentioned in it is in the Penzance Library, Morrab Gardens. The latter library also possesses three volumes of sketches by Blight of ecclesiastical

antiquities, two of which also contain notes by Crozier on crosses and chapels; his material is thus to be found in four volumes, mainly containing Blight's work, one in London and three in Penzance.

Earlier antiquaries in West Penwith had concentrated on fortifications and megaliths, being little concerned with habitation sites. The only courtyard house site published in the 18th century was that at Bodinar in Sancreed, which was planned by Thomas Tonkin (c. 1700) and published by Dr William Borlase (1754, 194, 273), who regarded the 'crellas' (a courtyard house) and the fogou as separate sites, and the former as a place of assembly with the small circle (round room) reserved for those of higher rank. Dr Borlase also knew of the courtyard house sites at Mulfra in Madron and Carne in Morvah, and accepted them as habitations, but noted them only in an unpublished manuscript (PM 5, 12). Interest in prehistoric habitations, and discovery of courtyard house sites, seems to have commenced c. 1840, with the activities of members of Penzance Natural History and Antiquarian Society (especially Richard Edmonds, 1801–1886) and the independent observations of Henry Crozier.

Chysauster was known to Crozier by 1847 at the latest, for Blight states (1858b, 133) that the site was pointed out to Crozier by George Dennis John of Penzance, who died in that year (and whose first wife Catherine Pascoe was the sister of Capt. James Pascoe who married Nicholina Crozier). Crozier prepared a plan of Chysauster, which has not survived, in 1849, and his note on the site, printed below, was probably made in that year. In 1854 or 1855 he showed the site to Blight, and in the latter year, on leaving Cornwall, he gave to Blight his material on Chysauster and other sites (Blight, 1858b, 133; 1861b, 39). In January 1856 Blight lectured on the site to the Penzance Institute, for the first time bringing

CHYSAUSTER

AFTER J.T. BLIGHT 1861
(House numbers from
modern plans)

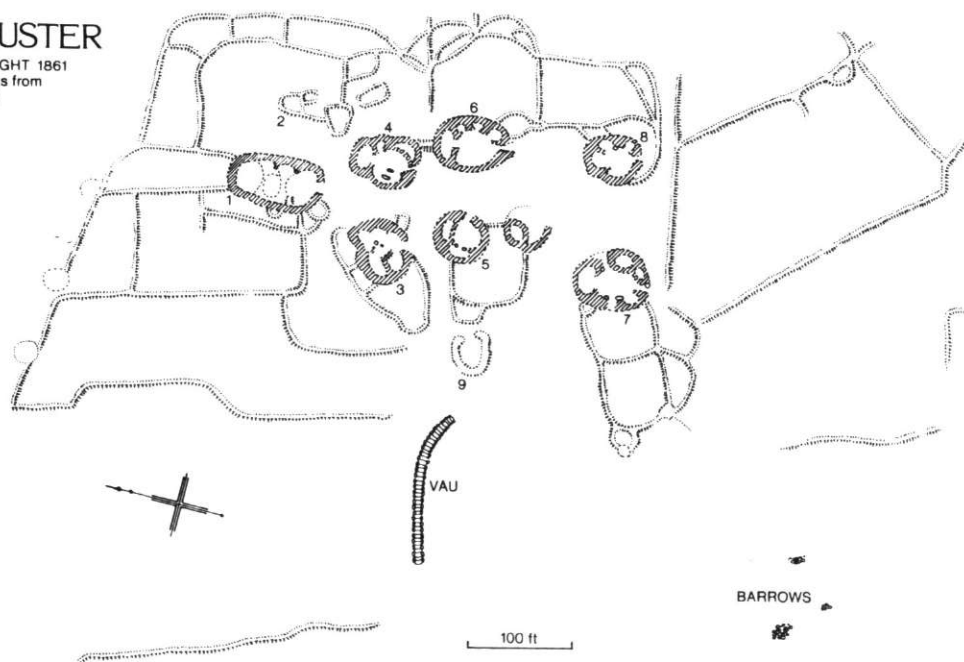


Fig 1

it to the attention of other antiquaries of the district, and in 1857 it was visited by Richard Edmonds, who entered the fogou and compared its construction with that at Chapel Euny (Edmonds, 1857, 1861).

In 1858 Blight published short accounts of Chysauster in two rather surprising contexts, a school magazine and his book on the crosses of East Cornwall (1858a; 1858b, 133–4). In December 1860 he lectured on the site to the Archaeological Institute in London (1861a), and in the following year the same society published his full account of it (1861b). This included a plan of the village (Fig 1), probably based on that prepared by Crozier, and plans of houses 4 and 6 (house numbers as on modern plans such as Hencken, 1933, and Reynolds, 1960). In the same year Blight included a short account of Chysauster in his guide to the district (1861c, 207–10).

In August 1862, on the invitation of the Royal Institution of Cornwall, the Cambrian Archaeological Association met at Truro, this being the first visit to Cornwall by an outside archaeological body. This visit prompted two important publications, Edmonds' book on West Penwith, which included an account of Chysauster and a plan of house 6 supplied by Blight (Edmonds, 1862, 49–51), and Blight's own gazetteer of the antiquities of Penwith and Kerrier, which included a better version of this plan (Blight, 1862, 35). The Cambrians devoted two days to exploration of the antiquities of West Penwith under Blight's guidance; Chysauster was among the sites visited, and in 1864 Blight published an account of this tour, including a description of the site and a plan of house 6 (1864a, 307–310; 1865a, 134–6).

In 1873 William Copeland Borlase excavated house 6 at Chysauster, and published his findings in the same year (Borlase, 1873, 336–9). Thus before his death in 1875 Henry Crozier saw his discovery widely known and recognised as a site of importance. Sadly, Crozier also lived to see the tragic end of the career, which he had so generously encouraged, of John Blight.

Crozier's note on Chysauster consists mainly of an account of house 6; it is cross-written in his most terrible hand, and in the transcript which follows some words have been omitted as illegible:

At Chysoyster and the neighbouring farm of Carnequidden in Gulval are the remains of a very remarkable British town or village with its adjoining enclosures. It covers a large space of ground and lies on the slope of the hill facing the south west and about a mile from Castle an Dinas. There are the remains of ten elliptical buildings lying near together, more or less ruined from the materials being used for fences and carried off for other building purposes, beside some large enclosures. Two of them are more perfect than any buildings of a similar kind in the district. Of four of them the outer walls 10 feet thick and in some parts even at present as many high. The single entrance 15 feet on the outside, narrowing to 8 feet within, being carried through the whole thickness of the outer and inner walls with their included chambers 24 feet. The inner wall is 6 feet thick and carried from the inner entrance two thirds round the interior of the building, and between it and the outer wall are included four compartments, three of them measuring respectively 17 feet in length and the other 30 feet, 13, 11, 11 and 16 wide. All these had entrances from the inner or central space which had granite jambs on each side. On the south in some buildings another which is (*illegible*) (in some examples divided into two) is formed by a wall carried round from the inner entrance on the left hand, carried round to meet that on the north-east to south-west on right hand side. This as it now is measures 38 feet long and in this particular building does not appear

to have been subdivided. This also was taken from the central space, which central space is 35 feet in its length. Descending a parapet wall 6 feet thick was carried nearly round on the north or most easily accessible side from the (*illegible*) of the ground. The apartments were probably closed and the central space used as a corral for cattle. The different buildings were connected by corridors fenced walls and raised banks in the enclosure (*illegible*). Connected with them a voe or sepulchral chamber (*illegible*).

(MDEP 45 No. 1).

Crozier's note ends with a mention of the fogou, which soon became a subject of confusion. In 1857 Edmonds entered it, and reported that it had originally been about 50 feet long but that much of it had been removed, leaving only the higher or northern end undisturbed (1857; 1861; 1862, 51). Blight reported first (1858b, 134) an underground passage about 20 feet long; later (1861b, 42) that there was a 'vau' or subterraneous gallery about 180 feet long in the position marked on his plan, and that Crozier had told him that he formerly saw about 20 feet of it entire, but that it had been totally demolished nine or ten years previously, and its position was marked only by a long drain filled with stones. Later still (1864a, 308) Blight concluded that there were two fogous on the site: one of considerable length, utterly demolished, its site marked by a long trench and heaps of stones; the other, about 100 yards distant, partially destroyed but sufficiently perfect to show the mode of construction. Copeland Borlase reported (1873, 336) one fogou only, 'the remains of an underground structure 200 yards SW (*sic*: SE) of the principal group'.

It is suggested that the structure reported to Blight by Crozier, entered by Edmonds, and mentioned by Copeland Borlase, the smaller of the two supposed fogous reported by Blight in 1864, was the undoubted fogou of which a fragment remains about 135 yards SE of house 7, in the position where Blight (1861b, 42) reported barrows, probably sepulchral; and that the longer structure reported by Blight in 1864, that marked on his plan in 1861, which he considered to be a totally demolished fogou, was actually a sunken way leading to the village, as reported by Hencken (1933, 238). Nobody ever claimed to have entered this supposed fogou, or to have seen any part of it prior to its destruction, and the reported length of 180 feet seems impossibly great for a fogou.

Crozier's other notes show that he was the likely or possible discoverer of several courtyard house sites in addition to Chysauster. At *Porthmeor* in Zennor he noted (SA) 'eight or nine elliptical remains of a large aboriginal village', and a plan and sketch of the site by Blight occur in the same manuscript. Porthmeor was thus known to Crozier and Blight, and its supposed discovery in 1928 by F.C. Hirst must be reckoned a rediscovery. At *Bosporthennis* in the same parish Crozier noted (SA) 'some remains of circular buildings and old walls in the croft', but he apparently missed the 'bee-hive hut'. This structure was visited by the Cambrians in 1862 under the guidance of Blight, who stated that it had lately been shown to him by Thomas Cornish of Penzance (1862, 33; 1864a, 311). One of the Cambrians described the hut in their journal (Barnwell, 1863), with Blight's illustrations, and Edmonds (1863) pointed out the similarity in plan between it and the fogou at Chapel Euny, a point emphasised many years later by Hirst (1934).

In Madron parish, the site at *Boswarva* was noted (MDEP 43 no. 6) by Crozier, with sketch plans of two houses, and he almost certainly discovered it. It was mentioned by Blight (1858b, 134), but then apparently lost sight of until rediscovered in 1933 by Admiral C.E. Hardy (Hirst, MSS). The site at *Bosulow* was described (46 no. 13) by Crozier, who may have discovered it. A small excavation was carried out there in 1849 (Millett, 1849), and Blight published (1862, 35; 1864a, 441) a plan of one of the houses. There is an undated

and unsigned plan of this site in the Red Folio for Cornwall of the Society of Antiquaries, possibly by Copeland Borlase, who excavated there (Borlase, 1873, 339). The site at *Mulfra* was known to Dr William Borlase (PM, 5); Crozier described it (42 no. 7), and as he is unlikely to have seen Dr Borlase's manuscripts, he probably discovered it independently. Crozier also described (43 no. 6) the Round at *Trewern* in the same parish, and may have discovered it; the site was first published by Edmonds (1848) following discovery of some ancient millstones there in 1845. Edmonds states (1848, 249) that the site was called the Cryglas, but this is actually the name of a field about 600 yards NW of the Round, which contains a courtyard house not noted by Crozier. There is apparent confusion between these sites both by Edmonds (see also 1862, 39, 48) and Halliwell (1861, 103–6).

In Gulval parish the site at *Crankan* was described (43 no. 15) by Crozier and then apparently lost sight of until rediscovered many years later (Henderson, 1922, II 59; Nance, 1923, 153), only to be missed by Hirst. The nearby site at *Boscreeg* was also noted (42 no. 10) by Crozier, but by nobody else, and has since been destroyed; for both these sites see Pool and Russell, 1960, 146.

In Sancreed parish, Crozier evidently discovered the site at *Botrea*, his rough plan (45 no. 10) of the single courtyard house there being clearly identifiable, but his naming it as 'Caerwhidden in Trannack Down above Botrea' reveals some confusion between this site, which is indeed above Botrea, and the round at Chygwidden, called by Dr Borlase Kaergwiden, which is about $\frac{3}{4}$ mile to the east, near Trannack. In the same parish, Crozier noted (43 no. 3) the site at *Brane* (Chapel Euny), with 'in the centre of the northern enclosure the entrance to a fogo'. He was not its discoverer; it had been noted by Buller (1842, 82), and Crozier's note was written on a circular dated 1849. In 1857, after Crozier's departure from Cornwall, the site was examined by Edmonds (1857, 1861), and in 1863 William Copeland Borlase at the age of fifteen began his archaeological career there with excavation of the fogou (Borlase 1863; 1868; 1873, 333–4). Similarly, Crozier was not the discoverer of the site at *Bodinár*, which had been known to Tonkin (c. 1700) and to Dr Borlase (1754, 194, 273). Crozier's account (43 no. 3) shows that the structures planned by Tonkin had been much damaged, and the fogou had been 'destroyed a short time ago for the stone'. One of the houses was excavated by Copeland Borlase in 1872 (Borlase, 1873, 327–9), and the site has since been totally destroyed (Pool, 1961).

Crozier noted (SA) the site at *Boscawell* in St Just, 'in an elliptical enclosure with high walls . . . a fogo on the NW side', but was evidently not its discoverer. The site was mentioned by Buller (1842, 81), and first described by Blight (1864b).

Finally, Crozier described (43 no. 11) the Round at *Castallack* in Paul, and was regarded by Blight (1865b) as its discoverer. In 1866 Blight discovered a fogou about 300–400 yards distant from this Round (Blight, 1867).

Crozier's contribution to the archaeology of West Penwith was not limited to courtyard house sites; his notes on sites of other periods and categories contain much valuable material. Yet his most important contribution was the discovery and description of Chysauster and other courtyard house sites, leading to recognition first by Blight (1868, 11) and then by Copeland Borlase (1873, 326–7, 347) that there existed in West Penwith, and there alone, habitation sites containing buildings vastly different from the hut circles found throughout Cornwall. By 1873 Copeland Borlase had established that 'in the western district we have a distinct class of structure altogether', had investigated several of them, and ensured that they would be a major subject for future research, culminating in the fieldwork of F.C. Hirst in and around Zennor in the period from 1925 to 1938, the excavations of Chysauster (Hencken, 1933) and Porthmeor (Hirst, 1937a), and Hirst's national publication of the

courtyard house sites (Hirst, 1937b). In terminology, Crozier's 'elliptical enclosures' were soon superseded by Copeland Borlase's 'hut clusters', and eventually by Hirst's 'courtyard houses', which term continues in use.

Blight always gave due credit to Crozier as the discoverer of Chysauster, but Crozier's failure to publish left him a figure of almost total obscurity. In truth, the name of Henry Acheson Crozier merits an honoured place, with those of Richard Edmonds, John Blight, and William Copeland Borlase, among the 19th century antiquaries whose labours went far towards making West Penwith one of the best archaeologically recorded areas of Britain.

Acknowledgements

Thanks are due to the Society of Antiquaries and the Penzance Library for access to manuscripts, to Mrs Christine North and Mr Colin Edwards of Cornwall Record Office for transcribing Crozier's note on Chysauster, and to Mr Craig Weatherhill for re-drawing Blight's plan of that site.

Hayle

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Fig 1

Trevarnon II, Gwithian

One of the most exciting and important discoveries made in '89 was this large triple-ditched enclosure located one kilometre south of Gwithian, and only 300 metres east of the enclosure known as Trevarnon round. Sited strategically at the northern end of the isthmus separating the Lands End peninsula from mainland Cornwall, this high status site would have been at the top of the settlement hierarchy of the area during the later prehistoric period.

No: CAU/ABP/F25/14; Date: 19th July; Grid Ref: SW 593 400

Aerial Photography in Cornwall: Summer 1989

STEVE HARTGROVES

By the end of May, 1989, following a long spell of dry weather throughout the spring and early summer months, it had become clear that this was to be a bumper year for cropmark photography. During June and July, with the aid of a grant from the RCHM(E), Cornwall Archaeological Unit carried out nine flights, spending over 20 hours in the air and taking around 1200 black and white photographs and a similar number of colour slides.

The work of identifying, locating and plotting all these photos has only recently been completed, and the results have yet to be fully evaluated. However, it is quite evident that a substantial number of new sites have been discovered, and additional features such as tracks or droveways, field systems and other minor features have been added to known sites.

A total of 119 new enclosures have been located, 114 of these as cropmarks, the remainder as slight earthworks, and a further 30 sites have been identified which are probably enclosures, but where the traces are too slight or indistinct to allow for certainty. Additional features have been added to 12 previously known sites, and 17 new post-medieval/industrial sites have been photographed. This adds up to 178 sites which are new or have had new information added.

The early flights rapidly identified a number of areas where cropmark traces of archaeological sites were either very dense, or very extensive, or both. This work tended to confirm earlier impressions of cropmark distributions, but those areas which in previous years had failed to yield cropmark sites (the southern part of Penwith, and between Bodmin Moor and the south coast for example) have produced a small number of new sites, and in addition, parchmarks in pasture or on the coastal slopes were also recognised for the first time. Albeit not impressive, they confirm that ploughed down sites are a factor to be considered in settlement distribution studies in all parts of the county.

The most spectacular area of extensive remains was located around the Camel Estuary, centring on the part-extant 'hillfort' site of Killibury Castle. In this area several additional enclosures, traces of field systems and droveways or tracks can be identified over a large area. Only slightly less exciting were areas located to the south of Launceston, between Redruth and Gwithian and on the Roseland, between Grampound and Tregony. In all these areas new enclosures, together with traces of fields and trackways, were recorded in landscapes already quite densely populated with known enclosure sites. Perhaps the most interesting aspect to emerge from this year's flying is the number of sites which now consist of two, three or more enclosures either superimposed or lying in close proximity to each other.

Sites and Monuments Officer, Cornwall Archaeological Unit

NOTE:

The results of this and previous years aerial photography are available for inspection (and copies can also be purchased) at the CAU's offices in Old County Hall, Truro. Prospective callers should first telephone to make an appointment.

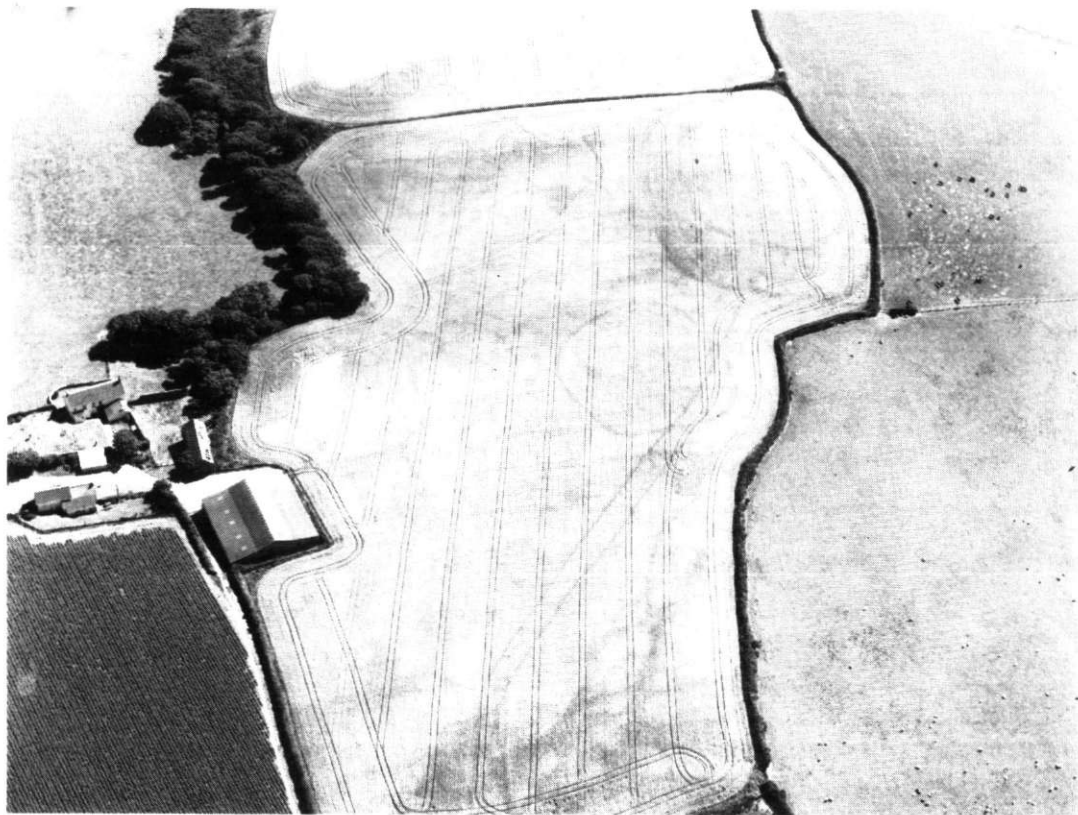


Fig 2

Great Lizen, Lansallos

Lying just inland from the coastal strip between Fowey and Looe, this complex consists of a double ditched oval enclosure, at top, partly incorporated into the present day hedge, with a simple sub-circular enclosure lying adjacent to its north-eastern side. Running diagonally across the field, a double ditched trackway is aligned on the former site, but runs across the simple enclosure. Clearly the features here indicate a multi-phase occupation, but the evidence of the photos does not enable us to disentangle the various phases of activity.

No: CAU/ABP/F24/27; Date: 18th July; Grid Ref: SX 184 209

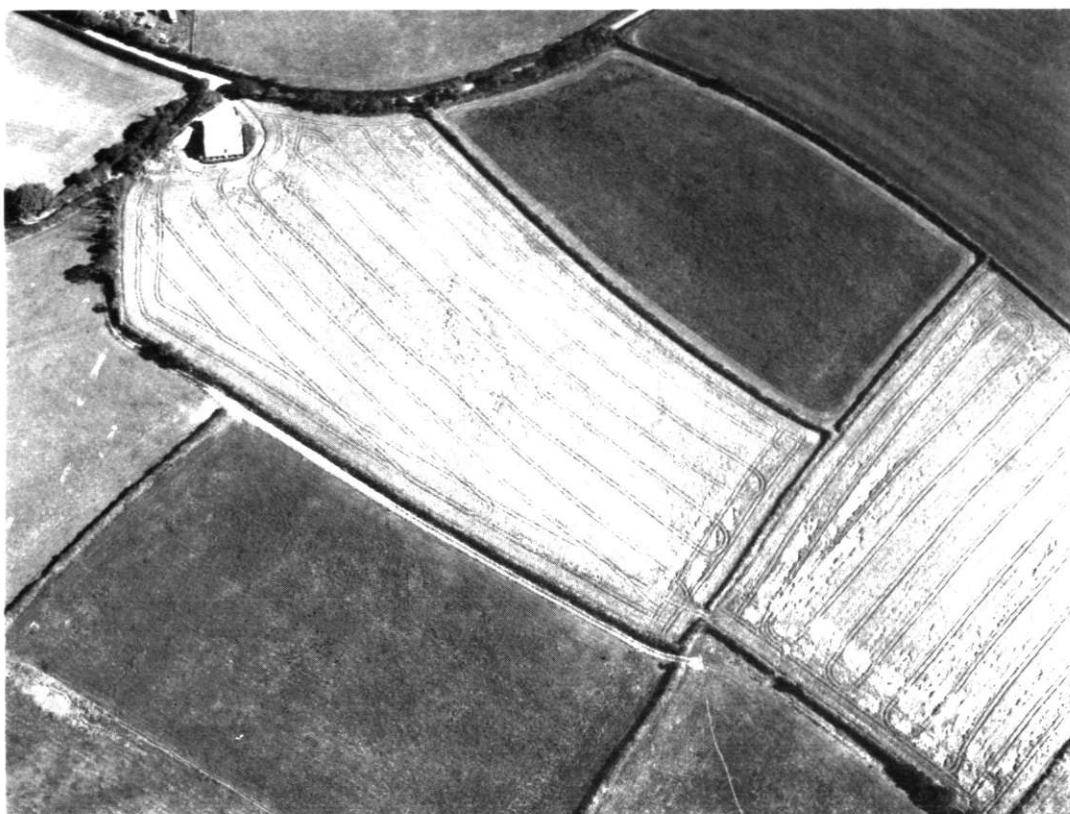


Fig 3

Tregongon, Veryan

The problem of multi-phase sites is well demonstrated by the cropmark complex at Tregongon, 2.5 km south of Tregony. It consists of two elements: a roughly circular enclosure defined by three closely spaced concentric ramparts, and to the west (left) of this, lying just beyond the outermost rampart, a second slightly smaller enclosure consisting of a single rampart enclosed by a second ditch which, at its widest point, lies 60 metres beyond the inner ditch and encloses a considerable area. The outer ditch crosses the central area of the multiple enclosure; clearly the two sites are not contemporary, but which is earlier? And do the different arrangements of ramparts have chronological, sociological or functional implications?

No: CAU/ABP/F23/64; Date: 16th July; Grid Ref: SW 917 422

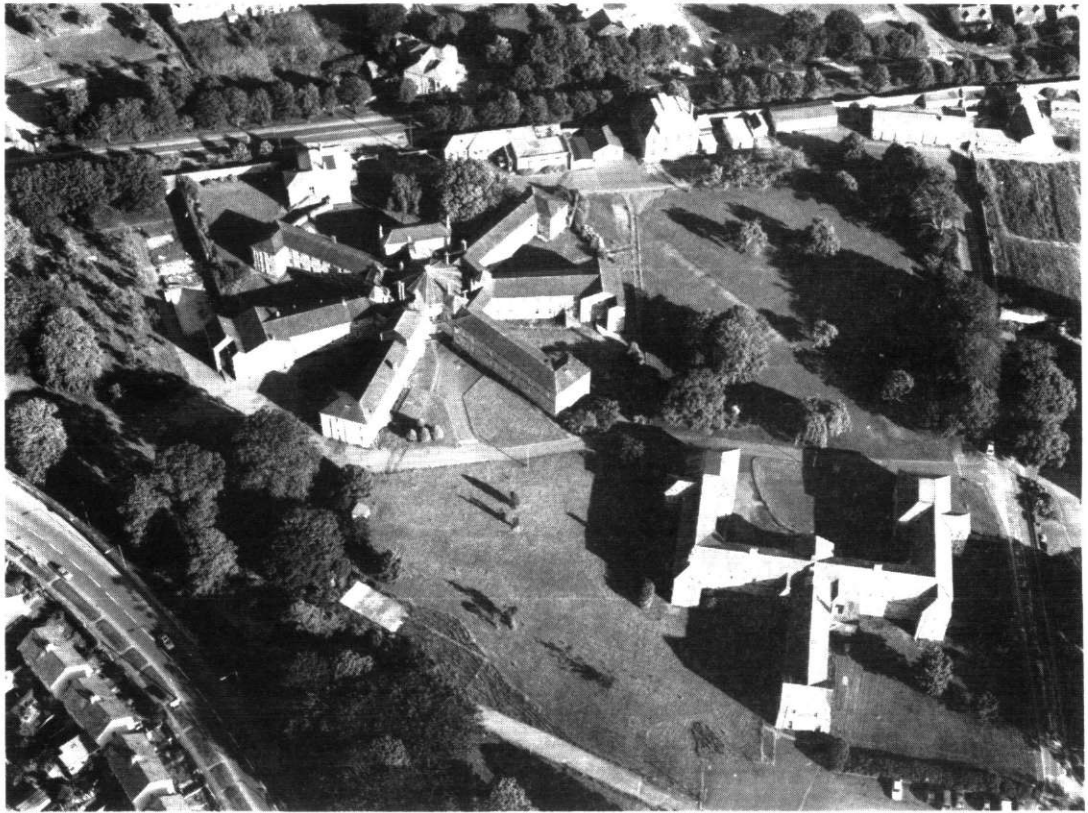


Fig 4

St Lawrence's Hospital, Bodmin

Whilst flying round the County photographing cropmark sites, the CAU policy is to capture on film all aspects of the countryside of Cornwall, including churches, villages and towns, defensive works, batteries, forts and castles, industrial sites and landscapes and historic buildings.

The geometry of this Victorian institutional building cannot be appreciated except from the air and many people who regularly go past this site en-route to Bodmin will not have been aware of its remarkable ground-plan. The need for a large body of inmates to be divided into smaller units, each isolated from the rest and controlled by a relatively few custodians lies behind this design. The architecture will be familiar to anyone who watched the newsreel pictures, taken from a helicopter, during the recent roof-top protest at Strangeways Prison in Manchester.

It says much about Victorian attitudes to mental illness.

No: CAU/ABP/F19/54; Date: 20th June; Grid Ref: SX 059 669

Recent Work: Survey

Mineral Tramways Project

Throughout the 18th and 19th centuries the area surrounding Carn Brea and Carn Marth was the industrial and economic heart of the county. From the mines in this area came the hundreds of thousands of tons of copper and tin that gave Cornwall its former domination over world markets. From this industrial ferment came many of the inventors who were central to the Industrial Revolution. The wealth blasted and hacked from deep beneath this landscape sustained dynasties of mine adventurers and landowners and created an industrial working class where there had been no more than cattle, oats and small farmers. More crucially, it was the principal force for landscape change in this part of Cornwall. Not only mine buildings but many of the towns and smaller settlements, most of the roads and all of the railways, even the pattern of fields and farms in what was formerly moorland have developed from the pattern laid down in this period. Although, with hindsight, the end of Cornish mining had been clearly signalled through the second half of the 19th century, the final demise of mining as the engine at the heart of the local economy had the devastating effects which are all too well known. Cornwall became, painfully, the first post-industrial region. With the economy of the county in tatters, the wreckage of the collapse – the buildings of mine, foundry, explosive works – was not cleared away and replaced, but became roofless, overgrown, abandoned. In the process these sites became an essential component of the character of the Cornish landscape.

After the passage of 100 years many of these buildings are in danger of final collapse. Their loss would utterly change the appearance of the Cornish landscape, and would remove the structural evidence for an important phase of its history.

The project conceived and undertaken by CAU with sponsorship from national and local bodies was to examine the extent, nature and potential of what remains, and to see whether the large-scale conservation management of the resource could be undertaken in such a way as to enhance local amenity, and provide the basis for new educational and tourism initiatives.

The essential skeleton of the scheme proposed will be a long distance footpath network made up of the former industrial railways and tramways that linked the central mining area to the coast at Portreath, Hayle and Devoran. Strung out along the routes, dozens of spectacular sites will be visible or visitable. There is much to be done: shafts to be capped, buildings to be made safe, vegetation to be managed and the financing for much of this work to be arranged. The first stage of the scheme, with the publication of the Project report, is now complete. The Kerrier Groundwork Trust has been entrusted with the drawing up of a comprehensive management plan for the area. Work has already begun. A feasibility study for an interpretation centre based on the theme of Cornish Mining has already been undertaken, a Trust has been established to manage the future of the Poldice Valley, whilst work on the surviving engine houses should soon be under way.

Adam Sharpe (C.A.U.)

Ballowall Barrow

Few members will not be familiar with Ballowall, or Carn Gluze Barrow near St Just in Penwith. Excavated and consolidated by W.C. Borlase in 1878, it has become a much visited and extensively photographed Monument in Care. Over the last few years, vandalism and dereliction have considerably reduced its comprehensibility. CAU were commissioned by English Heritage to undertake a new survey of the site, incorporating the photographic recording of the external stonework, and a re-appraisal of the excavation records in order to untangle the nature and history of this unusual monument.

The resulting report explored a number of potential development sequences for the site, and identified parts of the cairn where limited excavation might produce the information required to understand it better. Suggestions for a range of management options for the site were also outlined.

Adam Sharpe (C.A.U.)

Pennance, Zennor

A field survey by CAU followed the purchase by the National Trust of part of this tenement. The survey included making a new plan of the fine entrance grave, revealing its primary relationship with regard to a lynchet, an element of a later prehistoric field system.

The tiny courtyard house at Chykembro, which also falls within the Trust land, had already been surveyed by CAU but the new survey confirmed that it post-dated a well-preserved curvilinear field system, possibly of Bronze Age date on comparison with nearby sites at Trewey and Mulfra Hill. No fields could be securely associated with the courtyard house, and its size and unusually exposed location (at the end of a ridge with extensive views over upland grazing) were used to support a suggestion that it was the dwelling of pastoralists.

Fragmentary remains of an outfield strip system, presumably of either medieval or early post-medieval date, were recorded in the surviving block of moorland at the southern end of the property. Similar but much better preserved strips are found on neighbouring Treen, Boswednack and Kerrow Commons.

Peter Herring (C.A.U.)

The Garrison, St Mary's, Isles of Scilly

Early defensive works on the low cliffs of the Garrison, outside the better-known massive stone curtain wall of the 18th century, were revealed by coastal erosion during the severe storm of 16 December 1989. A survey of the four exposed batteries – at Steval Point, south of Steval Point, Boscawen's Battery and Woolpack Battery – was commissioned by English Heritage (Properties in Care) and carried out by CAU in March 1990.

At each site, a small point jutting into the sea was enclosed by a stone-faced bank – one at least having an internal ditch – protecting a levelled platform behind. These batteries, with others still surviving on the north-west side of the Garrison, connected by earth and stone breastworks, formed the coastal defences from the mid-17th century until the early 18th century works.

An unexpected feature of one of these platforms was the quantity of occupation debris apparently discarded by the garrison. Over 40 small finds and a scatter of middens were recorded; indicating that the soldiers were cooking and eating, and smoking clay pipes – as well as fitting their guns with flints – when not drilling or keeping watch to the west.

Cathy Parkes (C.A.U.)

Red River

The assessment of the remaining areas covered by the Mineral Tramways Project, from the Flat Lode to Gwithian via the Red River, was carried out by CAU in January 1990 at the request of the Kerrier Groundwork Trust. Following a thorough SMR search for sites in the vicinity, potential routes for a path associated with the course of the river were checked on the ground. The Red River, which rises just to the south of Nine Maidens Downs, flows through an extraordinarily varied countryside in its short course: from the uplands of Bolenowe, bisecting the minescape of the Great Flat Lode between Troon and Carnkie, through a ravine between Carn Arthen and Carn Entral to emerge, at Tuckingmill, at the heart of what was the busiest mining region in the county. Beyond Tolvaddon residual tin carried by the river from these upstream sources supported works extracting this material all the way down to Gwithian. Despite the passage of over 100 years since most of these sites were at work, there is still a remarkable amount to see along the route. A report outlined the findings, described the nature and condition of archaeological sites associated with the route, and summarised the potential of the area for access and interpretation.

Adam Sharpe (C.A.U.)

From Cornwall to Caithness, Some Aspects of British Field Archaeology.

Papers presented to Norman V. Quinnell. Ed. by Mark Bowden, Donnie Mackay and Peter Topping. British Archaeological Reports, British Series, 209, 1989. B.A.R. Oxford. Price £17.00, paperback.

Festschriften, for long assemblages of diverse, often unrelated, discourses dedicated by former pupils to scholarly father figures who, in Frances Cornford's memorable words, were sometimes of "no reputation outside the University, and a rather queer one inside it" (1964, 19), have posed immemorial bibliographic problems. Indeed, the present writer once found, interleaved in such a volume, a pungent verse penned by an adroit, but baffled, seeker:

The *Geschichtes* are really a crew.
There's *Ur*—, there's *Vor*— and there's *Früh*—.
The *Jahrbuchs* aren't worse
Nor better; the curse
Is the *Festschrift* for you-don't-know-who.

Essential change came when dedicated Society Proceedings, with apposite papers, were produced, a practice which eased the librarian's lot, but scarcely shifted the principles inherent in rooted practice. *Cornwall to Caithness*, however, positively and refreshingly, breaks twofoldedly with tradition. This connected parcel of papers is dedicated to one who has spent a long, and largely unsung, career in the Ordnance Survey Archaeology Division, analysing and recording the field monuments of the English landscape, our greatest and still largely unappreciated archaeological source. It should not be forgotten that, despite the work of the Ordnance Survey, RCHME and the CAS and other check-lists, basic field archaeology had, in the face of artifactual and excavational archaeology's claims, coupled with not a little ivory tower elitism in some quarters, almost withered away by 1970. Soon after came a shift in emphasis — and now, after two decades, fundamental fieldwork, such as has been carried out for a lifetime by the distinguished recipient of these papers, has changed wholly and dramatically our appreciation of prehistory: there was in our land a density of occupation such as never had been envisaged. Indeed, our island is no common earth but a sophisticated artifact, the product of men's minds, needs and hands.

As usual in a *Festschrift*, all is prefaced by appreciations of the life and work of the recipient who was initially a cartographic surveyor. These are of importance historically for they detail the working tradition, initiated by O.G.S. Crawford and developed by C.W. Phillips, of finding, identifying, surveying and reporting upon monuments in the field. Cartographic surveyors with an interest in antiquities were perforce recruited and their work was the basis of the National Index of Antiquities. The work was exacting, as the OS revisional pace was rapid, and high standards of observation and record were maintained despite tight schedules. It has been the present writer's privilege to have known the principals and, from 1950 onwards, to have met and talked with those working in the field and to make use of their records at Chessington and Southampton. Indeed, while a Royal Commissioner, he worked with the then RCHME Secretary engineering the transfer to that body of many talented people. The methods, organisation, and records were seen, studied and appraised and all that had come to pass fully grasped. Since the 1920s, they have been the bases of many County Sites and Monuments Records and only the exceptional and efficient have equalled their quality. Thus it must at once be said that the work of the recipient of these

papers and all the other members of the Ordnance Survey Archaeology Division, and its successor body, represents a scale of archaeological endeavour, equalled, even today, by few Western European countries.

The two archaeological-historical studies are a prologue. Aubrey's Avebury plan is seminally assessed and the man at work, in terms of the rise of the Surveyor, is evaluated and the early emergence of the plane-table and alidade indicated. Here the door is ajar for a consideration of antiquity as early depicted, its strengths and shortcomings. It is equally refreshing to read the portrayal of H.S. Toms. His long barrow survey, indeed, all his field work, was impressive and he cannot have been other than the founder of the field archaeology oriented Sussex school. A wider and more searching appreciation is needed.

Of especial interest for many will be the contributions concerning Cornwall and Scilly. The dated listing of the many small-scale sampling excavations carried out by Bryan and Helen O'Neil on Scilly between 1947 and 1954 has for long been necessary. Those who assisted their endeavours should be seen, their memories recorded and any incidental photographs they may have copied. Bryan O'Neil intended a book about Scilly and work was undoubtedly directed to that end. Thus the form that it could have taken may not entirely evade us. Also on Scilly, Charles Thomas gives us a fascinating insight into the much neglected Garrison by discussing battery names and, when he introduces his topic, reminds us of the miles of breastworks, batteries, redoubts and the like all awaiting unified study and all under threat from visitor pressure. On the Cornish mainland, Nicholas Johnson and Peter Rose unveil the remarkable sequence extant on Bodmin Moor, a relict landscape with implications far beyond its bounds, while Stowe's Pound is planned in the astonishing detail that we have come to expect from RCHME, a process which allows analysis and tentative dating. Beyond Cornwall, Beardon Warren brings the long-standing problem of pillow-mounds into play and, in Somerset, we see something of Exmoor's similar potential. These ancient fields and their like on Dartmoor and Bodmin Moor have clear palaeoclimatic and environmental implications, and their relegation to marginal land, and thus the preservation of particular areas, is a process that must be pursued.

In Central Southern England we have an in-depth treatment of Ancient Fields, adjacent to a hillfort, with notice of barrows: welcome attention to neglected Non-Hillfort Settlement in all its complexity: and the sometimes puzzling Multiple Ditch Systems. These important papers certainly reinforce the reviewer's one-time contention regarding the planned nature of the later prehistoric Wessex landscape. Mottes in Dorset, with supportive works, are superlatively planned, indeed, the illustrations are the vehicle which has led to an economy of words. Such remarkable planning also accompanies the adroit use of history in the enjoyable presentations of Hamstead Marshall's earthwork castles. This paper demonstrates more than anything the disciplined nature of field archaeology employed within a specific context.

Middle England's contributions are the Somersham Palace paper, with its inferences for the development of 'Garden archaeology', which is shared with a study of formal garden earthworks in Shropshire. Such gardens reflect the exercise of taste in times past and their surviving details can, from time to time, be reconciled with historical ideas and sources in a manner normally only possible in the urban scene. Thus one should turn to the treatment of Bristol's defences which shows how field archaeology's principles can be successfully employed within an urban context to great effect.

A combined operation in Lincolnshire, ancient gold and a monastic site, blends history and field-survey: Iron Age 'cord-rig', the narrow furrows of Northumberland, extend George Jobey's exposition of that region. In Cheshire we are shown how field-survey and excavation

can be positively related. The first is used to examine the validity of the results of the second. In Yorkshire a lost village and a country house with its supportive landscape, are each the subject of analytical field survey, and yet again it is the planning which carries the narrative. With the effluxion of time northern England will surely reveal relict landscapes which will rival those now known in the south and southwest. The survey and discussion of the burnt mounds of remote Sutherland and Caithness illustrates this contention, for they exist here as earthwork features. Their number is amazing and a widespread and regular use is indicated. An East Anglian excavation of one of the numbers of spreads of burnt flints in the region revealed a substantial ditch surround which could have given rise to an earthwork.

Like "Leprosy in Cornwall and Devon", some papers, although pertaining to analytical field archaeology and, naturally, to the distinguished recipient's signal work, are to some degree apart from the main thrust of the volume, which is the calculated application of analytical field archaeological techniques to a wide range of situations, almost all different and each fraught with especial and specific problems. As in all works of this kind, there are minor deficiencies, and even odd slips, but nonetheless all the papers are conceived and deployed to a remarkably high standard. At the risk of displaying prejudice, the reviewer feels that in certain areas long experience of the critical assessment of cognate problems makes for a more explicit communication.

A further aspect of this volume is its significance for the practice of archaeological investigation at large. The emergence during the past two decades of County and City Unit archaeology and the like, a compromise National Archaeological Service, has led to almost all excavation being directed by developmental considerations, which are far removed from and extraneous to the discipline. This is a process which began just before 1939 and has been continuing and widening ever since. Usually specific monuments are investigated and considerations of context, if made, are an afterthought. Undoubtedly much has been added to knowledge, and, of course, patterns of concerted research, for example those upon barrows and henges, have been carried out within its constraints. Notwithstanding, it is manifest that this is an unsatisfactory situation, for advance within an academic discipline should proceed from problems that arise as progress is made. It should be, from the outset, axiomatic that topographical considerations should precede excavation. Indeed, excavation is but the controlled investigation, if not confirmation, of considerations that have been arrived at by the exercise of analytical field archaeology. This principle at work can be seen, for example, in embryo, in much early work, and, in a surprisingly sophisticated form, in Sussex between the wars. Since then we have largely lost our way. This collection of stimulating case-studies shows how, once again, we can develop a systematic and disciplined approach to the problems that confront us.

A fundamental, thought provoking, volume has incited a particular view. In practice, of course, there must be harmony and integration. The reviewer must add his approbation for this *Festschrift*, dedicated to one of those who has long and effectively ranged the land, which throws into high relief much that is integral to effective ideas and progress.

Paul Ashbee

F.M. Cornford, *Microcosmographia Academica*, 1964 edn., 19.

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- | | | |
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