CHERT USE IN THE MESOLITHIC OF NORTHERN ENGLAND

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INTRODUCTION

This paper is written in the light of ongoing doctoral research into the Late Mesolithic and Early Neolithic periods of the Peak District, North Derbyshire. The main tenet of the thesis is that, whilst the transition between these two periods sees considerable change in traditions of making and using stone tools, there are also continuities. One way in which I have approached this idea is through the study of prehistoric exploitation of raw material. This requires a perspective beyond the regional horizon. Flint came into the area, and chert went out. How did this happen and what did it mean? As a consequence of this work I have had to look again at some collections and discussions relating to the Early and Later Mesolithic of the region. This has made me think specifically about the raw material conditions of various areas and how people shaped them.

CHERT: ITS MINERALOGICAL PROPERTIES

Chert, like flint, is a silicate, the essential components of which are silicon and oxygen. Flint and chert are aggregates of microscopic crystals of quartz found in calcareous sedimentary rocks. The British usage of the word 'chert' is different from the American. In British terminology, flint occurs in chalk, and chert occurs in Carboniferous limestone, though chalk is in fact a very pure type of limestone. Chert and flint can be envisaged best as poles on a graded continuum, which Henson (1982) describes thus:

<table>
<thead>
<tr>
<th>Chert</th>
<th>Flint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hackly fracture</td>
<td>Conchoidal fracture</td>
</tr>
<tr>
<td>Resinous lustre</td>
<td>Horny lustre</td>
</tr>
<tr>
<td>Opaque</td>
<td>Translucent</td>
</tr>
<tr>
<td>Coarse grain</td>
<td>Fine grain</td>
</tr>
<tr>
<td>Many impurities</td>
<td>Fewer impurities</td>
</tr>
<tr>
<td>No cortex</td>
<td>Cortex</td>
</tr>
</tbody>
</table>

Despite their regular usage, these definitions are somewhat contradictory. Flint, as defined by its parent material, is occasionally
more 'cherty' than some high quality cherts, which are 'flinty' in their intrinsic properties, especially the potential for a clean conchoidal fracture. Geological distinctions, then, may sometimes be less relevant to the archaeologist than appearance and flaking qualities.

The form in which chert occurs is extremely varied, a consequence of the many different processes which lead to its formation in sedimentary rocks. The main categories are 'stratified' (or 'bedded') chert, 'nodular' chert, and 'patchy chert' (where the boundary of the chert body is indistinct), though frequently these types are difficult to distinguish. The colour and texture of chert also varies both between and within chert beds or bodies. The main distinction here is between dark 'black chert', which consists of very fine crystals, and 'white chert' which is made up of coarser granular quartz (Sargent 1920). Both black and white chert can occur together as multi-layered, banded beds or concentrically banded nodules. Current research by Toynton [1] and others suggests that, while an initial supply of silica is vital, the distribution, colour, and form of chert is affected by post-diagenetic factors (i.e. after the transformation occurring during the conversion of sedimentation to sedimentary rock). The quantity of silica varies within different limestones at a local level, and fine-grained black cherts, as well as coarse white cherts, can be found in all the Carboniferous limestone areas of Northern England (B. Toynton, pers. comm.).

THE POTENTIAL OF CHERT AS RAW MATERIAL IN TOOL MAKING

Chert is generally understood to be of inferior quality to flint for knapping, though dark, fine-grained chert from the Bakewell area of the Peak District knaps considerably better than some of the coarse, white Wolds flint of North Yorkshire. Generally, however, the way in which it fractures is less predictable than flint and tends to be angular rather than conchoidal. Differences in evidence of core reduction demonstrate a response to this problem: chert seems most often to have been knapped using the weathered surface (which had interfaced with the limestone) as the striking platform, especially on tabular chert from bedded seams. One frequently finds a small proportion of tertiary flake assemblages from Mesolithic chert-working sites for this reason.
For the same reason, chert seems to have had correspondingly fewer applications. It is rarely used for cutting tools, though flake knives do occur occasionally -- as at the multi-period site at Demonsdale, Taddington, Derbyshire (Hind, in prep.). However, large blanks are frequently retouched to form scrapers and piercing tools, such as awls. It is often chosen alongside, or in preference to flint, for scrapers with steep retouch, awls, and fabricators, and it is often an alternative to flint for microliths, especially later in the Mesolithic. One Neolithic polished chert axe has been recorded from Mount Pleasant, Derbyshire (Derbyshire Sites and Monuments Record), but this is unusual. More common are Neolithic and Beaker Period arrowheads made in the same black chert (q.v. Leah, et al. 1997: 112; Radley 1965).

INTRODUCTION TO THE STUDY AREA

The study area is focused on a plateau of Carboniferous limestone known as the White Peak. Part of the Peak District National Park (or the Derbyshire Peak), it drains southward into the upper Trent Valley and is surrounded on the other three sides by gritstone uplands (see Figure
1). These uplands are the southern extremity of the Pennine chain, the mountain range which forms the spine of Northern England. There are two other areas of Carboniferous limestone in Northern Britain. One is at the northern end of the Pennine Chain, straddling Lancashire and North Yorkshire, and the other is to the west of the Peak District (beyond the Cheshire Plain) in Flintshire, North Wales (see Figure 2). Most research on the prehistory of Northern England has focused on the area to the east of the Pennines, especially the Yorkshire Wolds, an upland chalk area by the North Sea coast (beyond the Vale of York). Distinctive white and grey flints were procured from this area until the Bronze Age and used at least as far away as the Derbyshire Peak and in the Pennines.
Figure 2. Simplified map of the Derbyshire limestone plateau, showing areas in which fine-grained chert may be found. Outcrops of black chert have been noted at (1) Kirk Dale, (2) Lathkill Dale, (3) Monsal Dale and tributaries (4) Middleton Dale, and (5) Bradwell Dale.

ARCHAEOLOGICAL INTERPRETATIONS
Jeffrey Radley was the first archaeologist to pay close attention to the prehistoric use of chert in the Pennine chain (Radley 1968). He distinguished five different types of chert by texture and colour, basing his analysis on archaeological samples and suggested source areas for these types. There has been some confusion ever since about the exclusivity of these sites. Andrew Myers, for instance (1986: 298), developed a model of the procurement and use of raw material based on the idea that black chert originates solely in the White Peak. He concluded that increased use of chert in the Late Mesolithic was linked to a change in hunting practices which 'remained generalist and encounter-based throughout the year' (ibid.: 376). These properties required more complex, reliable, and maintainable technology and therefore a move away from logistical strategies toward smaller residential groups covering the greater part of the regional landscape. At the same time, he suggested, the move to smaller blades and microliths in the later period could have been an adjustment to the variability of raw materials encountered during the course of these frequent residential moves.

The Derbyshire origin for this material is highly likely for the sites from the Southern Pennines but more problematic for Blubberhouses Moor, some 80 kilometres from the White Peak and only 5 kilometres from the Yoredale series of North Yorkshire. Sargent states in no uncertain terms that very dark cherts *do* occur in these limestones:
The colour varies from white to dark grey, brown, black and blue... Not infrequently, especially in the Undersett Cherts, the individual beds have a core of translucent, black chert within upper and lower layers of a hybrid chert containing a considerable amount of calcium carbonate. A similar feature has been noted in the North Flintshire Cherts \[2]\(Sargent 1929: 405)\.

While this does not affect other aspects of Myers's model, it has implications for the scale of mobility in the Mesolithic period which cannot be supported purely on the basis of visual characterization of lithics. The (raw) material conditions under which Pennine communities were living were not altogether as previously imagined. In this paper, distinction by colour has been abandoned, and it is accepted that significant amounts of chert might have been introduced to sites in the Central Pennines from either end of the mountain chain.

While the sourcing of chert remains a problem, we know other materials were imported across great distances. Ian Brooks has demonstrated fairly convincingly the distant origins of flint used in the Peak District in this period. At Lismore Fields, near Buxton (at the western edge of the White Peak) sources on the Wirral (near Liverpool) were exploited in the Mesolithic and continued to be used into the Neolithic Period alongside material from the Yorkshire Wolds (1989).

Given these patterns, it is perhaps surprising that there has been little interest since the early 1980s in how raw materials were transported over such distances. Most studies involve the unwritten assumption that the knapper procures in every case. There are problems with this view, to which I will return below.

**THE DISTRIBUTION OF DERBYSHIRE CHERT: A SAMPLE**

This section takes a fresh look at the use of chert on and off the White Peak, focusing on the Mesolithic, when chert use was most prevalent. The collections analysed are mainly surface assemblages from upland erosion patches, as well as systematically collected plough-zone scatters.
Due to the extremely variable nature of the data no in-depth technological analyses have been performed. The main aim here is merely to demonstrate the extent of raw material use over time.

Derbyshire chert is represented (though not geochemically identified) on the gritstone uplands of the South Pennines, as well as in the coal measures and magnesian limestone of South Yorkshire and North Derbyshire, but it has not been recorded to the south of the White Peak in the Trent Valley. Archaeologists working in the Huddersfield area of the Central Pennines believe that at least some of the chert used there originated in Derbyshire (Spikins 1995; Stonehouse 1986). Manby (1963) commented on sites on the sandstone outcrop at Alderly Edge, Cheshire, where Derbyshire black chert was worked (sites SJ 856779 and SJ 860776), but it is only recently that systematic survey has been done on the Cheshire Plains. The chert used in this area (Leah, et al. 1997: 23, 112, 127) is mostly found nearer to the Flintshire series than the Derbyshire series and has been omitted here [3].

I have examined archaeological material from six areas: White Peak, East Moors, Southern Pennines, Central Pennines, South Yorkshire coal measures, and North Derbyshire coal measures [4]. Absolute and relative (percentage) quantities of chert were recorded against those made from other raw materials. Percentages of retouched artefacts in relation to waste were recorded, in order to give a rough idea of the types of stone working going on. Where possible a chronological framework was developed to distinguish between the Early and Later Mesolithic. Only securely dated, single-period sites have been used for final analyses. It should be noted that this survey has been limited by access to specific collections and is only as complete as circumstances have allowed.

<table>
<thead>
<tr>
<th></th>
<th>EARLY MESOLITHIC</th>
<th></th>
<th>LATE MESOLITHIC</th>
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<tbody>
<tr>
<td></td>
<td>No. of sites</td>
<td>Av. % chert</td>
<td>No. of sites</td>
</tr>
<tr>
<td>Central Pennines</td>
<td>4</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>South Pennines</td>
<td>4</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>South Yorkshire</td>
<td>2</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>North Derbyshire</td>
<td>2</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>East Moors</td>
<td>0</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>White Peak</td>
<td>2</td>
<td>37</td>
<td>9</td>
</tr>
</tbody>
</table>
It is obvious that there is no 'fall-off' in chert use for either period with distance from the White Peak. Use of chert in the Central Pennines is probably more frequent than in the lowland areas to the east of the Peak which are nearer to it. Further, this trend appears to go directly against any notion of a 'path of least resistance'. Chert is rarely, if ever, found in the Trent Valley into which the White Peak drains (Manby 1963), but it is frequently found in upland areas to the north, over the most mountainous terrain in England. That this may be a reflection of survey and collection traditions does not detract from the fact that large amounts of chert, often in unmodified form, found their way into these areas (i.e. as unworked tablets or nodules; q.v. Poole 1986; Spikins 1995).

The comment repeated by Hart (1981), Henson (1982), and Myers (1986) that chert was more favoured in the Later Mesolithic than in the Early Mesolithic can be supported for the South and Central Pennines. What little evidence we have suggests that for the White Peak, as well as for the lowlands of South Yorkshire and North Derbyshire, the reverse was true. It is certainly the case that more sites have been found with chert from the Later Mesolithic, but in any case, there are significantly more sites from this period in England. This may be a reflection of population growth, the fact that the Later Mesolithic is three times as long as the Early Mesolithic, or a combination of both (Spikins 1998). However, maximum percentages of chert on Early Mesolithic sites in any region are low compared with the relatively frequent counts of 90-100 percent in Later Mesolithic sites which Myers recognised (1986: 368). It may have been used as frequently but not in such relative quantity as later in the period. On Early Mesolithic sites for which we have data, the average percentage of retouched pieces which are chert is 10 percent. On Later Mesolithic sites, this figure rises to 26 percent. It could be argued then, that there was a change in the way chert is worked from the Early to the Later Mesolithic sub-periods, and that chert was increasingly used for retouched artefact types. Myers also commented on the division of Later Mesolithic chert-use sites into two groups: those with less than 40 percent and those with more than 90 percent chert. Out of 38 chert-use sites dated firmly to the Later Mesolithic, 8 did not adhere to this rule, and the assertion could only be upheld in three areas: South Yorkshire, North Derbyshire, and the White Peak.
All I have really demonstrated here is that chert was moving over long distances with great regularity and in a number of different forms, including finished artefacts and unmodified tablets. However, these patterns alone raise possibilities aside from those usually discussed. The distance over which raw material travels is often interpreted as an index of the scale of movement during the course of the annual subsistence round. This movement has been explained in terms of direct procurement, embedded or otherwise. This is certainly one structuring principle in recent theories of forager systems of acquiring raw material, but by itself it does not necessarily account for other issues.

Another possibility is that this material comes to where it has been found through exchange. In the literature on the Mesolithic of Northern England, exchange is rarely, if ever, mentioned, leading one to suppose that it is either taken as read or assumed not to be an issue. Is the unwritten supposition that the knapper (or someone in his or her 'band') always procures the raw material? This is certainly not a constant in ethnographically documented small-scale societies. We should not assume a priori that it was.

**RAW MATERIAL: LANDSCAPE, MATERIALITY AND IDENTITY**

Discussion remains of the mechanisms by which chert came to be worked so far from its sources. Don Henson's (1982) study of the area east of the Pennines suggested a 'supply-and-demand' trade network in raw materials which is perhaps more appropriate to a market economy than to a non-capitalist society. Henson does at least acknowledge the possibility of interaction and exchange between groups in different regions. Can raw material really give us a handle on scales of movement or trade patterns in prehistory? The assumption that the knapper procures is rarely demonstrable and is indeed unlikely in many cases. Equally, it is unwise to rely exclusively upon simple explanations based on modern economic theory of the cost/benefit type to explain patterns in prehistory. The concluding section of this paper outlines some ways in which we can better interpret phenomena of this kind with a sensitivity to recent trends in anthropology which deal with issues of landscape and technology.
Natural outcrops of chert occur in the gorges, dry valleys, and peripheral mudstones of the White Peak. The fine-grain black material mentioned by Radley is found where dark facies in the Monsal Dale series of limestone occur. Most of these outcrops cluster around Bakewell near the Wye Valley, but fine grained black chert is found as far north as Bradwell Dale which is within a day’s walk of most of the Mesolithic sites Radley studied. None of these outcrops is a demonstrable prehistoric quarry, but some of them, especially in the Bakewell area, are very close to rock shelter sites where large quantities of chert nodules were reduced in the Mesolithic (Hind, in prep.; Radley 1968).

In the Mesolithic, the Derbyshire Peak was inhabited by groups of hunter-gatherers who knew where to quarry this stone and how to work it. I believe we can take it for granted that these people had an intimate knowledge of their surroundings, embodied in stories linked to various natural features, and it is on the ridges of the Peak that most of these features would have been visible. The environmental evidence suggests that the river valleys and ravines of the Peak were densely forested in these times (Hicks 1971, 1972; Wiltshire and Edwards 1993). Communication may have hinged on the rivers themselves, as well as the edges of the high moors, where tree cover was less dense or absent. What is uncertain is how far these groups may have travelled in different circumstances.
Most small-scale forest societies of recent times have been characterised by high individual mobility and seasonal group movement. Many archaeologists are familiar with the huge annual round traversed by the Nunamiut band subject to study by Binford (1978). Even this would barely account for the distances over which Henson and Brooks reported flint to have been travelling, and hunter-gatherers in forest environments frequently have much smaller ranges (see, for instance, <http://lucy.ukc.ac.uk/Sonja/RF/Ukpr/Report135.htm> on Central Africa).

Such groups are linked by a variety of relationships. They meet up periodically for collective ceremonies, hunting expeditions, or other procurement expeditions. Conjugal families visit their relations in other camps and involve themselves with daily tasks there for weeks. Such practices make for constant fluctuation in a camp's composition, and are one mechanism through which objects and materials may be moved around.

Land is generally owned, even when it looks deserted, and complex ownership traditions and rights of access may restrict the use of quarries (McBryde 1984). Outside the community, there are exchange networks with neighbouring groups which provide goods unavailable within one's own range. The goods used for these exchanges and the value attached to them vary from one range to the next and can include unmodified raw materials. However, exchanges of material things are not always driven by demand for those things, and exchanges will still take place when there is no simple economic need. All exchange is symbolic, but, the goal of trying to identify a particular exchange mechanism may not be a particularly useful one, as there is a multitude of different agendas which can be worked through a transaction. Objects can even be made for an exchange beyond which they have no purpose, their value being as a medium for information exchange (Paton 1994: 184-5).

Aspects of materiality too are socially defined. Part of their definition involves 'presencing' the raw material itself with ideas, as Paul Taçon (1991) has described. Certain Australian peoples express an attachment to the land and knowledge of it through their dream stories. Quarries are amongst the nodes on the pathways followed in the journeys
narrated. The qualities and values attributed to the stone depend on a mythological understanding of its origin. This informs how it is used and by whom. The status of a raw material may be determined by whether the resource is 'on the track' or 'off the track' (Fullagar and Head, in press).

Technology, like exchange, is a total social phenomenon. The creation of certain artefacts in prehistory would have reminded knapper and onlooker alike of the tasks to which they were to be applied, as well as the place and meanings of those tasks in the social landscape. We generally apply these ideas to objects into which great labour has instilled an overt kind of value, but these ideas can also be realised in relatively everyday objects. It is their very 'everyday-ness' which can reinforce those views taken for granted of how to behave and who should perform what activities in a community. Raw material is a kind of backdrop for this theatre. It provides a context, a history, and a geography with which all the players are intimate through stories and other types of exchange. Learning both where stone tablets could be found and the special ways in which they had to be worked contributed to the construction of identity. As individuals found their way through technical acts and landscapes, they were socialized: they could act knowledgably and, in turn, pass on conventional understandings of how to proceed in different situations (Mauss 1979: 120; Tilley 1996: 162).

For some people, the procurement of chert may have involved days or weeks away from their range and maybe some of their kin, as has been suggested for the use of axe factories later in prehistory (Edmonds 1995: 59-61). For groups living on or near the limestone, it could easily have been done on the move, within the other suites of procurement making up the 'seasonal round'. The exploitation of similar resources, then, can have greatly different social settings, which are culturally specific in their interpretation but still affect our archaeological narratives. What may be crucial in understanding the patterns of movement of stone blocks and tools is the biographies they acquired through exchanges.

Outside the range in which such resources are present, different values may be ascribed to them. Many tablets of chert probably entered the Central Pennines through exchange networks between groups. Such
connections were not constant but were built up and later collapsed throughout the Mesolithic. If this is accepted, it is also likely that this material was considered in some way exotic by the groups who used it alongside the Wolds flint which could have been found nearer to hand. That we identify chert's physical properties as generally inferior to flint would not prevent any mythological associations making it desirable to people distant from the source. I am not suggesting trade was not organised at any time, just that it was one of a range of reasons for exchange. This exchange fulfilled a need for workable stone where it was absent and bound distant communities together. When used in remote territories it would have been evocative of other places and special relationships.

The purpose of this short paper is merely to encourage an awareness of the material conditions under which procurement models operate. The picture of Mesolithic Northern England which emerges is one in which materials are transported between areas which have very different conditions of raw material availability. Given that the distances involved are often beyond the annual range of modern hunter-gatherers who live even in extreme conditions, I have suggested that there are more mechanisms at play than direct procurement, whether embedded or logistical. Although we will never know if this is movement between people or with people, the distinction is crucial in terms of the value placed on the material. The intention has not been to re-create modern anthropological stories in the past, which is exactly what the narrow focus on direct procurement has done. Rather, it has been to demonstrate how the material informs us of social variability.

ACKNOWLEDGEMENTS

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being who they are. Needless to say, the responsibility for any shortcomings in the text lie exclusively with the author.

REFERENCES

ENDNOTES

1. Department of Adult and Continuing Education, University of Sheffield. (back to text)

2. I have recently discovered that Elizabeth Calender and Ron Cowell at the Liverpool Museum are studying Mesolithic sites from Merseyside at which black chert is found. This chert is almost certainly from the nearby Flintshire series in North Wales (see also Cowell and Innes 1994: 22). A discussion of the use of Prestatyn chert can be found in Quinnell and Blockley (1994). (back to text)

3. Of course, the practices and contacts that took Wirral flint to Derbyshire may have returned chert to the Cheshire Plain. (back to text)

4. This work has arisen from the need to distinguish Earlier from Later Mesolithic where the literature makes no such distinction. Many of the collections have been re-analysed by the author, but the basic source material is as follows: Barnatt, et al. (in prep.) (White Peak and East Moors); Radley (1968) (Southern Pennines); Littleborough Archaeological Society archive Manchester Sites and Monuments Record (Central Pennines); Radley and Marshall (1965) (South Yorkshire); and Hart (1981). (back to text)

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