QUARTZ TECHNOLOGY IN SCOTTISH PREHISTORY

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INTRODUCTION

It is generally recognized that, in the Stone and Bronze Ages of Scotland, numerous different lithic raw materials were used for the manufacture of tools (Saville 1994). While there are considerable variations at local level (e.g. involving bloodstone: Wickham-Jones 1990 or pitchstone: Haggarty 1991, 91), taking Scotland as a whole the most common raw materials exploited appear to be flint, chert and quartz. The true importance of quartz has to a degree been obscured by research bias since, probably because of difficulties associated with identifying tools in quartz, many archaeologists have shunned this raw material (cf. Lindgren 1998). As a result, many publications of Scottish quartz assemblages tend to be characterized by lack of enthusiasm, detail and precision (Table 1). From the literature there is an impression that quartz was a raw material only used in a few remote corners of prehistoric Scotland, whereas in fact it was a major lithic resource, or at least an important supplement, in large parts of the country over several millennia. The purpose of the project 'Quartz Technology in Scottish Prehistory' is to increase awareness of the significance of quartz in earlier prehistory.

PROJECT STRUCTURE AND AIMS

A draft project proposal was produced by Torben Ballin and discussed with Alan Saville and Patrick Ashmore (Historic Scotland). A two-stage project structure was suggested, with a pilot project to be completed in the financial year 2000/01 and a main project to be carried out in 2002/03, founded on the results and recommendations of the pilot project. Historic Scotland and the National Museums of Scotland agreed to fund the initial stage jointly.

After discussion of the selection criteria for the pilot project and following examination of material in the care of the National Museums, a number of quartz assemblages were accepted as suitable for further research. As most published quartz assemblages are of Bronze Age date, it was decided to focus on Mesolithic assemblages, and Kilmelfort Cave, Argyll (Coles 1983), Lealt Bay, Isle of Jura (Mercer 1968), and Shieldaig, Wester Ross (Walker 1973) were those selected for initial study. A specialist report (by Torben Ballin) was produced on each of the three chosen assemblages, together with a project report (Ballin 2001), which included recommendations for the proposed main project.

The main aim of the quartz project is to shed light on quartz variability, that is, to define how quartz assemblages in different periods and areas of the Scottish quartz province (N and NW Scotland) differ. With the general variation defined, it will be attempted to explain the variation. It is assumed that most differences between assemblages will be due to differences in chronology, regionality (territoriality), access to resources, or site activities. The prime purpose of the pilot project was to explore the prospects of a full-scale quartz project and assess the problems associated with the analysis of quartz assemblages.

METHODOLOGY

To ensure comparability between the selected assemblages, it was important to develop a standard methodology for description and discussion of the involved assemblages. The first element of the chosen
Assemblage and associated inferential problems | Date | Amount of quartz
--- | --- | ---
Kinloch, Rhum (Wickham-Jones 1990) Quartz assemblage not analysed/published | Mesolithic? | 668
Lealt Bay, Jura (Mercer 1968) Quartz and flint assemblages not kept separate in presentation | Mainly Mesolithic | ‘12 lb of milky quartz’
Lussa River, Jura (Mercer 1971) Quartz and flint assemblages not kept separate in presentation | Mainly Mesolithic | ‘72 lb of milky quartz’
N Carn Bay, Jura (Mercer 1972) Quartz and flint assemblages not kept separate in presentation | Mainly Mesolithic | ‘5 lb 10 oz of milky quartz’
Kilmelfort Cave, Argyll (Coles 1983) Terminological problems* | Mesolithic? | 331
Carding Mill Bay, Argyll (Finlayson 1992) ‘...sorted from only a sample of the shell material’ | Early Neolithic (Obanian) | 990
Loch Olabhat, North Uist (Finlayson forthcoming) Unpublished | Neolithic | Hundreds
Stanydale, Ness of Gruting, Gr. School, Wiltrow (Calder 1956) Material mainly excavated before 1950 | Neolithic/Early B.A. | ?
Scord of Brouster, Shetland (Whittle 1986) Terminological problems* | Neolithic/Early B.A. | ‘Nearly 8,000’
Callanais, Lewis (Ballin forthcoming b) | Late Neol./Early B.A. | 234
Lairg, Sutherland (Finlayson 1996) c.2,000 pieces of c.10,000 analyzed | Late Neol./Bronze Age | ‘Some 10,000’
Northton, Isle of Harris (Simpson 1976) Unpublished | Late Neol./Bronze Age | ?
Rosinish, Benbecula (Ballin forthcoming a) | Early Bronze Age | 3,532
Jarlshof, Shetland (Hamilton 1956) Material excavated before 1950 | Early-Late Bronze Age | ‘Hundreds of quartz tools’
Tougs, Shetland (Hedges 1986; Lehane 1986) Terminological problems* | Early-Late Bronze Age | 1,457
Bayanne, Shetland (Ballin, forthcoming c) Late Bronze Age | 2,955
Kebister, Shetland (Clarke 1999) A very brief report (one page of text + two tables) B.A./Early Iron Age? | 1,155

Table 1. Some important quartz assemblages, their dates and sizes, and problems limiting their inferential use-value.

* ‘Terminological problems’ generally refers to the use of a typology not including bipolar material. In Hedges (1986) and Lehane (1986) the terminological problems are due to the adoption of Broadbent’s (1979) typology.
approach was the identification of raw materials (sub-types of quartz), as the properties of the raw material might determine the choice of technology and, to some degree, artefact morphology.

The second element was typological classification and description of all debitage, cores and tools, and in this connection to discuss relevant typological concepts. As a third element, the technology was defined and discussed on the basis of raw material and typological background. And finally, the date and chronological coherence of the assemblages were examined. Due to excavation without standard grid systems it was not possible to test the assemblage chronology for the selected assemblages via distribution analysis, but this may be a relevant approach in connection with the main quartz project.

THE THREE ASSEMBLAGES OF THE PILOT PROJECT

There are some similarities between the three assemblages of the pilot project, but just as many differences. Contrary to ‘classic’ quartz assemblages from, for example, Shetland (Calder 1956; Hamilton 1956; Whittle 1986), all three assemblages form parts of larger lithic collections containing substantial amounts of flint. The quartz at Kilmelfort Cave is homogeneous milky quartz, the quartz at Lealt Bay is milky quartz and rock crystal, and there are two types of quartz in the Shieldaig assemblage: typical ‘vitreous’ milky quartz and rock crystal, and a variety with a ‘greasy’ lustre. These raw material varieties all have different flaking properties. The quartz at Kilmelfort Cave and Shieldaig is mainly vein quartz, whereas the quartz at Lealt Bay is pebble quartz.

It was possible to define some technological differences between the three assemblages, mostly associated with the use of different raw materials. Quartz from a pebble source usually results in a technology heavily dominated by bipolar technique, with vein quartz resulting in a technology based on platform technique, but with bipolar technique applied to otherwise exhausted platform cores.

The numbers of the individual debitage categories differ from assemblage to assemblage, mainly as a result of differences in recovery policies (at Shieldaig spoil was sieved; at the other sites not) and different flaking properties (the ‘vitreous’ varieties of quartz tend to splinter, the quartz with a ‘greasy’ lustre does not). Due to differences in date, raw material availability and technology, the typological compositions of the core and tool groups vary greatly. The Kilmelfort Cave cores are virtually all bipolar, those from Lealt Bay and Shieldaig are mostly bipolar but with a significant presence of platform cores. The fact that some platform cores are represented in the Lealt Bay pebble-based assemblage may be due to one of two possibilities: i) either the pebbles were larger than in other typical quartz assemblages, or ii) Mesolithic platform cores are so small that the size of the pebbles is less of a problem.

The differences in the composition of the tool group may be explained by differences in site activities, but most of the differences seem to be related to chronology: i) the Kilmelfort Cave assemblage contains few tool types, and there are no microliths – these facts, combined with the presence of many flint ‘button-shaped’ scrapers suggest a Bronze Age date for the quartz assemblage and parts of the flint assemblage; and ii) Lealt Bay and Shieldaig both contain quartz microliths (Lealt Bay: 1; Shieldaig: 18) and a wide variety of other quartz tool types, suggesting a Mesolithic date for most of the quartz material. Diagnostic elements in the flint assemblage from Shieldaig indicate that this assemblage may be contemporary with that from Gleann Mor, Islay (Finlayson and Mithen 1997), which was 14C-dated to around 7000 BP, though it must be admitted that the chrono-typological sequence for the Scottish Mesolithic is far from resolved (cf. Woodman 1989). Further work towards publication of the whole Shieldaig assemblage and re-publication of the Kilmelfort cave assemblage is in progress.

QUARTZ-BASED RESEARCH – PROSPECTS AND PROBLEMS

Due to its general properties, quartz is undoubtedly more demanding to examine than, say, flint or chert, but if quartz assemblages are excavated and examined as meticulously as assemblages in other raw
Quartz Technology in Scottish Prehistory

Raw Materials
When dealing with quartz, it is important to realize that this resource encompasses a group of closely related, but more or less distinctive, materials. In the pilot project milky quartz, rock crystal and ‘greasy’ quartz are three varieties with different appearances and different flaking properties, and they would probably have been perceived by prehistoric people as three different materials with different functional and perhaps symbolic values.

Typology
It is well known that it can be difficult to identify retouch, and thereby tools, in quartz. Another problem is that, due to the different flaking properties, many quartz blanks and tools have a different appearance to that of artefacts in flint-like silica. For this reason some scholars have attempted to develop a typology solely for quartz artefacts (Broadbent 1979; Callahan 1987; Lehane 1986). Unfortunately, the introduction of a separate quartz typology prevents comparison of quartz tools and those in other raw materials, and we believe this practice should be discouraged. As demonstrated in the lithic analyses already undertaken for this project (Ballin 2001), it is quite practicable to apply the same typology to all raw materials. A general difficulty with Scottish lithic research in particular has been the lack of consensus on one typology, which is a problem in need of serious attention.

Technology
The common use of bipolar technique in connection with reduction of quartz material, combined with the fact that the bipolar technique was not generally recognized as such until the mid-1980s, means that most older presentations of quartz assemblages are heavily flawed (Table 1). Bipolar material was classified as, *inter alia*, opposed-platform cores, wedges and scrapers, which firstly creates a bias in inferences about the assemblages and activities associated with them, and secondly makes comparison based on, or including, older literature highly problematic. With bipolar material classified correctly, it is possible to achieve a detailed picture of prehistoric lithic technologies, in particular combined with the *chaînes opératoire* approach (Eriksen 2000).

Distribution analysis
Analysis of quartz assemblages may include distribution analyses to either: a) shed light on intra-site settlement organization; or b) test the chronology of the site and/or the quartz assemblage. The main precondition for carrying out a distribution analysis is the existence of a standard grid system with square grids of maximum 1m² (or preferably 0.25m² or less). In Scottish archaeology, quartz has rarely (if ever) been used in distribution analyses. This is not due to quartz being less suited to this kind of investigation; it is more a combination of traditional low expectations and recovery/documentation policies. Most known quartz assemblages are from excavations, but unfortunately many of these were documented in ways inappropriate for distribution analysis (as, for example, in the case of the three assemblages studied in the pilot project). Today, it is common practice in Scotland to excavate Stone and Bronze Age sites with accurate recording of finds to either standard grids or well-defined contexts, and many assemblages excavated in the last 15-20 years are well-suited for analysis of settlement organization.

Dating
As demonstrated in the pilot project report, quartz is just as useful for dating purposes as other lithic materials, as long as diagnostic artefacts or attributes are present. At a general level, dating quartz assemblages by the use of diagnostic artefacts or technological attributes is hampered by the lack in Scotland of an adequate typo-chronological framework for the Mesolithic and Neolithic periods. It must be an important aim in Scottish Stone Age research to improve the chronological framework by identifying new diagnostic types or diagnostic technological attributes.

PROPOSALS FOR THE MAIN PROJECT
To satisfy the aims set up by this project, a substantial number of representative quartz assemblages must be examined and compared.
Chronology
It is most likely that the appearance of quartz artefacts will vary over time. To detect this variation it will be necessary to examine assemblages from all quartz-using periods and phases. To test whether the observed variation is in fact chronological (that is, not due to differences in territoriality, raw material availability, or site economy/activities), it will be vital to include in the project as many different assemblages as possible from each period and phase.

Territoriality
To test whether territoriality is a causal factor in the morphology and technology of quartz artefacts (stylistic variation), it is imperative that all regions of the Scottish quartz province are represented by suitable assemblages. Stylistic variation (Wobst 1977; Wiessner 1983; Gebauer 1988) is usually associated with the distinction of social territories (Clark 1975, 12), and, for example, Scandinavian research (Bruen Olsen & Alsaker 1984; Andersen 1983; 1995a; 1995b) suggests social territories to be identical to specific sets of biotopes ('economical zones') delimited by significant topographical features (fjords, rivers, mountain ranges or water divides). For this reason, the quartz project should attempt to cover as many economic zones as possible.

Resources
The effect of chronology and territoriality on the variation within and between quartz assemblages is as yet unproven, but it is fairly certain that some of the observed variation is due to raw material differences. The following points have been established: i) throughout the Scottish quartz province different types of quartz were used; ii) within the individual quartz types, some varieties are better suited for the manufacture of flaked tools than others; and iii) in some assemblages quartz was supplemented by other materials, or it was itself a supplement. In the attempt to analyse the influence of raw material variability on assemblage variability, quartz assemblages will be selected from all geological zones of the Scottish quartz province (mainly N and NW Scotland). Assemblages from central and southern Scotland rarely yield more than a few individual pieces of quartz.

Activities
As the specific subsistence economy and activities at a particular site may influence the composition of its assemblage, the quartz project should include assemblages from different types of site. Relevant site types are: i) open-air sites (i.e. sites not associated with more substantial dwelling structures); ii) house sites; iii) ritual sites; and iv) burial sites. One could, for example, envisage a marked difference between assemblages from sites of type i/ii and iii/iv. The composition of assemblages from the former group of sites might be dominated by utilitarian choices, and they might include a certain amount of production refuse. The composition of assemblages from the latter group of sites might be dominated by choices involving the symbolic value of artefact raw materials and style, and might contain less refuse, fewer blanks, and more tools.

CONCLUSION
The demands on the project’s selection process are extensive, and possibly the best answer, in terms of a project structure, is a general survey of the ‘Scottish quartz province’. This geographical concept corresponds roughly to N and NW Scotland. The project should attempt to cover:

- assemblages from all Stone and Bronze Age phases (as well as the Early Iron Age?)
- assemblages from as many biotopes/economic zones as possible
- assemblages in different types and sub-types of quartz, and assemblages in which quartz is supplemented by other raw materials
- assemblages from all main geological zones
- assemblages from different site types

Assemblages should be examined from museums within the ‘quartz zone’ and from the major collections in Edinburgh and Glasgow. The project should be structured in three stages:

- an initial planning stage, during which it is attempted, via the archaeological literature and communication with the relevant museums, to list and locate relevant assemblages. At this
stage a system is established for the on-site classification and cataloguing of assemblages. This includes preparation of database schemas for direct storage of lithic information.

- a ‘travel stage’, during which all relevant assemblages are examined, combined with some sample collection of natural quartz from relevant locations.
- a final writing-up stage – the assemblages are compared and a publication is prepared, including the commissioning of extensive illustration.

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the Neolithic site of Eilean Domhnuill, Loch Olabhat, North Uist.


ENDNOTES

In the Scottish archaeological literature it is possible to find up to four different definitions of the same lithic type (e.g. ‘chips’), which hinders comparison of assemblages (Ballin 2000).