The illustration (Figs. 2-4) of a Neolithic chisel or rod (butt end only) is an analysis of the order of the flake removals in the course of manufacture.

Fig. 2 shows the flatter, ventral face which was flaked first together with the probable order (1-11) of the removal of these flakes. It can be seen that these flake scars are substantially truncated: the negative bulbs would have been about 3 mm away from the present edges—see Fig. 1b.

Fig. 3a shows the four main steep flake removals (A-D) on the dorsal face which were responsible for this. The sequence of that flaking is also clearly shown: B invades scar A (and therefore succeeds A) and likewise scar D invades scar C. Flake X was removed at a final stage to thin or taper the butt.

Fig. 4 (ventral face) shows the areas of final trimming or retouch subsequent to the removals 1-11 and possibly added to make the lateral edges straighter.

Fig. 3b is a composite, finished drawing of the ventral face made by superimposing Fig. 4 on Fig. 2 but which should still allow the two stages of working to be distinguished.

The understanding of the process of manufacture and order of flaking by the illustrator enables a much more realistic and descriptive drawing to be produced.

Reference

LITHICS IN A LANDSCAPE: THE NEOLITHIC AND BRONZE AGE IN THE FLOUGHSOIL OF NORFOLK
by Frances Healy
(Based upon a lecture given to the LSS in May 1980)

What follow are some of the results of research done for a Ph.D. thesis on the neolithic in Norfolk (Healy 1980). Norfolk itself is the most northerly county of East Anglia and, though an arbitrary division for prehistoric study, provides a fairly representative slice of the topography of the whole region. Relief is unemphatic. The solid core of the county consists of a chalk and greensand escarpment in the west overlain as it dips eastwards by boulder clays which cover most of the centre of the county and are in turn overlain in the north-east by now decalcified upper Devensian loess (Catt 1978, fig.1) fluvial sand deposited on the chalk of south-west Norfolk and west Suffolk forms the distinctive micro-region of the Breckland (Sim 1978, fig.1). The edges
of this relatively solid mass have been subject to considerable post-glacial fluctuations in sea-level, so that large areas available for settlement in parts of the neolithic and bronze age are no longer so. Submerged land surfaces are visible off the north and east coasts and the flooding of the region's main estuaries has led to the formation in them of two large areas of alluvium, Broadland in the east and the Fens in the west. The complexities of estuarine submergence are best documented in the Fens, thanks to a lifetime of work by Godwin, recently summarised (1976), and to the application of radiocarbon dating.

Outside these areas of submergence patchy evidence suggests that deciduous forest, broken only by temporary clearances, obtained over the rest of the county until the late third millennium, when open conditions began to be established in the Breckland and some other areas of light soil.

Two main communication systems are imposed by the main north-south watershed which lies just to the east of the west Norfolk chalk ridge. One is formed of rivers flowing east from the watershed to converge in the present area of Norwich and eventually flow into the North Sea, facilitating communications over east and mid-Norfolk and north-east Suffolk as well as with the rest of the east coast of Britain and the other side of the North Sea. The other is formed of rivers flowing west from the watershed into the estuary now occupied by the Fens and eventually into the Wash, combined with the chalk ridge itself, which forms part of the Icknield Way, this links western East Anglia with the Thames valley and Wessex on the one hand and north-east Britain, including Yorkshire and Lincolnshire, on the other.

A major problem of local archaeology is that most of the region is highly fertile and has been farmed solidly for at least the last two thousand years, so that standing field monuments are rare and occupation sites are often heavily ploughed. In addition, bone is seldom preserved because soils are predominantly acid. In these circumstances, lithic material, with its unique survival value, is an important aid to filling out and interpreting the local record.

Flint is accessible in situ in limited areas of the chalk and present almost everywhere in superficial deposits. Other lithic raw materials are scarce. Even in the boulder clays, non-flint erratics occur in quantity only in the North Sea Drift of north-east Norfolk.

Neolithic settlement, represented by sites with, and finds of, neolithic bowl, Peterborough, and grooved ware pottery, is absent from the mid-Norfolk boulder clays, and is concentrated on the lighter soils of the north-west Norfolk gravel, the west Norfolk chalk and greensand, the gravels of the river valleys dissecting the heavier central area, and to a lesser extent the Breckland and the south-west Norfolk fen edge. This pattern, which seems to have obtained for some fifteen thousand years, does not entirely correspond with the distribution of many classes of flint artefact. Most show increased densities in the main areas of settlement, but these are overwhelmed by a massive concentration in the Breckland and the fen edge south of the river Wissey, extending from south-west Norfolk through west Suffolk towards Cambridge (e.g. Clark 1929; Cummins 1979, fig.1; Green 1980, fig.52). In all cases this concentration is one of the densest in Britain and is out of all proportion to neolithic settlement evidence from the immediate area. This discrepancy vanishes, however, when one examines sites with, and finds of, beaker pottery, which occur in large numbers on the fen edge south of the Wissey, where they have their maximum regional concentration, and to a lesser extent in the Breckland. A chronological, if not a more complex, relationship seems probable between occupation sites and surface finds, in the sense that both may reflect intensified use of the area in the second millennium bc.

When some of the different artefact classes concentrated in the area are examined separately their Norfolk distributions show divergent characteristics:

Flint and stone axes. Stone axes alone have a Breckland and fen edge concentration, but, when flint axes are also taken into consideration, the total distribution is much more even, though the maximum concentration is not eclipsed (Healy 1980, 126). The main reason for this is that stone axes form a much higher proportion of the sum of axes from west Norfolk than of the sum of axes from east Norfolk. The rocks from which stone implements are made also vary between west and east. West Norfolk stone implements are mainly of grouped rocks, from almost all sources; while east Norfolk stone implements are more often of ungrouped rocks. Implements of group XVIII (Whin Sill dolerite) are alone in having a relatively diffuse distribution, comparable to that of ungrouped implements (Gough and Green 1972, figs. 5, 8), both being present in west Norfolk but also scattered over the rest of the county, especially the north-east. Group XVIII implements and the majority of the ungrouped implements from north-east Norfolk are made of rocks locally present in the North Sea Drift, in contrast to ungrouped
implements from west Norfolk, most of which are of probably Cornish greenstones. It seems, in short, that very few imported stone implements were introduced into the east Norfolk communication system of rivers draining into the North Sea, although quantities of imported implements entered the east Norfolk communication system of Wash rivers, and Icknield Way, a situation of which the Icknield Way itself may have been one of the main determinants. The distributional divergence is not repeated in other surviving aspects of material culture.

The frequency of flaked, as distinct from polished, flint axes is very uneven. The 10 km squares in which they exceed the mean for the county (approximately 3% of all axes) almost all coincide with industrial sites, even when axes from the industrial sites themselves are not taken into consideration. The larger the industrial site, the greater its impact on the composition of the axes from the surrounding area; the 37 ha of Grimes Graves correspond to high percentages of flaked flint axes in at least four surrounding 10 km squares; while the 0.2 ha of a site at Stanhoe correspond to high percentages in only two squares. The whole seems to reflect local, source-centred distribution, a hypothesis testable by flint analysis.

Industrial sites themselves are sited on the west Norfolk chalk ridge, where shafts and pits were sunk to the flint seams, and along mid-Norfolk rivers where seams were followed inwards from exposures in the valley sides. Grimes Graves were worked from the late third to the early second millennium BC (Bar Leigh et al. 1977) and a similar date for at least some of the other sites is suggested by the presence on them of later neolithic flint types and of flake axes of the same type as those made at Grimes Graves (e.g. Richardson 1920, figs. 57, 58).

Flint axes found together in hoards often show a strong internal similarity (Smith 1921), but bear no resemblance to known flint mine products. The Norfolk distribution of axe hoards is northerly and easterly, generally away from known industrial sites. Axes in these areas seem to be made on nodules from the boulder clays and may well be another aspect of the use in this area of local materials to compensate for a relative scarcity of imported stone implements. Discoidal knives are the only other attested flint mine product, made at Grimes Graves (Norman 1976, 104) and apparently at several other sites. The manufacture of both flake axes and discoidal knives requires large, sound flakes, such as were regularly produced on industrial sites, often by

Levallois technique, but were less often capable of production from the raw material available in superficial deposits.

Arrowheads. Leaf-shaped, petit tranchoir derived, and triangular arrowheads are found throughout the areas of settlement, with a maximum concentration in the Breckland and on the fen edge, like that of stone axes. The largest numbers occur in the fen edge parishes of Feltwell and Hockwold, the next largest in the Breckland parishes immediately to the east. Barbed-and-tanged arrowheads show the same concentrations but are also dispersed over the heavy soils of the boulder clays, as the other arrowhead types are not. Similar extensions of barbed-and-tanged arrowhead distribution are reported from the area of the Vale of the White Horse in Berkshire (Bradley and Ellison 1975, 191, fig. 5.1) and from Sussex (Burwen 1936, 18). In Norfolk, at least, the extended distribution is not matched by contemporary settlement evidence, though it suggests an expansion of activity into previously little-used areas, perhaps an effect of the rising population suggested by a national increase in settlement sites and pottery finds in the early second millennium BC.

Other types. Most other readily recognised tool types, including plano-convex knives, show the same pattern of maximum concentration on the fen edge and secondary concentration in the Breckland. The reverse is true of a few heavier types, which have their maximum concentration in the Breckland and their secondary concentration on the fen edge. These include flaked and polished discoidal knives, predictably, given their manufacture at Grimes Graves; laurel leaf; and heavy triangular points sometimes known as projectile heads. This is an aspect of the overall relative heaviness of Breckland surface collections, a consequence of the local abundance of hard and surface flint, often in large nodules or slabs. Flint available on the fen edge is by contrast rolled, often frost-fractured and generally small, while all lithic material would have had to be carried to some of the occupation sites on sand hills in the fen. It is not surprising that smaller, lighter tools dominate the fen edge surface collections.

What is surprising is that they seem to almost completely lack Grimes Graves products and to contain very little Breckland flint, when only three hours' walk (some 12 km) separates the two areas. This is likely to reflect a chronological rather than a social dichotomy: the fen edge occupation seems to have been at its densest from the middle of the second millennium BC to its end, largely post-dating the main
mainly of typologically late beaker (Bamford 1970), with some food vessel and collared urn, while the latest pottery assemblages are dominated by biconical urn forms like those from the post-mining occupation at Grimes Graves.

If surface finds from the fen edge do indeed derive from its second millennium occupation, it might be hoped that industries excavated from the occupation sites would bear some relation to the surface material, with the reservation that different factors must determine the loss of objects away from living sites and their abandonment on them. The retouched components of industries studied from six sites in Hookwood-cum-Wilton are very similar, with high proportions of scrapers and a great variety of scraper types, and low or non-existent proportions of notches and denticulates. Flint and stone axes, numerous on the surface, are rare and fragmentary in the industries, a reflection of the common sense consideration that a complete axe-head is much more likely to have been lost in use than abandoned as rubbish. Similarly, arrowheads of the types abundant on the surface are present on the sites, but in the same low proportions as in contemporary industries elsewhere, seldom exceeding 10% of the retouched pieces. Apparently related to these are pieces rarely found elsewhere in the form of occasionally broken, thin, flat bifaces made on flakes, which seem likely to be abandoned, unfinished arrowheads. It is possible, in other words, that the numerous arrowheads found on the surface were indeed made and used by the occupants of the sites, although their function ensured that they were lost in the surrounding area.

The whole group of Hookwood industries contrasts strongly with another group from Spong Hill, a site on a small area of gravel surrounded by mid-Norfolk boulder clay. Here, two industries associated with neolithic bowl pottery are distinguished from another two associated with later neolithic and early bronze age pottery by their d?bitage, their general workmanship, and the presence in the latter of chronologically distinctive types. At the same time, however, the composition of the retouched pieces from all four shows considerable similarity. They share a low proportion of scrapers, a high proportion of notches, and an excess of miscellaneous pieces with abrupt retouch over miscellaneous pieces with flat retouch. These common features are very different from those of the fen edge industries. The contrasting locations of the two groups suggest that the basis of their compositional differences is likely to be at least partly functional. Since the industries of each probably span several centuries, there is a strong suggestion of functional continuity in the reoccupation of particular sites and areas.

References


THE SECOND INTERNATIONAL WORK SEMINAR IN LITHIC TECHNOLOGY:
LEJRE, DENMARK

by Caroline Wickham-Jones

From the 1st – 9th August 1981 the Second International Work Seminar in Lithic Technology took place at the Historical and Archaeological Research Centre at Lejre in Denmark. Participants were invited from all over northern Europe. Not all present were skilled knappers but everyone had a particular practical interest in the field of lithic technology and there were also several observers from the Archaeological Institute in Copenhagen.

The particular problem studied was that of the manufacture of the thin-butteted Danish Square Axes of flint. These axes appear to have been flaked in stages. The quarrying of raw material and large scale production of basic rough-outs, that is stages 1 and 2, were usually undertaken together while the final flaking, stages 3 and 4, and then grinding, stage 5, seem to have been done on a smaller scale at separate sites as axes were prepared for particular tasks.

The first day was spent collecting flint and enjoying unstructured knapping exercises on the beach at Stevns Klint where there are high chalk cliffs rich with seams of beautiful flint. After this the structured experiment started, this was organised around the production stages with particular emphasis placed upon an examination of the resultant waste. At Lejre, in addition to the obvious interest and value of the research activities great care is taken to record and process the actual sites where they took place (eg Madsen 1981, 16-20). The site prepared for the seminar had been deturfed and divided into several areas by low turf walls. Each area was designated for different activities, some of which, by resident knappers for example, are of a much longer duration than the week long seminar. Those set aside for the experimental square axe work were gridded at 0.5 m intervals to facilitate the recording and mapping of flakes as they fell. Previous experimental work by Anders Fischer (1979, 16-21 & 41-2) has demonstrated that this size of grid provides an optimal recording level for flake scatters both ancient and modern.

Flaking was carried out in the different stages by separate knappers using different techniques. At the end of each exercise the experimental piece and all debris was collected. Work upon subsequent stages used pieces prepared before the start of the seminar so that a complete reference collection of the various stages was built up. As well as close recording of the techniques – percussors, positions etc. – the distribution of waste after each exercise was mapped and the differences produced by different production strategies noted. The flakes themselves were examined both for differences characteristic of the various techniques and stages and for their suitability to provide the raw material for other items of the contemporary tool kit. An initial analysis of the day's results was discussed and taped each evening.

After flaking some work was undertaken upon the grinding of the axes. This was carried out with good results upon sandstone slabs using water as a lubricant, adding no additional sand. Some ground axes were then hafted into replica hafts copying for example the one from Stevns, Sigrelev Bog and these were used quite successfully in a variety of ways upon different hardnesses and thicknesses of wood. Among those present were several, including Errett Callahan, Hans de Hass, Peter Yang Petersen and Peter Venning Hansen, with great experience in using stone tools upon wood. This exercise with use was less structured than the main experiment as the axes selected were not complete replicas so that it had to be regarded as an experience rather than an experiment. True functional experiments would involve longer periods of time, but could form the basis of an entirely separate seminar in the future. To follow up the functional work at Lejre, however, a use wear examination is to be made by Debbie Clausen at Lund in Sweden.

In the past, experiment has largely been used to aid technological and functional interpretation but it may also be used to assist more basic