DEALING WITH THE ‘QUARTZ PROBLEM’ IN IRISH LITHIC RESEARCH

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ABSTRACT

The use of quartz as a raw material for chipped stone tools was widespread in Irish prehistory but a traditional focus by archaeologists on flint, and the use of a flint framework for analysing quartz, has led to the neglect of prehistoric quartz use. This paper introduces a PhD programme of analysis of quartz chipped stone technology in Irish prehistory currently being undertaken at the UCD School of Archaeology. This project, which is primarily based upon a recently excavated Mesolithic and Neolithic quartz assemblage, aims to provide a general overview of the extent of quartz use in Ireland, develop analytical frameworks for this material through experimental knapping and to test these frameworks through selected case studies. The aim is to enable the archaeological community to have a readily accessible, common set of general principles and analytical tools to facilitate and enhance research agendas involving quartz.


Keywords: Quartz, flint alternatives, technology, experimental archaeology, Irish prehistory

INTRODUCTION

This paper introduces a programme of analysis of quartz chipped stone technology in Irish prehistory currently being undertaken at the University College Dublin (UCD) School of Archaeology. The widespread use of quartz in Irish prehistory is not well appreciated by the archaeological community, and this ‘quartz problem’ (which, as we argue below, is really a ‘flint problem’) presents a major stumbling block in understanding prehistoric activity. The aims of the paper are to highlight the scale and extent of the problem addressed, locate this problem in its international context, outline the methodologies and case studies planned, and to promote debate on an oft-ignored raw material. The article reviews work in progress, and we very much look forward to comment and debate.

The present project arises from an excavation of a late Mesolithic and early Neolithic site at Belderrig, north Co. Mayo, directed by Graeme Warren and funded by the Royal Irish Academy. The site, which is detailed below, includes a substantial quartz assemblage, primarily of later Mesolithic date and a key objective of the project was to develop analytical frameworks for this material, and to bring quartz use to archaeological attention in Ireland. In October 2006 Killian Driscoll began a PhD project on this material, funded by the Irish Research Council for the Humanities and Social Sciences. The PhD aims to provide a general overview of the extent of quartz use in Ireland (see below), develop analytical frameworks for this material through experimental knapping and to test these frameworks through selected case studies. The aim is to enable the archaeological community to have a readily accessible,

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common set of general principles and analytical tools to formulate further discussions, and facilitate and enhance research agendas involving quartz.

**RESEARCH BACKGROUND**

Understandings of chipped stone technology in Ireland remain problematically centred around flint. Even though a range of Irish stone age tool raw materials including quartz has been recognised for a long time (Knowles 1889), flint has played a predominant role in the minds of antiquarians and archaeologists. The north-east of Ireland is the almost exclusive home of in situ deposits of flint — often, but incorrectly, glossed as Antrim flint — and a strong tradition of flint collecting has led to the accumulation of tens of thousands of lithics from that region, with intensive collecting and trading of lithics during the nineteenth and early twentieth centuries (cf. Woodman et al. 2006). For a long time the distribution of stone age, but especially Mesolithic, activity in Ireland was seen as primarily north-eastern and the Antrim flint deposits were seen as the lynchpin of stone age settlement patterns (Macalister 1949). In fact, in areas where other raw materials were noted, the supposed lack of a trade in flint was seen as evidence of the cultural backwardness of the peoples’ of those areas (cf. Brunicardi 1914).

More recently, the recognition that the island of Ireland was extensively settled from the early Mesolithic onwards (Woodman 2003) has run alongside increased awareness of the diverse suite of materials utilised for stone tool production (see especially discussion in Woodman et al. 1999). Nevertheless, materials such as chert or quartz are often still regarded as a substitute for flint (cf. Herity 1987; Woodman & Scannell 1993) as opposed to valid raw materials in their own right, and analytical categories and typologies are primarily based on long-standing categories often derived from flint. In Knutsson’s (1998) terms, and in parallel to some areas of Scandinavia, it would appear that in Ireland an ‘unconscious projection of the framework of categories for flint’ has had considerable impact on our understandings of prehistory. In fact, whilst the use of quartz as a raw material for stone tools in Ireland has been especially under-acknowledged it has primarily been seen in terms of its ritual or symbolic attributes, as it is a common find in megalithic tombs and other monuments, and also as part of megalithic architecture (Bergh 1995; O’Brien 1999; for parallel distinctions between approaches to quartz see Warren & Neighbour 2004).

The down-playing of the extent and nature of quartz use in prehistoric Ireland stems primarily from the relationship between the physical properties of quartz and the history of archaeological research. As is widely acknowledged, the artefacts produced during quartz-knapping do not always conform to those characteristically produced during flint-knapping; consequently archaeologists have been reluctant, until very recently, to engage with a material often perceived as intractable and therefore difficult or fruitless to analyse. Ballin (forthcoming), reviewing approaches to quartz, comments on a similar problem whereby “many publications of Scottish quartz assemblages, as well as quartz reports world-wide, tend to be characterized by a lack of enthusiasm, detail and precision”. These difficulties are compounded by the common occurrence of quartz deposits in most of Ireland. Consequently, quartz can be difficult to identify during fieldwalking and quartz lithics are probably under-represented in such collections (cf. Kimball 2000), and during excavations they are also often missed (cf. Warren & Neighbour 2004). This is perhaps especially significant in a context where for non-specialists lithics are all too often equated with flint, and many excavators have not been trained in the recognition of ‘flint alternatives’ or how to deal with them: the recovery of worked quartz on many sites is very unsystematic. Moreover, too many people
continue to equate tools with formal retouched artefacts and downplay the analytical significance of ‘waste’: as retouch is very difficult to identify on quartz, this bias further limits the recovery of quartz. In parallel with areas of northern Europe (e.g. contributions to Holm & Knutsson 1998), the quartz problem in Ireland is leading to a systematic misunderstanding of the nature and extent of prehistoric activity in large parts of the island.

Of course, these difficulties with quartz are not unique to Ireland, and the worldwide quartz problem has seen renewed interest in recent years, with diverse approaches being utilised to try and provide some analytical purchase on the material (e.g. Dickson 1977; Barber 1981; Gramly 1981; Knutsson 1988; Bisson 1990; Saville & Ballin 2000; Cornelissen 2003). Two broad camps of quartz-focused research can be discerned — those who maintain that quartz can be analysed using a framework developed from flint fracture mechanics (e.g. Bisson 1990; Saville & Ballin 2000), and those who consider the necessity of examining the different fracture mechanics of quartz (e.g. Gramly 1981; Knutsson 1988). Saville & Ballin (2000) maintain that quartz must be analysed using a flint framework, not least because assemblages in differing materials must be comparable in terms of identifiable types of formal types of tools in assemblages — they equate tools with retouched lithics. In contrast, for Knutsson (1988), quartz and non-quartz assemblages can only be comparable if the differing fracture mechanics of the raw materials are taken into consideration, and the cores and débitage products are analysed according to the technological attributes discerned from experimental work on the different raw materials; analyses based on form do not adequately interpret the making and use of stone tools, and tools are not restricted to retouched lithics. Indeed, while Ballin (forthcoming) maintains a flint-centric position in analysing quartz, his conclusions imply a need for a separate quartz technological terminology, and a broadening of the use of the term ‘tool’ to extend beyond retouched lithics alone.

The debate here, although seemingly technical, is absolutely central to the development of approaches to quartz — as it asks us to consider little less than the purpose of our analytical typologies and the kinds of comparisons they facilitate. Ballin and Saville are clearly correct in as much as a quartz-based typology should not endlessly recreate new names for old objects: a barbed and tanged arrowhead in quartz is a barbed and tanged arrowhead. However, the radically different fracture properties of quartz imply that a different understanding of past technologies is needed. Following Knutsson (1998) there is considerable danger that a focus on formal properties, in the absence of detailed technological models, will lead to the misidentification of supposedly significant artefact types; conversely, as noted by Gramly (1981), a lack of formal types in a quartz assemblage when compared to a flint assemblage can be interpreted erroneously as resulting from a different group of peoples, instead of the same peoples’ approaching the material differently. Our stance is that certain, highly formalised artefacts may have direct typological comparanda in alternative materials, and that in these instances such relationships should be highlighted. However, it will also be critical to understand those objects in terms of the technical sequences that have led to their formation — and that these sequences may not be comparable across materials. Such an understanding can only be generated through detailed understandings of the properties of varied materials.

QUARTZ USE IN IRELAND

The initial stage of this project has been the setting up of a database of quartz finds from excavated and non-excavated contexts. This database has been formulated by a literature review, a search of the online database of Irish excavation reports, excavations.ie, and an archive search in the National Museum, Dublin. The database will eventually appear as an
interactive, online map. It is important to note that this database is heavily constrained by the primary data in four key areas:

Firstly, the database currently includes both worked and unworked finds — i.e. deposits of quartz in ritual and funerary contexts that do not necessarily include ‘worked’ quartz (Herity 1987; O’Brien 1999). ‘Worked’ and ‘unworked’ finds are differentiated in the database, and the maps here include only ‘worked’ finds. However, this distinction is based on the description in the primary source, and, as Warren & Neighbour (2004) have argued, the differing contexts of quartz use are associated with different sets of archaeological terminology. Many ‘unworked’ finds may, actually, include worked pieces; and many ‘worked’ finds may need considering in the light of the use of quartz in ritual contexts.

Secondly, it has not checked the identification of the quartz as worked or possibly worked, but rather simply referenced it as stated.

Thirdly, this count should be seen as a minimum amount, as it is apparent that even though quartz may have been found during excavations, it may not be stated explicitly as quartz in the reports or publications but instead called ‘stone’ artefacts/lithics; this also applies to the National Museum archives.

Finally, the point made earlier, that quartz will be under-accounted for in both surface collections and excavations, must also be borne in mind.

These problems demonstrate that any current ‘total’ for quartz in Ireland would be incorrect — but in a context where over 1000 licences for archaeological excavation have been granted in Ireland every year since 2001 (Anon. 2006), any static figure would be meaningless in any case. More significantly, and accepting the caveats above, this simple database concretely highlights the extent of the ‘quartz problem’ in existing archives. A recent review of Irish prehistoric stonecraft has highlighted eight instances of quartz lithics (admittedly not attempting to list all quartz use) and mentions that quartz occurs at a number of other Neolithic structures (Woodman et al. 2006). This project’s database has shown that over 150 townlands (the smallest official land unit in Ireland) have quartz artefacts that are described in the literature as either worked or possibly worked.

The map in Figure 1 shows that the quartz problem runs throughout Ireland. As with any distribution map, this mainly informs us of modern archaeological practice: infrastructural developments in eastern Ireland are clearly evidenced in the distribution. The map should also be seen in the context of the general distribution of finds of other raw materials; for instance, the southwest and the midlands both have a relative lack of non-excavated finds of any material, and both have a minor amount of research and development-led excavations. Whereas finds of flint are more common from non-excavated contexts, this map highlights that quartz is relatively rare from such contexts due to the difficulties in identifying surface finds of worked quartz mentioned earlier. In the map a distinction is made between ‘surface’ finds and ‘fieldwalking’ finds. Surface finds denotes quartz found on the surface including antiquarian lithic collecting activities, while fieldwalking denotes surface finds collected during research projects, such as plough zone surveys. And quartz is far more common from research excavations than development-led excavations, but this interpretation may be skewed because more research excavations have been published.
For most of the assemblages the amount of quartz finds is small (Figure 2). However, this should be seen in context of the overall number of lithics from these areas: for instance, while only five quartz lithics were found at the Neolithic structure at Drummenny Lower, Co. Donegal, these accounted for 33% of the lithic assemblage (the rest being six flint and four chert; Dunne 2003); at the Neolithic house at Enagh, Co. Londonderry, the quartz finds were...
a “few” flakes and only one flint artefact was recovered (McSparron 2003). Given all the
difficulties of collection and curation highlighted above, it is clear that any comment on the
comparative significance of the raw materials is impossible at this stage.

Figure 2: Worked and possibly worked quartz: find quantities
Two case studies (Figure 3) have been selected to date by the current project with a further study still to be specified. The primary case study is a late Mesolithic and early Neolithic site at Belderrig, Co. Mayo. This site is located immediately on the shore of the modern Belderrig Harbour. The site is characterised by a complex archaeological sequence buried beneath up to 2m of blanket bog. In brief, a series of activities appear to have taken place from c. 4800–4300 cal BC resulting in the deposition of stone tools, faunal remains, and evidence for some stake holes and pits. These activities appear to have been taking place at a time of on-going peat formation in the region. Assumedly in conjunction with this, at some stage c. 4160–4000 cal BC an extensive stony surface is laid down. This in turn becomes a focus for stoneworking activity. Also within the excavation trenches are dykes of the pre-bog field systems of the region, most widely known as the Céide fields (Caulfield et al. 1998). A fire place, dating to 3600–3300 cal BC, relates to the active use of the field system. Abundant lithics have been recovered from Belderrig, mainly in quartz (both vein quartz and rock crystal), but also including siltstone (sourced from c. 2–5km to the east), chert, flint and others (Kelly 2005). Most of the quartz lithics are derived from a platform technology producing large flakes and some blades. As excavation is ongoing and many samples still require processing the overall size of the assemblage is not currently known, but is in excess of 10,000 pieces.

The second study focuses on a small cluster of quartz identified at Lambay Island, Co. Dublin during excavations of a Neolithic stone axe quarry, directed by Prof. Gabriel Cooney of the UCD School of Archaeology (Cooney 2005). This small group of artefacts (c. 70 pieces in total) appears to be a complete knapping episode, deposited against a face of worked porphyry. Preliminary examination indicates that a high quality platform technology has been used. Using the framework developed in the main case study, this assemblage will be analysed, and a refitting exercise will be conducted to ascertain whether this represents a knapping episode.

PROJECT METHODOLOGY

The database clearly highlights that the quartz problem in Ireland is significant, and the international context of quartz research highlights that many researchers maintain that an understanding of quartz must be derived from a detailed knowledge of fracture mechanics — ideally developed through experimental work. Indeed, in essence, this is the approach taken by this project. However, some caveats are needed. There is a tendency to treat the results of experimental work, especially those based in fracture mechanics, as ‘hard’ facts. This sometimes fails to recognise that technology is not primarily constituted of material production but is fundamentally social (Reynolds 1993; Dobres 2000; Ingold 2000). The sociality of technology is not an after-the-fact addition to material considerations, and the social factors of technology cannot be appended on to discussions after the analysis of the seemingly more grounded material side of technology. Rather, from the first instance the study of past technologies must be approached from a perspective which implicates the sociality with the materiality of technology. To take a concrete example, extensive programmes of quartz analysis in Scandinavia (e.g. Holm & Knutsson 1998; Rankama et al. 2006) are founded upon detailed experimental work within a framework of fracture mechanics, leading to the development of analytical frameworks based on the fragmentation of a material prone to shattering. A simple approach to quartz analysis in Ireland would be to borrow these frameworks and apply them to our material. However, this would fall foul of the materialist fallacy of technology: quartz working was not just a matter of fracture mechanics but was social: choices in how to strike rock arose from the interplay of local identities and...
local materials and as a consequence our understandings must be grounded locally, and build outwards from these points.

Figure 3: Case studies

Within the project, therefore, the first point of departure is an understanding of the fracture mechanics of quartz from the primary case study area in the context of a particular approach
to the working of this stone. An analytical framework will be developed by experimental quartz-knapping, using a variety of techniques and methods, but itself informed by preliminary analyses of the assemblages — that is to say, the experimental work will attempt to simulate the approaches to knapping used at Belderrig in the past and understand the interplay between these choices and the materials to hand. The resultant cores and débitage products will then be used as a comparative assemblage with which to formally analyse the Belderrig assemblage, and then tested further on assemblages from a different spatio-temporal context. This will include the small knapping cluster from Lambay Island.

**EXPERIMENTAL KNAPPING AT BELDERRIG**

The initial stage of the knapping exercise has been the collecting of the raw material from near the excavated site at Belderrig, Co. Mayo. The material collected has been from both *in situ* veins, disturbed veins, and beach cobbles (which are also derived from vein quartz). Samples from three different veins and a beach cobble have been analysed macroscopically and in thin section by Dr Julian Menuge, UCD (School of Geological Sciences). This has shown that the vein ‘quartz’ naturally available near Belderrig is variable in character in terms of crystal size, orientation, and fracture development. An initial overview of the vein quartz variability from the excavated assemblage has shown that other possible subtypes of quartz were utilised beyond those sampled so far; the next stage is to identify possible outcrop sources for these types and to conduct further programmes of thin sectioning. The implications of the variability of the quartz for knapping are poorly understood, and this aspect will be examined during the experimental exercises.

As understandings of raw material selection develop, the experimental knapping will utilise various techniques and methods of production, informed by preliminary analyses of the assemblage. This programme of analysis will not examine the evidence for possible hafting and use, which would involve a detailed use-wear analysis, which is anticipated to be developed by another PhD project. The resultant assemblage from the experimental knapping will then be used to develop a classificatory framework, a core and débitage product typology, with which to analyse the chosen case studies. If possible, this analysis will incorporate refitting exercises. Observations to date imply that the high variability of quartz utilised at Belderrig offers some potential for this approach.

**CONCLUSIONS**

As noted at the outset, this paper discusses work in progress. We are far from having developed a comprehensive ‘solution’ to the problems presented by archaeological approaches to quartz use in Ireland; it is essential to recognise that the quartz problem can only be solved when *all* archaeologists routinely recognise the potential of quartz and collect it in the field. At a time when by far and away the largest amount of excavation in Ireland takes place in a commercial context, and the discipline suffers serious structural problems in terms of training and information transfer (Anon. 2006), a solution to the problem on this scale is beyond our immediate reach. We hope to have demonstrated a significant ‘quartz problem’ in Irish prehistory and provided an introduction to our analytical techniques for approaching this problem. We do not imagine this is the only approach to the material, and we publish this preliminary note hoping to encourage debate. We also believe that continuing to raise the profile of the material serves an important role in itself.
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