'TEXTILES AND TEXTILE PRODUCTION IN DARK AGE BRITAIN'

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TEXTILES AND TEXTILE PRODUCTION IN DARK AGE BRITAIN

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The aim of this thesis is to bring together all the information relating to textiles and textiles production in Dark Age Britain. Accumulating and ordering the material has permitted generalizations to be made about certain aspects and, in order to put it into perspective, the British Dark Age material has been compared and contrasted with evidence from other periods and/or areas.

In contrast to the Roman period before, and the medieval after, for the Dark Ages almost total reliance has had to be placed on archaeologically derived information. In this respect the work is analagous to that done on prehistoric textiles and textile production in Britain by the writer (Hedges 1973 ; M.A. Sheffield). Comparison with the protohistoric and historic periods shows the partial nature of the evidence preserved and the level of reliance that can be attributed to generalizations base on such a sample.

It is nevertheless true that the information derived archaeologically throws light on almost every aspect of textiles and their production during the period. It is particularly significant that more than half the factual material presented is new, being the unpublished work of Miss Elisabeth Crowfoot and the writer. The layout of the thesis follows the order of production - that is, from the fibres and their processing, through the spinning and the yarns produced, to the looms and the textiles found. Such an approach necessitates an interleaving of information derived from the textiles and equipment preserved together with parallels, ancient and modern. It has been preferred, however, since all the information is immediately placed in a context within which it can be understood and which relates it to the total process. For this reason the 'conclusion' is of a more general than particular nature.

INTRODUCTORY NOTE AND ACKNOWLEDGEMENTS.

The subject of this thesis was a natural choice following the writer's M.A. dissertation on prehistoric textiles and textile production in Britain (1973 : Sheffield University) and Wild's post-doctoral publication for the Roman period (1970). Work was commenced in 1972 with a Research Studentship from Southampton University. This terminated after two years and work thereafter was continued under, at first, severe financial hardship, and, latterly, great competition from other responsibilities and interests in an area remote and devoid of library facilities. It has to be admitted that this thesis, as it stands, represents more a determination not to give up than a continued interest in the subject matter over a seven year period. Such circumstances have naturally had an effect on the quality of the product and it is in recognition of this that it is presented for an M. Phil. rather than a Ph.D..

My Supervisor, Professor Colin Renfrew has been of great and continual assistance to me throughout my archaeological career and the work involved in this thesis from research to production has been no exception. He has always been willing to give good advice when he has been asked and has otherwise left me to my own devices; I am grateful to him for this and have only myself to blame for anything lacking in this work.

Acknowledgements for pre-publication information are given in the text and appendices where appropriate; most people approached were helpful and my appreciation of their assistance has doubled since similar demands have shown me how much work it involves. An acknowledgement seems insufficient when it comes to Elisabeth Crowfoot. Without Grace Crowfoot and her daughter Elisabeth the study of early textiles in Britain would hardly exist. It is a great pity that most of Elisabeth Crowfoot's work has remained unpublished and it is certainly no fault of her own. Her readiness to supply copies of her analyses and to permit me to incorporate them into this thesis is kindness of a great order and I hope that her reports will be published in the not too distant future and that she will find time to write down some of her knowledge about textiles for the benefit of the academic world.

It remains to express my gratitude to the University of Southampton for a two year Studentship and to thank my parents for both financial help and general encouragement. Inevitably there are a larger number of people to whom I am indebted in connection with this thesis than I could possibly mention by name ; this does not however reduce my indebtedness to them, nor does it mean that I have forgotten their help.

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July 1979.

CHAPTER ONE

THE EVIDENCE AND ITS PRESERVATION

The Textiles

Textiles, being usually organic in composition, are very vulnerable to biodegradation. It is only under unusual circumstances therefore, where the processes of decay are thwarted, that they will survive. A full understanding of the reasons why survival is the case depends on a knowledge of the fairly complex mechanisms and natural agents of the normal process of organic decay but this has been dealt with at length elsewhere (Hedges 1973, 14-17) and it is only intended here to list the circumstances in which textiles are found, giving pertinent examples.

1. Slightly acidic, permanently waterlogged conditions

Only fibres of animal origin will survive for any length of time under acidic, permanently waterlogged conditions. Such conditions are most commonly met with in peat bogs and deep archaeological deposits with a high organic content but the less mundane third circumstance of log coffin burials should be included for fullness.

Bog finds are perhaps the most vexing of all. Some were probably just lost garments, and others may have wrapped items which were hidden, but most are what remain of graves which, to say the least, tend to be peculiar; such finds are usually beautifully preserved but are too often completely undatable. Although the Danish finds are most famous (Broholm 1940, Hald 1950, Glob 1971) clothing has been found in bogs all over north-

Fig. 1.1 Anglo-Danish textiles preserved under acidic waterlogged conditions from Lloyd's Bank, York (Hedges forth. (A)).

west Europe, including in the British Isles. Instances from Ireland are to be found discussed e.g. by McClintock (1950, 63-7) and Coffey (1907 119-24) while the majority of the Scottish finds have been published by Henshall (1952; 1969). It is sufficient to say that, regrettably, none of these fall within the timespan under consideration with any certainty. Henshall has attempted to assign two very important Orcadian finds to the Viking period - textiles from Greenigoe, Orphir, and a hood from St. Andrews - but not very convincingly (1952, 9-14,17).

Textiles from deep archaeological deposits are some of the fruits of excavations in towns, something which has only really developed on a large scale in the last ten years with the growth of units. It is certain that within a comparatively short space of time textiles will be recovered on a scale formerly unthought of. Already there are large mediaeval collections from e.g. Barnard's Castle, London (E. Crowfoot, Pers. Comm.), Southampton (Crowfoot 1975; Hedges forth (H) and Exeter Hedges forth (F)). More important in the present context, though fewer in number, are the Anglo-Danish textiles recovered from Lloyd's Bank and Coppergate, York (Hedges forth (A)) (fig. 1.1); the late Saxon ones from Westgate, Gloucester (Hedges forth (J)) (fig. 1.2) and those from Viking and early mediaeval Dublin (O Riordain 1971). Lagore Crannog, Co. Meath provides an unusual instance of a rural setting where similar conditions of preservation prevailed and where the majority of Irish Dark Age textiles were recovered (Start 1950).

Log coffin burials would not concern us here, being generally attributable to the Early Bronze Age (Hedges 1973, 5) were it not for the fact that one found near Lancaster (Edwards 1973, 298-301), which contained a large piece of cloth, received a C14 date of 1340 $\pm$ 110 BP (White A Pers. Comm.). The wood which was sampled had suffered badly from root penetration, and the generally inept way in which the find was treated throws considerable doubt on this date.

2. Slightly alkaline, permanently waterlogged conditions

While animal fibres are preferentially preserved under acid conditions it is vegetable ones that survive under alkaline. The most prominent example of this is the vast collection from the Swiss Neolithic Lake Villages where calcium carbonate deposits had kept the pH high (Vogt 1937); such conditions are not really to be found in Britain except perhaps in a very localised situation.

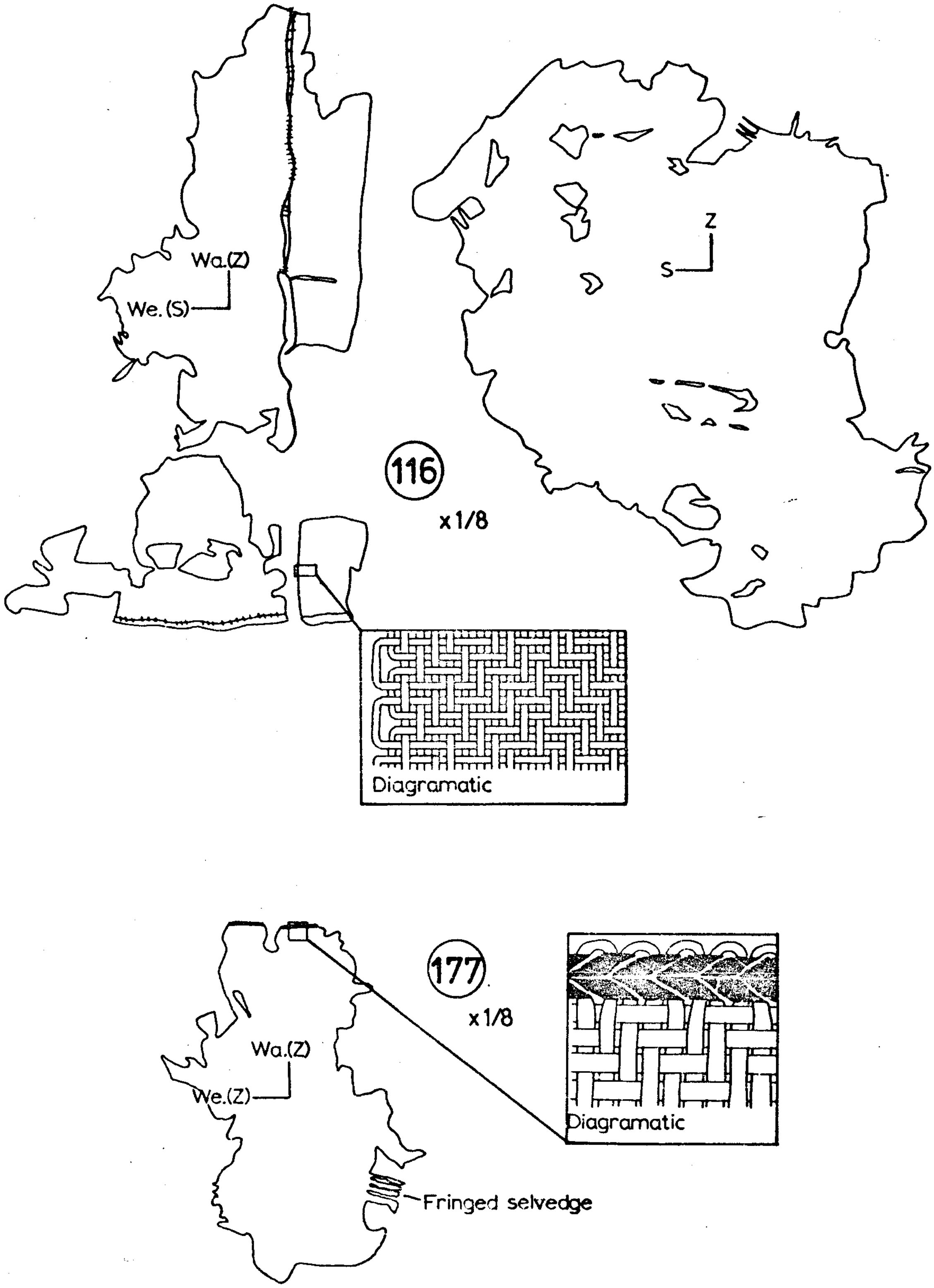


Fig. 1.2 Late Saxon textiles preserved under acid waterlogged conditions from Gloucester (Hedges forth. (J)).

3. Preservation in the immediate vicinity of metals and their corrosion products

Copper, its alloys, and iron are often responsible for the preservation of textiles they are in contact with. The most likely circumstance in which this would occur would be where bodies had been interred with grave goods, a thing which not all cultures do. Saxon graves prior to the Christian injunction against grave goods are, of course, the most rich source of textiles preserved in this manner: Viking graves might be equally as productive were they easier to find.

Copper tends to be more gentle in its effect; sometimes the textile is completely replaced but often it is still flexible, the fibres being extant and traces of dyeing may show through a green tinge. Textiles in contact with iron are usually replaced and give limited information, all colour and fibres having gone, being less clear and often warped, and only one side generally being visible.

Although it is not of importance here, other metals, particularly lead and tin, will preserve textiles as is evidenced, for example, by certain Roman Burials (Wild 1970, 43, 91).

4. Replacements of textiles by mineral salts

'Dirt' replacements are similar to those caused by corrosion products except that they appear to be made by the deposition of insoluble salts. They have similar disadvantages to metallic replacements as a way of preservation except that they are not usually attached to anything. Although not common, they occur in all periods and several were apparently found with the Sutton Hoo Ship burial (Crowfoot, E. Pers. Comm).

5. Desiccation

Although textiles, like other organic materials, will remain perfectly preserved under arid conditions, this is not a situation generally found in the British Isles. (The St. Cuthbert's textiles may however be examples).

6. Refrigeration

While inapplicable to the area under consideration, permafrost has been known to deep-freeze textiles for centuries in rather unusual circumstances e.g. in Siberia (Rudenko 1951).

7. Conditions of extreme salinity

There are continental examples of clothing having been pickled in salt mines (Vogt 1947) but none in this country.

8. Impressions of textiles

Impressions of textiles on pottery and less hardy materials are fairly commonplace in prehistoric and Roman contexts (Hedges 1973, 11-12) but not later. An impression, presumably in soil, is reported from the Sutton Hoo Ship burial and two on pottery from a Pagan Saxon habitation at Buckden, Kent (Crowfoot, E. Pers. Comm). Ironically an example found at Hamwih, Southampton was on a piece of imported pottery (Hedges forth (B)).

While the Dark Age material does not include impressions as would be generally thought of there is a rather peculiar product which fits in this category. Tablet woven braids of Early and Late Saxon date which are brocaded with gold are known; much more numerous however are instances of graves of the earlier period in which gold strips have been found bearing pressure marks whereby the original braid can be reconstructed (Crowfoot 1967).

9. Carbonization

In rare instances textiles have been charred but not burnt by being heated in the absence of oxygen. The preservation of the earliest textiles known in the world, those from Catal Hüyük, Anatolia can be attributed to this (Burnham 1965, 169) and so probably can the presence of pieces of cloth in Bronze Age cremations in this country (Hedges 1973, 13).

It will have been gathered from the preceding paragraphs that while the different conditions under which textiles may be preserved are few, the circumstances in which the Dark Age sample being studied have been found are fewer still. With one or two exceptions they have survived either through being near metal or through being in acid waterlogged conditions and this is a reflection of the unrepresentativeness of the sample in hand because Pagan Saxon graves are the only ones that are plentiful and contain grave goods, and late Saxon and early mediaeval layers are those most likely to be encountered on town sites, where the textile bearing deposits are, because of the distribution of such settlements and the dates of their expansion. Thus while, as with most aspects of archaeology, little can be said of the area outside the Saxon occupation because of the comparative lack of attention it has received, with textiles it is also the case that suitable conditions of preservation are less likely to be found. In round numbers there are some six hundred and fifty early Saxon textiles, but only sixteen Middle and Late Saxon, forty-one Anglo-Danish, thirty-six Viking and thirty-four for the rest of the British Isles in the whole of the period.

The Equipment

The artefacts connected with textile production which are available for study are influenced by the following factors:

1. Those which were actually used

This is a truism in one sense but, in another, we can never be absolutely sure that the lack of an item can be attributed to it not having been used or whether, for one reason or another, it just hasn't been found in that particular context.

2. Those items which are recognised as forming part of the assemblage

Textile equipment is not always obvious and there must be few excavators who would recognise something new if they saw it. Recent excavations of Dark Age layers in town centres, for instance, have resulted in a lot of worked wood being recovered, some of which must have had something to do with large textile implements such as looms and warping boards which would have been made of this material. The reverse is also true, that artefacts or features which are not connected with textile production may have been labelled as such. There is for instance, an Early Saxon 'weaving hut' reported at Lower Warbank, Kent which had in it twenty-nine stake holes, (which the excavator connects, mysteriously with a loom), one lead loom weight, two everyday bone pins, two needles and part of a hair comb (Philp 1973, 156-8); another 'weaving hut' at Harston, Leicestershire, contained a spindle whorl, loom weight and hair comb (Dunning 1952,53). This obsessive connection of combs with textiles probably originates in the 'weaving combs' of early Iron Age date which are unlikely to have had any such function (Hodder and Hedges 1977, 17, 19).

3. The components of the implements and the conditions of preservation

Implements connected with textile production would most commonly be made of wood and this, of course, is one material which does not preserve well except under waterlogged conditions; such conditions only really obtain in the deep urban deposits caused by continuous occupation, in wells, and in bogs, where things would tend to be stray finds.

The next most common material would be bone although, apart from whalebone, it would only be suitable for smaller things like spindle whorls and pin beaters. Bone tends to survive well but in upland and marginal areas of the British Isles where acid soils predominate complete assemblages are rarely to be found.

Other materials known to have been used are metal (particularly iron where great strength is needed as in wool combs), baked and unbaked clay, and stone (spindle whorls and loom weights principally). Of these only baked clay survives almost anything fairly well although both unbaked clay and metal tend to be found in a recognisable state on well drained sites.

It will be seen from the above comments that due to the vagaries of preservation the sample of textile implements we will have will tend to be a peculiar one. Except under extraordinary circumstances, all we are going to have is some of the things not made of wood i.e. a proportion of the smaller implements and the durable parts of larger ones. While we know Early Saxons in the south-east and the Vikings used iron sword beaters there may not have been an innovation but just an aberrant fashion; wood is far more suitable and sword beaters made of it may have been as common as looms. Similarly, the bone distaffs found in Early Christian contexts in Ireland may just be peculiar; a much more reasonably sized implement could be made of wood. The only loom we have any positive evidence for by way of parts is the warp-weighted. This may be because other ones are made exclusively of wood and it is unique in having the clay or stone weights which are so commonly found.

4. Inequalities in archaeological investigation over Britain and the varying productivity of different types of site

By and large, sites in the north and west of the British Isles are less productive in artefactual terms than those in the south and east. This, coupled with the fact that probably more than 90% of excavation done in Britain occurs in England, means that the sample is very heavily biassed. The dense distribution of certain implement types in Saxon England, for instance, may have no further significance than reflecting this state of affairs.

5. Evidence derived from textiles

Certain implements leave their characteristic impress on parts of their product. Hence, a starting border evidences the warp-weighted loom; a seamless garment, the tubular; a multi-shed fabric, the horizontal; and twists, the tablet. This sort of evidence only occurs as a matter of pure chance, on statistical grounds probably only one fragment in hundreds of a web woven on the warp-weighted loom would retain a piece of starting border. It is only possible to use rare occurrences in a positive sense and it is not feasible to say, in general terms, that something wasn't used because the evidence is lacking. Occasionally textiles can tell us something more definite about the implement, such as the warp capacity of a loom, or its breadth, but, because of factors of preservation this sort of information tends to be scattered and thin.

To summarize, our information about the textile equipment used is every bit as biassed as it is for the textiles themselves. In no way is it a representative sample and the discussion is tempered by this and must be viewed with it in mind.

Literary and Pictorial Evidence

The Dark Ages first acquired that name because during that time classical civilisation was extinguished and, prior to the rise of archaeology, very little was known about them compared to the Roman period before and the Middle Ages after. It would be completely erroneous to say there are no written documents or illustrations but true to say that they are singularly unhelpful when it comes to elucidating everyday life. Apart from what can be gleaned from chance information included, as far as textile production goes, we may as well be in prehistory. The difference can be seen by comparing the abundance of contemporary commentators and illustrations called on by Wild in his book on Roman textiles (1970), with the almost total lack in this study.

CHAPTER TWO

FIBRES

Fibres available and those identified

Fibres to be used in textile production must be flexible, fine, have a high ratio of length to thickness; they must be available and be easy to process. Possible sources occur in animal, vegetable and mineral origins and they may be used as they naturally present themselves after processing or may take the form of synthetics; the latter are however recent innovations and need not concern us here.

Fibres of animal origin include filaments, that is continuous lengths extruded by creatures like the silkworm, as well as hair and wool; tendons and sinews may be marginally included. The most common source of vegetable fibres is the bast, or phloem, of plants; flax and nettle come most readily to mind but coarser fibres such as those from hop-bines and elder bark would be subsumed in this classification. Fibres may also come from plant seeds, as cotton does, from the leaf e.g. sisal, and from the fruit, e.g. coir. Whole plants such as rushes may also be involved in coarse work like matting. Mineral fibres are unusual but do occur and have been used. Some, like asbestos, are already fibrous; the more general case is of a malleable substance, such as gold, being made into fibres.

The list of fibres that could be used in textile production is of purely theoretical interest but it must be stated that while in Dark Age Britain imports such as sisal and coir would not be available it is likely that a greater range of sources were taken advantage of than would be commonly thought of today. There are fibre sources such as hop bines and nettles in the vegetable kingdom and goat and horse hair in the animal which may have been ousted because they are not suitable for industrial production and because alternatives with preferable qualities are readily available.

Written records are as scant on this subject as any other and, because of the similarity in the requirements for processing like natural fibres, archaeological finds of implements and structures are of limited use. The only way to really investigate the types of fibre used, rather than just to assume sheep's wool and flax to have been employed exclusively, is microscopic examination of preserved textiles. This is more disappointing than it sounds however for most of the textiles we have are either completely replaced by metallic oxides or mineral salts or are so infused with them that the fibre characteristics will have been destroyed. Specialist work done on this has been fairly piecemeal and of variable quality and fresh approach which was total would be desirable. The author has confined his microscope analysis to the textiles actually examined by him, for two reasons. In the first instances, although guide texts are available (e.g. Appleyard 1960; Textile Institute 1965) a complete survey, to be worthwhile, would have to be done by a specialist with a very great knowledge, especially if anomalies are to be looked for rather than a confirmation of that already known. Secondly, to track down and sample all the textiles reported on, the other aspects of which have already been studied, was a labour which the potential results did not seem to justify.

It is intended to discuss here fibres that are known through literary sources to have been commonly used in the past and those which have been identified by the limited work undertaken. Appended to this is an account of the basic processing of wool, flax and silk, together with the pertinent archaeological evidence, which may be generalized with regard to similar fibres.

1. Animal Fibres

Sheep's wool

In Britain at present over thirty breeds of sheep are recognised (Ryder and Stephenson 1968, 33). These are all adaptations suited to variations in climate, soil, elevation and herbage and have been selectively bred with one or more of man's requirements in mind, whether it be wool, meat, manure or milk. In certain parts of the world wild sheep still exist (Ryder 1968, 10) and these can provide us with an idea of what sheep were like before domestication and selective breeding began. M.L. Ryder has tried to trace this process with the aid of evidence from fleeces, raw and worked wool, leather, parchment, bones, pictures and written accounts (1969, 495-521), and it is worth summarizing his findings because of the relationship of certain facets with textile production.

Wild sheep are small, with short tails and have a pigmented double coat consisting of an inner layer of wool and an outer one of coarse hair ('hairy' fleece). Subsequent selection has resulted in larger sheep with unpigmented fleeces which are not cast annually and from which hairs are generally absent. The Soay, found on St. Kilda, are a feral breed which have so many features in common with wild sheep that they must have been derived from the earliest domesticates to enter Britain with Neolithic Man. They differ however in that some of their fleeces contain fewer hairs ('hairy medium' wool) while others contain none ('generalized medium' wool) and these fleece types are seen as the important link between that of the wild sheep and those of present day breeds.

The characteristics which have been selected are obviously of importance to textile production - hairs make wool harsh to handle and will not dye, while a white fleece gives a purer and more homogenous colour; a larger animal in turn means a greater wool yield, and shearing sheep rather than plucking them is less wasteful. Further refinements in breeding have resulted in sheep suited to certain ecological niches which produce wool for different purposes - that from hill-breeds ('hairy medium') is nowadays used for mattress filling, carpets, and tweeds while short and long-wools are used for woollens and worsteds respectively. Another fleece type, not popular in this country now, is the finewool produced by e.g. the Merino which came into being as a breed in Spain.

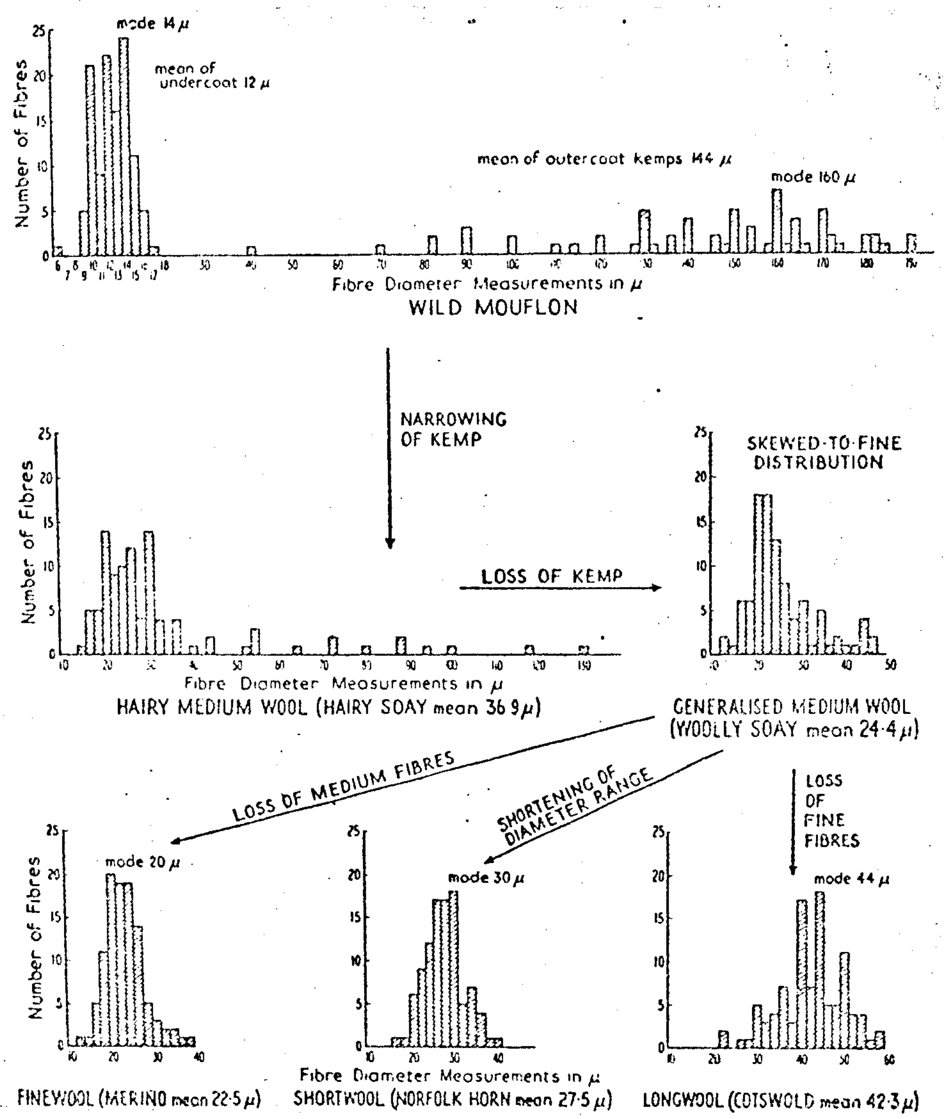


Fig. 2.1 The six main types of fleece to be found at various stages of coat evolution according to Ryder (after Ryder 1969 fig 2).

Each of these fleece types can be identified from wool samples by the shape of the histogram produced by plotting the diameters of a sample of a hundred fibres (fig. 2.1). There are many criticisms that can be levelled against this procedure - the categories are not clearly distinguishable, the sample is a small one, the quality of wool varies over a single animal and between those of the same breed - but it does offer the possibility of being able to follow changes of fleece types in the past. However crudely, accordingly the results of over two hundred and fifty analyses have been synthesised, and are presented in fig. 2.2 by period and area.

Few prehistoric samples have been analysed but it seems likely that sheep with hairy-medium and generalised-medium fleeces were the rule - primitive domesticates similar to the Soay. In two instances however samples on analysis have turned out to be fine wool but the most likely explanation of this lies in the fact that moulting sheep shed their fine undercoat first.

Unfortunately all the prehistoric samples are Bronze Age, as few Iron Age textiles are known. In the Roman period the whole range of fleece types is represented and it is clear that not only has new stock been imported but that interbreeding is taking place with the old. As far as can be told Britain was slightly behind the Continent.

In the migration period there are indications of a change of fortunes. In Britain finewools predominate together with fleeces midway between these and the more primitive types. On the Continent not only do the more primitive fleeces come to predominate but the intermediate ones disappear. In later periods in Britain this also happens and in Viking times hairy fleeces occur which continue into the medieval era. This occurrence surely indicates the introduction of a third type of stock and it is interesting that Ryder posited on other grounds that a black-faced horned type with hairy fleece must have been added to the descendants of the original Soay sheep and brought in during or before the Roman period in order to account for some present day breeds (1969, 512).

Other animal fibres from coats

Excluding those that are too small and those whose coat is scant, almost any animal could provide fibres which could conceivably be used in textile production of some sort. At a more realistic level those which may have been used in this way would have been those commonly available; domestic animals such as goats, dogs, cattle and horses. It is obvious from present day circumstances that none of these have been

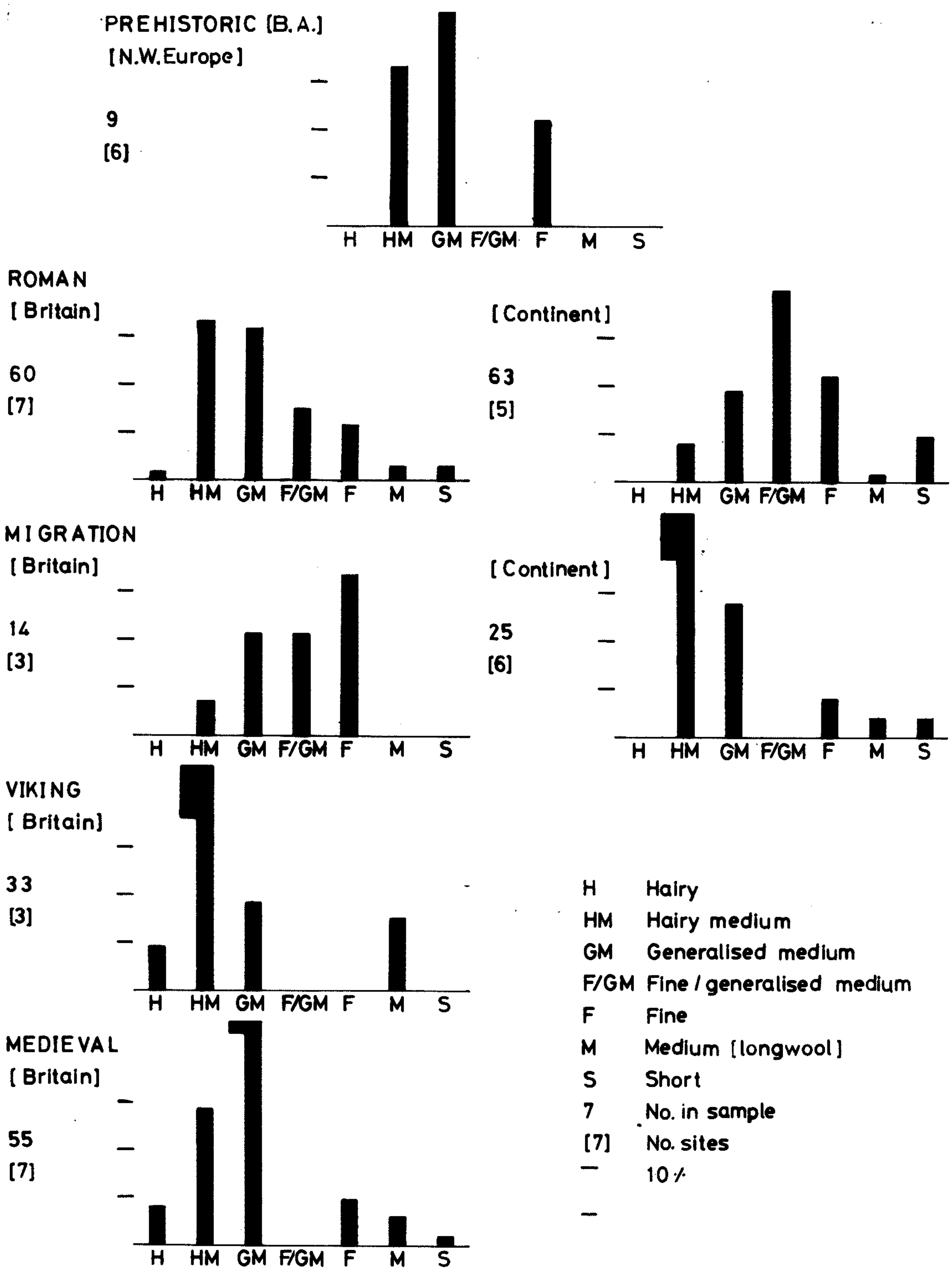


Fig. 2.2 Histograms of fleece types by period and area based on available archaeological data (appendix I).

selectively bred for fine fibres, as sheep have, (although the existence of the Tibetan and Angora goat which produce cashmere and mohair respectively show this could have been done), this does not negate their use as sources of coarse fibres. It is known from Roman records that goat hair was made into ropes, tents, sails, sacking and inferior clothes (Wild 1970, 20) while Alcuin in the eighth century sent to a friend on the Continent for garments and hoods of this material (Wilson 1971, 92); there is no reason why other fibres, such as those from animals mentioned, could not be similarly employed. The late Bronze Age girdle from Armoy, Ireland, made exclusively of unspun horse tail hairs indicates that coarse usages may not be the only ones involved (Henshall 1950, 138 : Coffey 1907, 119 : Hedges 1973, Pl 13). So far the recognition of hair in textiles is as limited as one would expect from the number of samples analysed. From both Late Saxon Gloucester and Early Christian Lagore Crannog (Hedges forth ; Start 1950, 124) there are textiles with hair in the yarn; this may be a deliberate adulteration of wool or may be the double coat of an animal like the goat. One of the textiles from Lagore is a tablet braid and here, as with the Armoy textile mentioned above, the choice of fibre may have been for effect.

Silk

Silk is the generic term for all filaments spun by insects, particularly the larvae of moths, to form a cocoon in which the grub exists until it metamorphoses into an insect. The term, more specifically, is applied to members of the Bombicidae, one of which, Bombyx mori L is the mulberry silk worm which was originally native to the Himalayas and China; others are the so called 'wild' silk moths which inhabit Asia for the main part but two members of which Pachypasa otus Drury and Saturnia pyri are to be found in the central and eastern Mediterranean (Wild 1970, 11). Wild and cultivated silk can be fairly easily distinguished microscopically. While both are extruded as twill filaments (which may divide in processing) the former is flat in section and striated while the latter is smooth and has a triangular section with very rounded apices. A further point of differentiation is that true silk is finer, having a diameter range of from about six microns to fifteen. (Textile Institute 1965, 14-15; Wild 1970, 11-12: Hedges 1976, 14-15).

Silk in the Roman empire was a costly luxury item which, disregarding for the moment wild sources, was imported through intermediaries from the Far East. Not surprisingly literary references are plentiful during this period and the impression they give is that silk was a novelty and that the Romans at first had no idea how it was made. It has been postulated that the Parthians' banners at Carrhae in 53 BC during the Syrian campaigns were the first silk seen by the Romans; certainly the earliest definite reference only dates to a few years after, when Caesar entered Rome in triumph with canopies of silk (Boulnois 1966, 7-8). In AD 14 the Senate limited the use of silk to women; 'In barely fifty years, the use of this new and exotic product had grown to such proportions that it could be considered a social menace' (Ibid, 10). It should be noted that this evidence does not absolutely preclude silk being known before the Syrian campaign but it was only with the destruction of this intervening barrier that trade could take place with what was hitherto an unknown world; the Orient.

The Chinese, in order to maintain their advantage in trade, kept the manner in which silk was produced a very closely guarded secret and the export of eggs or cocoons was a capital offence (Boulnois 1966, 22). For a century or more the Romans thought that silk grew on trees (Ibid 40; Wild 1970, 27) but this state of affairs could not have lasted for long because the cocoons of wild silk moths were being unravelled and spun, most notably on the island of Cos in the Aegean, as early as the first century AD (Boulnois 1966, 41-2). At about the same time raw silk and yarns began to be imported to be made up within the empire (Wild 1970, 13). The Romans therefore quickly ascertained the approximate origin of the fibres; knew how to process them, and had evolved the technology to make cloth. What they lacked was Bombyx mori, the only silk worm amenable to domestication and large scale rearing, and which produced an unbroken filament which didn't need to be spun. This the Chinese managed to keep from Europe until 513 or 514 AD (Wild 1970, 13) so that up to that time, wild silks being of minor importance, they were more or less the sole source of the raw material, if not the finished product.

The physical remains of silk belonging to the period so far discussed are rare (Wild 1970, 12-13) and have not, for the most part, been studied as fully as they might be. Finds of woollen cloths embroidered with silks from two Hallstatt contexts in Germany indicate that silk was known as early at the 6th Century BC although, in these instances at least, it was used in small quantities as decoration and was probably wild. Wild notes the existence of silk in a 2nd Century grave in Bulgaria and woollen cloth embroidered with Bombyx silk from an early 4th century grave at Budapest. Damasks of complex construction have also been recovered from late Roman contexts at Trier and Conthey in Wallis and, as they have spun warps, these must have been woven within the Empire. A Latin embroidered factory mark on one of the Trier fragments may even indicate the workshop to have been in Italy. Apart from a damask textile of third century date from Holborough in Kent which is conjectured on the weave to be silk, until recently the only evidence for silk in Roman Britain was the Latin loanword serica in Old Welsh. Recently a scrap of silk broadly datable to the 2nd to 5th centuries was recovered from a Roman sewer in York. Analysis showed the fibres to be from *Bombyx mori* while the construction indicates that they were spun and the cloth made up in Europe or the Near East. (Hedges 1976).

While the presence of *Bombyx mori* in Europe made sericulture possible, for many centuries raw silk was still mostly imported from China as it was cheaper to produce there (Boulnois 1966, 295) and it was not until the 12th and 13th centuries that the production of silk fibre spread through Italy which more or less monopolised the trade with north-western Europe, not only in its own products but also ones from the Middle East until the 15th century. Although it would have been feasible to practise sericulture in Britain - as it was in France from the end of the 15th century - and silk is known to have been woven here since about the same time (Warner n.d. 23, 35), there cannot be any doubt that finds of silk of Dark Age date in Britain were imported, be it as yarn or cloth, and that the fibres are most likely to have originated in the Far East and to have been worked up in the Near East.

The majority of finds of silk in Britain of Dark Age date have come from one context, the coffin of St. Cuthbert at Durham (early 10th century); here were preserved the only two extant pieces of Late Saxon embroidery - a stole and maniple - and ten braids in tablet woven silk brocaded with gold and silver gilt as well as the remains of at least nine imported silks (Brown 1913; Christie 1938; Crowfoot 1939; Battiscombe 1956). These are discussed in Chapter 7 under the headings of 'tablet weaving', 'decoration' and 'silks', and their existence is only noted here as indicating that in Late Saxon times textiles were imported which originally came from the Orient; braids, at least, were made up here with foreign yarns; and imported silk threads were used in embroidery. The only other evidence to be called on by way of actual textiles is two pieces from Anglo-Danish York (again 10th century) and one of like date from Lincoln, all of which are of fine plain woven silk which had been made up in the Near East. The Lincoln piece and one of the York ones are particularly interesting, being parts of identical head-dresses.

We can be fairly sure from literary sources however that the paucity and restrictedness of the archaeological evidence is not a true reflection of the popularity and use of silk. Aldhelm, in the course of disapproving of immodest tendencies in the dress of nuns, gives us a good picture of late 7th century aristocratic costume in which is included a head dress, sleeves with silk borders, and veils held in place by ribbons (vittae) (Wilson 1971, 93-4). Crowfoot and Hawkes have suggested that the Early Saxon gold braids (p245) are the remains of what are described as vittae and as on the Continent some of these are based on silk there is no reason why they shouldn't also have been here (1967, 61-4, 57). The use of silk for borders was common in parts of the Continent as well, for Einhard, in telling us how Charlemagne liked to dress in the national costume of the Franks, includes a woollen three-quarter length tunic trimmed with silk in his description (Wilson 1971, 93). It is clear that silk was one of those luxuries of the Dark Age world, dealt in by such as the merchant in Aelfric's Colloquy (Wilson 1971, 88) and indulged in by the aristocracy of north-west Europe, being used mostly in a sparing fashion for embroidery, trimmings and small textiles such as braids. Other things which the merchant mentions he imports are 'purple .... precious gems and gold, rare garments and spice, wine and oil, ivory and brass, copper and tin, sulphur and glass'.

2. Vegetable fibres

As has been mentioned, fibres may be obtained from the leaves of particular plants, from the seeds or fruits of others, and from the bast in the stems of still more. As circumstance would have it, all of the leaf sources are quite exotic and do not really need to enter into this discussion. This is also the case with seed and fruit fibres with the possible exception of cotton. It remains that most, if not all, of the vegetable fibres used in Dark Age Britain were probably bast ones.

Cotton

The cotton fibre is a seed hair formed by the elongation of a single epidermal cell in seeds of plants of the genus gossypium. These grow to their maximum length (2 - 2.5cm) and then thicken causing the boll to burst; the fibres subsequently dry, collapse, and twist taking their characteristic form of flattened tubes with about a hundred convolutions, both clockwise and anti-clockwise, per cm. (Textile Institute 1965, 15; Grant 1954, 449; Wild 1970, 18).

Two species were known in antiquity, Gossypium arboreum, tree cotton, which is native to India and the Sudan and which grows up to 2m high, and Gossypium herbaceum, which is more shrub-like and which is first heard of in the Nile Valley.

The Greeks first met with Indian cotton through the wars of Alexander the Great (4th century BC) (Patterson 1956, 199) and it was certainly in use in Egypt at that time (Zeuner 1954, 373). In the Roman period cotton was grown within the empire around the eastern Mediterranean and in the Near East, and goods were manufactured, particularly in Malta, on a large scale (Patterson 1956, 199); at the same time however there was a brisk import trade in Indian fabrics which were of a superior quality (Patterson 1956, 199).

In the 8th century the plant was introduced by the Moors into Spain where its manufacture became of importance and the industry (not the plant) spread subsequently to Italy and France (12th cent.), Flanders (13th), Germany (14th), and England (15th) (Patterson 1956, 199).

Wild's comment that 'Cotton, when and if it occurs in the northern provinces, must be classed as a rare luxury fabric,' can be extended to include the Dark Ages (1970, 19). Considering the known trade network, it is conceivable that examples will be found, although they haven't been yet. The only early instance is a piece of thread from a 4th century well in Somerset, although Wild cites two other nearer the Mediterranean (1970, 18).

Flax

Linum usitatissimum was among the earliest plants domesticated in the Near East and is found throughout Europe in the Neolithic (Renfrew 1973, 120). The seeds of the plant are a valuable source of oil but the fact that the potential of the fibres was realised just as soon is shown by the linen cloth found at Çatal Hüyük, Anatolia, datable to 6,000 BC (Ryder 1965, 175-6). While Neolithic cloth made from flax is known from other parts of Europe, most notably Switzerland (Vogt 1937), no textiles at all of this date have been found in Britain. The earliest reliable identifications at present are of the late Bronze Age; pieces of cloth which had secured the handle in the socket of a knife from Nydie Mains, Fife, and an axe head from Somerleyton, Suffolk (Hedges 1973, 67-69; 1972, 293-4).

Textiles published as 'linen' are abundant from Roman and Dark Age Britain but, even if the assertion is correct, this only really means, whatever the authors think, that they are made of bast fibres.

It should be noted that only two positive identifications have been made for Roman Britain (Wild 1970, 91, 94) and fifteen for the Early Saxon period. This is partly due to a lack of work done and also to the bad state of preservation general in archaeological samples. No doubt flax was the most commonly used source but one can't help but wonder at the same time if the high proportion of samples identified simply as 'vegetable' is because of condition, or whether it means it is not flax and the specialist has no alternatives in mind. In a well preserved or modern sample the individual fibre elements should be 12-25 microns in diameter and 2-4cm long. They are sharply polygonal in transverse section and have a lumen which tends to be small and punctiform although it may be larger, but still round. In longitudinal section the fibres can be seen to have heavy transverse dislocations along their length and faint 'Z' spiral striations (Metcalfe 1950, 272). In all but an excellent sample they are practically impossible to distinguish (with confidence) from hemp.

Hemp

Hemp (Cannabis sativa c) was first domesticated in western Asia (Godwin 1967, 42). Godwin, on etymological evidence, considers it to have spread through the Mediterranean area in early Classical times and to have reached north-west Europe by means of Teutonic migrants as early as the 6th to 3rd centuries BC (Ibid, 44), and indeed an author writing about AD 200 mentions it was grown in the Rhone Valley in the mid third century BC (Wild 1970, 16-17). In point of fact hemp seeds have been found in many contexts in Europe of Neolithic date although not in large numbers (Renfrew 1973, 163), and not in Britain. Extant identified examples of its use in textiles are four in number - two pieces of rope, one sewing thread and a piece of local-made cloth - all are Roman and came from Germany (Wild 1970, 17).

Godwin, on the basis of a pollen sample which was found from one source and extremely loosely dated, suggests that hemp appeared in Britain abruptly at the end of the Roman period. His dating cannot be taken seriously nor the sudden appearance of a crop in a pollen sequence be given anything but local meaning; nonetheless his results do indicate an earlier date for the cultivation of hemp in Britain than other types of available evidence. The earliest Godwin can muster is a 10th century legend of hemp fishing lines being sold in Lincoln, followed by place names from the late thirteenth century on (Ibid 44). In view of the lack of evidence there is no case for certainty, but it is very likely that hemp was grown and made into cloth in Britain. Under perfect conditions it should be distinguishable from flax by the comparatively variable width of the lumina and their tendency to be slightly flattened; the striations which go in a 'Z' direction on the cells of flax are in an 'S' direction in hemp, but these are difficult to see in even fresh samples.

Nettle

A third and very likely source of bast fibres is the common stinging nettle (Urtica dioeca L). Several members of the family Urticaceae will give fibres and are reported to have been found used for this purpose all over the world; one in particular, Ramie, is cultivated at the present day on an industrial scale in hot climates (Metcalfe 1950, 1253; Kirby 1963, 180; Hald 1942, 32; Clark 1952, 25). Stinging nettles occur naturally all over Europe and it is difficult to believe that they would not have been utilized; Hald has assembled a mass of data that points to the fact that what is presently regarded as a weed was once a valuable source of food, fodder, dyes and medicines as well as fibres, (1942).

Hald records the use of nettles for textiles at the beginning of the 19th century among several Russian people; in Finland before agriculture was known there; in Switzerland in 1796; in the Tyrol as late as 1917 and in Silesia up to the time of her writing (1942). Textiles of this material became very fashionable in north west Europe in the late eighteenth century where it was regarded as a luxury, and where it was of superior quality (Ibid 30); it was so sought after and its quality so desirable that it was exported by Holland and France and was also imitated (Ibid 30). The only reasons why it ever went out of use and has ceased to be thought of in this connection is because competitors, such as cotton, were introduced, and because it is unsuitable for intensive cultivation. As late as the last two wars attempts were being made to commercialize its production in western Europe (Ibid 36; Metcalfe 1950, 1253).

It is peculiar that no Classical writer mentions nettles in connection with cloth manufacture, but that may be because they just weren't used in that part of the world. That they were in north-western Europe in prehistory is clearly shown by an identified find of Late Bronze Age from Voldtofte, Denmark, (Køie 1943, 100) and another, of the same period, from Pyotdykes, Angus, Scotland (Hedges 1973, 39). An early

Bronze Age cord from a burial at Garton Slack, Yorkshire, may also be of nettle fibres, but could be of something similar (Ibid). There are no known Dark Age nettle textiles and the only vague evidence we have of their use is a bundle of stalks found in the Iron Age ship excavated at Kvalsund in Norway (Hald 1942, 41; 1950, 125). There seems little doubt however that our lack of evidence is directly related to the amount and type of specialist work done - in the thirteenth century a German, Albertus Magnus, discussed nettle fabrics as opposed to ones made of flax or hemp (Clark 1952, 23; Hald 1942, 33).

The fibres have several distinctive features which serve to distinguish them from flax and hemp. In cross section some are circular or polygonal but a large number of them are flattened and in this instance the lumen is broad and flat and the whole fibre ribbon-like. In whole mount the lumen can be seen to be broad, often half the width of the cell, and there are characteristic longitudinal parallel striations and some faint diagonal ones; they do not however have the transverse dislocations characteristic of flax or hemp. The diameters of one hundred fibres from the late Bronze Age textile from Pyotdykes, Angus, had a symmetrical distribution ranging from 5 to 27 microns with a mode of 16.

Other Bast Fibres

The three bast fibres discussed are the most obvious ones but others such as hop-bines and elder bark could have been used too. An account of all the sources actually taken advantage of will have to await competent analysis of preserved vegetable fibres.

3. Mineral Fibres

Asbestos

Asbestos can occur naturally as fibres up to 3cm in length and at least two Roman writers attest to its use for table napkins that could be burnt clean instead of washed. The only actual occurrence Wild cites, which may be textile or cushion stuffing, was with a late Roman burial in Cologne (1970, 21).

Metal

It would not be practicable to produce fibres of metal which would subsequently be spun into yarn. Malleable metals, particularly gold, can however be made into yarns either by being stretched or by being beaten, cut into thin strips, and wound round a core. The construction and use of these yarns is dealt with fully in a later section but, briefly, the material falls into two categories. In the first place there is cloth into which they are incorporated and this was a very great and popular luxury from the Roman period until medieval times; during the Dark Ages in Britain it has only been recovered from Saxon contexts, although from Early to Late. Secondly, there are instances where the yarn, or wire really, is used on its own in some technique such as trichinopoly or Osenstitch. It is difficult to know whether such things constitute textiles but they were worked in silver, being particularly found in contexts associated with Scandinavian incomers.

The Processing of Wool Prior to Spinning

It is possible to spin wool directly from the fleece but the result is dirty and irregular and it is usual to prepare the fibres before they are made up into yarn. Obvious contaminants can be removed manually at a very early stage and the wool is then generally washed; a process which requires little explanation. In order to produce a regular yarn the mass of wool fibres has to be made homogenous in some way and, traditionally, there are three simple methods of doing this - combing, carding and bowing.

Combing

Combing wool aligns the fibres and frees them from knots. Not only does this mean that a regular yarn can be produced from the fibres but their parallel slignment enhances its stability and smoothness; the product is what is known as a worsted yarn, as opposed to a woollen one. Worsted yarns are best produced from wools with a long staple, and historically such wools have been the material worked on with combs although in the absence of other means shorter staples may have been prepared for spinning by this method.

Wool combing was certainly practised in ancient Greece and Italy. Aristophanes referred to both carding and combing in his comedy *Lysistrata* while Romans had two kinds of cloth for their togas, the *toga trita* or *rosa* being a worsted type and the *toga denea* or *hirta* a woollen (Lemon 1972, 85). Wool combing is also shown in a wall painting at Pompeii, although indistinctly (Wild 1970, 25 fig. 2). Wool combs were probably first introduced to north-west Europe by the Romans: the so-called 'weaving combs' found in prehistoric contexts in Britain have been seen by some as wool combs (Fox 1881, 433; Coughtrey 1871, 141; Hartley 1957, 24) but they really are impracticable (Hodder 1977). With the Roman withdrawal from Britain their typical wool-combs ceased to be produced and the opinion has recently been expressed that the comb was only reintroduced in the thirteenth century, it being a necessary part of the equipment used by the immigrant Flemish craftsmen in their worsted process (Lemon 1972, 86). From this period on there are several very fine illustrations of combs being used by women (Roth 1909, figs. 4 and 5; James 1857, Pl.1., fig. 8; Lemon 1972, fig. 7.1). Wool combing by hand was one of the last basic processes in the production of textiles to be mechanized and by the time it was superceded in the mid-nineteenth century it had become an intricate process employing a large number of skilled men.

As a result of its resistance to mechanisation and its consequent survival through the first part of the nineteenth century we have a large number of written records of wool combing (Luccock 1805, 150-152; 1809, 150-152; Ure 1835, 145-147; James 1857, 249-250; Burnley 1889, 88-90; Roth 1909, 2-10; Lemon 1972, 86-90). These accounts differ slightly in detail and describe a state of the craft geared to fit industrialized cloth production but nonetheless they all include certain elements which are basic to the process.

The essential equipment consisted of a pair of combs (although often two pairs were used), a post with a 'pad' affixed to it, a 'comb-pot' and an object called a 'diz', as well as a supply of oil and, of course wool. The combs were of a fairly standard design, so much that in 1805 Luccock was able to say with a great degree of truth that "Even to this day the comb is almost in its simplest state, very few alterations have been made either in its structure or dimensions from the time when it was brought into Europe". Each comb (fig. 2,3) was shaped like a capital letter T and was made, for the most part, of wood; the handle was approximately 25cms long and the head about 20cms across and 10cms deep. The head had from three to eight rows of steel teeth affixed to it at an angle of about 60 degrees; these were often embedded in horn to add to their elasticity. The handle had two holes in it by which it could be attached to the 'pad' - one at the end and one some 15cms from it in the side - these often being reinforced with iron.

The 'pad' was some 35cms in length and of the form illustrated in fig. 2,3. This was screwed (by means of a tommy bar through the central

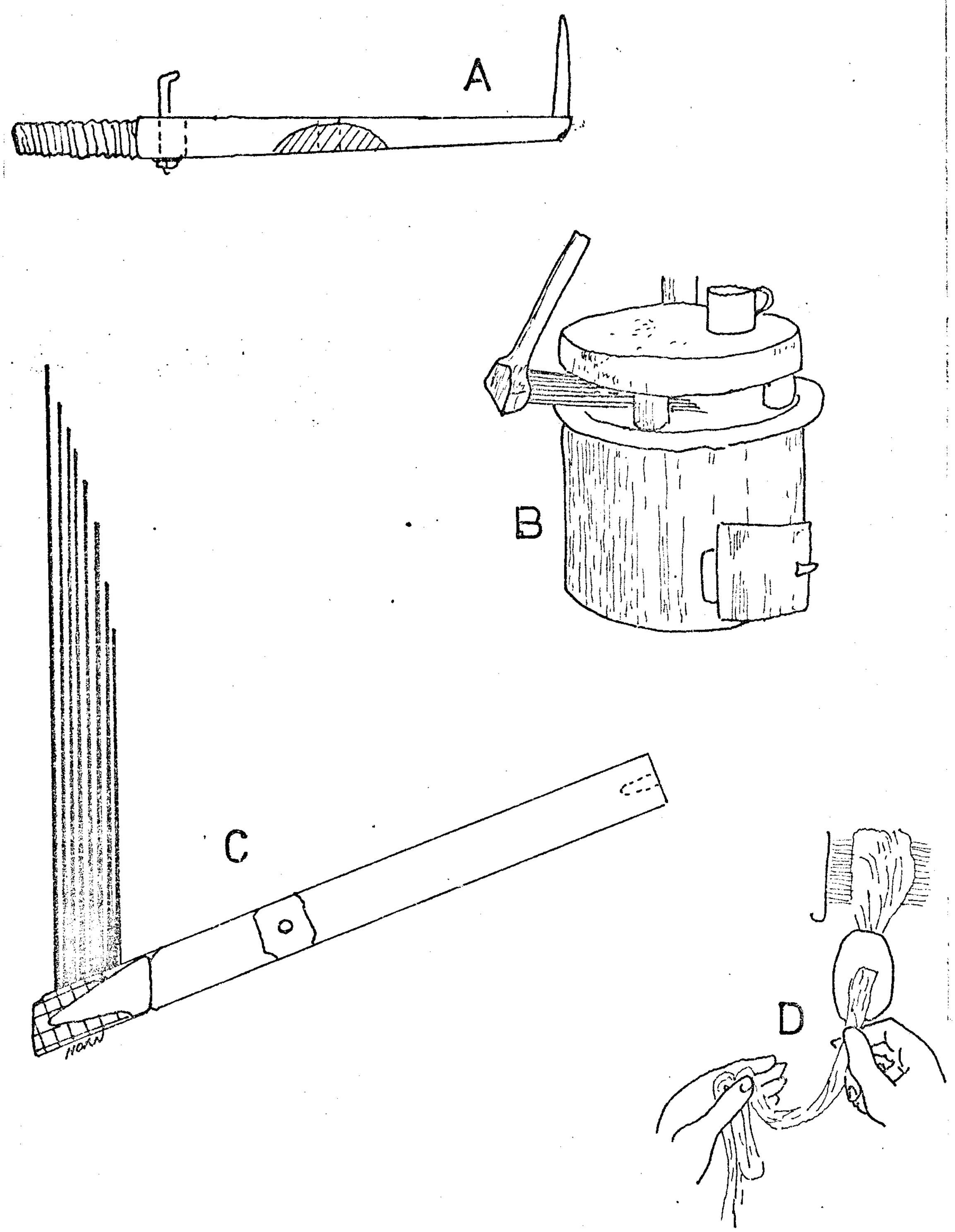


Fig 2.3 Equipment used by 19th century woolcombers (after Roth 1909 figs 1,2, 6 & 11).

perforation) into a wooden upright so that it was firmly held in a horizontal position. Although generally used, the 'pad' and post were not essential to the process, for Roth records nineteenth century wool-combers who worked without them (1909, 3).

The 'comb-pot', which was simply a device for heating the teeth of the combs together with wool held on them, attained complex forms by the nineteenth century. One which Roth illustrated (fig. 2,3) was furnished with a cast iron dish, a stone cap on supports, and a chimney; it was fed by coal.

The 'diz' was a piece of horn with a maximum dimension of some 5cms and a central perforation (fig. 2,3).

After the wool had been washed it was wrung out and kept damp until it was to be combed. Often it was given a preliminary sorting by hand in order to reduce fibre breakage, and lengths of fibres pulled from the mass were sprinkled with oil to lubricate them in the combing process. Lubrication was further increased, and fibre breakage decreased, by the warmth of the teeth of the combs which were placed in pairs in the comb-pot prior to use. One comb was then taken and held with the teeth vertical, either manually or by a simple device, while wool to be combed was attached to it (lashed on). Wool was lashed on with a downward action a little at a time so that the fibres hung down in a fringe with as short a length as possible attached to the teeth. The comb was then fixed onto the iron pad so that the teeth were either horizontal or extended sideways and the other comb was taken from the pot for use in 'jigging'. 'Jigging' consisted of swinging the empty comb vertically through the fringe of wool on the held comb so that through progressive movements wool would be transferred between the two; sometimes the combs were changed around so as to equalize the amount of wool on each. When the fibres were sufficiently disentangled each comb was placed in turn on the pad and the wool was pushed up to the middle of the teeth and drawn off in long slivers. These were then broken up and lashed on again for the process of 'straightening' which was exactly the same as 'jigging' except that the fibres were drawn off at the end through the 'diz' in order to regularize the thickness of the slivers. Finally the slivers were inspected for hard clusters of fibres (which were bitten out) and were bundled. The short fibres in the wool, which gather at the base of the teeth, were extracted for use in the woollen industry.

Little has remained of the equipment of the early wool-comber apart

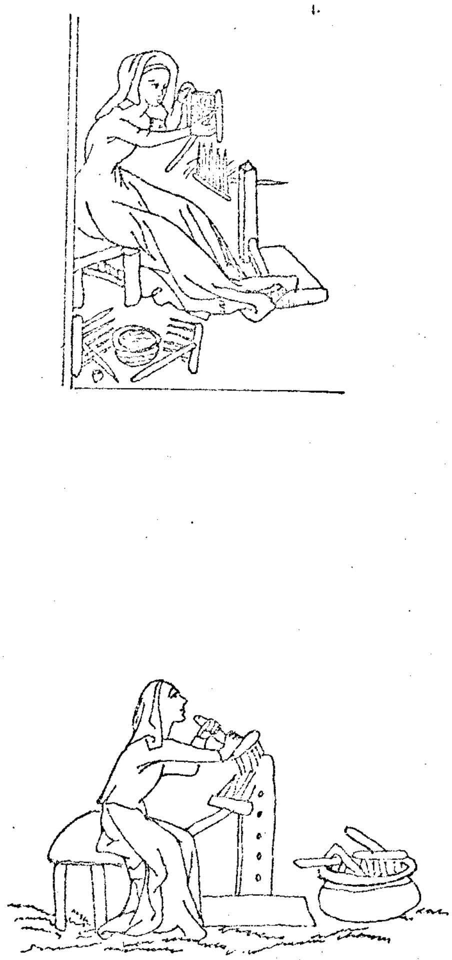


Fig. 2.4 13th/14th century illustrations of hand woolcombing (after Roth 1909 figs 4 & 5).

from the fragments of the combs themselves. Before looking at these it is worth commenting on the 13th/14th century illustrations of wool-combing (fig. 2,4) for, although they are to some extent schematic, they do show a number of interesting features. In both cases the seated operator is working with one pair of apparently single pitch combs while another pair is being heated in or around a very simple form of comb pot. It is also clear that some form of fixture was used for one of the combs but the way the combs were used in conjunction with one another is far from clear; the only thing that is certain is that in one case the fixed comb has the teeth set vertically.

The remains of wool combs were not at first recognised as such and this is not surprising as the teeth, when found out of context, cannot really be distinguished from any other iron point or headless nail (fig. 2,5). Their lengths range from six to thirteen centimetres with no noticeable peak; they are generally circular in cross section and they taper to a point from a maximum diameter of slightly over half a centimetre. Often the blunt end is crudely formed and slightly hammered over, and there is sometimes an impression in the rust indicating that this end was embedded in wood.

The first occasion on which these teeth were recognised as having come from a specific implement seems to have been in 1956 when Hamilton published three together with what would appear to be an antler handle from 9th century Viking layers at Jarlshof in Shetland (fig. 2,6). This idea would not seem to have been taken on by archaeologists dealing with Saxon finds further south, for it wasn't until 1964 that Addyman singled several out from Maxey, Northants, as a type of find (65), one which he was to find afterwards at East Socon, Huntingdonshire, Little Paxton, Huntingdonshire, and Hamwith, in Hampshire (1965, 65; 1969A, 87; 1969B, 65), and in Anglo-Danish levels in York (pers. comm. A. MacGregor). Wool combs found in the form of thirty-nine spikes were with a Viking Burial at Harrold, Bedfordshire (Eagles 1970, 42) and fourteen from Shakenoak, Oxfordshire, although discussed in detail (Brodribb 1972, 115-116), were not given a function until the next year (Brodribb 1973, 134). P. Brown then realised the similarity between these points and those which are found in tools which have been published as heckles in the Scandinavian literature; it is now realised in Scandinavia that these are much more likely to have been wool combs (Hoffman 1964, 285) (fig. 2,6).

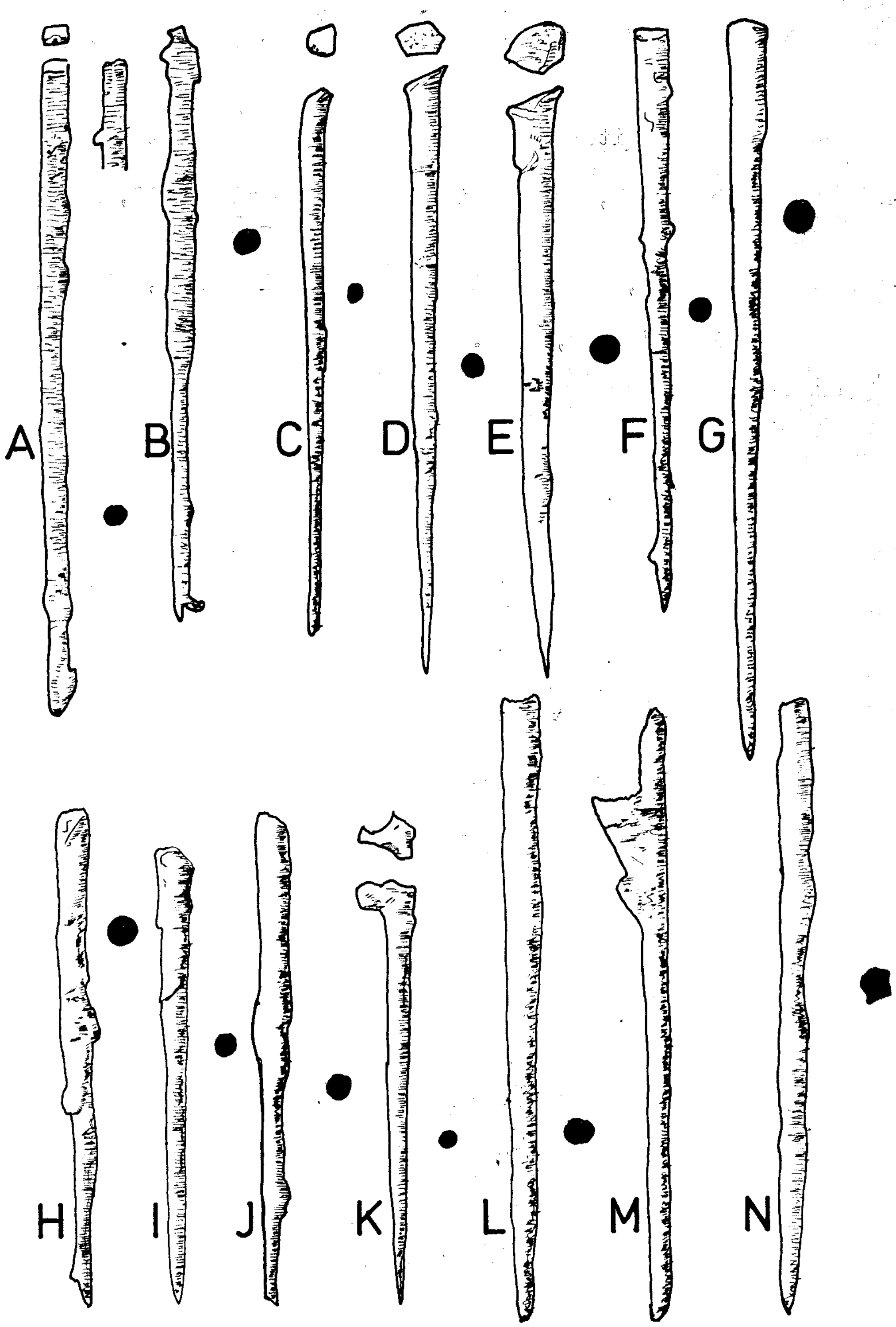


Fig. 2.5 Teeth from Woolcombs of Dark Age date at 1:1 ; A-N (for sites, periods and sources see reverse of figure).

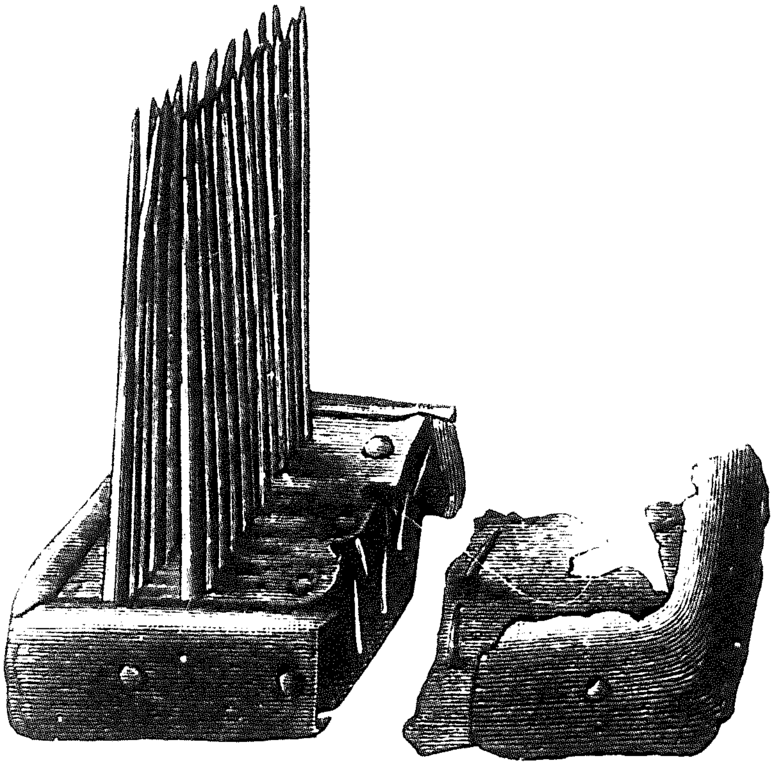
		Site	After
A-K	MS	Shakenoak, Oxfordshire	Brodribb 1972, fig 51 nos. 297-303, 307-310
L-M	V	Harrold, Bedfordshire	Eagles 1970, fig 12.
N	A/D	Lloyds' Bank, York.	Addyman forth.

The Viking handle from Jarlshof has already been mentioned and to this must now be added two finds of pairs of wool combs, one Saxon and one Viking, which leave no room for doubt regarding the function of the iron spikes which have been more commonly found. These finds exemplify three ways in which the combs could be constructed and are worth describing in full.

The handle from Jarlshof is 'T' shaped and made of antler. Across the top of the 'T' notches can be seen in the drawing, and examination makes it evident that part of the tool has been broken away and that these would have in fact been seventeen holes; both ends are however broken and there were probably more originally. The shape of the grooves further make it clear that the holes held tapering objects and the excavator was almost certainly right in thinking that these were the iron spikes he found elsewhere on the site (Hamilton 1956, 128-129). The maximun width of the grooves (4-5mm) certainly accords well with the diameters of the spikes.

The teeth of the combs from Westness in Orkney would seem to have been set in a wooden handle, for although they are now just cemented together with rust a distinct impression can be seen covering the first 2.8cms of them. Neither is probably complete now but one comb has 24 teeth left and the other 20; the length of these in all cases is 12.5cms and they are round in section and taper from a maximum diameter of five millimetres. A very similar comb or combs was found in the grave of a Viking man or woman at Ballinaby in the Hebrides but the remains are now so fragmented that little can be said about them. The eleven remaining teeth are round in section and taper from a maximum diameter of six millimetres; they were at least eleven cms long.

The pair of combs from Wicken Bonhunt are both in remarkable condition although one is more complete than the other. They were evidently double pitch combs, the perfect one having thirteen teeth to the front and twelve to the back while the damaged one has eleven at the front, ten at the back and two loose ones. The teeth vary slightly in length but they are generally about 9cms long and round in section, tapering from a maximum diameter of about 5mm. The surfaces are flattened in parts and this is probably connected with the original tempering of them, while they also have a slight head. A large part of the mounting also survives and the teeth can be seen to have been set in a wooden handle which was then encased in iron at the head end; the latter



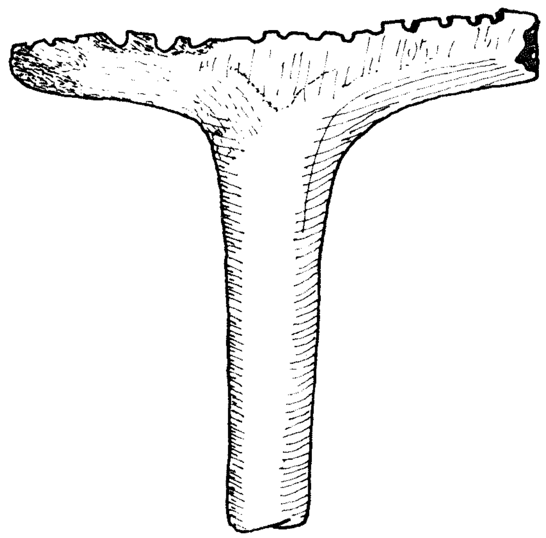


Fig. 2.6. Bone wool comb of Viking date from Jarlshof, Shetland at 1:2 (after Hamilton 1956, fig 57) and an iron one of the same period from Scandinavia.

was secured with small nails, some of which can be seen. The fore set of teeth are at right angles to the handle while those behind them lean slightly backwards.

Carding

Carding is another process which opens up the wool from the fleeces, cleans it further, gets rid of the short pieces, and makes the mass homogenous for spinning. The term actually comes from the latin carduus, a thistle and certainly thistles or teasels could be used.

The implements most commonly associated with this process are cards which are pairs of boards 15 x 25cm each with a handle; from the leather covered faces protrude a mass of wiry teeth. A small amount of oiled wool is placed on one card and they are worked together until it is evenly distributed over both. It is then accumulated on one card and 'doffed' off as a roll which could be just tied to the top of a distaff. This process, as opposed to combing, produces a mass of randomly oriented fibres which when spun make a woollen and not a worsted yarn, (Patterson 1956, 194; 1957, 153; Starkie 1973, 353).

The distinction between woollen and worsted yarns should provide us with a handy indicator of when carding was first introduced. In practice, although some of the few textiles we have are made of coarse yarn, none are definitely woollen.

Cards do not receive their first mention until the 13th century in France. Patterson cites another instance in Flanders where carded wool was permitted to be used as weft for fine fabrics in 1377 (Patterson 1956, 193). The earliest illustration is in the Luttrell Psalter and belongs to the 14th century (Patterson 1956, 193, fig. 167).

Bowing

Bowing is a medieval technique for preparing wool for spinning. The bow is suspended so that it lies horizontally, the string is struck and is worked among laid out wool while vibrating. The rapid vibrations separate the tangles and give a similar result to carding. (Patterson 1956, 195).

The Processing of Silk

Although silk was definitely not processed in Dark Age Britain it was a coveted, if rare, textile fibre and it is necessary to give some

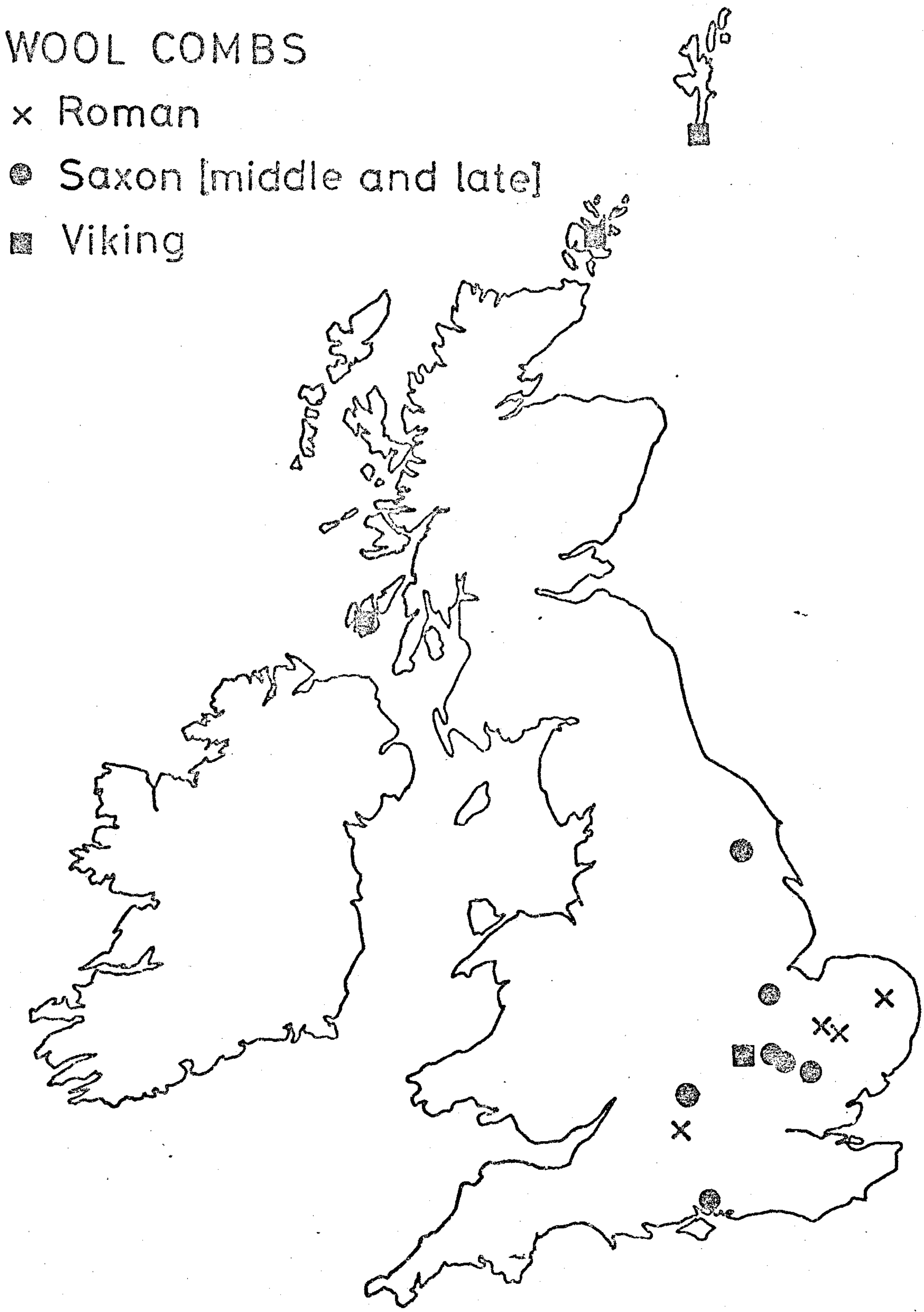


Fig. 2.7 Distribution of Roman, Saxon and Viking wool combs and detached teeth (appendix II).

brief account. In China before the silk moth had a chance to emerge the cocoons were dropped into boiling water in order to kill their occupants and soften the gum in between the silk. The ends of the filaments were then caught with wooden rods stirred in the water and about half a dozen cocoons at one time would be reeled off onto a frame. As a continuous fibre was involved no spinning was necessary; damaged or tangled cocoons could not be reeled off, however, and would have to be spun (Patterson 1956, 198-9). This would be the case anyway with most wild silk, because the filaments tend not to be continuous and it is often not possible to prevent the moth from breaking through the cocoon. The use of a spun warp in products of the Near East may reflect an inefficiency at reeling, a dependency on Middle Eastern wild silks, and a reluctance to waste nothing of this valuable commodity.

The Processing of Vegetable Fibres Prior to Spinning

Bast Fibres

As has been mentioned in a previous section, while vegetable fibres may derive from various parts of plants, it is mostly bast fibres which concern us, and of these only flax, and possibly hemp and nettle, are of any real importance. The common problem with these is to liberate the desired fibres from the surrounding material and to separate them one from the other; to judge from evidence as diverse as Ancient Egyptian wall paintings, classical authors (Patterson 1956, 195-7), nineteenth century treatises (Andrews 1872; Brown 1851; Charley 1862; Crory 1864; Deman 1852 a & b; Sproule 1846) and modern practice (LIRA 1970), the stages in which this has been done are fairly standard and pre-ordained by the nature of the material. A general description of the process based on these sources, which refer mostly to flax, will therefore suffice.

After the stems have been pulled (to maximize length, rather than cutting them) they are rippled. This involves pulling them through a large comb to remove the seeds and is done for two reasons; one being that linseed is valuable in its own right, and the other that if left on they cause an intolerable stench in the next stage of manufacture, retting. Retting, as it sounds, is a species of rotting under conditions designed to induce bacteria which will attack the material between the fibres rather than the latter themselves. Two main methods of retting may be distinguished, although often in practice they are combined. In water retting, bundles of flax are immersed in, for example, a stream or pond and weighted down for a week or two; in dew retting the stalks are first laid out in a field for a month or so, being turned periodically.

Archaeological evidence for the retting of flax or other bast fibres is very scant but during the excavation of the 79-80 St. Aldates site, Oxford, a ditch was found which had been cut into a (possibly) artificial clay bank (Hedges forth (D)). In itself it was about 22 cms deep and 93 cms wide but a wattle fence had been added on either side which gave the total feature a width of 110 cms and a preserved depth of 48 cms (fig. 2,8). Due to the circumstances of the excavation it was not possible to uncover more than 186 cms of the length of this feature and we do not know therefore whether it had any ends as such and where they were. All in all it was nothing exceptional to the site; at the same level, which has been dated to the early ninth century on the basis of a radiocarbon analysis, there was a parallel gully 5½ metres to the east and a wattle fence 4½ metres to the west. Great interest arose, however, when it was found that the lowest deposit of the ditch in question was thick with the seeds of cultivated flax and the possibility that it may have been used to rett flax was immediately realised.

The general siting of the ditch would have been ideal for the purpose suggested. It was on a low, flat, marshy piece of ground, well away from human habitation, which is conjectured to have been to the north. The fact that it had been dug into clay would have made it perfectly water-tight, while water, although hard, could have been diverted from Trillmill stream some 50 metres away and the noxious waste could have been discharged during the seasonal flooding when it would have done no harm.

On the other hand, if the ditch was intended for use as a retting pool it was badly constructed. It is nowhere near the depth and width usually associated with such a structure. One nineteenth century writer suggests that the optimum depth is just over a metre, and width from four to six metres (Crory 1864, 31), although he was referring to pools used industrially. Even if a small pool was desired it is difficult to understand why wattle hurdles were used to increase the depth when the

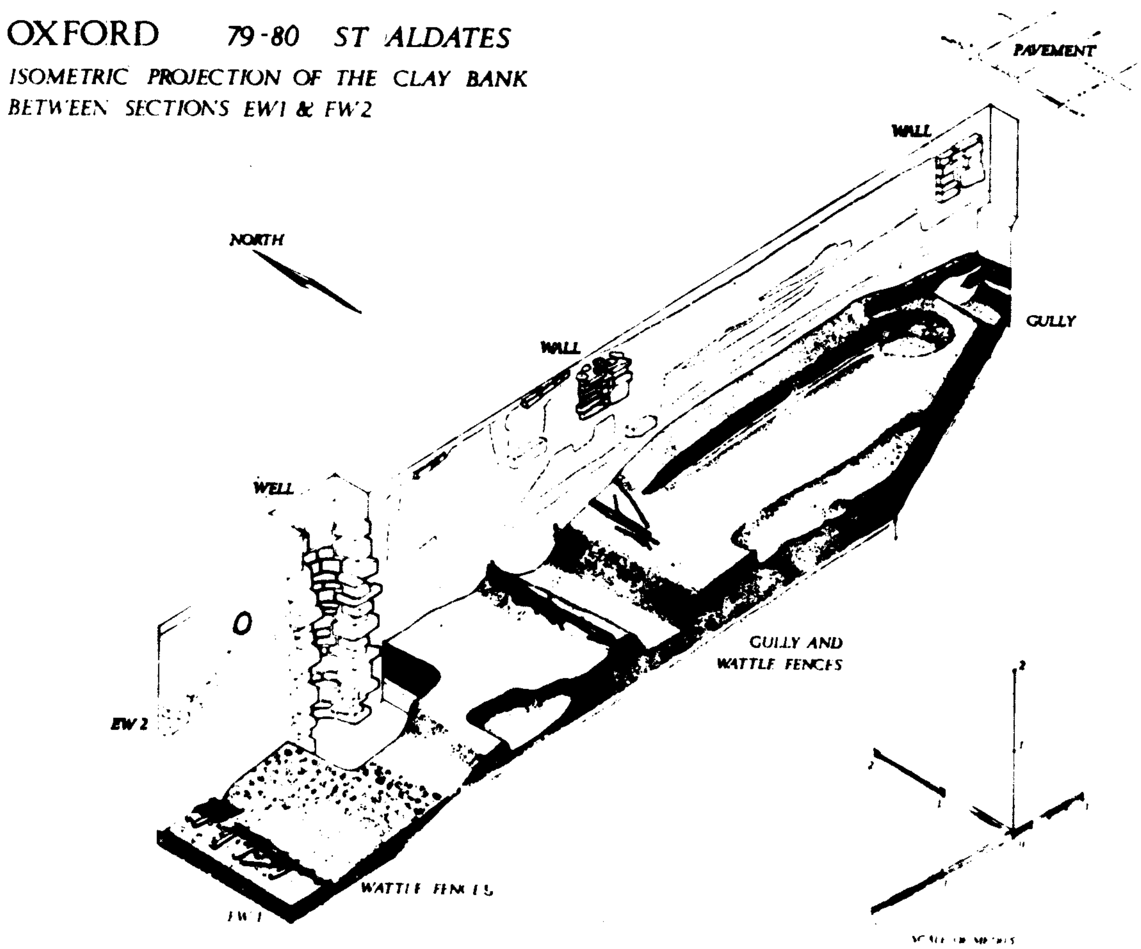


Fig. 2.8 A possible flax retting pool of early 9th century date found at St. Aldgates, Oxford (after Selkirk 1972,319).

gully could have been just dug deeper. These hurdles must have been difficult to make water-tight and could scarcely have witheld the pressure of the water well.

It is a little ironic that the seeds which first suggested that the gully was used for retting provide a powerful argument against the idea. Flax is most commonly pulled when slightly immature, whereas the seeds found in the ditch were fully ripe. More importantly, the bolls, and the seeds they contain, are usually removed from the flax before it is retted, as has been mentioned, as not only are they valuable but, if present, they make the flax difficult to work and cause a stench. This does not however close the case quite as firmly as might be thought, as several nineteenth century writers, while talking of the Irish linen industry, decry the great waste and inefficiency brought about by not rippling the flax before retting (Charley 1862, 55; Deman 1852a, 22-5; Sproule 1846, 17). It is moreover difficult to give an alternative explanation for the presence of the seeds in the ditch. The surrounding area would have been quite unsuitable for growing flax or for grassing and drying it, while it would have been poor ground for keeping cattle on at times when they needed fodder. These three suggestions together with the idea that the seeds were introduced by seasonal flooding, can also be forcibly rejected because of the strictly localised occurrence of the seeds - they were found in tremendous numbers in the soil sample from the bottom level of one ditch and from nowhere else.

On balance it would seem that the most plausible explanation is that the ditch did indeed have some connection with retting. Due to the limitations of the excavation it is not possible to decide whether it was a retting pool in itself or just the outlet from one. It seems too poorly designed to have been originally constructed for retting and may just have been a drainage ditch used for the purpose; certainly the presence of the seeds does not indicate that the users were particularly efficient.

After retting the straw needs to be <u>dried</u> and this can be done either by laying it on a fresh cut meadow or by setting it in stooks. The next important stage in the process is <u>scutching</u>, in which what is left of the non-fibrous parts of the plant stems is broken and crushed and largely falls away. The most common type of implement employed for this in earlier times was a blade of wood which, in form, if at all elaborate, may superficially resemble a sword beater (fig.2·9). Although it never superceded the simpler type of implement, a breaker was invented in the fourteenth century in Holland (Patterson 1956, 196) consisting, as can be seen from fig. 2.9, of a blade pivoted between two planks; other types of scutcher are also known, including mallets (fig.2.9) and flails (Mitchell 1898, 186; Patterson 1956, 196). The actual mechanics of scutching are very simple; a bundle of dried straw is just repeatedly beaten along its length until, the pith having largely fallen away, fibres remain. This may be divided into two processes - breaking, and the removal of the detritus, and they may be achieved separately to some extent. In Coptic Egypt, apparently, the stalks, after being broken with mallets, were combed through iron combs to remove the coarse tissue. In mediaeval times the broken stems were sometimes put over the edge of a bench and struck with a flat, paddle-like, instrument (Patterson 1956, 196). As they would generally be made of wood, it is not surprising that scutching blades are not recorded from archaeological sites, but an 'oar' recovered from Ballinderry Crannog, Co. Offally, and datable to between the 7th and 9th centuries (Hencken 1942, fig. 26) could very easily be one, if it is not a sword beater. (fig. 2,9)

The fibres are finally heckled, or combed, in order to align them, remove any short lengths, and rid them of any remaining vestiges of pith. A quite normal way of doing this would be for the comb to be secured in a vertical position and for the fibres to be drawn through it. Pairs of so-called heckles have been recovered from several Scandinavian graves of the Viking period but these are more reliably considered to be wool combs (Hoffman 1964, 285).

Cotton

In view of the possibility that cotton articles may have been imported into Dark Age Britain, although it could not conceivably have been grown here, it is necessary to give a brief account of how it is processed. The problem with cotton is getting rid of the boll casing and separating all the fibres from the seeds to which they are attached. The earliest form of gin was not invented until the medieval period in India (Wild 1970, 30) and it is most probable that until then this part of the process was carried out by hand. The seed hairs once gained constitute cotton wool and this is made up of an admixture of long and short fibres.

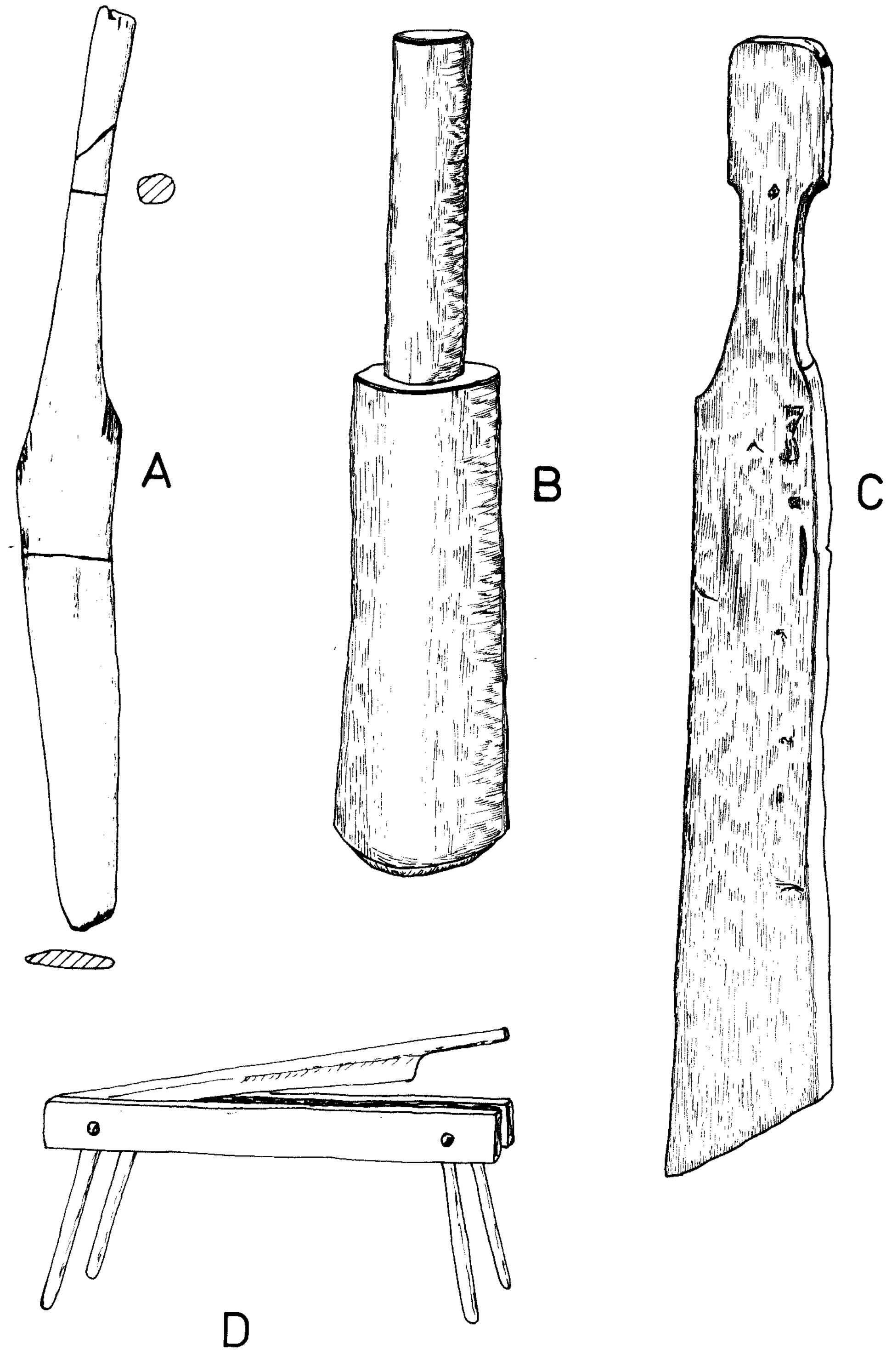


Fig. 2.9 Flax scutching implements. A, 'Oar' from Ballinderry Crannog, Co. Offaly (7th-9th cent. AD) at 1:4 (after Hencken 1942,fig 26): B & C, Mallet and scutcher of recent date from Tiree, Hebrides at 1:2 (after Mitchell 1898, figs 7 & 5) ; D, 16th century breaker, diagramatic (after Patterson 1956, fig 158).

The proportion of short ones can be reduced and the remainder worked into a state suitable for spinning by the process of carding. Patterson mentions that in the medieval period in Europe bales of imported cotton were spread out on a wickerwork or wire frame and beaten with rods to open it and remove seeds and other contaminants which fell through the mesh. Apparently bowing was also used (1956, 200).

Gold and Silver.

As has been mentioned, malleable metals have been used in textiles as thin wires or strips wound on a core; as these are rather anomalous their manufacture will be dealt with in the section on the textiles themselves.

CHAPTER THREE

SPINNING

Purpose and methods employed

With the exception of filaments, like silk, all the fibres used in textile production have a staple length and would be of no use unless spun into yarn. The origins of this very important process have been sought for and some interesting theories proposed (e.g. Ryder 1968), but these are unfortunately incapable of substantiation.

The basic principle is that if fibres are aligned with their ends overlapping and a twist is imparted then they interlock and an amazingly strong continuous thread is produced. At a more detailed level the whole process can be seen as three actions - the fibres must be drafted i.e. pulled longitudinally in order to align them as well as being twisted, and then the completed yarn has to be wound onto something in order to prevent it from untwisting or tangling. In woollen spinning draft and twist are imposed simultaneously (spindle draft); the tendency is for the longer fibres to take the strain and form the core of the yarn, the

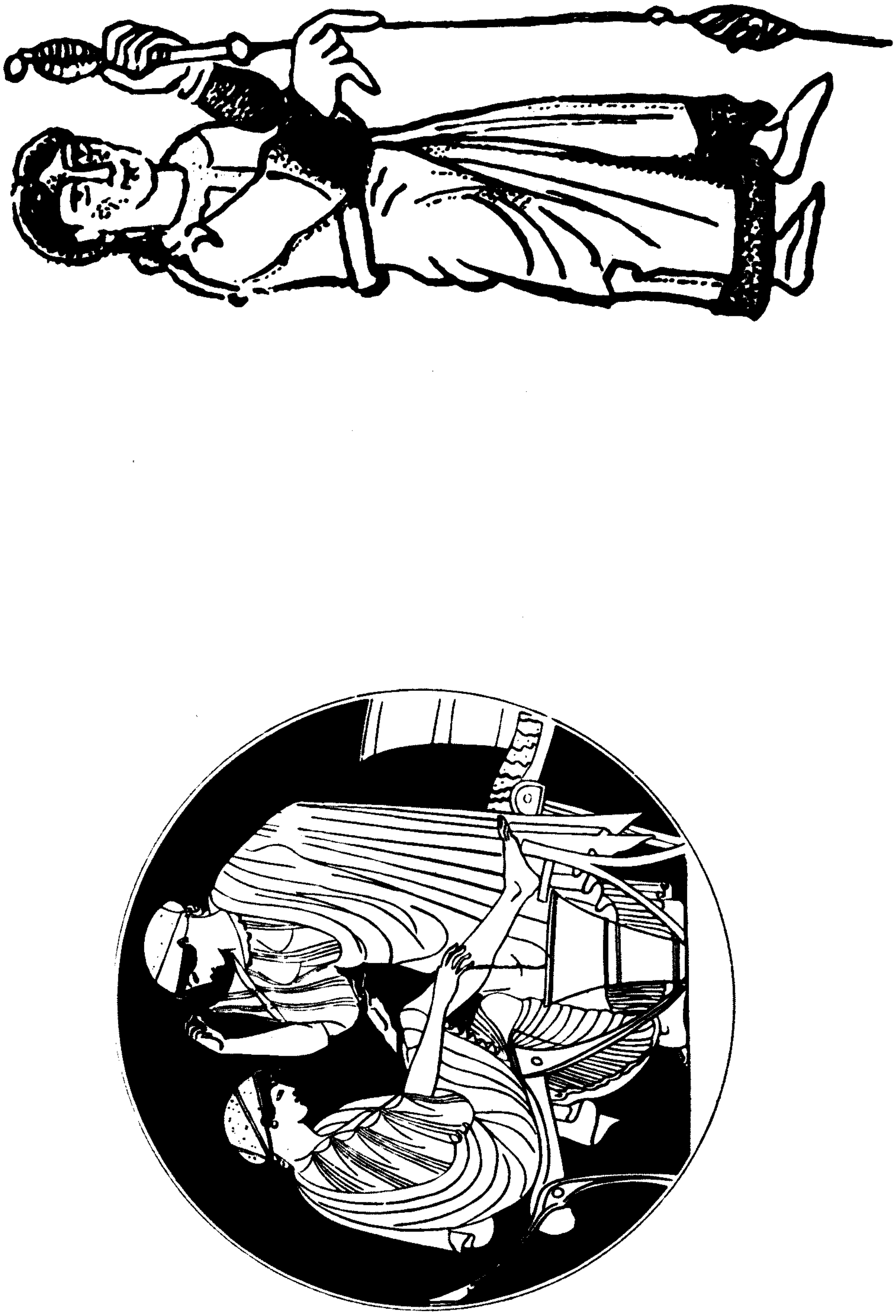


Fig. 3.1 (Right) Spinning with a short distaff; from an Italian manuscript of the early 11th century (after Patterson 1956, fig. 165).
(Left) Greek girls rolling wool; from an Attic cup, 5th century BC. (after Patterson 1956, fig. 162).

shorter fibres finding their way to the outside, some of the ends protruding; the yarn is thus full and fuzzy. In worsted spinning the fibres are first drafted under the control of a little twist (draft against twist) and then the required final amount of twist is inserted without relative movement of the fibres; the yarn is thus sleek and smooth.

Several different techniques have been used for both worsted and woollen spinning at one time or another. The most primitive method is simply to pull fibres from a bundle - even a sheep fleece - and to twist them either by rolling them against a surface or with the fingers (fig. 3.1). The process is slow and the product crude - mainly because of the lack of control over draft for any length and twist for any period of time. The ancient Greeks however used this method (with the aid of an epinetron, a pottery surface which fitted over the knee) in order to produce a roving which could then be spun properly (Forbes 1956, 152).

A more even thread can be produced by attaching one end of the drawn fibres to a spindle which is then rolled while the yarn being formed is tensioned. Control over draft and twist is increased with this method but it is still slow as only short lengths of yarn can be produced with each action. The ancient Egyptians found a way round this problem by attaching the fibres to a support rather than holding them, so that the spinner could use both hands simultaneously to stretch and twist a much greater length (Crowfoot 1954, 425).

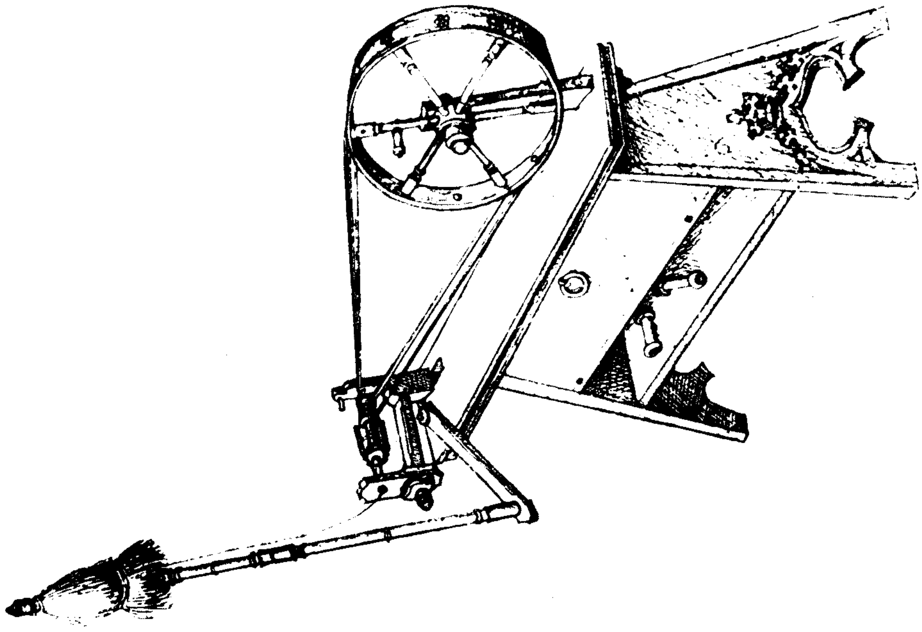
The most universally adopted method, however, which is still used in many parts of the world, is suspended spindle spinning (fig. 3.1, 3.2). This is far superior to any of the techniques already discussed, being much quicker and allowing greater control over draft and twist, therefore producing a superior product. The key implement in this process is the spindle which is spun when suspended from teased out fibres; its weight either provides draft or aids it while its moment of inertia gives the necessary twist. Both of these necessary attributes - mass and moment of inertia - can be manipulated by altering the size and shape of the spindle while the influence of the former can be reduced and controlled by having the base of the spindle spin on a surface. Commonly the spindle is just a thin piece of wood, round in section, the weight and moment of inertia being provided by a whorl wedged on one end. Another implement associated with this method of spinning is a distaff, the function of which is to conveniently hold the unspun fibres (figs. 3.1, 3.2).

Fig. 3.2 (Top) Medieval illustration of drop spindle spinning with a long distaff (after Hartley 1925b)
(Bottom) Medieval illustration of drop spindle spinning with a fixed distaff (after Hartley 1925b).

As Lemon (1968, 86) has pointed out, suspended spindle spinning in common with the methods outlined above can be used to produce both worsted and woollen yarn depending on the action used. If the fibres are simply pulled from the distaff with one hand while the spindle is in motion then draft and twist are imposed simultaneously and woollen yarn results. In order to produce a worsted yarn both hands have to be used so that the fibres between them can be more or less fully drafted before the twist is allowed to them.

More sophisticated means of spinning were not invented until relatively late and even then were adopted reluctantly as they were thought to produce inferior yarn. The earliest reference we have to the spindle wheel takes the form of an entry in the Drapers Guild regulations at Speyer (1298) forbidding yarn spun on it to be used as warp (Patterson 1956, 202). The earliest pictorial representations we have of the spindle wheel belong to the first decade of the fourteenth century and are to be found in the Decretalia of Gregory IX and the Luttrell Psalter (Lemon 1968, 87). As is shown in fig. 3.3 the implement consists of a spindle set horizontally on a bearing which can be made to turn at high speed by revolving a large wheel which it is attached to by a belt. Although it is the earliest example of the belt transmission of power known (White 1962, 119), and in that sense marks an important technological advance, looked at another way it is only a mechanically driven spindle which although faster does not have all the benefits of its predecessor. While one of the operator's hands turns the wheel, the other is used to draft the fibres which are simultaneously twisted by the revolving spindle (Catling 1972, 101-102). The yarn, which is then wound onto the spindle, must therefore be essentially woollen although one more worsted in character can be produced by a preparatory combing of the fibres (Lemon 1968, 91). This drawback of the spindle wheel, that good worsted yarn cannot be produced on it, must have been the reason for its unpopularity with the weavers' guilds.

The spinning wheel familiar to us today, where spinning and winding proceed simultaneously, is not found illustrated until 1480 (Patterson 1956, fig. 168) (fig. 3.3) although it is shown in such a developed form that it must have been invented earlier. Although outside our period, it might be mentioned in passing that because of the construction of the bobbin and flyer (Catling 1968, fig. 8.2) its action is essentially draft against twist and the tendency is towards the production of a worsted yarn, although this would be affected by the way in which the



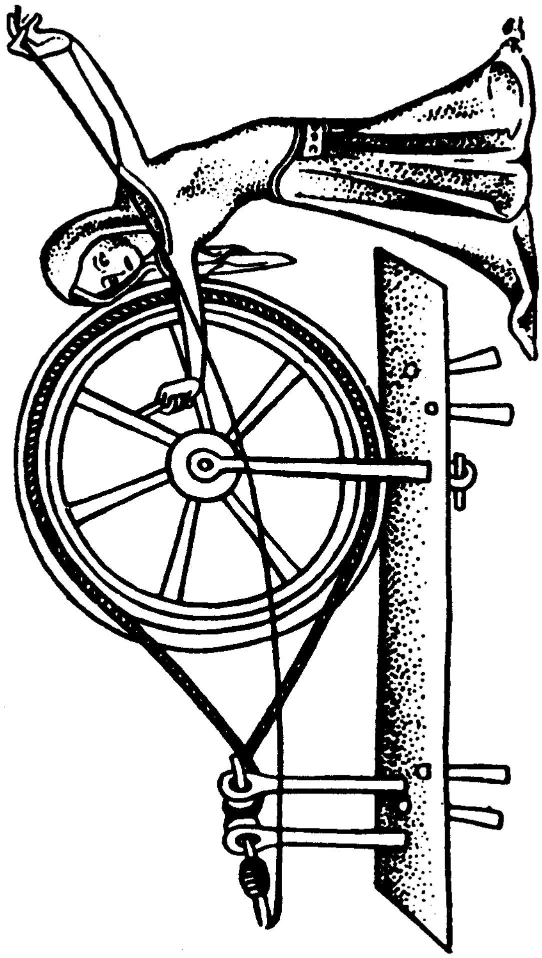


Fig 3.3 (Right) A spinning wheel; from Das Mittelalterliche Hausbuch c1480. (after Patterson 1956, fig 168).
(Left) A spindle wheel; from The Luttrell Psalter c.1338. (after Patterson 1956, fig 167).

fibres were prepared.

Spinning Equipment

As has been mentioned above we cannot be certain of the introduction of the spindle and spinning wheels until the end of the thirteenth and fifteenth centuries respectively. Although these dates might be pushed back slightly in the light of new evidence, for the most part the types of artefacts we would expect to be recovered from archaeological contexts are spindles, whorls, and distaffs; these are discussed under separate headings below.

Spindles

Spindles seen in ethnographic collections are invariably wooden. Out of the range of materials readily available to pre-industrial man wood is most suited as it can easily be carved to any desired length and diameter while it is also relatively light. Bone does provide a possible alternative although it comes in predetermined shapes and sizes which are not always convenient for a given purpose.

That bone spindles can be made is shown by the large number of Roman ones found in north-west Europe (Wild 1970, 127-129), and it is surprising that, with the exceptions of a Late Saxon example from Oxford and an Anglo-Danish one from York (fig. 3,4), they are completely unrepresented on Dark Age sites in Britain. Both were initially thought to be pin beaters but the former has clear wear marks two-fifths of the way along its length where a spindle has been, while the latter is of an appropriate length. It is possible that a lot of the pin beaters are spindles but the lack of wear marks or whorls in situ militates against this.

Wood is a substance which easily decays and implements made from it are only found rarely and under unusual conditions. This property of wood, that it is not likely to survive, can however give interesting negative evidence for the existence of wooden spindles. A large number of instances have been recorded of one or more spindle whorls having been found with both inhumations and cremation burials of Early and Middle Saxon date, which seem to be exclusively female; there are also Continental examples (Myros 1973, 112). It seems that women were sometimes buried with their spindle and whorl just as they often were with a number of other household items; the spindles must have been wooden otherwise they would

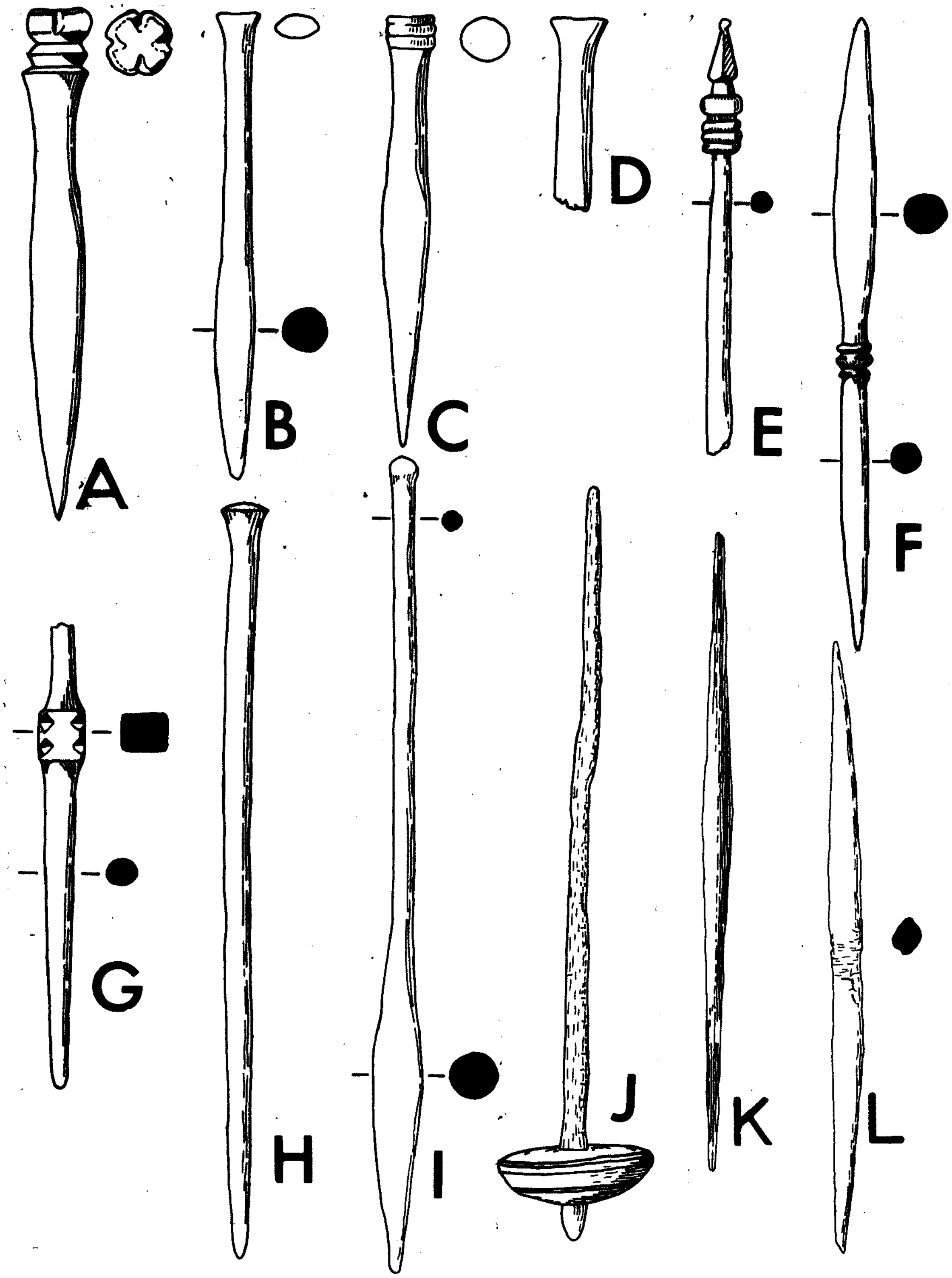


Fig. 3.4 Spindles and distaffs from Dark Age British sites at 1:2 ; A-L (for sites, periods and sources see reverse of figure)

		Site	Source
A	EC	Lough Faughan, Co. Down.	Collins 1955, fig 12.
B-F	EC	Lagore Crannog, Co. Meath.	Hencken 1950, figs 82 & 85.
G-I	EC	Ballinderry Crannog, Co. Offaly.	Hencken 1942, fig 26.
J	ES	Sutton Courtenay, Berkshire.	Leeds 1947, pl XXII.
K	A-D	Lloyd's Bank, York.	Addyman forth.
L	LS	Cornmarket St, Oxford.	Hassall 1971, fig 6.

have survived. In graves which have been accurately recorded the whorls have either been found in the pelvic region, which suggests that the women when buried had a spindle in her girdle, or within the remains of a small box interred with the deceased. These were containers for personal effects such as shears, knives, and spindles; the smallest could have held a spindle of 25 cms long, (table 3.1).

A total of seventeen spindle shaped objects made from a variety of woods have been recovered from Early Christian deposits at three Irish crannog sites, (fig. 3.4). This distribution of find-spots is probably only a reflection of the peculiar nature of the sites in question and it is highly likely that similar objects would be found in waterlogged deposits elsewhere in Britain. Some of them, which are about fifteen centimetres long, are peg-shaped with a flat and a pointed end; the shaft is constricted near the former and expands before the latter. One from Lagore and a broken specimen from Ballinderry are probably representative of another type the main characteristics of which is a central embellishment. The others have little in common except that the two unbroken ones are comparatively long. When published all these artifacts were assumed to be spindles. Hand distaffs can however be very similar and Patterson (1955, 81-82) has reasoned that this is what they are. None of his arguments however make the one from Ballinderry seem less convincing,as in size and shape it is indistinguishable from many modern spindles (fig. 3,4I). It has a long thin central portion yarn could be wound onto; at the top there is a small swelling which would prevent a half hitch from slipping off, while a whorl could have been jammed onto the larger expansion at the bottom.

At the pagan Saxon habitation site of Sutton Courtenay an iron spindle was found which was nine inches long and generally circular in section except near the base where it had been hammered square. It is very doubtful if it would have been recognised for what it was,had a bone whorl not been wedged onto the thickened end, (fig. 3.4J)

Whorls

Spindle whorls must be one of the most common finds on archaeological sites in Britain from the Bronze Age to mediaeval times and there can be little doubt about their identification,although some of the smaller ones could be large beads and some with grooves round their circumference have been very dubiously suggested to be pulleys (MacGregor 1974, 92).

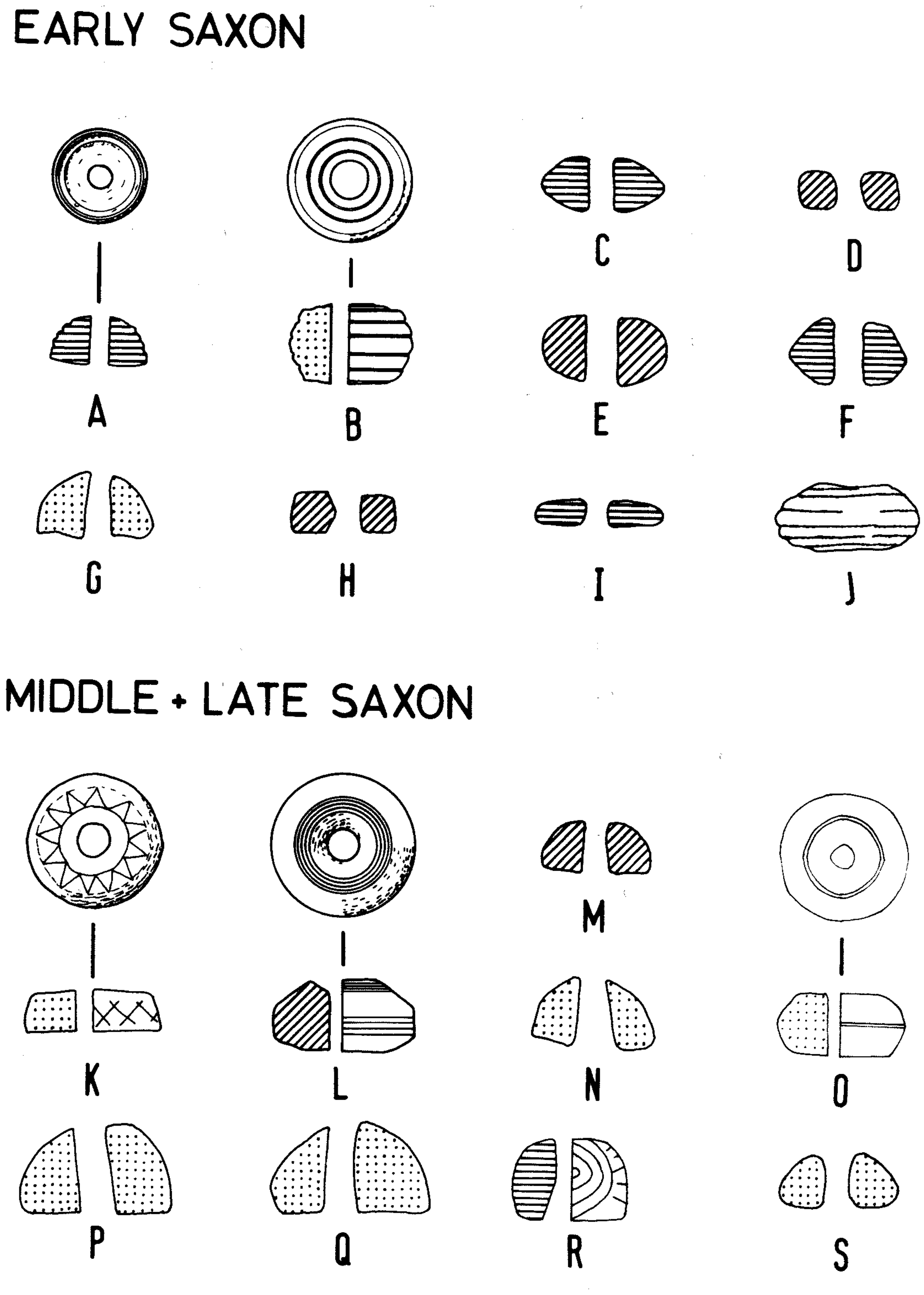


Fig. 3.5 (Top) Early Saxon spindle whorls at 1:2.
(Bottom) Middle and Late Saxon spindle whorls at 1:2.
(for sites, periods and sources see reverse of figure).

		Site	Source
A	ES	Chamberlain Barn, Berkshire.	Hyslop 1963, fig 12.
B	ES	Harrold, Bedordshire.	Eagles 1951, fig 14.
C	ES	Chamberlain Barn, Berkshire.	Hyslop 1963, fig 9.
D&E	ES	Harston, Leicestershire.	Dunning 1953, figs 4 & 6.
F	ES	Abingdon, Oxfordshire.	Avery 1972, fig 5.
G	ES	Upton, Northamptonshire.	Jackson 1969, fig 6.
H	ES	Postwick, Norfolk.	Clarke 1935, fig 3.
I	ES	Bourton on the Water, Glos..	Dunning 1932, fig 6.
J	ES	West Row, Cambridgeshire.	Lethbridge 1931, fig 2.
K	MS	Hamwih, Hampshire.	Southampton Archaeological Research Committee, Pers. Comm.
L&M	MS	Maxey, Northants.	Addyman 1964, fig 15.
N	LS	Clarendon Hotel, Oxford.	Jope 1958, fig 25.
O	LS	Westgate Street, Gloucester.	Hedges forth. (J).
P&Q	MS	Hamwih, Hampshire.	Southampton Archaeological Research Committee, Pers. Comm.
R	LS	Westgate Street, Gloucester.	Hedges forth (J)
S	LS	Little Paxton, Huntingdonshire.	Addyman 1969, fig 16.

Table 3.1 Occurrence of spindle whorls in Pagan Saxon burials

Abingdon, Berkshire.	Cremation 29 (female furnishings) Bone spindle whorl	Leeds 1936,17.
	Grave 61 (child). Bone spindle whorl	Leeds 1936,63.
Burwell Cambridgeshire.	Grave 2, skeleton A (female). Stone bead or whorl on left hip.	Lethbridge 1931,40.
	Grave 7 (female furnishings). Stone whorl at left hip.	" " 50.
	Grave 25 (female). Right hand on head of femur and near it a stone bead or whorl.	" 1925-6,116-7. " 1931,50.
	Grave 42 (female furnishings). At bottom of grave a small wooden box (12" x 8") containing shears, a chalk spindle whorl and a cowrie shell.	" 1931,53.
	Grave 76 (young female). At feet fittings of wooden box (8" x 6") containing a whorl and bronze scraps.	" 1927-8,100. " 1931,59.
	Grave 121 (female). Small chest on feet (16" x 12"). Contains 3 chalk whorls and an iron pin beater (?)	" 1931,67.
Caistor by Norwich, Norfolk.	A pottery and a bone spindle whorl from different cremations.	Myres 1973,112.
Cambridge (Girton), Cambridgeshire.	Grave 71. A spindle whorl	Myres 1973,113
Chamberlain Barn, Bedfordshire.	Grave 32 (child) Three shale spindle whorls; position not noted.	Hyslop 1963,179.
Fordcroft, Kent.	Grave 35 (female). Spindle whorl made from sherd lying just inside top of right femur.	Tester 1968,141.
Kingston, Surrey.	Grave 142. Box (14" x 14") containing whorls, knife and shears	Lethbridge 1931,57.
	Grave 299. Box (10" x 6") Two whorls.	" " "
Londesborough, Yorkshire.	Grave 7 (female furnishings). Bone whorl; position not noted.	Swanton 1963-6,275.
Markshall, Norfolk.	Clay spindle whorl with a cremation.	Myres 1973,243.

IRISH EARLY CHRISTIAN

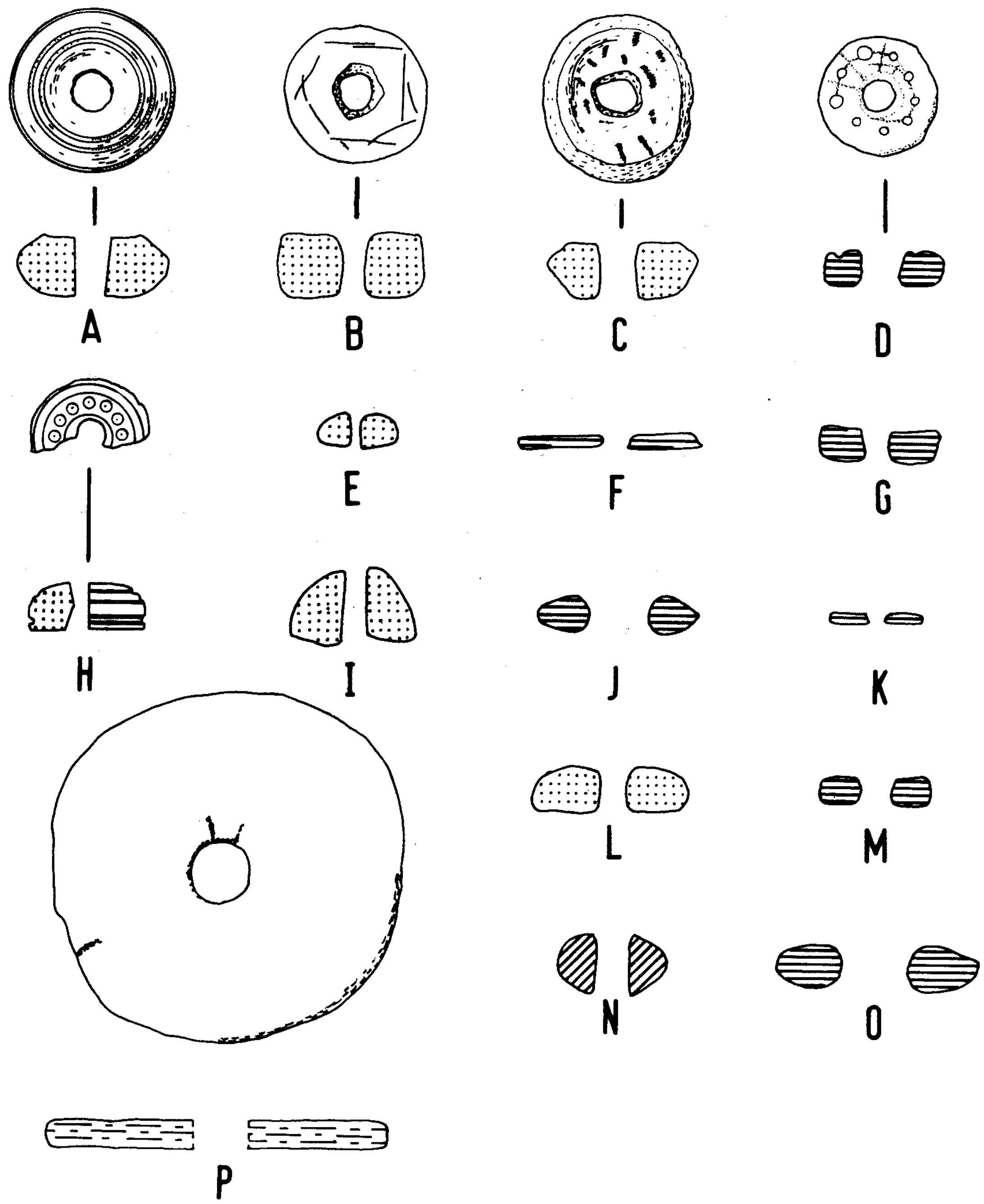


Fig. 3.6 Irish Early Christian spindle whorls at 1:2 ; A–P (for sites, sources and period see reverse of figure).

		Site	Source
A-C	EC	Lough Gur, Co. Limerick.	O'Riordain 1949, fig 14.
D	EC	Clea Lakes, Co. Down.	Collins 1959, fig 2.
E	EC	Freestone Hill, Co. Kilkenny.	Raftery 1969, fig 13.
F	EC	Lough Faughan, Co. Down.	Collins 1955, fig 10.
G	EC	Garranes, Co. Cork.	O'Riordain 1942, fig 13.
H	EC	Dressogagh, Armagh.	Collins 1966, fig 5.
I	EC	Freestone Hill, Co. Kilkenny.	Raftery 1969, fig 13.
J	EC	Castlescreen, Co. Down.	Dickinson 1959, fig 10.
K	EC	White Fort, Co. Down.	Waterman 1956, fig 10.
L	EC	The Spectacles, Co. Limerick.	O'Riordain 1949, fig 22.
M	EC	Clea Lakes, Co. Down.	Collins 1959, fig 2.
N	EC	Larryban, Antrim.	Childe 1936, fig 6.
O	EC	Castlescreen, Co. Down.	Dickinson 1959, fig 10.
P	EC	Lagore Crannog, Co. Meath.	Hencken 1950, fig 82.

Sleaford, Lincolnshire.	Grave 55 (female furnishings). Bone spindle whorl	Myres 1973,113.
Soham, Cambridgeshire.	Grave 3 (female?). Chalk whorl under skull.	Lethbridge 1931-2,156.
	Grave 23 (female). Round chalk toggle at left hip.	" " 163.

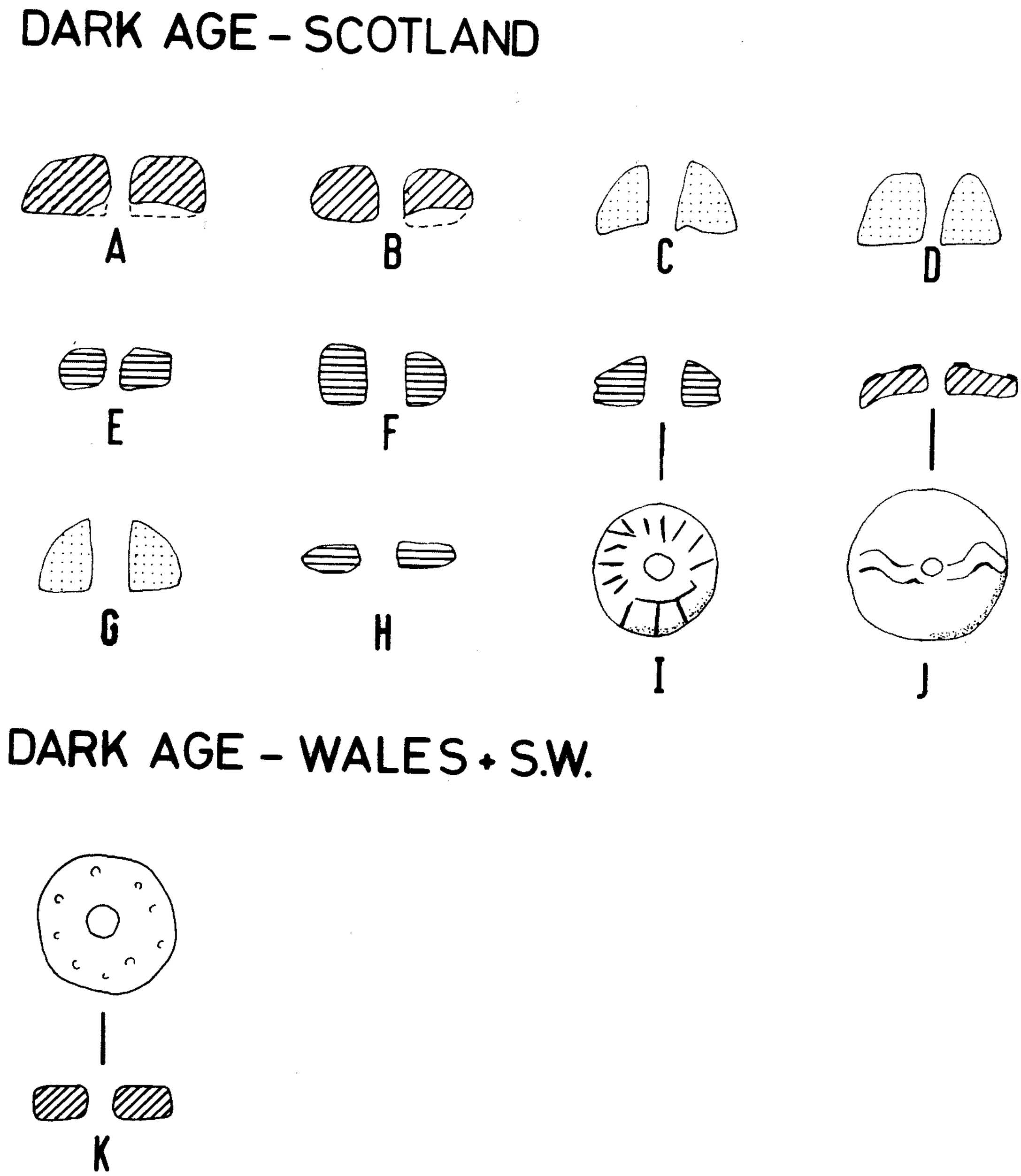


Fig. 3.7 (Top) Dark Age Scottish spindle whorls at 1:2.
(Bottom) Dark Age spindle whorls from Wales and the SW at 1:2
(for sites, periods and sources see reverse of figure).

		Site	Source
A	DA	Jarlshof, Shetland.	Hamilton 1956, fig 31.
B	DA	Clickhimin, Shetland.	Hamilton 1968, fig 63.
C–E	DA	Dun Cuier, Barra, Hebrides.	Young 1956, fig 13.
F–G	DA	Broch of Burrian, Orkney,	MacGregor 1974, fig 18.
H	DA	Dun Cuier, Barra, Hebrides.	Young 1956, fig 13.
I–J	DA	Broch of Burrian, Orkney.	MacGregor 1974, figs 17 & 18.

Throughout the entire timespan in which they were used there is a sameness in the form of whorls which revolves around their being symmetrical and perforated, the tools available for manufacture, and the materials at hand (figs. 3,5-3,8). Perforated stone whorls of one period are indistinguishable from those of any other, as are those made from a flattened ball of clay, subsequently baked, or the ball joint of a humerus drilled through. Having said this a few broad trends may be discerned. In the first place there is local availability of material; the Vikings, for instance, were largely aceramic but had a high dependency on the soft, carveable stone steatite for vessels, and this material is used for whorls and not generally clay or pot-sherds. Secondly there are the occasions in which craftsmanship and technique override functional necessity; here we have the fine lathe-turned bone whorls found in both Saxon England and Early Christian Ireland. A large number of whorls, like spindles, would have been made of wood and hence not survived; the large example from Ireland figured (fig. 3,6) may have been used for plying.

Distaffs

The function of a distaff, as already noted, is to hold a convenient amount of fibres which are then gradually converted into yarn and wound onto a spindle. We have seen however that there are two different ways in which suspended spindle spinning can be carried out producing alternatively woollen or worsted yarn. In the first case only one hand is required, but in the second both must be free. It is exceedingly interesting in this context that there are basically two types of distaff. The Romans and the ancient Greeks (Wild 1970, 31; Patterson 1955, 82) used hand-distaffs, which are fundamentally short sticks about 20-30cm in length and are held in the left hand while spinning proceeds (fig. 3.1); these are still used in parts of Italy and the Balkans (Wild 1970, 31). In early medieval manuscripts (fig. 3.2), on the other hand, long distaffs are illustrated which whether tucked in a belt or free standing would leave both the spinster's hands free. In fig. 3.2 it can actually be seen that the spinster is applying draft before allowing the twist to the fibres. It seems likely that the two types of distaff are associated with the alternative methods of suspended spindle spinning and hence with different products.

Patterson suggested that some of the wooden 'spindles' from Irish crannogs were in fact hand-distaffs (1955, 81-2) and supported this

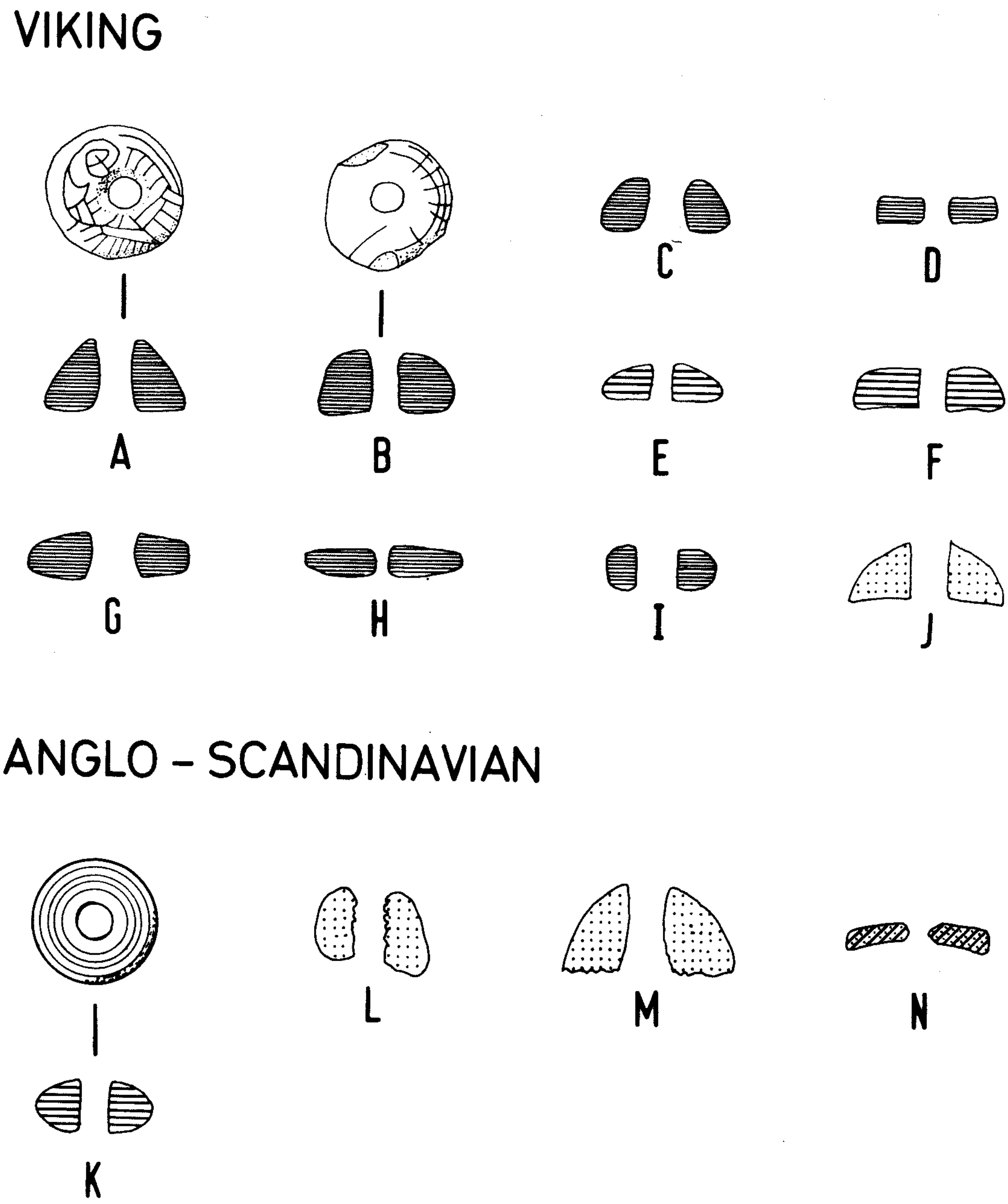


Fig. 3.8 (Top) Viking spindle whorls at 1:2.
(Bottom) Anglo-Scandinavian spindle whorls at 1:2.
(for sites, periods and sources see reverse of figure).

		Site	Source.
A–F	VIK	Jarlshof, Shetland.	Hamilton 1956, figs 56 & 66.
G–J	VIK	Brough of Birsay, Orkney.	C. Curle, Pers. Comm.
K	A–S	Hungate, York.	Richardson 1959, fig 19.
L–N	A–S	Lloyd's Bank, York.	Addyman forth.

idea with functional arguments. As he said, if the peg shaped ones were used point up then a whorl could not have been attached to them, while if they had been used point down the expanded top would have caused eccentric motion. The two with central embellishments he also thought to be distaffs because such a feature would be a nuisance on a spindle. It is interesting that many of the Roman ornamental distaffs have centrepieces (Wild 1970, 124) which obviously served to divide the part where the fibres were to be placed from the grip. Finally, if these objects had been spindles then it is likely that the whorls would have been found on at least some of them.

The spinning of yarns in the textiles; regional and period differences

It must be said at the outset that, for the period under consideration, plyed yarns are of no concern. They were used in the Bronze Age because the unplyed yarn was too weak but slight technological advances altered this so that, by and large, plying was only used for cords etc. where great tensile strength was required. The normal means of plying would be to spin two yarns together with a spindle in the direction opposite to their individual spin.

Yarns may be Z or S spun; with wool it is, theoretically, a matter of indifference but vegetable fibres are better spun in one direction or the other depending on their origin. Disregarding, for the moment, the natural predilections of certain vegetable fibres and taking as accepted that Z and S spun yarns are equally easy to make, we may consider what combinations of spinning direction we would expect to find in a large sample if chance was the sole factor. If large webs were preserved and the yarn units used for warping and weaving were of reasonable length then the odds are that, in most cases, Z and S spun yarns would occur in both warp and weft. If only portions of these webs were preserved then the proportions of Z xZ; Z x S; S x S instances would be approximate to 1; 2; 1, although this would be tempered by instances of mixed spinning ie M x Z; M x S; M x M, the incidence of which in small specimens would be contingent on the yarn unit lengths used. The situation in reality is in hard contrast to this theoretical one; people of different periods seem to have been, largely, quite conscious of the spin of the yarns they were using and intentionally combined them in different ways in all or particular types of cloth. Hald noted the following nine theoretical possibilities (1950, 424):

	Warp	Weft
1.	S	S
2.	Z	Z
3.	M	M
4.	S	Z
5.	S	M
6.	Z	S
7.	Z	M
8.	M	S
9.	M	Z

Hald's nine possibilities assume that it is known which system is the warp and which is the weft, whereas in practice it usually isn't. Disregarding distinctions between warp and weft the list of combinations narrows to the following - 1. - Z x Z; 2. - Z x S; 3. - S x S; 4. Mixed (M x M, M x S, & M x Z). This information is shown in fig. 3.9 by period for the thousand plus textiles of different weaves from this country for which it is known.

Finds from the prehistoric period are scant but they indicate that in the plain weaves of the Bronze Age warp and weft were spun in the same direction but that in the Early Iron Age S x S combinations went out of use and the combination of a Z system with an S one was introduced and used for the new four shafts as well as the two shaft weaves; Z Z was however the most popular combination throughout being used about six times as often as one would predict from chance.

With the proliferation of weaves in the Roman period the situation gets slightly more complex. Z Z is definitely the most popular for plain weaves with an occurrence of over thirty times its predicted rate; Z S only occurs twice in a sample of twenty-four, and S S never. The spinning combinations of the Roman twills overall are much more random but in the case of certain weaves, such as 2/2 herringbone and diamond, particular combinations may have been preferred.

The situation in the Early Saxon period is similar to that in the Roman but more extreme. Of the 186 examples of plain weave where spin is known a mere 9 are not Z Z and none are S S. Excluding mixed spinning, for the moment, this is an occurrence of 177 times the expected magnitude. The mixed category, of which where are six examples, are innovations for by this is not meant random mixing so much as 'spinning patterns'.

BRONZE AGE

	ZZ	ZS	SS	MIX	TOTAL
T	10*		6*		16*
H					
P	10		6		16
/					
2/2M					
◇					
/					
2/1M					
◇					
+Tw					
Tw					
?					
Tot	10		6		16

*inc plyed yarns

EARLY IRON AGE

	ZZ	ZS	SS	MIX	TOTAL
T	3	1			4
H					
P	3	1			4
/	3	1			4
2/2M					
◇					
/					
2/1M					
◇					
+Tw					
Tw	3	1			4
?	2	3			5
Tot	8	5			13

ROMAN

	ZZ	ZS	SS	MIX	TOTAL
T	21	2			23
H	1				1
P	22	2			24
/	1				1
2/2M	2		1		3
◇		4	1		5
/	1				1
2/1M					
◇					
+Tw					
Tw	4	4	2		10
?					
Tot	26	6	2		34

EARLY SAXON

	ZZ	ZS	SS	MIX	TOTAL
T	176	3		6	185
H	1				1
P	177	3		6	186
/	88	6		1	95
2/2M					
◇	9	10			19
/	10	1	1		12
2/1M					
◇					
+Tw	89	40	1	1	131
Tw	196	57	2	2	257
?	23	18			41
Tot	396	78	2	8	484

MIDDLE & LATE SAX.

	ZZ	ZS	SS	MIX	TOTAL
T	4	3	4		11
H					
P	4	3	4		11
/	1	9		1	11
2/2M					
◇		4		2	6
/	1		1	1	3
2/1M		2			2
◇	8				8
+Tw		2			2
Tw	10	17	1	4	32
?		2			2
Tot	14	22	5	4	45

OTHER DARK AGE

	ZZ	ZS	SS	MIX	TOTAL
T					
H					
P					
/					
2/2M					
◇					
/	1				1
2/1M					
◇					
+Tw					
Tw	1				1
?					
Tot	1				1

VIKING

	ZZ	ZS	SS	MIX	TOTAL
T	10	4			14
H					
P	10	4			14
/	2				2
2/2M					
◇					
/					
2/1M					
◇					
+Tw					
Tw	2				2
?					
Tot	12	4			16

MEDIÆVAL

	ZZ	ZS	SS	MIX	TOTAL
T	50	139	62	1	252
H		2	3		5
P	50	141	65	1	257
/	52	34	20		106
2/2M			1		1
◇					
/	11	33	4		48
2/1M					
◇					
+Tw					
Tw	63	67	25		155
?		1			1
Tot	113	209	90	1	413

Fig. 3.9 Spinning combinations of different weaves by period, (appendix X).

Mixed spinning only occurs once in the twills where we have the situation that for 2/2 diagonal twills (a sample contaminated with fragments of herringbones and diamonds) Z Z is preferred to Z S by 88 : 6 while S S again doesn't figure. This contrasts with known 2/2 diamonds where Z Z and Z S are almost equally favoured. In the case of 2/1 twills, which are all simple as far as is known, there are 10 Z Z examples and one each of Z S and S S.

The Middle and Late Saxon textiles show a direct contrast to previous ones in the same area. Not only are plain weaves uncommon and used for coarse cloth but little bother was taken about direction of spin. It is in the twills here that we get spinning patterns, but disregarding these, we have proportions of 1 Z Z : 9 Z S for 2/2 diagonals as opposed to 88 : 6 in the previous period and, while 2/2 diamonds were almost equally Z Z and Z S earlier in the Middle and Late Saxon material, they are all Z S. The 2/1 herringbones and diamonds, hitherto unrepresented, display a distinct partiality for Z S and Z Z combinations respectively. Here then we have a breakdown of interest in the coarse plain weaves and a particularization in the twills tempered by an almost complete avoidance of the S S combination.

The Viking textiles are few in number, though not so few as the 'Other Dark Age' ones for which spin direction is known, and it would be unwise to make any comment further than to say that S S seems to have been avoided and Z Z favoured.

In the Medieval period there is a complete breakdown of interest in spinning directions and the values obtained; both plain weave and twills are very close to what would be predicted. The number of cases we can be certain in the Dark Age textiles of which system is warp and which weft is pathetically small but this is not surprising as they are not easy to differentiate (p220). The following short table is taken from Appendix X

	Warp	Weft
Early Saxon	Z	Z
	Z	S
	Z	
	Z	Z
Late Saxon &	Z	S
Anglo-Danish	Z	Z
	Z	S
	Z	S
	S	S
	S	S

	Warp	Weft
Viking	Z	S

It can be seen from this that except in those rare instances where both systems are S spun the warp is always Z.

Finally, it would be of interest to know whether any distinction was made in making the yarn used for the warp and weft above and beyond spin direction. For this we only have yarn diameter measurements and descriptions for the Late Saxon textiles from Gloucester and the Anglo-Danish ones from Coppergate and Lloyds Bank, York. From this limited sample, which is nearly all wool, it can be seen (Appendix X) that generally the warp, or system thought to be the warp is either more or less the same diameter as the weft or supposed weft, or finer and harder spun.

CHAPTER FOUR

THE WARP-WEIGHTED LOOM

Description, modern parallels and ancient illustrations

Scandinavia has long been known to be the last refuge of the warp-weighted loom illustrated on Classical Greek vases (Ling Roth 1913, 34-35, Crowfoot 1936, 40-44) and a Hallstatt vessel from Ödenburg, Hungary (Henshall 1950, fig. 3). While the use of this loom in Classical Greece and Rome is evidenced by references in the literature as well as the loom-weights which commonly occur in all parts of Europe and the Near East, the main information about its appearance and use came from Norway, Lapland, the Faroes and Iceland.

This ethnological material was derived from museum specimens, literary references and travellers' illustrations and accounts (Broholm 1940, 112-116) and it was lamented that it had ceased to be used in the nineteenth century (Crowfoot 1936, 40, Henshall 1950, 144) in contrast to the horizontal ground loom and the vertical two-beamed loom. In the 1950's however Marta Hoffman (1964) discovered that while it had ceased to be used in Iceland in the early nineteenth century and in the Faroes in the early years of this one, it was extant on an island off western Norway and among the Lapps of Norway and Finland. While this discovery has the greatest importance for the interpretation of the archaeological record, Hoffman's conviction that the present looms are practically the same as the prehistoric ones (Ibid, 5) need only be accepted where there is evidence to support it.

The warp-weighted loom used in Scandinavia in the present and recent past

The looms from the Faroes, Norway, Iceland and Lapland do show differences in structure and mode of usage but these have been assimilated into the general picture. The loom of the Skolt Lapps of Finland is however so different that it has been dealt with separately.

The typical structure of the extant Scandinavian warp-weighted loom (fig. 4.1)

The two side beams (A, A') are about 200cms high and stand some 150cms apart; at the top of each there is a crotch (B,B'). Around two-thirds of the way down each beam a peg projects some 30cms and these have forked ends (C,C'). Two further pegs are to be found about three-quarters of the way down the beams (D,D'). Along the length of the beams there are sometimes, but not always, several holes (E,E').

A cloth beam (F) which is some 200cms in length rests in the crotches (B,B') at the top of the side beams. It is more or less circular in section except that there is usually a ridged edge along which a number of perforations occur at intervals. One end of this beam may be constructed to facilitate the easier turning of the beam and likewise there may be a device to prevent the beam from turning of its own accord when this is not desired. (G).

A rod heddle (H) is to be found either placed in the crotches of the pegs C,C' or lying on the pegs against the side-beams (A,A'). The heddle leashes are not usually permanently attached to this rod.

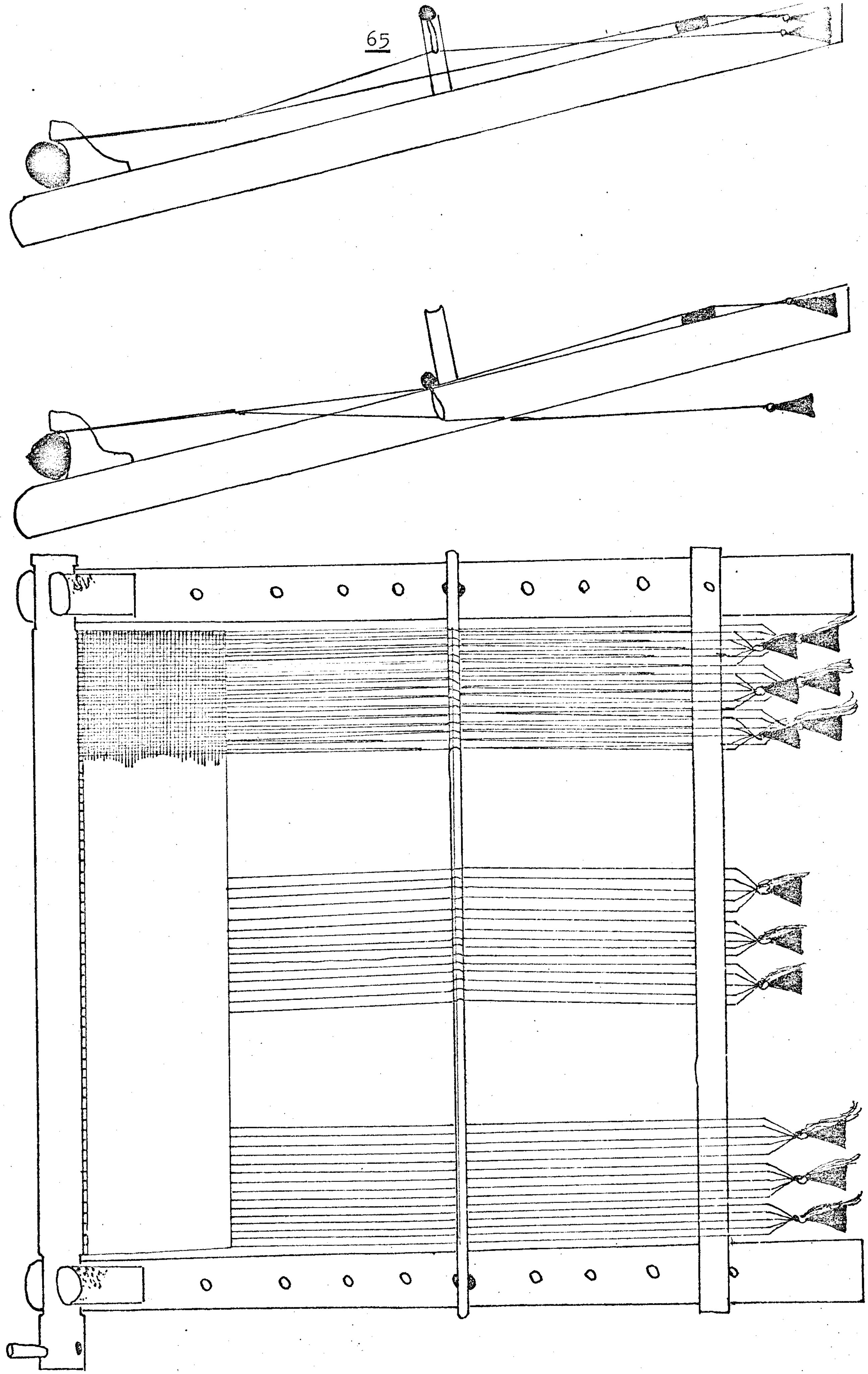


Fig. 4.1 Diagram of the warp-weighted loom.

The shed rod (I) is laid across the two pegs D,D' when weaving is in process.

The loom weights (J) which are attached to bundles of warp ends by a loop of cord tied either around them or through a perforation and may be made of any suitable material e.g. baked clay or stone.

Other items which may be associated with the loom are the pin-beater, the sword-beater, and a device for maintaining a constant width when the cloth is being woven.

The typical mode usage of the extant Scandinavian warp-weighted loom

In all cases the loom has been set at an angle to the vertical in order to obtain a natural shed. This could be done by leaning the loom against, for instance, a wall, a rafter or a large rock. Some of the looms have holes at the top of the uprights through which nails are hammered into a wall or rafter.

The warping requires that the warp be first measured into uniform lengths. This is done by winding it around pegs. In western Norway three upright pegs are used as they were in the Faroes. In Iceland, where great lengths of cloth were woven, the warping was done on the loom round pegs stuck in holes in the side-beams. Looms from the Faroes and western Norway frequently have these holes and this was possibly their purpose, although it is not documented. In the three areas mentioned a cord was put through the loops of the warp on the pegs so that when this cord was later attached to the cloth beam of the loom the warp would hang from it.

The Norwegian and Finnish Lapps have an entirely different system. The warping frame generally referred to (Hald 1950, 163) seems to be a modern localized invention but the principle is the same as when pegs are used by Lapps in different areas. Between two of the pegs are stretched a dozen or so threads which are divided into two sheds by a rigid needle. In effect this is a horizontal ground loom the length of which is regulated by the desired width of the finished cloth. A weft is then woven through this system so that while a selvedge is formed on one side the other consists of long loops of thread the length that the finished cloth is to be. This is done by taking loops of yarn from a ball through the shed of the horizontal loom and over a third peg. The warp of the horizontal loom becomes the weft of the starting selvedge of the warp-weighted loom while its weft hangs down as the warp. There are no rigid heddles known from prehistory and Hoffman (1964, 107) questions the dating of the supposedly Roman one found at South Shields, Durham (Wild 1970, 74). Wild does however mention two other Roman examples, one from Pompeii and the other from Pannonia (ibid).

The prepared warp is then sewn to the cloth beam of the loom along its ridged, perforated edge. Due to the height of the side beams this either means that the cloth beam has to be temporarily taken down or that the weaver has to stand on a support in order to carry out this operation. A method of warping where a thread is taken from behind the ridge through one of the holes, round a series of warp threads and then back through the hole is described by Hoffman for the Faroes, (1964, 147) but it is likely to be a modern innovation.

The shed rod is placed on its supports and the warp is divided into two sheds, one on either side of it. The loops of the warp are usually left as by twisting the warps near the starting border both sides of a loop can be brought into the same shed without hopsack cloth having to be woven. In Iceland however it would appear that they were cut.

The warp is next attached to the weights, the sheds being weighted independently. The weights may be weighed, marked with their weight and carefully balanced against each other in the two sheds. Heavier weights may be put at the ends of the warp in order to counteract the tendency for the sides of the cloth to draw in during weaving. The attachment of the warp is always to a looped cord which goes round or through the loom weight and never directly to the loom-weight itself. On average it would seem that one double end of warp is tied to the weights for every 250 gm of their mass. The weights themselves vary greatly in mass (those used by weavers Hoffman watched in western Norway had weights ranging from 1,250 gms to 4,500 gms) but this does not seem to have any effect on the weaving providing they are properly balanced and the weight is distributed fairly evenly between the threads in each shed.

The warp is usually spaced by chained cords being put through each shed above the weights. On some of the looms from western Norway the shed-rod has a number of pegs sticking out of it which would also crudely space the warp but this seems to be a localized and modern innovation.

The heddle (assuming only one is being used) is tied to the side beams and the leashes are knitted around the threads of the back shed. The length of these is gauged by eye. When the weaving is finished the heddle leashes are unravelled and the cord kept for future occasions.

The Icelandic sources provide the only real evidence of weaving having been done with three heddle rods although this is referred to in a proverb from the Faroes. An experiment was carried out by Hoffman (1964, 131-136) which showed that it was perfectly possible to weave four-shaft cloth on the warp-weighted loom, although rather than use an extra heddle the two weavers in western Norway Hoffman watched darned the third shed by hand.

The weft is formed into a skein with a hard head called by the Lapps ud'do and this is thrown through the shed. When more than one weaver is working at once they often exchange ud'dos where they meet and this means that a weft thread may pass through several sheds on its passage from selvedge to selvedge. The heddle is now lifted in the middle as it is very heavy. Either two people change the shed, one at each end of the heddle, or a single weaver lifts it one end at a time.

The Norwegian Lapps do not use any implement for beating up the weft. Either they use their fingers as one would a pin-beater or they take a group of warp threads from facing parts of each shed and pull them apart. Only the sword-beater seems to be known in western Norway but both the pin-beater and sword-beater are recorded from Iceland and the Faroes. Beating up is not done after every pick but rather after every half dozen or so. While beating up with the fingers may be suitable for the coarse blankets the Lapps and Norwegians presently weave it is doubtful if it would be as effective with finer materials.

The edges of the cloth have a tendency to draw inwards when weaving is in progress and this may be counteracted by the use of temples as in western Norway. In the Faroes pins were stuck through the sides of the cloth and these were tied to the side-beams. The Skolt Lapps actually sew the sides of the cloth to the side beams.

When weaving has progressed and the shed has begun to narrow the cloth is wound onto the cloth beam and the weights are tied lower on the warp bundles while the spacing cord is eased down.

The cloth is usually finished by fringing the bottom, the remaining scraps of warp being put to other uses.

The warp-weighted loom of the Skolt Lapps of northern Finland

The warp-weighted loom of the Skolt Lapps of northern Finland differs in a number of important respects from the looms found in other parts of Scandinavia and therefore deserves to be discussed separately.

The weaver works in the angle of the sloping loom, pushing the heddle away from her to create the artificial shed. The leashes of the heddle are made before the warps are put through them i.e. they are not knitted round the warps as everywhere else, and they may be permanent. The artificial shed is weighted by a pole with stones attached to it while the natural shed is tied to a horizontal pole which is fixed to the framework of the loom. In addition to this the beam cannot be rotated. The cloth is sewn to the side-beams as it is woven and when the shed gets too small this must all be undone, the cloth beam removed, the cloth wound round it, and the cloth beam replaced.

Other than these features the weaving of the Skolt Lapps has a great deal in common with that of the other Lapps. They have starting borders produced in a similar way, chained spacing cords, ud'dos, and they beat up the weft without any implements other than the fingers.

Hoffman is quite firm that 'The loom of the Skolt Lapps shows every sign of being a primitive imitation of a piece borrowed from a cultural area with a more highly developed technology' and her arguments are convincing. The Skolt Lapps have only had domesticated sheep for a very short time and put the wool to limited purposes which would not require them to be well versed in weaving techniques. Their loom is only mentioned here in detail because it shows conclusively that warp-weighted looms need not be the same in all details as those known from other parts of recent Scandinavia.

The warp-weighted loom of the Classical Greeks and Romans

The warp-weighted loom is mentioned in both Latin and Greek literature but the intention of the authors was not to give an accurate description of the loom or how it worked and so the usefulness of these references is limited. The best evidence comes from Greek vase paintings of the sixth to fourth centuries B.C. and a much destroyed marble relief of the fifth century (Hoffman 1964, 297-321). There are no comparable Roman representations but loom weights and written accounts both make it clear that they had the warp-weighted loom (Wild 1970, 62-3). Among other things, a discussion of the Classical warp-weighted loom is a useful way of gauging how certain we can be that the recent Scandinavian loom is really the same as the prehistoric one.

The warp-weighted loom of the Classical Greeks

Although some of the vase paintings are crude they give a good deal of consistent information - with the exception of two. These, a very fine painting on a sixth century lekythos now in the Metropolitan Museum of Art, New York, and one on a fifth century hydria, show a number of anomalous features and will be discussed separately.

The Greek loom consisted of two sloping uprights which were supported by struts meeting the uprights at about half their height, by being leaned against a solid structure, or both. The cloth beam could evidently rotate because in several of the paintings cloth is clearly shown wound on it. None, except possibly the Metropolitan lekythos, shows a spoke for turning the beam or any device for preventing the cloth unwinding of its own accord; this may be due to the artistic simplification. With the exception of the two paintings mentioned above they all have two lines drawn across the loom in the central region and, with the same exceptions, the way the weights are arranged indicates that the warp was divided into two systems. To divide the warp requires a shed rod and this must be what one of the transverse lines is intended to be. This being the case, then the shed behind the shed rod must have hung vertically and it seems most likely that the second line indicates a heddle rod to bring this system forward. On the one hand it is difficult to attribute any other function to this second rod while on the other weaving would be awkward if the back system (which lies so far back because of the slope of the loom) had to be brought forward by hand. In the absence of the heddle it would be better if the loom were upright as the second shed could then be taken up by hand with much greater ease. It seems reasonable therefore that the Greeks had the heddle rod but it must be admitted that there is no certain literary evidence for it (Crowfoot 1936, 43).

The painting on the lekythos mentioned has a number of differing features which cannot be dismissed as artistic inaccuracy because they are consistent differences which, in combination, produce a perfectly workable loom. There is only one thick rod crossing the uprights and this has crosses painted along its length. Where it traverses the uprights further crosses indicate lashing and at both ends what appear to be bobbins of weft are inserted in the lashing. Only one row of loom weights is shown. They are pyramidal and each has a number ofthreads attached to it by means of a ring. The fact that adjacent threads are attached to each weight is another indication that warp is not divided. (There is a sherd from Athens which shows loom-weights tied in the same way as on the lekythos (Hoffman 1964, 316-317). Above the thick rod are two thin ones which start at the edge of the cloth and meet in the middle.

The best interpretation that can be put on this painting is that it is intended to show an upright loom without a natural shed. The lower, thicker, rod can then be seen as a primitive reed spacing the warp by means of the threads lashed round it. One shed would be produced by lifting the two thin shed rods lying above this spacing rod while the other would be darned by hand, (Crowfoot 1936, 42-44). This painting is one of the earliest, and Hoffman has suggested that it might represent a less developed loom than the majority of the others although finds of loom weights in two rows from before the sixth century indicate that heddles were already known (Hoffman 1964, 310-312). It seems more likely that the loom was being used to weave cloth for which two permanent systems of warp would be more of a disadvantage than a help - eg. tapestry. Tapestry is quite clearly illustrated in another painting, that on a fifth century skyphos from Chiusi (Hoffman 1964, fig. 129).

The painting on the fifth century hydria also only indicates one rod and one row of weights (Hoffman 1964, 315) and the same interpretation can be put on this. Whether it leaned at an angle or not is irrelevant because while the angle would not be taken advantage of in tapestry weaving it might be a structural feature of the loom because the loom was designed for ordinary weaving as well.

It seems then that the Greek warp-weighted loom was very similar to the recent Scandinavian one and Hoffman goes as far as to suggest that they might have used more than one heddle although she has no clear evidence (Hoffman 1964, 318-319). A certain simplification of the loom appears to have been made when tapestry was woven. This is something which we cannot parallel in Scandinavia but it is reasonable. Particularly interesting are the light shed rods shown on the Metropolitan lekythos which could be inserted and taken out at will.

The minor tools associated with the Greek loom are well documented. The bobbin, which can be seen in several of the paintings, consisted of a stick on which the weft was wound. The spacing cord, sword-beater and pin-beater are not shown with any certainty in any of the paintings but are known from the literature (Hoffman 1964, 319-321). Crowfoot (1936, 45-46) suggests that the stick in the hand of one of the weavers on the Metropolitan lekythos may be interpreted as a pin-beater although it is not certainly one.

The Roman warp-weighted loom

Unfortunately there are no Roman illustrations to assist us in envisaging what their warp-weighted loom was like. Wild cannot however find any disparities between the literary references and the type of loom found in Scandinavia (1970, 61). The weaving comb is not associated with the warp-weighted loom although it is found later in connection with the two-beamed one (Wild 1970, 72). The characteristic Roman tools seem to have been the pin-beater and sword-beater, both being mentioned in the literature (Wild 1970, 67).

According to two Roman authors writing about 63 A.D. and 180-192 A.D. the warp-weighted loom was being rapidly displaced at the time by the two-beamed vertical one in the Mediterranean provinces and Italy but it appears to have been used until at least the fourth century in Italy, if only for specialized purposes, and later elsewhere in the Roman world (Wild 1970, 67-68).

The warp-weighted loom on the Ödenburg urn

The representation of weaving on the Hallstatt vessel from Ödenburg, Hungary is highly conventionalized (Henshàll 1950, fig. 3). The weaver can be seen to be standing on the left of the loom but her feet are not on the same level as the loom-weights which are clearly depicted. This could easily be interpreted as showing that either the weaver stood on a support to raise herself to a working height or that a pit had been dug beneath the loom. The reason for this may have been that while a length of cloth greater than the weaver's height was desired the loom was not fitted with a cloth-beam - certainly one isn't depicted. Eight paired loom-weights can be seen and the convention by which they are shown may have been meant to indicate two sheds. It is difficult to decide what the three rods are meant to be which cross the warp as they have just been schematically drawn in. If the loom-weights are taken to be in one rather than two rows then it is possible that the lowest (which looks different from the other two) was a shed rod while the other two further up were leash heddles. With the three sheds so provided three shaft twill (i.e. 2/1) could have been woven (but there is no evidence for it at this date). If, on the other hand, the loom-weights are taken to be in two rows then the weaving of three shaft twill would be impracticable according to Hoffman (1964, 251), but then it is difficult to imagine what three rods would have been used for. Plain weaving would only require two, and simple twills (other than 2/1) four. Considering the highly conventionalized nature of the representation it is likely that it is not an exact reproduction of a loom and ought not to be treated as such.

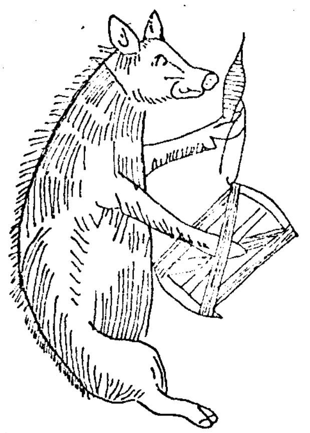
Implements and practices associated with the warping of this and the vertical two-beamed loom

As we shall see, the introduction of the horizontal treadle loom brought with it sophisticated implements which replaced what would have been simpler ones.

The Reel

After spinning, the yarn has to be taken off the spindle and stored in a form in which it is easily useable. The simplest method is to wind it into a ball but alternatively it may be made into a skein by winding it round two fixed points. Although this adds another stage to the process (for the yarn has to be re-wound into a ball before it can be used again), it has the advantage of permitting dyeing and allowing quantity to be accurately checked. Any two fixed points will do, even the distance between the hand and the elbow, but the traditional and more efficient implement is the stick reel which consists of a handle with a cross bar at each end. The yarn is wound round in the form shown in fig. 4.2.

There is no very solid evidence, by way of archaeological finds,



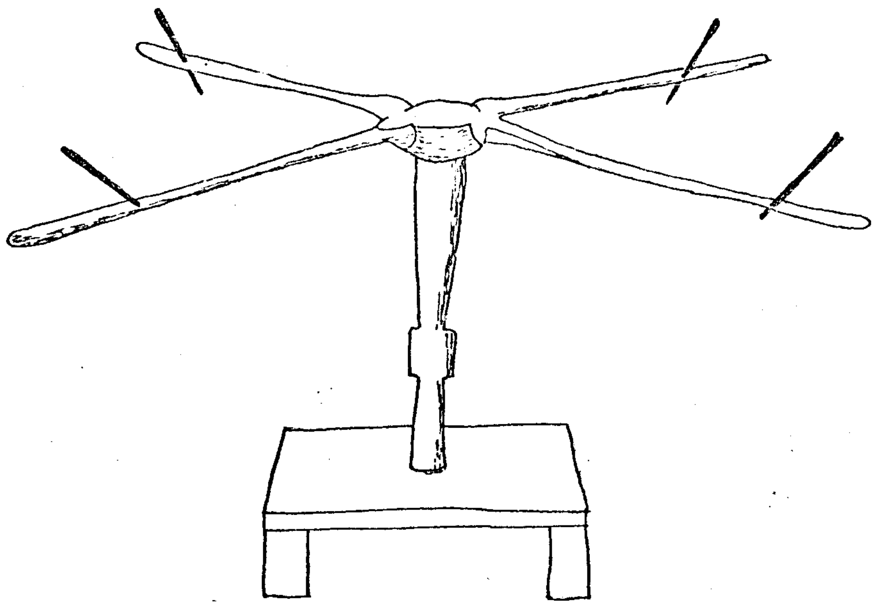


Fig. 4.2 (Top) Pig with stick reel ; from German woodcut c1490, (after Hoffman 1964, fig 123).
(Bottom) Swift from the 9th century Oseberg ship burial, Sweden, (after Hoffman 1964, fig 124).

literary references or illustrations, for the use of the stick reel in the ancient world. The skeins in the Tegle Find in Norway (3rd-4th century A.D.) are the first evidence for this additional process (Hoffman 1964, 290, fig. 120) and the earliest dated reels are from the Oseberg ship burial (mid 9th century A.D.) where there were two present (Ibid 291, fig. 122). The word hespa which occurs in Old Norse literature and also in many of the other old Germanic languages apparently means a tool on which to make skeins (Ibid, 290); nearer home, the list of weaving equipment in the early 11th Century Gerefa includes a 'reol'.

The swift

The swift is a pair of crossed timbers which rotate on a vertical axis; along them there are pegs which can be set at different distances so that large or small skeins can be accommodated. While the yarn is being made into a ball the swift is meant to spin round freely.

One of these was in the 9th century Oseberg find (Hoffman 1977, fig. 124)(fig. 4.2) and according to her the old word is Garnvinda (Ibid 294); following the 'reol' in the Gerefa we have 'gearnwinden'.

Ball cage

As neither shuttle or spool rack was used to our knowledge a spool winder would not have been necessary. The place of the spool rack, supposing warping was done with more than one thread, could have been taken by a series of boxes with holes in, through which the end was taken; this was the practice in Denmark in the last few centuries (Hoffman 1964, 386). With the vertical two beamed loom and the warp-weighted one it is not practical to use more than a few yarns at a time in warping.

Warping

The warping board was necessitated by the long yarns associated with the horizontal treadle loom and the craft industry it instigated. With the warp-weighted loom it is important that adjacent threads lie side by side and are incorporated into a heading; warping is intimately involved with this process which requires a tablet or band loom and one or two pegs which will give the required length. The vertical two-beamed loom, as we understand it, is just warped around itself and requires no additional piece of equipment.

Evidence for the warp-weighted loom in Dark Age Britain

Although the above ethnographic and historical parallels give us a fair idea of what the warp-weighted loom was like and how it was used it will be seen that they themselves differ in detail, and in order to get a more faithful account pertaining to Dark Age Britain, we must first adduce the evidence for its existence and then compare and contrast it with the ideas given by the examples cited. The evidence is best dealt with under a number of headings, namely - literary and pictorial; loom-weights, other parts and 'weaving huts'; associated minor tools; textile peculiarities.

(1) Literary and Pictorial evidence for the warp-weighted loom in Dark Age Britain

Considering the connotations of the term the period we are discussing goes under - the Dark Ages - it is not surprising that there is no extant illustration or indubitable literary reference to the warp-weighted loom in spite of the fact that it is so fully attested in the archaeological record. Having said this it must be recorded that in Njals Saga, itself probably written down in Iceland in the 13th century, is a poem, the Daraddaljord, which may be of 11th century Scottish or Irish origin and which incorporates a detailed description of the warp-weighted loom. In the Saga this poem immediately follows the account of the battle of Clontarf which took place outside the walls of Dublin on Good Friday 1014 between Brian Borumb, the high king of Ireland, and Sigurd, Earl of Orkney. On the occasion of the battle various visions were seen in parts of Britain and Scandinavia and one of these was that of a man called Dorrud who lived in Caithness. He was out walking when he saw twelve riders go to a building; looking in he saw that they, the Valkyries, had set up a loom using men's heads as weights and entrails as warp and weft whereon they wove the web of slaughter while reciting the poem. At the end of the poem they enjoined Dorrud to memorize it and, tearing down the web and dividing it between them, they rode away. While the majority of scholars believe the poem was composed not long after the battle, whether it was in the British Isles or in Iceland is a matter of contention. Kershaw, for instance argues that it is of Irish origin (1922, 116) while Magnusson declares it to be Icelandic (1910, 76). We do not know therefore whether the facts contained in the poem about the warp-weighted loom have any relevance to its use in Britain in the 11th Century; most of the translations of the poem however have been done in partial or complete ignorance of the workings of a loom and I am grateful to John Swannell for having very carefully translated the Islensk Fornrit text with this in mind (Sveinsson 1954, 454-58).

THE DARRADARLJOD

1. Widely is warped (the) hanging cloud
vítt er orpit reiðiský
(of the) beam, foreboding (the) fall of the slain;
rifs fyrir valfalli
(it) rains (with) blood: now (the) web
rignir blóði nú vefr
(of) men, grey (with) spears, is raised
verþjóðar grás geirum er kominn
up, which the friends (of) Randver's
upp er þær vinur Randvés
Slayer fill (with a) red weft.
bana fylla rauðum vepti

2. That web is warped (with the) intestines
Sjá vefr er orpinn þermum
(of) men, and weighted
ýta ok harð kléaðr
(with) heads (of) men; there are bloodstained
hofðum manna eru dreyrrekin
spears for heddles, (the)
dorr at skoptum yllir
mounted with iron, and (the web is) beaten with arrows;
járnvarðr en hrælaðr orum
Let us strike this web of victory
skulum slá þenna sigrvef
(with) swords.
sverðum

3. Hildr goes to weave and Hjorprimul,
Hildr gengr vefr ok Hjorprimul

Sanngridr, (and) Svipul, (with) drawn swords;
Sanngriðr Svipul togaum sverðum

(the) spearshaft will crack. (The) shield will
skapt mun gnesta skoldr mun

break, (the) hound of the helmet will
bresta hjalmgagarr mun

come upon (the) shield.
kona hlif

4. Let us wind, let us wind (the) web
vindum vindum vef

(of the) spear, which (the) young king
darraðar þann er ungr konungr

has experienced before! (We) shall
atti fyrri skulum

go forward and rush into (the) host,
ganga fram ok vaða i folk.

where our friends share weapons (i.e. fight).
þar er várir vinir skipta vapnum

5. Let us wind, let us wind (the) web
vindum vindum vef

(of the) spear and then let us follow (the) king!
darraðar ok siðan fylgjum siklingi

There Gudr and Gondul, who
Þar Guðr ok Gondul er

protected (the) king, see (the) bloody
hlifðu grami sjá blóðgar

shields (of) men.
randir bragna

6. Let us wind, let us wind (the) web
Vindum vindum vef.

(of the)spear, where (the) banners
darraðar þar er vé

(of) warriors rush (forward).
vigra manna vaða

Let us not allow his life to perish;
Latum hans lif farask

(The) Valkyries have
valkyrjur eiga

choice (of the) slain.
kosti vals

7. Those people who formerly inhabited
Þeir lýðir er aðr byggða
outlying headlands will rule
utskaga muna raða
(the) lands; I say (that) death (is)
londum er kved dauða
determined (for a) mighty prince; now
raðinn rikum gram nú
(an) earl has sunk down
jarlmaðr er hniginn
before spear-points.
fyrir oddum

8. And (the) Irish will suffer sorrow
ok Irar mun bíða angr
which will never be forgotten
pat er mun aldri fyrnask
(by) men. Now (the) web is woven,
ýtum Nú vefr er ofinn
and (the) field reddened;
en vollr roðinn
baleful tidings of men will
laespjoll gota munu
fare through (many) lands.
fara um lönd

9. Now it is terrible to look around,
Nu er ógurligt at litask um
for (a) bloody cloud is drawn across
er dreyrug ský dregr með
(the) sky; (the) sky will (be) dyed
himni lopt man litat
(with) men's blood, when
lyða blóði er
women of battle chance to sing.
söknvarðar kunnu syngja

10. Well have we recited many
vel kváðu fjolð
songs of victory about (the) young
sigrhljóða um ungan
king, Luck to our singing!
konung syngjum heilar
and let that (man) who listens to
en hinn er heyrir á
(it) learn by heart (the) songs
nemi hljóð
of the spear-women, and tell (it) to men.
geirþóða ok segi gumum

11. Let us ride fast away from here
Riðum hart ú brant heðan

(on) bare-backed horses, (with)
berum hestum

drawn swords.
brugðnum sverðum.

The mention of the loom in the poem is, of course, highly symbolistic and the meaning of technical words, where given, can now only be tentatively translated; with this in mind, however, the following relevant pieces of information may be extracted

1,1-2. "Widely is warped the hanging cloud of the beam" - this is the warp attached to the warp beam (Cleasby & Vigfusson 1957).

1,3-6. "Now the web....is raised up, which.... (the Valkyries) ....fill with the red weft." - the making of the sheds and the passing of the weft.

2,2-3. "and weighted with heads of men" - bizarre loom-weights.

2,3-4. "there are bloodstained spears for skopton. Skapt or Skaft, plural skopt, is rendered in Cleasby & Vigfusson as the beam in a weaver's loom (1957); this is rather vague and Kershaw, no doubt correctly, takes the word to mean a heddle (1922, 119, 192), which a spear would be very close to in shape.

2,4-5. "(the) Yllir mounted with iron." - it is not clear what yllir means. Cleaby and Vigfusson again gives it as a beam in the upright loom (1957); Finnbogason that they were the wooden pegs which projectd from the side beams to house the heddles; while Kershaw, passing over the possibility that it may be a shed rod, ends with the idea that it may be a kind of teasel (1922, 192); in fact it is not fully known what this was or what it was used for (Sveinnson 1954, 454 (note 4)).

2,5-5. "and (the web is) beaten with arrows." - there can be no doubt here that the arrows are being used here as pin beaters (sing. hraell) as the verb used (hraela) means the use of such an implement (Cleasby and Vigfusson 1957).

2,6-7. "Let us strike this web of victory with swords." - the similarity between a sword and a sword beater is obvious here and the verb used (slá) in connection with vef (web) would mean to beat the loom in weaving (Vigfusson); i.e. to slay the weft (Kershaw 1922, 193).

3,1-2. "Hildr goes to weave and Hjorprimul, Sanngridr and Svipul." - i.e. four persons weaving at one loom.

4,1-2. "Let us wind, let us wind the web of the spear." - this is a literal translation and Kershaw is quite incorrect to take it as 'twisting the web' and to interpret this as the passage of the weft through the warp (1922, 119, 193); it really means to wind up on the cloth beam what has already been woven (Finnbogason 1944)

The person who portrayed the Valkyries weaving the web of slaughter in this poem was accustomed to a warp-weighted loom, and one of a certain degree of sophistication; it was capable of being worked on by four people at once who used sword beaters, pin beaters, and more than one heddle, and it had a cloth beam (to which the warp was initially attached) on which the cloth could be wound as woven. The problem of course remains of whether this relates to an 11th century Icelandic or British loom. If the former the, incidentally, additional information is provided in the Jomsvikings Saga where, in a dream, "one of the weights fell down behind from the middle of the cloth" and was then seen as a head (Blake 1962, 10); the inference here is that the weights, and warp, were divided into a front and a back set and that the loom had a shed rod.

(2) Loomweights

The existence of the warp-weighted loom in our period is amply testified to by finds of loom-weights. Indeed their abundance gives the impression, which may be true, that the warp-weighted loom was the most popular, or perhaps the only, type of large loom in use but it must be realised that the others do not have any such imperishable components. Because the existence of loom-weights is incontrovertible evidence for the use of the warp-weighted loom, it would seem impossible to work out exactly in which areas the loom was used and for how long. The blank areas on the map could then be interpreted as negative evidence for the use of another type of loom. This approach is unfortunately rendered invalid however, at least at a detailed level, by three factors which loom-weights share in common with other items of 'weaving equipment' - the uneven spread of excavation, the problem of whether all the objects we call loom-weights were actually used as such, and the worry that we are not in possession of information about every type. With these provisos in mind it is however possible to draw some conclusions about the use of the warp-weighted loom from the distribution of loom-weights but it is first necessary to look at the problems of function, identification and preservation in greater depth and to define and discuss the types found in Britain.

Many functions have been suggested for loom-weights of different types and period. Some varieties of prehistoric ones, for example have been described as spit rests, sheep holes, fire-bricks, trade weights, bricks, clay hammers, hoes or, more realistically, as net sinkers or thatch weights (Hedges 1973, 110-12). To these may be added, for the historic period, the suggestion that the ring-shaped Anglo-Saxon clay weights were used to stand round-bottomed pots on both in and out of the fire, (Dunning 1932, 290). It is possible to argue against proposed functions individually e.g. that although Early Saxon weights could have functioned in this suggested capacity their form changes with time and the later ones definitely could not; that the wear marks often found radiating from the central perforation are incongruous with this suggestion; that Saxon pots are in fact only rarely round-bottomed; or that no-one really needs several hundred pot stands in the same house. Another pertinent case is that although early Saxon lead weights are very similar to net weights some were found at Stevenage at some distance from water where they could be put to this use. What would be more satisfactory would be a positive line of argument. There is however only one circumstance which is conclusive and that is when loom-weights are found as they fell from a loom which was deserted or burnt when in use; this only happens rarely (table 4.1) and in this country all eight cases have involved Saxon clay weights and the few foreign examples are unfortunately of no use to us in trying to substantiate the identification of our other types. The case for these rests on their being of a suitable size, as judged by modern parallels, the fact that they sometimes occur in large uniform groups, and that alternative functions seem less plausible. This is of course no proof and in the case of a few types, particularly the finely turned stone examples that occur in ones and twos on sites in the west, the identification may well be suspect and this should be borne in mind.

Table 4.1 Occurrences of lines of loom-weights on sites

Site	Period	No.rows	Length*	Total Wts.	Comments	Reference
Troy, Greece	Mid 3rd millennium B.C.	'several'	110cms*		Post-holes	Blegen 1950,350 353,fig. 461
Niemitz, Guben Germany.	La Tène	2	60 cms		-	Hoffman 1964,312
Bornholm, Denmark.	Migration	2	-		Post-holes	Ibid,fig. 131
Grimstone End, Suffolk.	Pagan Saxon?	2	244cms	63	-	Brown 1954, 198, pl. XXIV
		2	-		-	Ibid
Upton, Northants.	Pagan Saxon	2	100cms. (approx.)	18	-	Jackson 1969,210, fig.4.
		3	40cms. (approx.)	30	-	Ibid.
West Stow, Suffolk.	Pagan Saxon	1	90cms. (approx.)	10	-	West 1969, fig.3.
		1	60cms. (approx.)	18	-	Ibid.
		1	60cms. (approx.)	8	-	Ibid
St. Cross, Hampshire.	Late Saxon/ Norman	1	170cms*	22/3	Post-holes	Hedges forth. (G).

* Distance between post-holes.

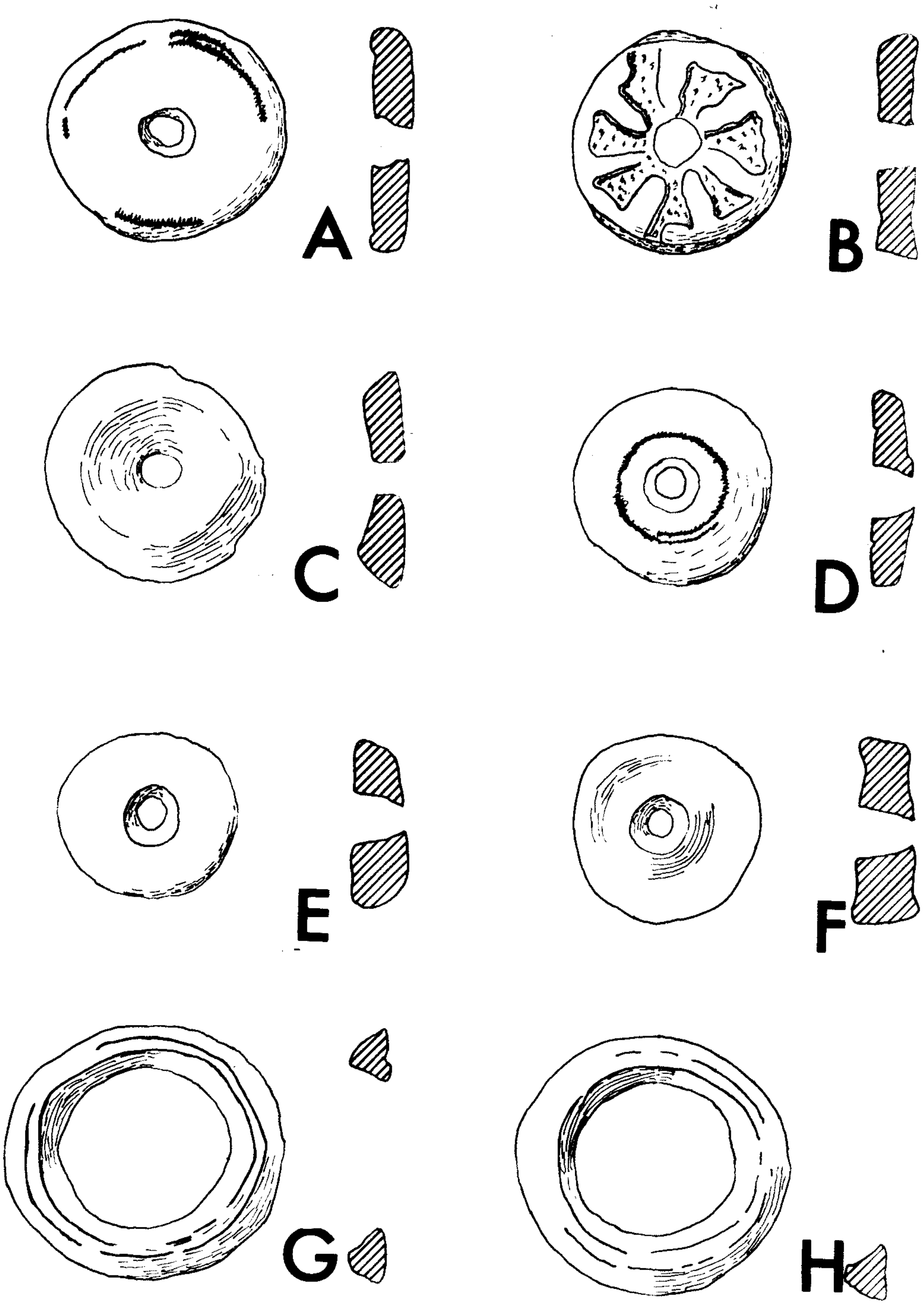


Fig. 4.3 Early Saxon lead loom-weights types a & b at 1:2 ; A-H (for sites, periods and sources see reverse of figure).

		Site	Source
A	ES	Hanwell, Middlesex.	Wheeler 1935, fig 19.
B	ES	Lower Warbank, Kent.	Philp 1973, fig 49.
C	ES	Mucking, Essex.	M. Jones, Pers. Comm.
D-F	ES	Linford, Essex.	Barton 1965, fig 17.
G&H	ES	Mucking, Essex.	M. Jones, Pers. Comm.

All of the loom-weights hitherto mentioned as such in site reports have had two things in common; they have been of a suitable weight and they have been perforated. Only the former is functionally necessary, modern parallels include unperforated weights (Hoffman 1964, 21), and it is almost certain that objects which were used as loom-weights have not been recognised as such. This means our information is probably incomplete and to this factor may be added that of the vagaries of preservation. Just because some loom-weights were made of durable materials doesn't mean they all were; unbaked clay weights have been identified at the early Saxon site of Mucking in Essex and two wooden ones were found at the later iron age village of Wijster in Holland (Van Es 1967, 135, fig. 65).

(a) Lead, type A

Weights in this group take the form of a flat disc with a central perforation (fig.4.3A-F).The latter usually tapers and, as suggested by Wheeler (1935, 139), seems to have been made with a bluntly pointed stick when the lead was cooling in its mould; the contraction of the metal during this process accounts for the indented rings often found on the upper surface of these objects (fig. 4.3, A.D.). Barton (1965, 100) considered that previously prepared clay moulds were used but there is no evidence for this and any plastic substance such as sand or mud would have sufficed.

The shape of these weights is diverse and on a superficial examination it seems that thin ones with a large diameter are clearly distinguishable from thick ones with a small diameter and might perhaps be seen as two groups. There are however so many intermediate forms that such a division would add a precision unwarranted by the material. Barton's typology (1965, 100) not only cannot be generalized but does not even seem to fit the loom-weights from Linton, which he was reporting on.

This type has only been found on five settlement sites so far. These are all 5th-6th century and cluster around the Thames estuary (fig. 4.4).

	No. in sample	Average	Range
Weight	34	220gms	140-374gms
Diameter	36	5.6cms	4.5-7.0cms
Thickness	36	1.1cms	0.7-1.6cms
Perforation diameter	36	1.3cms	0.7-1.9cms

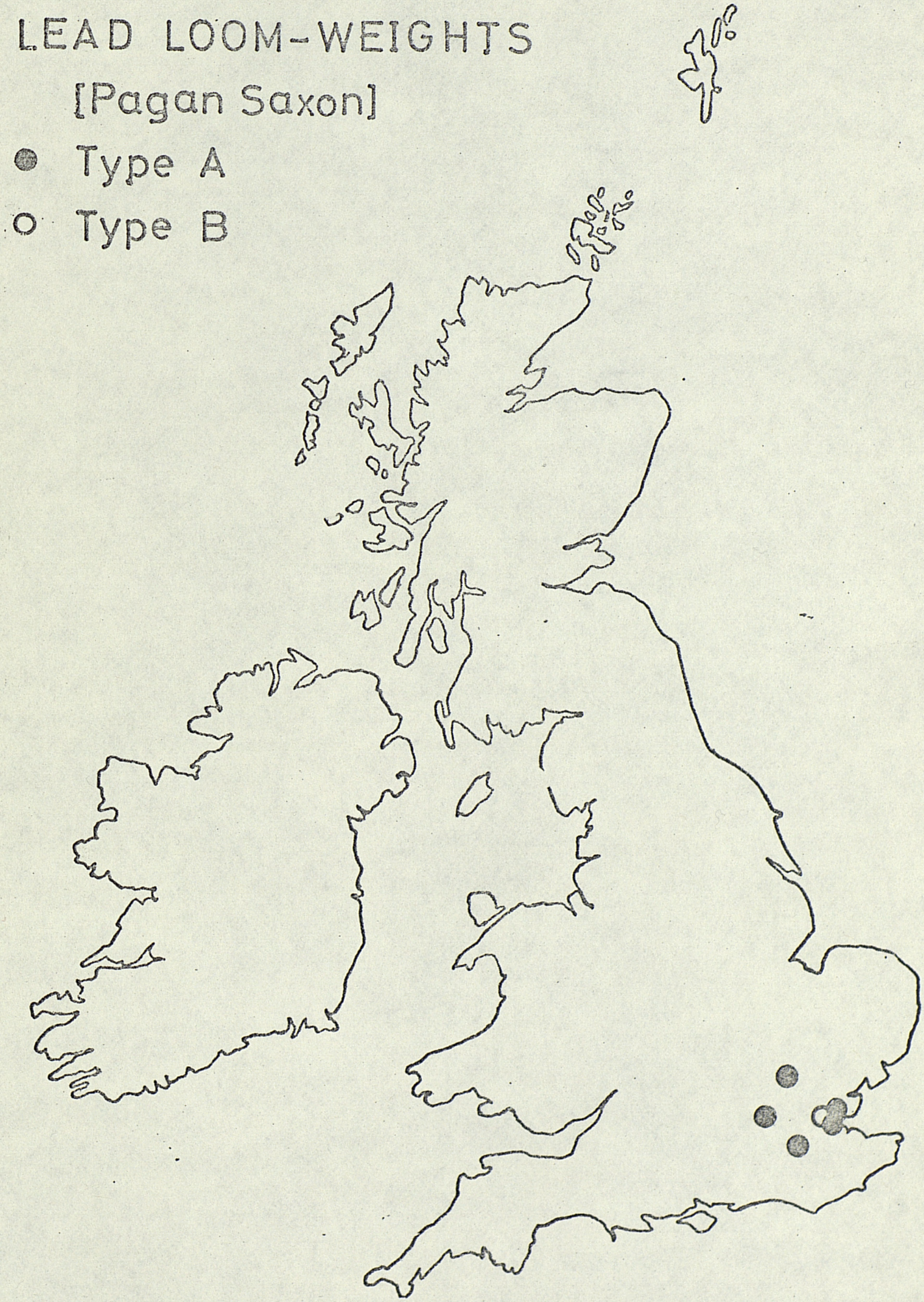


Fig. 4.4 Distribution of Early Saxon lead loom-weights (appendix IV).

One of the weights from Mucking has a shape intermediate between that of types A and B. Its weight is 256gms, and its diameter, thickness and the diameter of its perforation, 6.3 0.9 and 2.3cms respectively.

(b) Lead, type B

The shape of the weights in this group is most accurately described as annular although they should not be referred to as such to avoid confusion with ones of that name of baked clay. The rings are triangular in section, the flat surface often bears signs of the contraction of the metal during cooling, while the inner surface is usually smooth and curved in such a way as to suggest a former, and the outer one is somewhat irregular. In the case of one of the weights from Mucking no former seems to have been used.

This type has only been recovered from Mucking, Essex as yet; this is within the tightly clustered distribution of type A (figs. 4.3, 4.4).

	No. in sample	Average	Range
Weight	4	237gms	200-291gms
Diameter	4	7.3cms	6.8-8.0cms
Thickness	4	1.1cms	1.0-1.2cms
Perforation diameter	4	4.1cms	3.3-4.8cms

(c) Clay, Saxon type

Weights in this broad category are not dissimilar to enlarged spindle whorls - they are circular in one plane, relatively flattened in the other, and have a central perforation (figs. 4.6, 4.7, 4.8). The degree of finish desired in the manufacture of these objects seems to have varied widely. At one extreme are perfectly formed and baked ones while at the other are those crudely made from coarse tempered clay which has often been only imperfectly baked. The identification of hundreds of blobs of green clay at Mucking as loom-weights (Pers. Comm. M. Jones) brings the question of preservation into the discussion; there can be little doubt that, although they are rarely preserved, these weights were often of unbaked clay. Unbaked clay weights are perfectly serviceable in use and have been found on at least one other

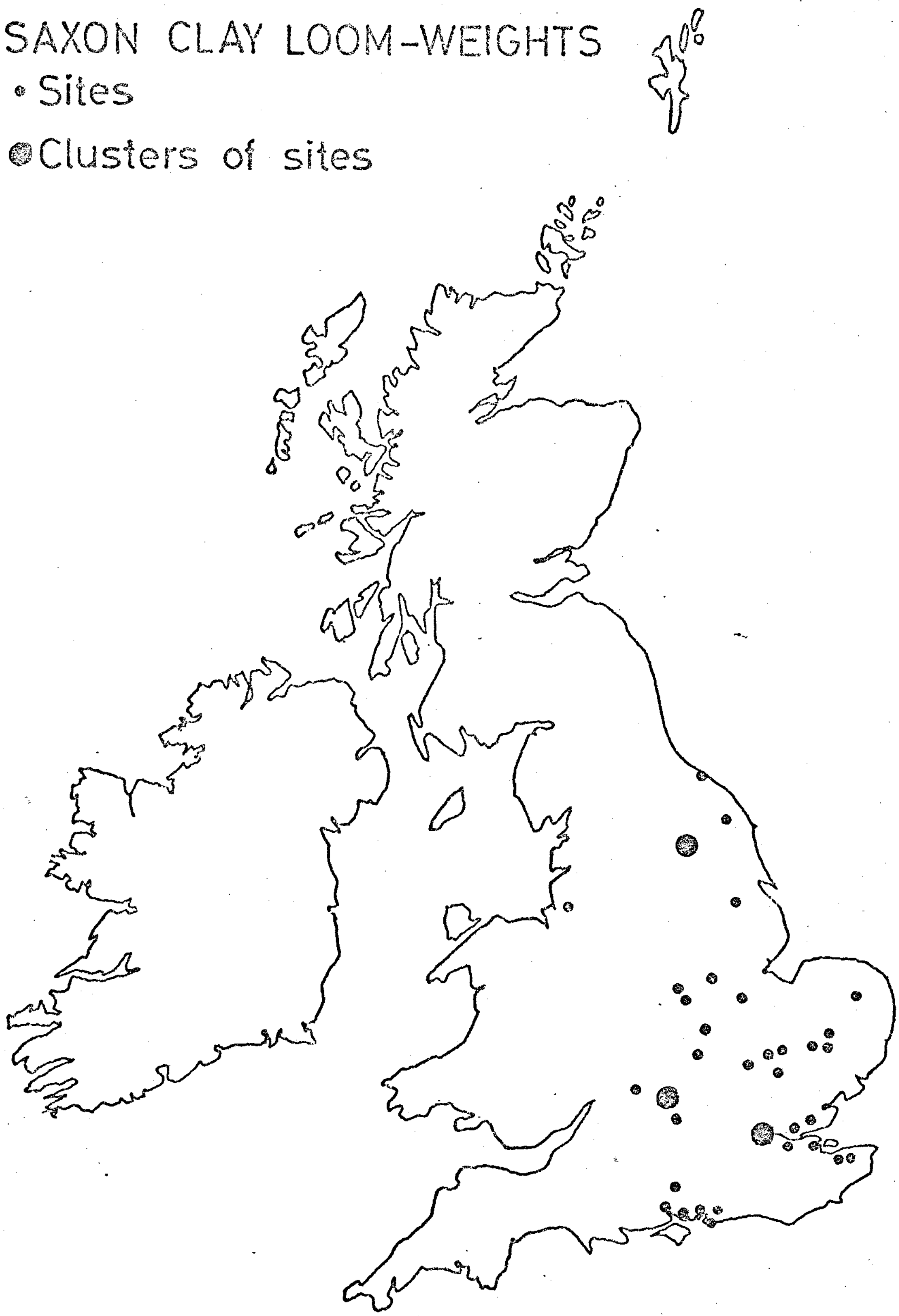


Fig. 4.5 Distribution of Saxon clay loom-weights (appendix IV).

site, albeit of a different period (Orray 1953, 274).

This type of weight not only has a wide distribution contiguous with that of the Saxons (fig. 4.5) but was in use from the time of the earliest occupation - as at Portchester, Hants.(Appendix 1V) - to certainly the eleventh and even the twelfth century, as at St. Cross Winchester, Hants, Rochester, Kent, and Oxford. It is inevitable considering this, the plasticity of clay, and the functional unimportance of exact shape, that the weights will vary in form, and this is shown in the table below.

	No. in sample	Average	Range
Weight	131	732 gms	148-1460 gms
Diameter	174	12.2 cms	7.2-18 cms
Thickness	113	3.7 cms	2.0-9.0 cms
Perforation diameter	166	3.4 cms	1.4-10.0 cms

It was Wheeler who first noted that there was a chronological trend in this and he asserted that weights with a relatively large central opening, distinguished as the 'annular' type, belonged to the earlier Saxon period, while later ones, which were 'bun-shaped' and more massive had similar piercings (Wheeler 1935, 154 fig. 131; fig. 4.6). This typology has recently been modified in the light of further finds by Dunning (1959, 23-25, fig. 6; fig. 4.6). While agreeing with Wheeler in principle, he considered that a third type 'Intermediate' in form was in use in the middle-Saxon period (examples of which Wheeler had inadvertently cited and figured as 'annular') and that while early Saxon loom-weights were made as rings those later in date had been made as discs which had then been pierced.

Although these typologies are vague, they do assert that there is a correlation between period (early, middle and late Saxon) and type of weight (based variously on size, shape, diameter of hole and method of perforation). With a view to testing this, information has been gathered about a large number of dated weights (Appendix 1V).

Wheeler's original statement that late weights were more massive than earlier ones was based on a very small sample, for which this was true (1935, 154). As can be seen from the relevant histogram in fig. 4.9 the mass of a weight has no dating value whatsoever, but this is not to say that differences do not exist between the periods. The histograms

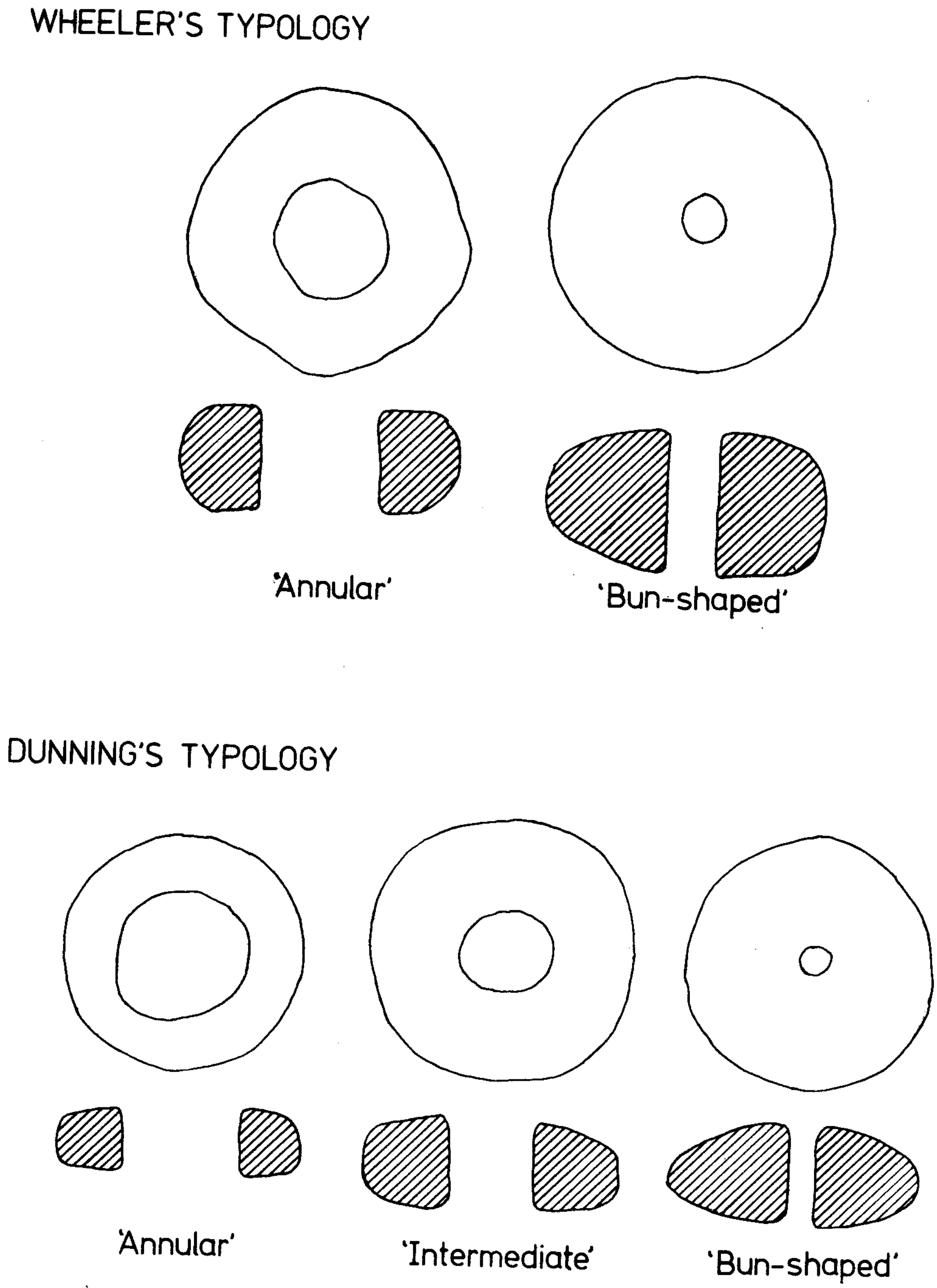


Fig. 4.6 (Top) Wheeler's typology of Saxon clay loom-weights, (after Wheeler 1935, fig 31).
(Bottom) Dunning's typology of Saxon clay loom-weights, (after Dunning 1959, fig 6).

indicate that in the early Saxon period weights were roughly made to a standard size and this is shown by a more or less normal curve. The histogram for the late period on the other hand is clearly different and while it does owe its shape to an extent to the inclusion of three sets, from Rochester, Kent and St. Cross, Winchester, Hants, it would seem that weights were being manufactured purposely over a range of sizes. The histogram for the middle Saxon sample appears to reflect an intermediate situation.

The shape of the weights is something of a subjective index. The thirty-six cross-sections of dated weights shown in figs. 4.7, 4.8 are sufficient to cast suspicion on any simplistic equation between a definite shape and subdivision of the Saxon period. This notwithstanding, the early Saxon weights are mostly in the form of a ring with a relatively large central opening ('annular') while the middle and late ones have either been formed around e.g. the thumb or have been perforated when wet with a stick (i.e. they are 'intermediate' or 'bun-shaped'). Attempts were made to quantify this by measuring the diameter of the perforations of a sample and by relating this figure to size by dividing it into that for the overall diameter (fig. 4.9). It can be seen that the size of the perforation is not a certain indicator of period but that the early weights do on average have larger perforations than the middle and late ones. Between the latter there seems little or no difference but the last set of histograms give a slight suggestion that this may be because of a relationship between the size of the perforation and the size of the weight. It would seem that the main value of Wheeler's and Dunning's typologies is at a descriptive level in that there are loom-weights which are 'annular', 'bun-shaped', or 'intermediate' in form between these two. These are not however discrete classes; the divisions between them are artificial and not as clear as it has been believed. It has moreover been shown that while a difference exists between the early weights on the one hand and the middle and late on the other, there seems to be no distinction between the latter. The relationship of form to period is far from a precise correlation and loom-weights should never be used to date sites or features. The fact that two sets of weights, one 'intermediate' and the other 'bun-shaped' were found in the same hut in Winchester, is a sufficient illustration of the point being made (Hedges forth (E)).

It remains to be said that many weights (e.g. fig. 4.8) have wear marks radiating from their central perforations, caused by the loop of string to which the warp would be attached. Weights from Faversham

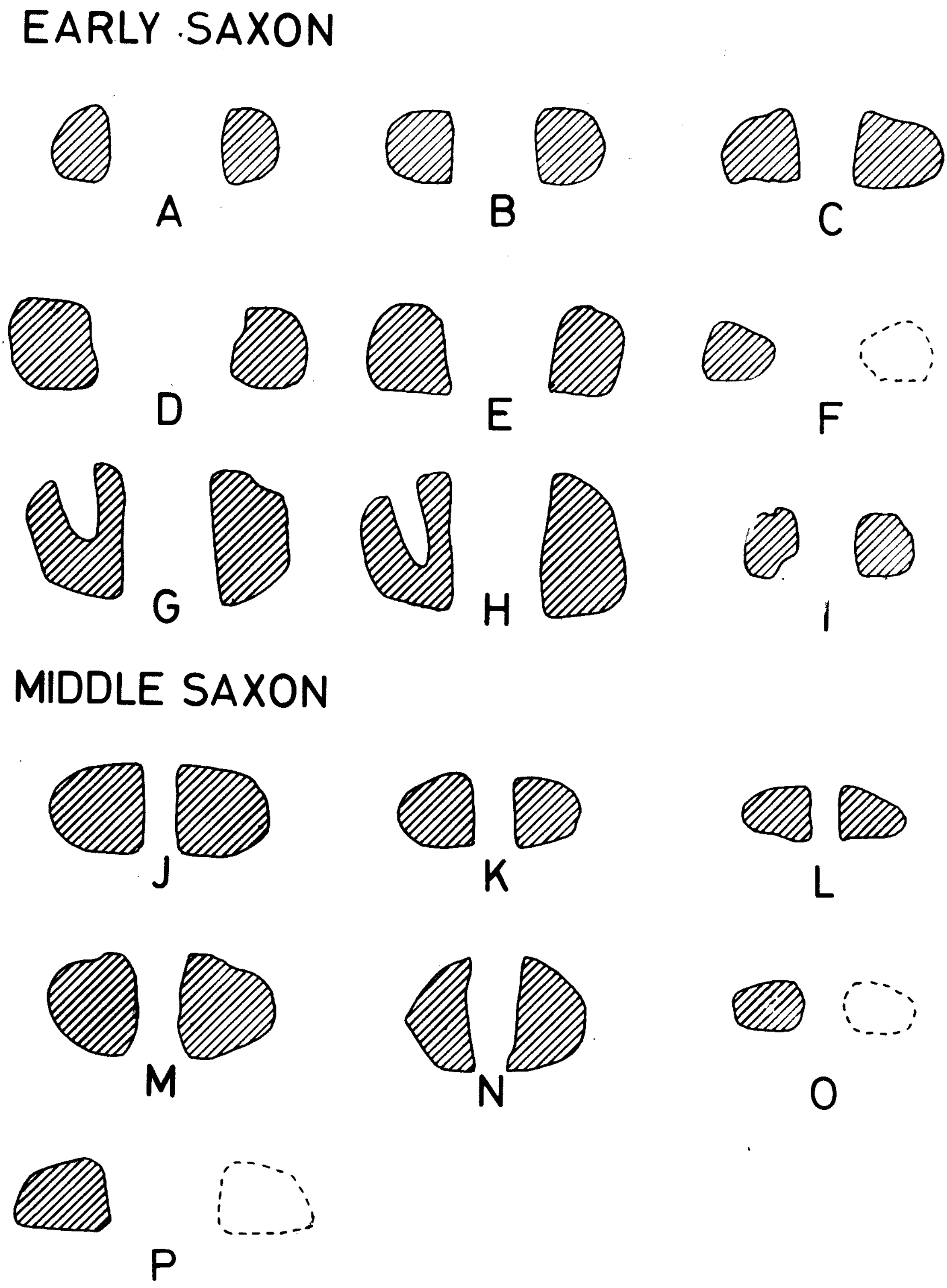


Fig. 4.7 Early and Middle Saxon clay loom-weights at 1:3 ; A-P (for sites, periods and sources see reverse of figure).

		Site	Source
A	ES	Portchester, Hampshire.	Cunliffe 1970, fig 2.
B&C	ES	Linford, Essex.	Barton 1965, fig VII
D&E	ES	Darenth, Kent.	Philp 1973, fig 46.
F	ES	Postwick, Norfolk.	Clarke 1937, fig 3.
G-I	ES	Mucking, Essex.	M. Jones, Pers. Comm.
J-L	MS	Whitby, Yorkshire.	Peers 1933, fig 24.
M&N	MS	Normanby le Wold, Lincolnshire.	Addyman 1970, fig 2.
O&P	MS	Maxey, Northamptonshire.	Addyman 1964, fig 12.

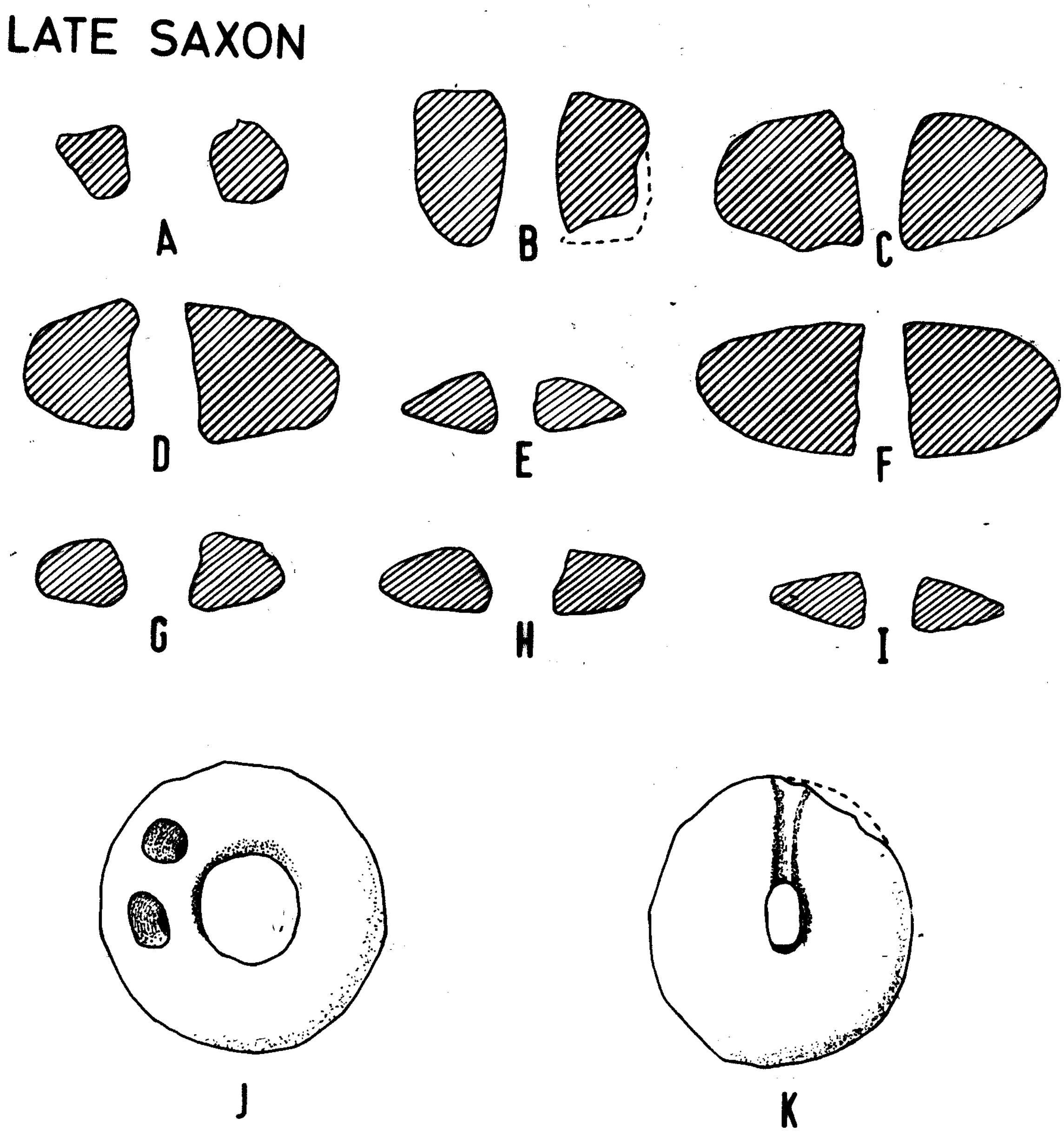


Fig. 4.8 (Top) Late Saxon clay loom-weights at 1:3 ; A–I.
(Bottom) Anomalous clay weights of Saxon type at 1:3 ; J&K
(for sites, periods and sources see reverse of figure).

A	LS	Lloyd's Bank, York.	Addyman forth.
B	LS	Emsworth, Hampshire.	Bradley 1973, fig 14.
C&D	LS	Clarendon Hotel, Oxford.	Jope 1958, fig 23.
E	LS	St. Cross, Winchester, Hants.	Hedges forth. (G)
F	LS	Rochester, Kent.	Harrison 1972, fig 20.
G-I	LS	St. Cross, Winchester, Hants.	Hedges forth. (G)
J	ES	Mucking, Essex.	M. Jones, Pers. Comm.
K	U/S	Faversham, Kent.	Grove 1955, fig 2.

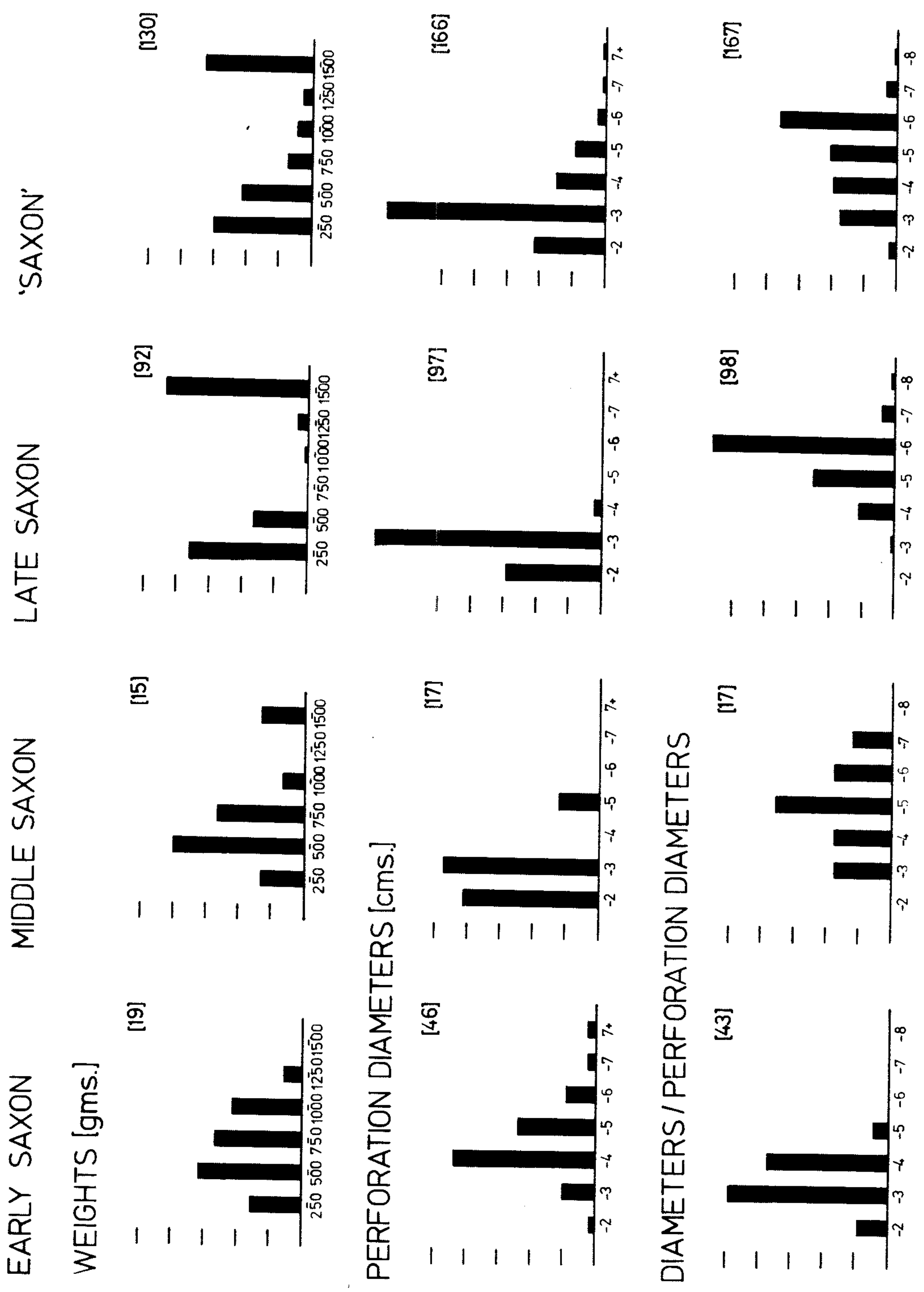


Fig. 4.9 Masses and measurements of Saxon clay loom-weights (appendix IV).

and Rochester have a groove ostensibly to accommodate this string, although why is not clear. Two weights from Mucking have finger impressions on the edge (fig. 4.8). These could be indicators of weight, marks of ownership or purely decorative and a greater sample is needed before a conclusion can be drawn.

(d) Perforated stone disc loom-weights

As suggested by the name given to this 'group' the objects which are considered to belong to it have in common that they are thin pieces of stone (most commonly schist, sandstone and slate according to locality), which are more or less circular in shape and have a central perforation. As with other weight types, there is a range of finish, in this instance, from the fine lathe-turned example from Clea Lakes, Co. Down (fig. 4.10, H) to stones which appear to have hardly been worked beyond being perforated (e.g. fig. 4.10, D), and there is also a range of sizes and, accordingly, weights.

	No. in sample	Average	Range
Weight			
Diameter	40	9.2cms	4.9-22.4cms
Thickness	29	1.9cms	0.4-5.5cms
Perforation diameter	39	1.4cms	0.4-5.0cms

The type, if it is accepted as such, has a very wide distribution (fig. 4.11) which does not overlap at all with that of the known Saxon weights. It would seem, in fact, that this was the type of weight in use in Scotland, Wales, Ireland and the south-west of England for a period contemporary with the Roman occupation of England up until the Norse incursions (Appendix 1V).

As intimated above, the definition of this type is slightly unsatisfactory. One reason for this is that with small specimens it is difficult to decide whether they are weights or spindle whorls (assuming that they had a connection with textile production). Another problem is that the number listed in the Appendix is really very small when it is considered that these objects were supposedly used for more than a millenium over two thirds of the British Isles. Not many sites have of course been excavated in this area but even so one would expect more than two or three loom-weights to be found in any one excavation.

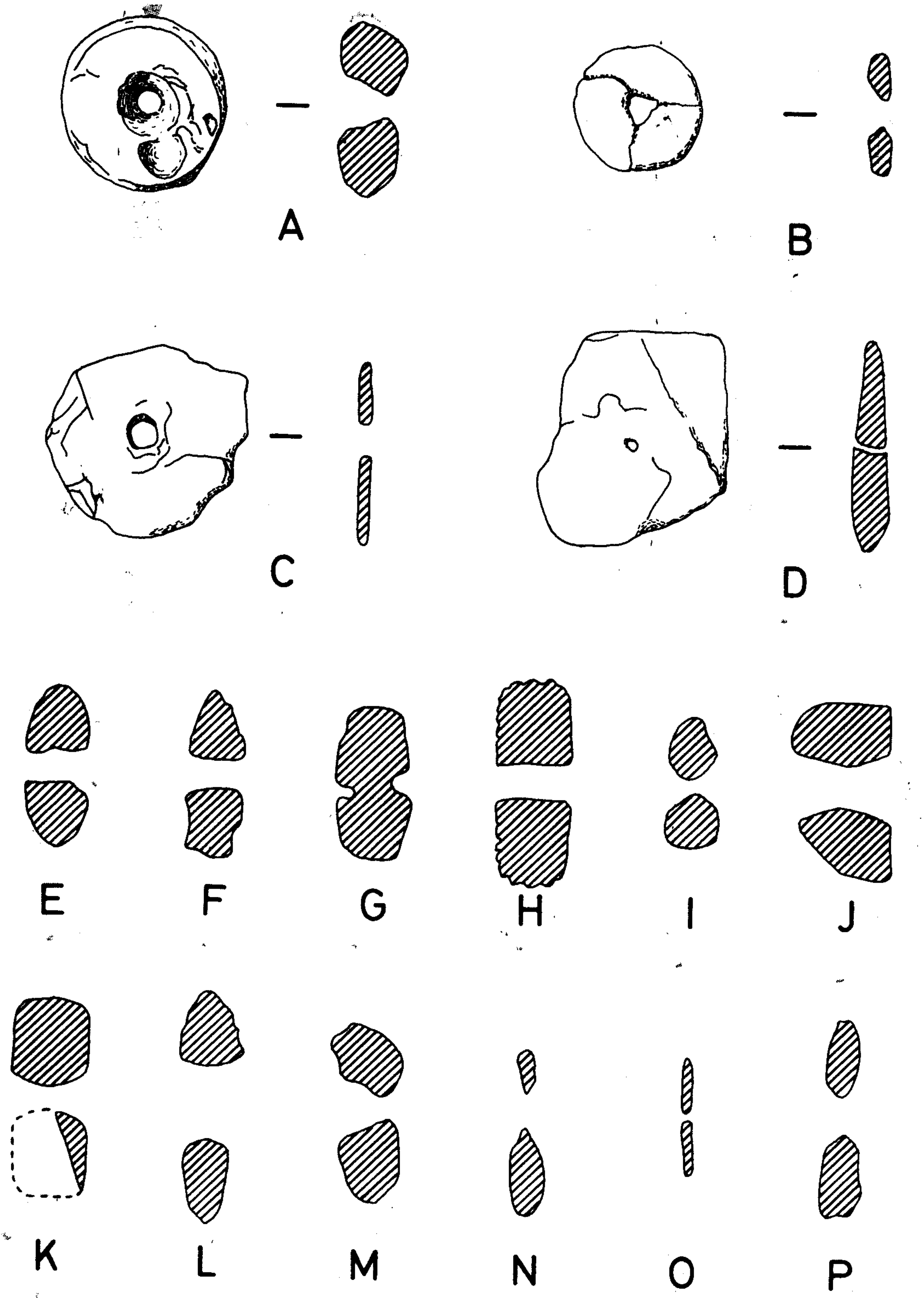


Fig. 4.10 Dark Age perforated stone disc loom-weights at 1:3 ; A-P (for sites, periods and sources see reverse of figure).

For the periods of the sites see appendix IV.

	Site	Source
A	Lagore, Co. Meath.	Hencken 1950, fig 92.
B	Dun an Fheurain, Argyll.	Ritchie 1971, fig 4.
C	St Mawgan in Pyder, Cornwall.	Threipland 1956, fig 37.
D	Ballinderry, Co. Offaly.	Hencken 1942, fig 32.
E-G	Garrance, Co. Cork.	O'Riordain 1942, fig 13.
H	Clea Lakes, Co. Down.	Collins 1955, fig 10.
I-J	Loch Faughan, Co. Down.	Collins 1955, fig 10.
K	Belfast (Shaneen Park)	Proudfoot 1958, fig 6.
L	Penmaenwawr, Caernarvon.	Hughes 1923, fig 14.
M	Lagore, Co. Meath.	Hencken 1950, fig 92.
N	Beginnish, Co. Kerry.	O'Kelly 1956, fig 5.
O	St Mawgan in Pyder, Cornwall.	Threipland 1956, fig 37.
P	Cush, Co. Limerick.	O'Riordain 1940, fig 40.

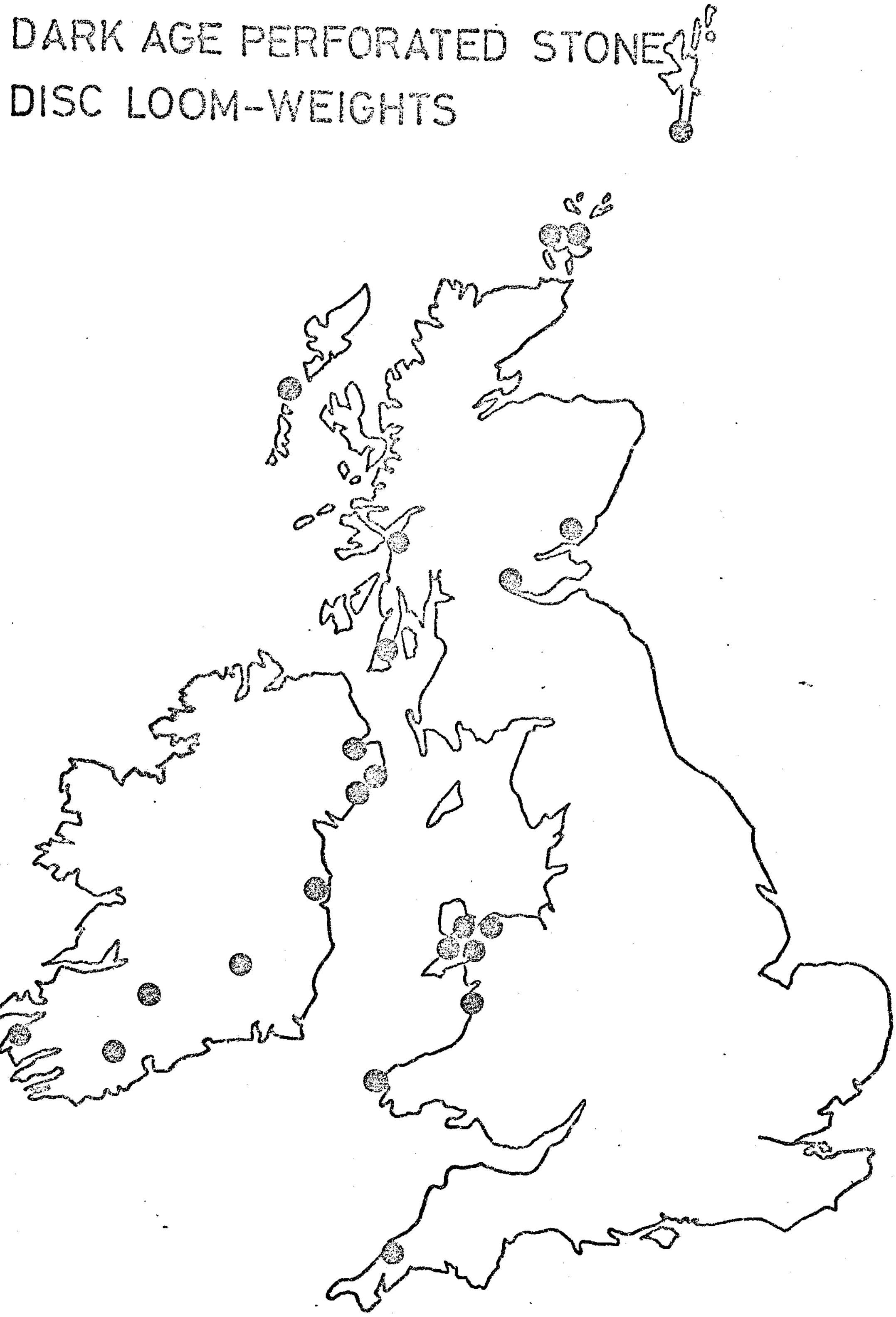


Fig. 4.11 Distribution of Dark Age perforated stone disc loom-weights (appendix IV).

(e) Perforated pebble loom-weights

This group consists of stones longer than they are broad with a perforation drilled usually through the wider face near one end. Apart from matters of fine finish the weights in this category have less uniformity of form than those in any other. Some have quite obviously been manufactured from water worn pebbles of various easily perforated stones while others, particularly those of steatite, which is very soft, may have been shaped to some extent. In this group are also included weights made from fragments of steatite vessels since these were undoubtedly just thought of as handy pieces of the material to use.

Being of such simple manufacture this type, without sub-division, can hardly be thought useful for any other purpose than suggesting the warp-weighted loom was known on some sites at a certain time. This is particularly the case as the number of sites they have been found on are so few (Appendix 1V), although this can probably in part be explained by the lack of excavation over the area in which they seem to occur (fig. 4.13).

While doubt may be expressed about their real usage on other Dark Age sites there is little question when it comes to the Viking period. At Jarlshof, which is really the only large settlement of this period excavated in this country, they were the most numerous class of artefact and a definite transition was observed from the use of ones shaped from locally available steatite in the earlier period to water worn beach pebbles by the later 9th Century (Hamilton 1956, 113). Hamilton points out the interesting fact that the old Norse for steatite is kléberg, which literally means loom-weight stone and that this term occurs in Shetland place names as well as Scandinavian (Ibid.).

(f) Grooved stone weights

Although all the types of loom-weight discussed so far have been perforated this is not strictly an essential feature. Modern stone weights from Scandinavia often have a groove around them to facilitate attachment of the string to which bunches of warp are tied. It is possible that some of the so called 'line sinkers' which are commonly found on Viking sites in Scandinavia (Childe 1943, 14) are in fact loom-weights. Several of these objects, which are of a similar size to the pebble loom-weights but which are grooved along their major axes (fig. 4.12) were found on the Viking settlement

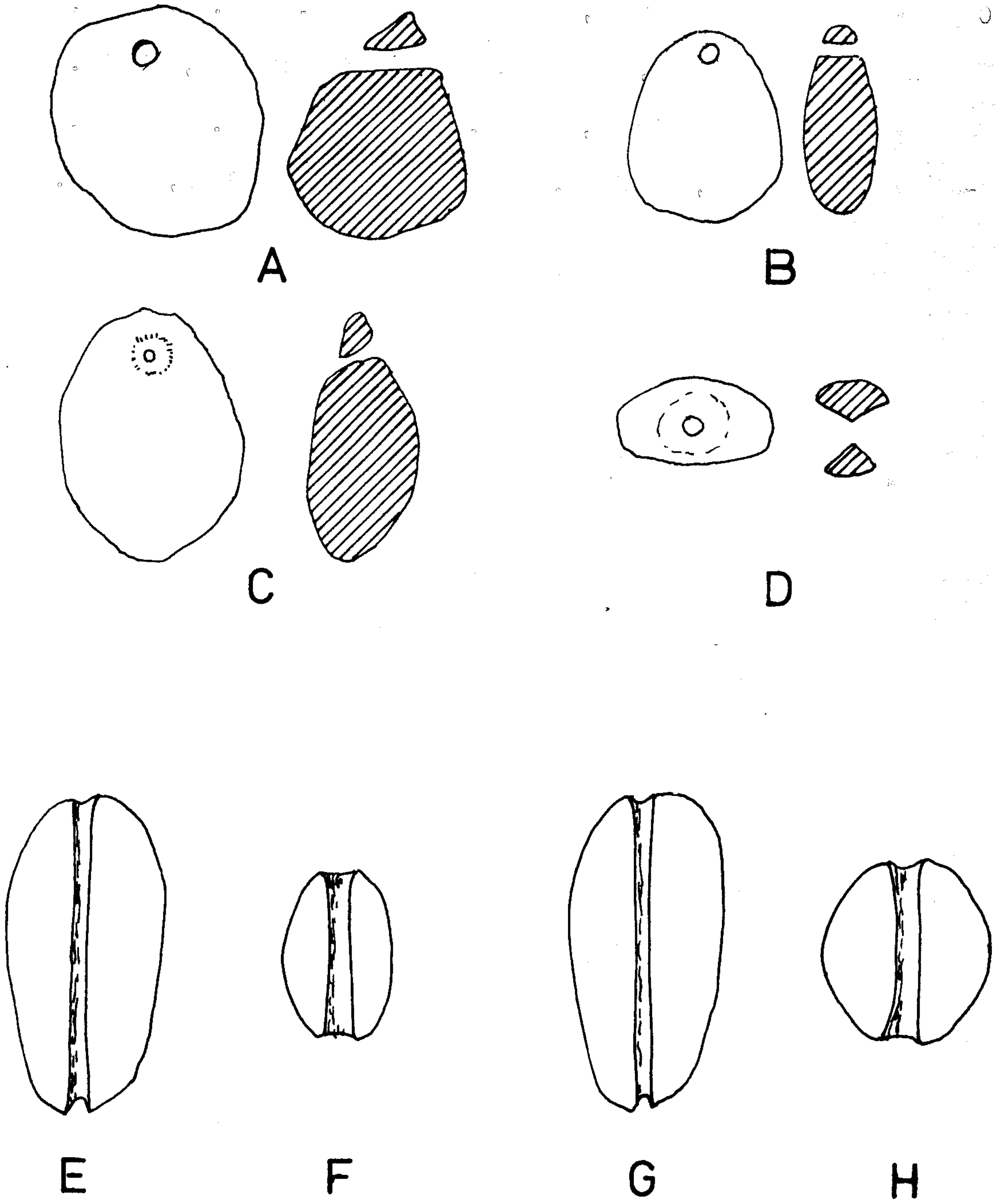


Fig. 4.12 (Top) Perforated pebble loom-weights at 1:3 ; A-D
(Bottom) Grooved stone weights at 1:3; E-F
(for sites, periods and sources see reverse of figure).

		Site	Source
A-B	DA	Church Island, Co. Kerry.	O'Kelly 1958, fig 9.
B	V	Brough of Birsay, Orkney	Pers. Comm. C. Curle.
D	IA/DA	Hownam Rings, Roxburgh.	Piggott 1947, fig 11.
E	V	Brough of Birsay, Orkney.	Pers. Comm. C. Curle.
F-H	V	Jarlshof, Shetland.	Hamilton 1956, fig 55.

sites at Jarlshof, Shetland (Curle 1934, 303; Hamilton 1956, 118, fig. 55) and at Freswick, Caithness (Childe 1943, 14, pl. IV, 6).

(g) Natural stones used, without alteration, as loom-weights.

As mentioned in the introduction to this sub-section (p. 85), stones without perforations or grooves are known to have been used recently as loom-weights. There is every likelihood that they were also used in the period we are discussing; suitable pebbles are often found on sites e.g. the aisled farmhouse on the Isle of Barra (Young 1953, 102), and the wheelhouse of A Chearbach Mhor (Young 1960,141) both in the Hebrides, but the only convincing proof of this suggested function would be if such stones were found in rows as from a loom which had collapsed when in use.

The evidence of the loom-weights, allowing for lack of excavation in certain areas, suggests that the warp-weighted loom was in use over the whole of the British Isles for the period in question and that different types of weight are quite strongly correlated with different parts and periods. Wild (1970, 136) in listing five loom-weights of three different materials and three different shapes which are allegedly Roman provides good negative evidence. It seems clear that in areas of Roman occupation the warp-weighted loom went out of use, being replaced, in all likelihood, by the vertical two beamed loom. It was the Saxons who reintroduced the warp-weighted loom to the Romanized regions as is shown by early finds of their distinctive type of weight at, for example, Portchester Castle and also possibly the cluster of lead loom-weights around the Thames. In the parts of the British Isles not occupied by the Romans the warp-weighted loom seems, as far as the evidence can be interpreted, to have continued in use with little or no alteration in the type of weight from the prehistoric through what could be equated with the 'Romano-British', and into the Dark Ages proper. Although few of the Viking sites excavated have produced any finds at all, let alone loom-weights, it would seem on present information that the Scandinavian immigrants, although they used the same type of loomas the aboriginal population, introduced their own type of weight which at its crudest was a perforated pebble and at its most sophisticated a piece of carefully shaped steatite.

Just as the presence of loom-weights on sites indicates the use of the warp-weighted loom, so their systematic absence can be taken as evidence that other types of loom were in vogue - as has already been done

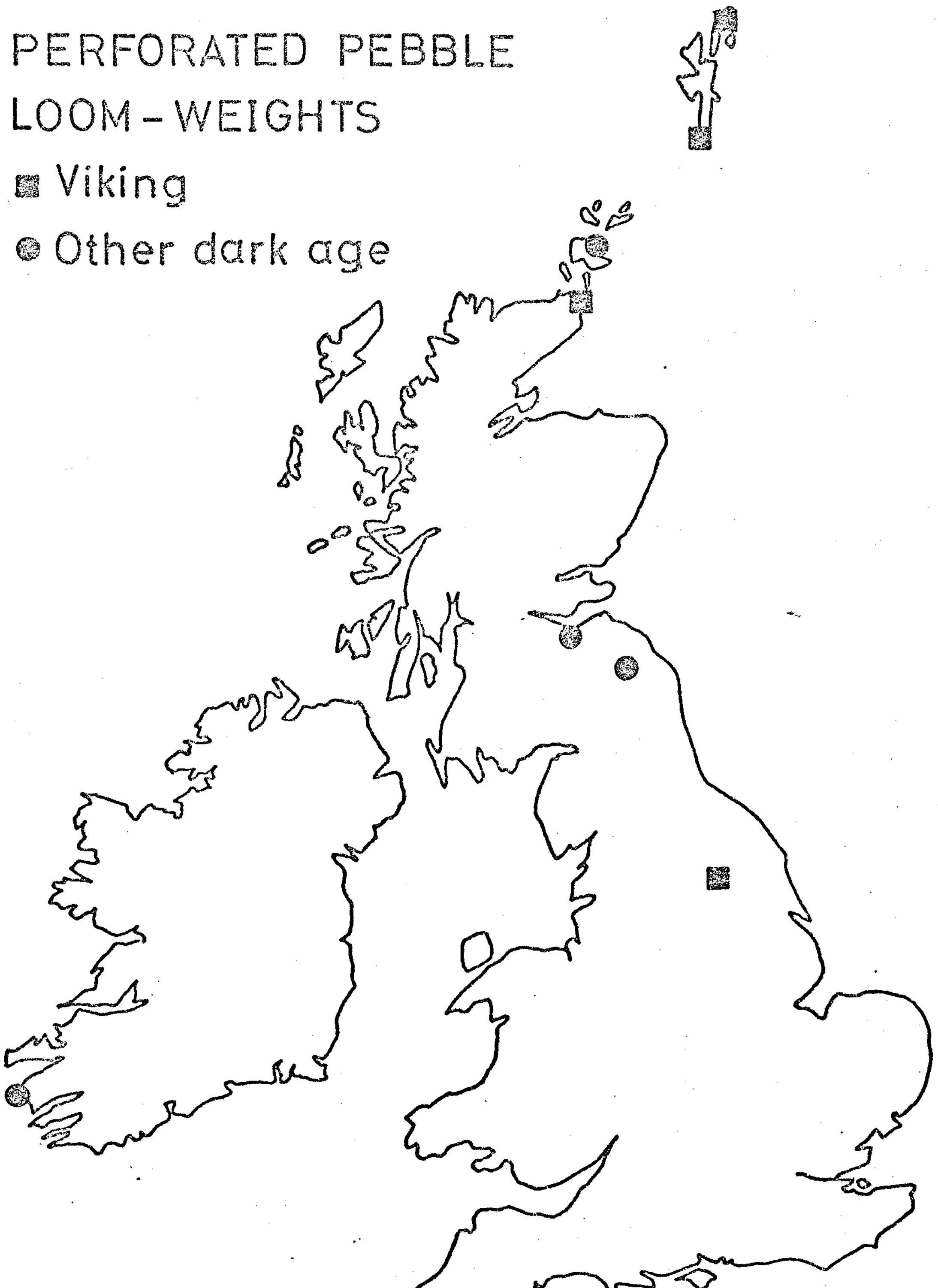


Fig. 4.13 Distribution of Dark Age perforated pebble loom-weights (appendix IV).

for the Roman period. Using this criterion, it seems that in England generally the warp-weighted loom was superceded totally in or around the twelfth century. Due to a paucity of excavation, particularly early medieval, it is impossible to form an idea of the situation in the rest of the British Isles, although it is no surprise that loom-weights from Jarlshof in Shetland may be as late as the fourteenth century when it is considered that the warp weighted loom survived in the Faroes, another Danish territory, until this one (Hoffman 1964, 143).

Loom-weights are of course used in groups and large numbers found in association in archaeological contexts can tell us, depending on the exact context, a little about the warp-weighted loom.

The least informative situation is where it is just mentioned in a report that large numbers were found in a particular house or occasionally in some other feature. Figures, where given, do however give an impression of the sheer number of weights used in a distinct locality; an impression refined by more unusual and better recorded discoveries which will be itemized later. At the Middle Saxon site of Shakenoak, Oxford, clay weights had obviously been discarded in a ditch where 141 fragments and one complete specimen were found (Brodribb 1972, 48). At Jarlshof Shetland, 25 weights were found in one house, 55 in another and 106 in a third, of which 52 are said to have occurred in a cache (Hamilton 1956, 135, 180, 183). At the Early Saxon site at Mucking, Essex, two of the huts excavated so far have contained appreciable numbers of weights randomly scattered across the floor; in one instance 136 fragments were planned <u>in situ</u>, and in another, 24 (fig. 4.14) (M. Jones pers. comm.). On all classes of site where loom-weights are found, although there is often a general scatter, they are frequently in distinct groups which suggest they were used in such numbers. Several parallels can be quoted for the British Isles in the prehistoric period (Hedges 1973, 161-163). Without thinking, for the moment, any further than sheer numbers, the evidence suggests the opinion that weights were used in fours (Wheeler 1935, 139-140; Peers, 1943, 84) is as much in error as ideas, based on the frequent occurrence of fragments on sites, that the textile industry was of a monumental scale (e.g. Brodribb 1972, 28-30) or that loom-weights were easily come by objects to be disposed of wantonly. The fact would seem rather that loom-weights were manufactured in sets with some care and were stored against future use when finished with for a period. If fortunate, therefore, we can expect to find such sets in three different contexts, which would be more useful than when they had been discarded - in the process of manufacture, in use, and in storage.

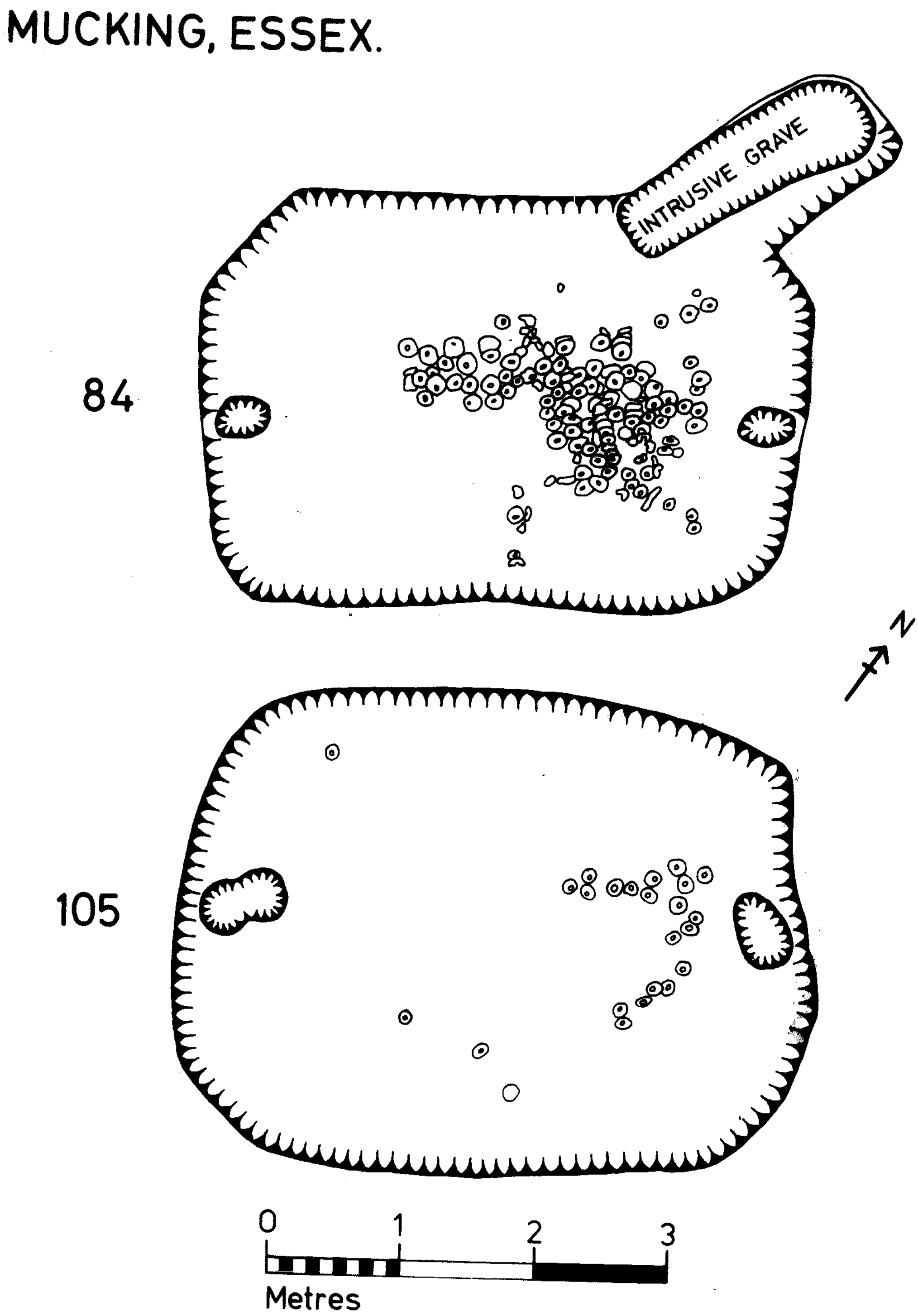


Fig. 4.14 Early Saxon huts at Mucking, Essex containing spreads of loom-weights. (after plans provided by M. Jones).

The first of course would be unusual, but has happened. Although loom-weights were sometimes used unfired in the Saxon period, as at Mucking (p 87) and in the majority of cases were only partially baked, obviously having been little more than burnt in a hearth, it is occasionally the case that they are well fired e.g. one of the Winchester sets (Hedges forth (G)). During excavation of Late Saxon layers at Rochester, Kent, a trench some two metres in length, one in width, and 60cms deep, which had been lined with clay and bore signs of heat, as a kiln might, contained thirty-three very similar 'bun-shaped' weights with fragments of at least seven more. A second feature nearby, which could also be interpreted as a loom-weight kiln, had been relined three times at least and the contents included four 'waster' fragments (Harrison 1972, 123, 156). Technological interest aside, there is evidence here for a set of forty or more weights.

Loom-weights are only really attached to the loom when there is a warp on it i.e. when it is in use. Should a loom be deserted in such a condition, for whatever reason, the archaeological evidence we would expect to find would consist of one or more lines of weights on the ground. Although this would seem to be a rather unusual thing to occur, no less than eight examples from four different Saxon settlement sites can be cited for this country although the foreign parallels are few (Table 4,1). Excavations at Upton in Northamptonshire revealed a large grübenhaus of later 6th to early 7th century date which had been destroyed by fire (Jackson 1969, 210, 213-4, fig.4; (fig 4.15)). On the floor of this were over sixty clay loom-weights and for the most part they were in two groups. Against the eastern wall were three parallel rows of weights thirty-five centimetres long involving twenty-six weights according to the figure and thirty in the text; near the western wall there seems to have been two more or less parallel rows of weights, one of eight and the other of ten, which were about a metre in length.

In the interim publication of the early 5th To mid 7th century Saxon site of West Stow, Suffolk, two 'weaving sheds' are mentioned, although only one is described and illustrated satisfactorily (West 1969, 5 fig. 3 ; fig 4.16). Almost a hundred loom-weights were found scattered across the floor and in three instances there are single lines of weights; one has only eight weights in it and is about fifty-five centimetres long while there is a parallel line 125cms away which is about seventy centimetres long and contains ten weights; in the opposite corner of the building, in a group of eighteen weights is another single line sixty-five centimetres long. It seems that at this site at least there is evidence for floor boarding across the top of the concavity usually assumed to be the house floor and in this case the formation of the weights must have been appreciably disturbed when the floor gave way.

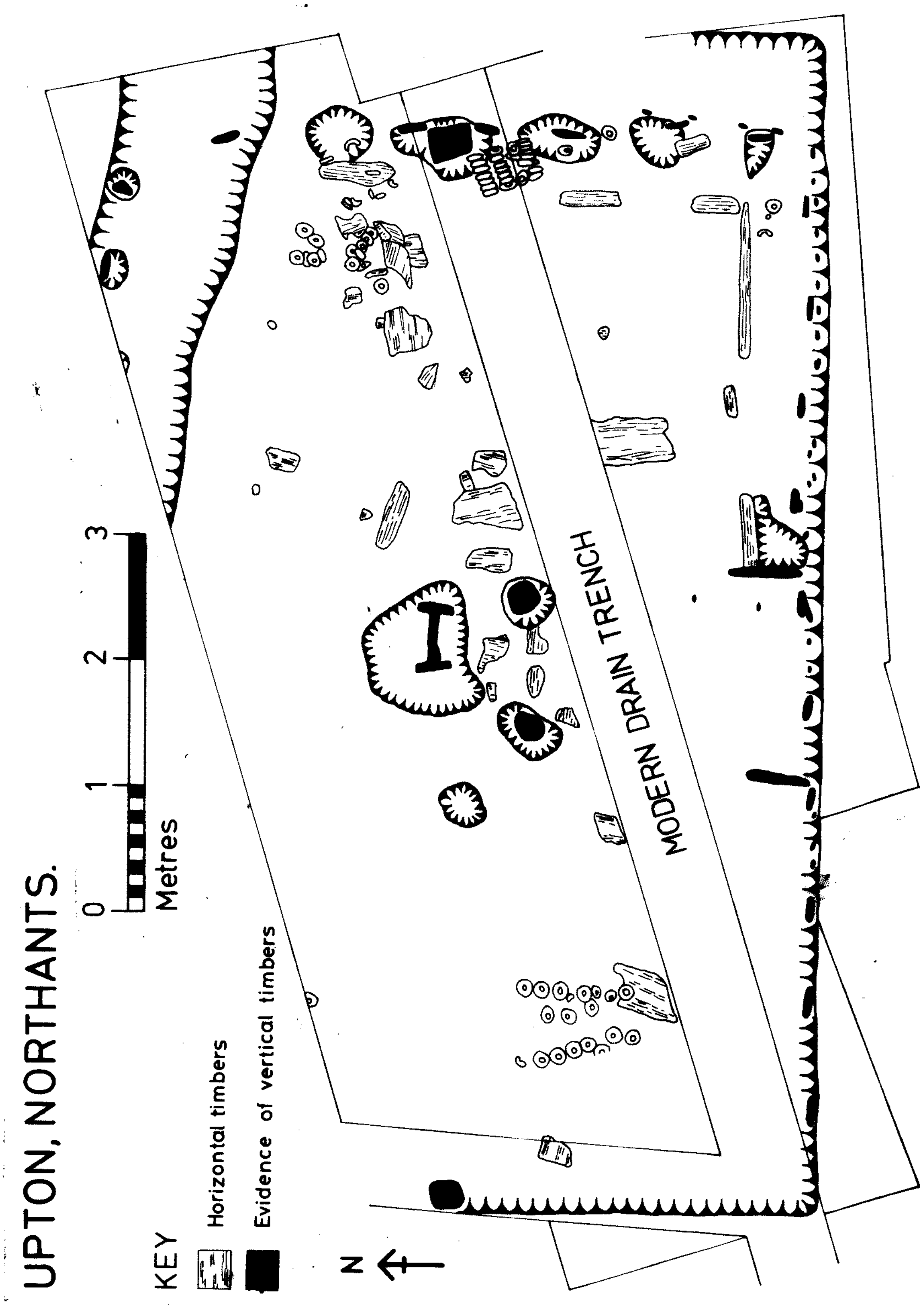


Fig. 4.15 Early Saxon building at Upton, Northants containing lines of loom-weights (after Jackson 1969, fig 4).

During the excavation of a barrow which contained burials of very mixed dates at Grimestone End, Suffolk (Brown 1954, 190, 198-9), two series of clay weights were encountered which seemed to belong to the Early Saxon period. It is evident that the excavators missed the occupational evidence that went with these features and all that can be said is that as they came from different sides of the barrow they must have been in separate huts. One series is just described as 'a number of fused and broken clay rings lying in two groups (lines) in close proximity to one another'. The other group is said to have been of 'a more orderly arrangement and consisted of two lines of clay rings numbering 30 and 32 respectively, with an additional ring between the lines. The two lines 245cms in length were 18-20 cms apart, ... converging at the eastern end'.

The final example was discovered at Winchester during construction work, rapidly excavated, and poorly recorded (Hedges forth (G). Nonetheless it is clear that within a hut of Late Saxon date there was a single line of twenty-two or three loom-weights between two post-holes 170cms apart (Fig. 4.17).

It might be mentioned here that the alignment of the twenty lead weights in an Early Saxon hut at Linford, Essex is less impressive than thought by the excavator (Barton 1962, 68).

Far more convincing examples of the storage of loom-weights are found in prehistoric rather than historic Britain, (Hedges 1973, 161-3) and in fact the only clear instance is a set of at least forty-three weights and a couple of odd ones which were piled beside the loom at Winchester. It is of course possible that a different method of storage to that formerly used has left little archaeological trace. It might have been the case that strings of weights were suspended from the rafters and if so one could expect a dense but more or less random group such as that occurring in the north-east corner of hut 15 at West Stow (fig. 4.16).

Although the evidence is poor at present certain facts are beginning to emerge about the warp-weighted loom of the period. The length of the lines of weights left by a collapsed loom, for instance, should tell us the width of the cloth being woven and we know therefore that this ranged at the least from a minimum of thirty-five centimetres to two hundred and forty-five. This lack of standardization fits well with what we know about prehistoric textiles which were manufactured to a size optimum for a specific product (Hedges 1973, 169); this is in distinct contrast to the early medieval records of fixed widths geared to a cash-based market economy involving specialist production (Hoffman 1964, 262).

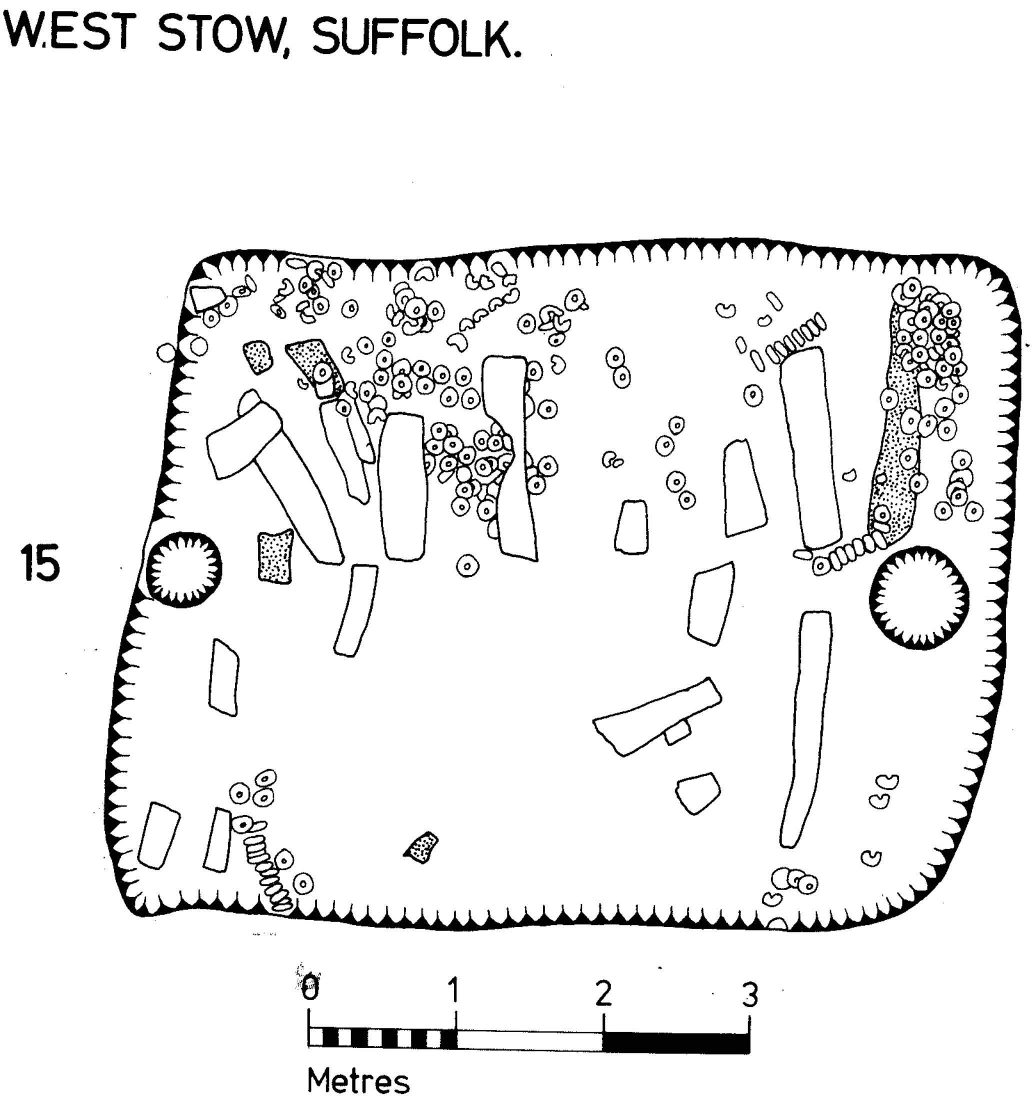


Fig. 4.16 Early Saxon hut at West Stow, Suffolk containing lines and spreads of loom-weights, (after West 1969, fig 3).

For a given width of any type of cloth there would of course be an optimum tension and this would be achieved by the use of a certain number of weights, each of a particular mass. It is interesting that the weights actually on the Winchester loom in one row weighed some seven kilogrammes so that the warp would have been under a tension of 40 gms per cm. The other set, although double the size, only weighed a total of about nine and a half kilogrammes giving a not too different tension of 55 gms per cm. It seems likely that one set was used when the warp was not to be divided and the other when it was. It might be mentioned that although Hoffman regrettably does not give relevant figures for looms still in use in Norway, a calculation based on the text and photographs for the experiment in Troms (1964, 63ff) suggests that ten and a half kilograms of weights were used in weaving a blanket one and a half metres wide. This figure of seventy grammes tension per centimetre of cloth is noticeably similar to those for the two Winchester sets of weights. It might also be mentioned that while British prehistoric loom-weights are consistently heavier (Hedges 1973, 115-120) than the historic ones they also occur in smaller caches, which means that the total tension used need not have been very different but just more evenly spread in the later period.

A description of the construction and method of working of the Scandinavian loom as studied by Hoffman has already been given. As mentioned, however, while there is no doubt that her work is of great value and relevance to that in hand, there is no reason to accept the opinion that this type of loom has never changed. Two particularly important assumptions, which have a bearing on the types of textile which can be produced, are that the loom always sloped and that the warp was divided into two parts. The first of these has already been questioned, to a slight degree, on the evidence of illustrations, both early and late, but finds of loom-weights leave little doubt that both are incorrect some, if not all, of the time. If it is taken as accepted that lines of loom-weights in archaeological contexts mark the site of looms then such occurrences as exist (Table 4,1) indicate that the warp was sometimes divided into three as well as two and frequently was not split at all, at least at the level of the weights.

The best evidence that could be hoped for archaeologically to prove that the looms were sometimes, or always, vertical would be if they had been set in post-holes. A number of instances can be cited for both the prehistoric (Hedges 1973, 108-109; Ap Simon 1972, 309) and historic periods in this country where pairs of post-holes are alleged to have held the uprights of looms; most of these are highly conjectural,

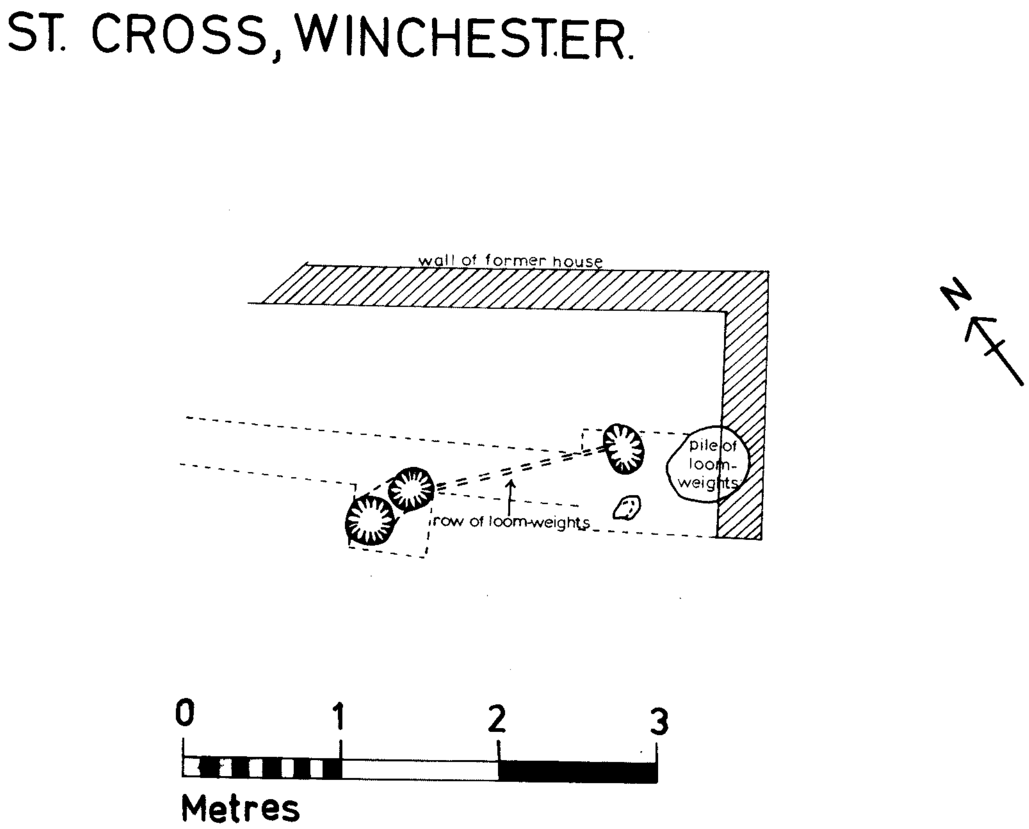


Fig. 4.17 Row of Late Saxon loom-weights with associated post-holes and dump of loom-weights found at St. Cross, Winchester (Hedges forth. (G)).

but of course possible. At the early Saxon site of Sutton Courtenay in Berkshire, for example, one partially destroyed grübenhaus contained fourteen weights and one post-hole in addition to a choice of two seats for the weaver (Leeds 1927, 75, fig.12); in another there were two post-holes a hundred and thirty-five centimetres apart (both of which were on the axis of the building, and one of which was structural) while the floor was littered with an unspecified number of weights including one fragment noted as having been found between the holes (ibid 76, fig. 13) (fig. 4.18); Leeds suggested that a further house which contained a pair of post-holes (but no weights) could have housed a loom (ibid, 76) and indeed, in his terms, the evidence for house IV in his first report could well be used to support a similar argument (1923, 158). These are not very convincing examples and neither is that from a site of similar date at Bourton-on-the-Water, Gloucestershire (Dunning 1932, 285-7, pl LVI) (fig. 4.19). Scattered across the floor of this hut were the remains of some two or three dozen weights, which meant that a pair of post-holes two hundred and thirty-five centimetres apart could readily be interpreted as having housed the uprights of a loom (in spite of the fact that two weight fragments were found in or on one of them), and a pile of stones as a weaver's seat. Although these examples are far from persuasive, there are three instances, admittedly only one from this country, where such post-holes had a line or lines of weights between them. It is of course possible for slanting posts to be housed in post-holes but, as far as can be made out, those at Winchester were vertical and this is underlined by the fact that the row of weights were between the supports and not to one side of them.

The subject of loom-weights brings us naturally to that of 'weaving huts' since, being the most obvious type of artefact connected with weaving, their presence tends to be the main criterion. 'Weaving huts' even if not called precisely that name, came in with the Saxon settlement archaeology on the publication of Sutton Courtenay, Berkshire, and Bourton-on-the-Water, Gloucestershire (Op, cit,) and the concept has grown from strength to strength since, being used in several recent publications (e.g. Philp 1973, fig. 48; Jackson 1969, 214; West 1969, 5; and Addyman 1968, 74; Barton 1965, 68).

The existence of weaving sheds, at least on the continent, is proven by an entry in the Leges Alamannorrum, a Carolingian text based on pre-Carolingian laws. An entry specifies fines for the violation of women from weaving sheds. It is clear moreover that the weaving shed was not just a communal facility, for the money was to be paid, not to the woman violated, but to the master. It is of interest that the word translated weaving shed is in fact genicium (evidently derived from the late Latin

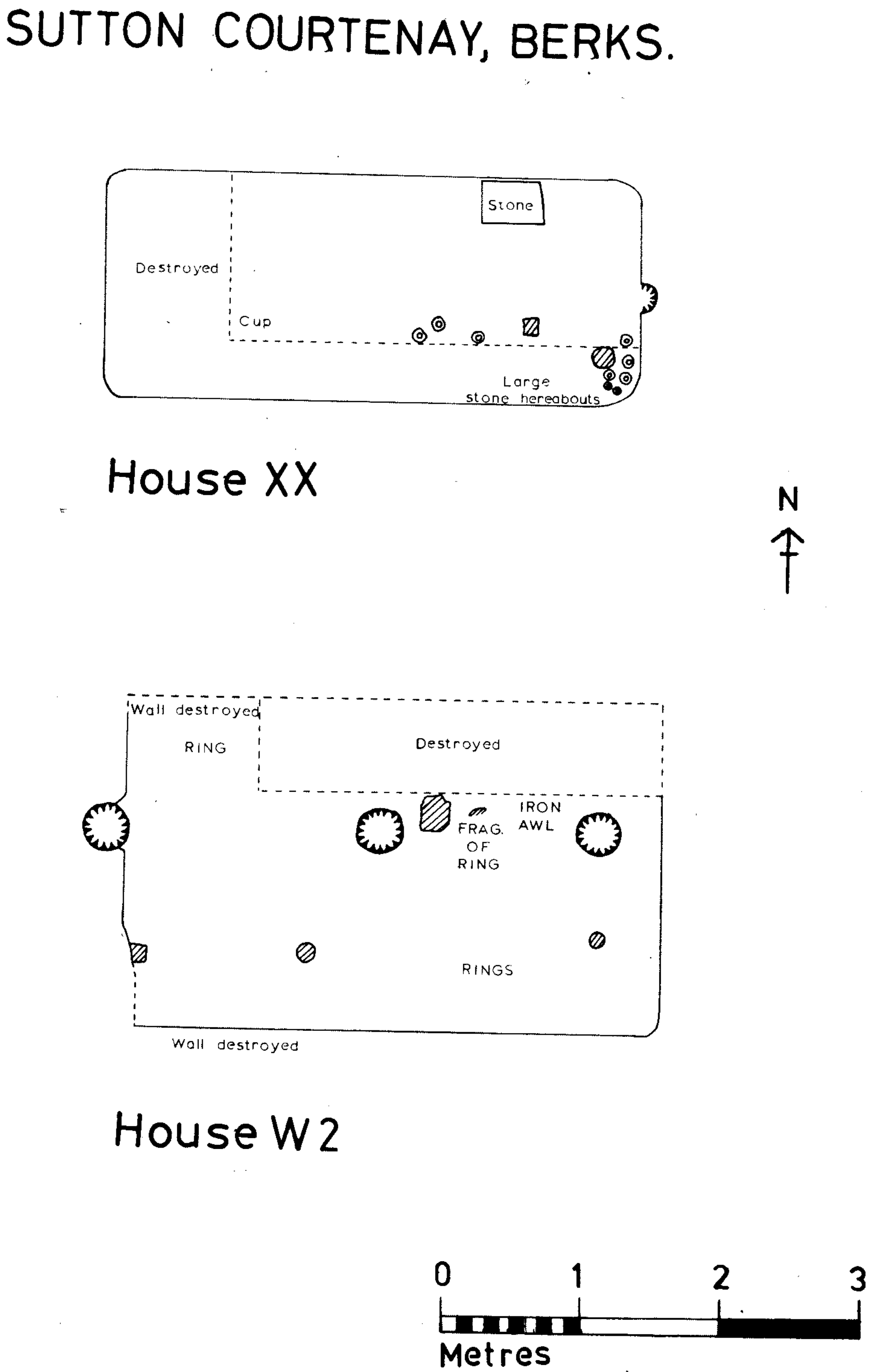


Fig. 4.18 Early Saxon 'weaving huts' found at Sutton Courtenay, Berkshire (after Leeds 1927, figs 13 & 13).

gynaecium which originates in the Greek for woman), and is glossed in some texts as textrinum, a classical Latin word for weaving shed (Radford 1957, 37). It should also be mentioned that in Pliny's Natural History he states that in Germany people wove in sunken sheds (Ibid 19, 9).

Abundance of weaving equipment in a particular hut on a site, especially if it involved duplication, could, in a lot of ways, be taken as evidence for a weaving shed or hut in the sense of a building set aside mainly for that purpose. Unfortunately, in a lot of cases the buildings called 'weaving huts', or whatever, by excavators are imaginatively interpreted as such. Bradley, for instance, writing up a self-confessed, small-scale, schoolboy excavation on a Late Saxon site at Emsworth in Hampshire says 'with such limited work its nature (the site) must remain in doubt, though the finding of post-holes, daub and loom-weights (three fragments) in such proximity, might suggest the site of some form of weaving shelter' (1973, 30). Another example in this vein is that of an Early Saxon building at Lower Warbank, Keston, Kent published as a 'weaving hut' by Philp (1973, 156-8). One feature of the hut as excavated consisted of twenty-nine stake holes in one quarter, and the excavator interpreted at least some of these as having been connected with a loom, backing this up with the evidence provided by one lead loom-weight, two bone pins, two needles and part of a hair comb. While a catalogue of supposed 'weaving huts' which evidently are not proved to be such, on the evidence, is of limited use we might add a final example, again Early Saxon, where a hut at Harston, Leicestershire, which contained a spindle-whorl, loom-weight, and hair comb, was felt to merit this description (Dunning 1952, 53).

Other buildings, mentioned above have of course been found to contain substantial quantities of weaving equipment, and in particular loom-weights. A case could be argued that weaving was carried out in all the dwellings simply when cloth was needed and that buildings with this specialized function did not exist e.g. although only two out of two hundred grübenhauser so far excavated at Mucking, Essex, contained a large number of loom-weights, practically all had one or more pieces of weaving equipment in them (M. Jones, pers. comm.). Similarly, at Sutton Courtenay, Berkshire, while four of the thirty-three huts could be interpreted as 'weaving sheds' on the slight evidence reviewed above, in fact no less than eighteen contained one or more artefacts that could have been used in textile production. Evidence for a counter argument is however provided by Saxon huts excavated at Winchester, Hants., Upton Northants, and West Stow, Suffolk, and a Viking house at Jarlshof, Shetland (Op. cit.) where quite clearly more than one set of weights were used.

(3) Weaving Swords

As has been mentioned, the function of a sword beater is to drive

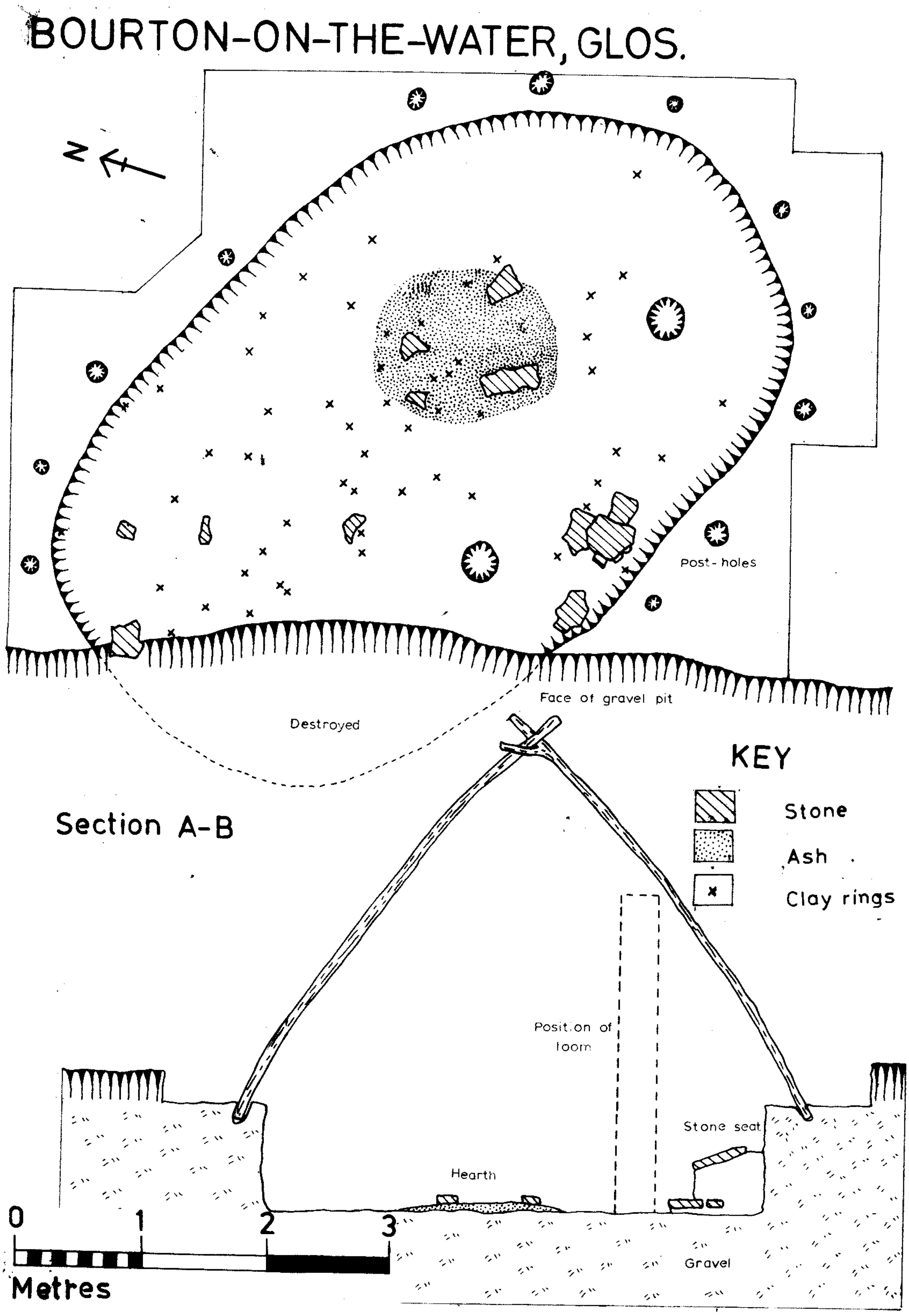


Fig. 4.19 Early Saxon 'weaving hut' found at Bourton-on-the-Water, Glos., (after Dunning 1932, pl lvi).

home the weft evenly across the shed when weaving is in process. This to some extent determines the shape it has to be - the blade must be long so that as much of the weft as possible is affected by it at once, and should be thin in order that it doesn't disrupt the threads on insertion and can compact them closely. In order to make the implement manageable there is usually a handle at one end which is small in diameter in comparison with the width of the blade, to lessen the possibility of the hand getting in the way when it is in use. The material a sword beater is made of must obviously be strong and readily shaped but the prime consideration is the size; this largely rules out bone and leaves metal and wood as the most obvious choices with the possibility of whalebone in some areas.

It is difficult to say when sword-beaters came into use, as finds from the prehistoric period are both rare and debateable. The earliest ones claimed are some short wooden and bone implements (about 22 and 17.5 cms long respectively) from Swiss Neolithic lake dwellings (Vogt 1937, 47; Johl 1917, fig. 8.1). To these may be added a bone example from Randersfjord in Denmark which is claimed to be late Bronze Age because of its similarity to daggers of that period. Perhaps the most convincing specimens that can be evinced for the prehistoric period are eight complete and three fragmentary implements found in a late Bronze Age context in the Heathery Burn Cave, Durham, one from the Sculptors Cave, Morayshire, and another apparently from Jordan's Farm, Oxon (Benton 1931, 184, fig. 7). These were made from long split bones, are 26-30cms in length with an average width of 3.2cms and are highly polished. The early historic period in Europe is equally barren for while there are apparently numerous references in Greek and Roman literature to the sword-beater (Hoffman 1964, 319) not one is known and the only possible illustration is conjectural (Ibid fig. 130).

In the post-Roman period weaving swords suddenly became a commonly found artefact in certain areas (see below) but these are almost all made of iron, and to a lesser extent whalebone, and we must be very wary lest we read too much into a distribution which may just be the result of differential preservation and variations in funerary customs. It is likely that most weaving swords were made of wood, a substance only rarely preserved, and it is interesting in this context that the few examples that can be cited - one of Roman Iron Age date from Jutland and several from the Frisian terps (Millard 1969, 19) as well as the two British ones belonging to the Early Christian and Viking periods (Appendix VI) - were found outside the distribution given when only those of more hardy materials are plotted.

The sword beater is not an implement associated with the horizontal treadle loom so that when this made its appearance in north-western

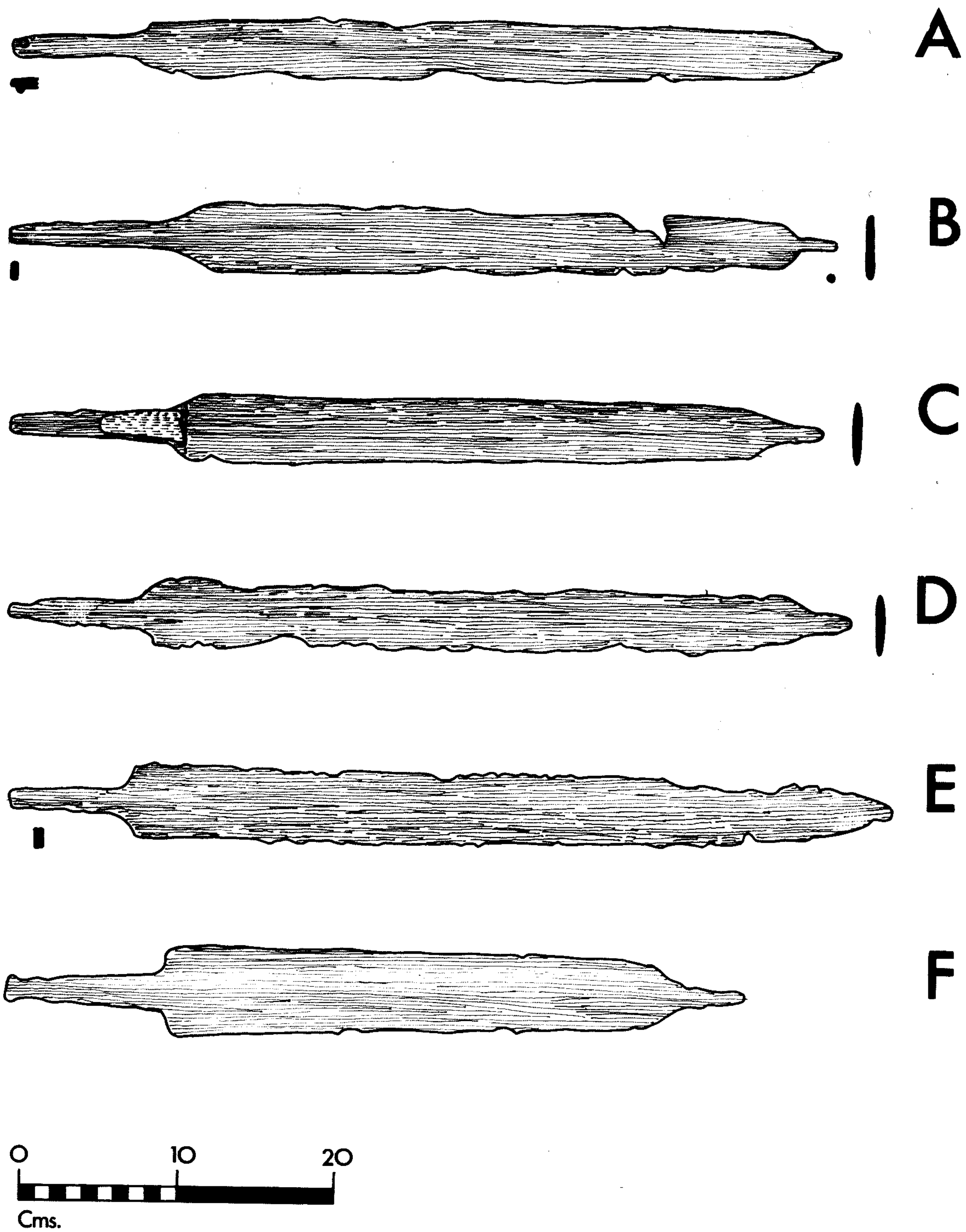


Fig. 4.20 Pagan Saxon iron sword beaters at 1:4 ; A-F (for sites and sources see reverse of figure).

	Site	Source
A	Holywell Row, Suffolk.	Chadwick 1958, fig 7.
B	Bifrons, Kent.	Chadwick 1958, fig 7.
C	Chessel Down, Isle of Wight.	Chadwick 1958, fig 7.
D	Finglesham, Kent.	Chadwick 1958, fig 7.
E	Mitcham, Surrey.	Bidder 1905, fig 8.
F	Ozingell, Kent.	Wyatt 1868, fig p 147.

Europe at about the tenth or eleventh century the tool in question ceased to be needed as the old looms were phased out. There was of course a short period of survival in most areas - one is for instance illustrated in a thirteenth century Austrian manuscript (Hoffman 1964 fig. 110); and in parts of Scandinavia, Iceland, and the Faroes sword beaters were used on warp-weighted looms in the last century as they are sometimes today (Hoffman 1964, 90, figs. 14, 53, 54, 62).

Hoffman is very dogmatic that in northern and western Europe the sword beater was used solely on the warp weighted loom. The evidence is not sufficiently strong for this statement to be made. While it is true that it does not form part of the equipment of the horizontal treadle loom there is no reason why it could not have been used on a two beamed vertical loom as they were in ancient Egypt (Roth 1913, figs. 13, 16) and as they are in Syria now (Crowfoot 1937, 44) or for that matter on a horizontal ground loom as in the present day Sudan (Ibid).

It is now fitting to describe the British finds by category, to cite parallels, and to place them in their general European context.

Pagan Saxon iron sword-beaters

A total of fifteen iron sword beaters have been recovered from nine pagan Saxon cemeteries while one was possibly found in a barrow burial of similar date (Appendix VI). The shape of these is quite distinctive (fig. 4.20) and their dimensions, with one exception, uniform. Not surprisingly, they are sword shaped although usually only just over fifty centimetres long (the one from Luton is half this) including a large tang at one end for a wooden handle and a small one of unknown use at the other. The remains of the wooden handle can be seen on three of the English examples - Chessel Down, Bifrons (1), and Ozingell (2) - while one from Leihgestern, Oberhessen, Germany was found with the grip intact (Nehrens 1948, 138, abb.9) and gives a good idea of the appearance of the complete tool. The section of the blades, as preserved, is typically the shape of an extended oval some four centimetres in width and half a centimetre in thickness. Those that are dateable seem to have been deposited between the mid sixth century (Sarre 2 and Chessel Down) and the mid seventh (Sarre 1 and Holywell Row) (Chadwick 1958, 33).

It is not difficult to find continental parallels for this little group of implements whose distribution clusters closely around Kent (fig. 4.21), but to explain the links that the continental distribution indicates and to seek the origins of both the artefacts and the idea of burying them with the dead is more problematic. In brief, the continental distribution clusters into two distinct groups (Millard

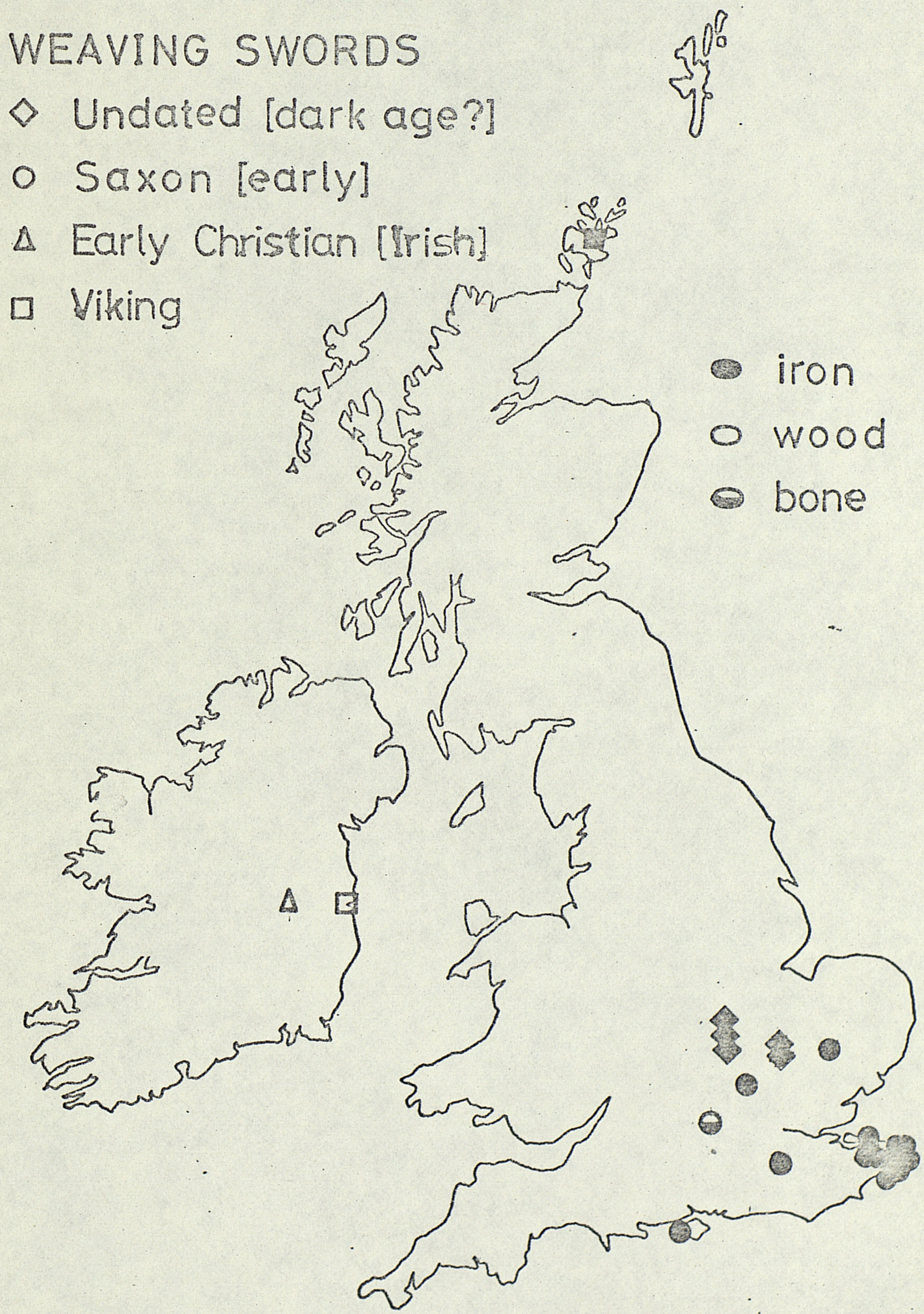


Fig.4.21 Distribution of Dark Age sword beaters (appendix VI).

1969, 19-21), between which there is no obvious link (Chadwick 1958, 34).

One of these groups centres on Scandinavia and this is where the earliest weaving swords have been found - dating from the fourth, fifth and early sixth centuries (Rygh 1885, fig. 150; Shetelig 1912, figs. 220, 276, 375; Blindheim 1945; ; Blindheim 1946, 187). These are like the English examples but are about half the length. During the later sixth, seventh and eighth centuries they become larger but lose their tongue-shaped tip (Shetelig 1912, fig. 359, 402, 445; Millard 1969, 19). It is well known from grave goods accompanying some of the richer burials that the Anglo-Saxon Kingdon of Kent had cultural connections with south Scandinavia (Millard 1969, 19) but there are problems attached to accepting this as the link whereby iron sword beaters were introduced into this country. The only English example which is as small as the early Scandinavian ones is that from Luton but because of the circumstances of the discovery it cannot be dated. All the others are long and though the Scandinavian ones got longer with time they lost the tongue-like tip which the English examples retain. If there is a connection then the likeliest explanation is that the earliest Scandinavian swords were copied but that we have lost this link (with the possible exception of the specimen from Luton) and are now comparing the results of independent development in each area.

The other concentration of iron weaving swords of interest to us is mainly east of the Rhine in central Europe (Behrens 1946,135; Werner 1962, 34, 164, pl. LXVIII, 2; Millard 1969, 20). These resemble the English ones closely in form except that they are slightly smaller and were deposited at a similar time - from the mid sixth century to the early seventh (Chadwick 1958, 33). The problem is that the distribution does not extend very far into the region of the Franks, only three having been found in the middle Rhine district and two in the Moselle Valley (Millard 1969, 20). On the one hand iron weaving swords are singularly absent from the Frankish areas the Kentish kingdom is known to have had trade with, while on the other there is little evidence for firm links with the Alamanni, the nearest Germanic people who buried people with these objects. The sole example from eastern France - Herpes en Charente (British Museum 1923, (fig.) 148) - was probably imported from Kent.

Wherever they originated from, it is clear that as cultural objects these iron weaving-swords were more than functional. Where the facts are known with the exception of a few Norwegian graves (Peterson 1950, 292) the burials they are found with are always female and almost invariably they are accompanied by very rich grave goods (Chadwick 1958, 32). These weaving swords made of iron were therefore possessions of the rich and it is a probable inference from this that they were status

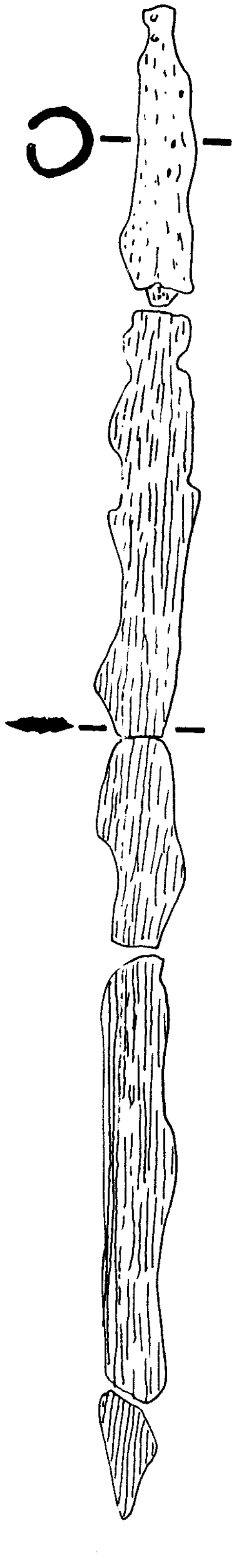


Fig. 4.22 Weaving sword found in a woman's grave of Viking date at Westness, Rousay, Orkney, at 1:4 (drawing made of object in NMAS).

symbols. An interesting sidelight on this is that two have been found, from Finglesham, Kent and Villey St. Etienne, France, which have been made from cut down swords, the blades of which had been pattern-welded (Chadwick 1958, 34) and that the indications are only the socially prominent could afford weapons made by this technique.

Viking Sword-Beaters

Only one iron weaving-sword which is known to have come from a Viking context has been found in Britain. The contrasts between this and the Scandinavian situation - two hundred and eighty-three were known from Norway alone in 1951 (Hoffman 1964, 282) - may just be because of the small number of Viking graves discovered in this country.

The grave in which the weaving sword was found, at Westness, on Rousay, Orkney can be dated to the beginning of the Norse settlement (9th cent.) and is one of the richest known in Scotland. The woman and child had been accompanied by a variety of pieces of jewellery and some utilitarian objects including wool combs, shears, a sickle, bronze bowl and a weaving sword. The position of these items is not really known because of the circumstances of discovery of the grave but they are said to have been beside the skeleton. The fragmented blade seems to have been some sixty cms in length; the eliptical section is six millimetres across and it tapers slightly in width to a minimum of four cms (fig. 4.22). Although there is no trace of a tang or socket another object was recovered which may have been the handle of the implement; this is made of sheet iron wrapped around a wooden core and is sixteen cms long, circular in section, and tapers to the butt from a maximum diameter of three and a half cms. (fig. 4.22).

Two iron implements found in fields near Cambridge and formerly supposed to be Early Iron Age currency bars (Allen 1968, 334 pl. XXXII) are likely to be weaving swords of Viking date. They are about sixty cms in length and thin but with a maximum width in the region of six cms.. Their shape is much more spear-like than the earlier weaving swords and each has a socket for a handle.

Allen also mentions three supposed currency bars from Northamptonshire which were found without context and which do not fit into any of his categories (1968, 334). These may be weaving swords too but the case is not as clear cut as with those from Cambridgeshire.

As has been mentioned, a large number of weaving swords are known from Scandinavia and the few from Britain are very similar. The

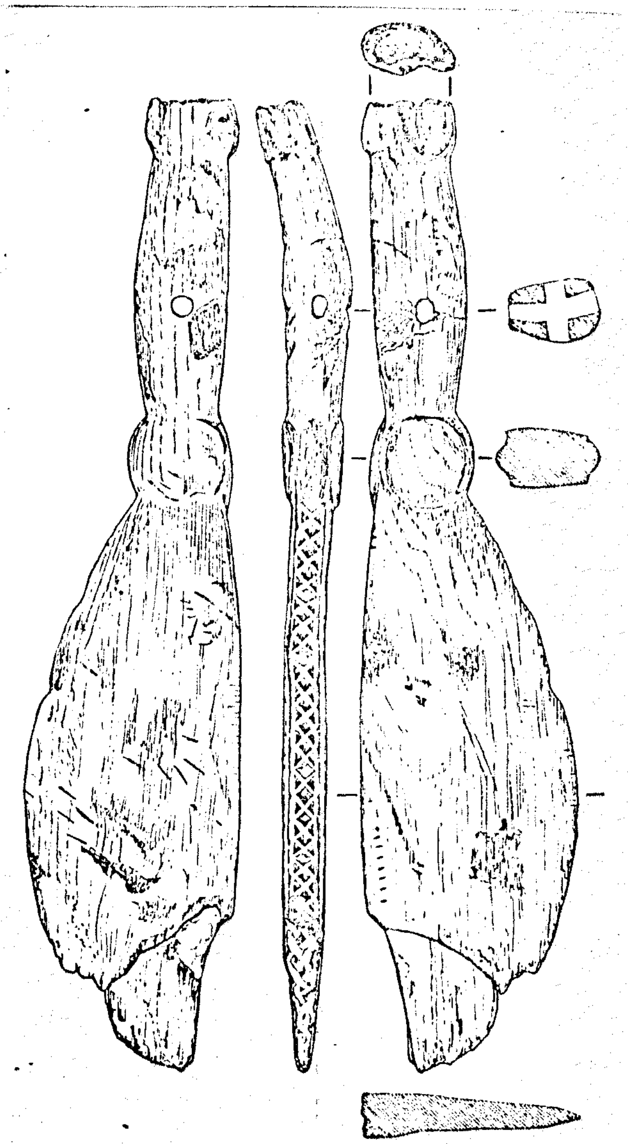


Fig. 4.23 A wooden weaving sword from Viking Dublin at L:2 (after O'Riordain 1971, fig. 22).

Scandinavian weaving swords of this date lack the tongue-like projection of earlier ones, are longer, ranging from sixty to eighty cms, and usually have a socket eight and a half to sixteen cms long for a handle at one end (Petersen 1951, 287; Hoffman 1964, 380).

Weaving-swords of other materials and periods

They are few but throw an interesting light on what might be unrepresented owing to the vicissitudes of preservation and excavation. There is firstly a piece of cetasean bone in Reading Museum which is attributable to the 11th century and came from Wallingford, Oxfordshire. This was originally more than 20cm long, is 5cm broad and 0.5cm thick. It is spatulate and blunt-ended with a central groove and has on it EADBURH MEC AHAI...AEI, a statement of ownership.

Secondly, and in contrast, there is an unusually shaped and exquisitely decorated sword beater of Viking date which was found in Dublin (O'Riordain 1971, fig. 22)(fig. 4.23). This very fine object 25.4cm long, 5.4cm wide, and 1.2cm thick, stands itself in contrast to a crude oar-like object of Early Christian date recovered at Ballinderry Crannog, Co. Offaly (Hencken 1942, 60, fig. 26). This is 104cm long, 9.6 broad and 1.6cm thick and was in fact published as an oar, could be a flax scutcher, but also gives a very good idea of what a typical everyday weaving-sword might look like. (fig. 2.9).

(4) Saxon Pin-Beaters

The characteristic Saxon pin-beater, first recognised by Elizabeth Crowfoot (Dunning 1952, 50), was used over the whole area of Saxon occupation (fig. 4.24) remaining unchanged for the time of the earliest settlers to as late as the eleventh and even twelfth centuries as at Oxford and Wareham. This stability of form can be directly attributed to their being manufactured by splitting the shaft of cattle long-bones and smoothing thick splinters until they were circular or oval in section and tapered to a fine point at each end. The maximum length and diameter of the implement was thereby predetermined and it is not surprising that their thickness varies little from the average of 8.3mm and their length ranges from 5.4 to 16.5cm with and average of 10.9. With the small sample in hand it would seem that examples of Late Saxon date tend to be the smallest and those of Middle Saxon date the longest, but this may be fortuitous.

In a few cases very little trouble seems to have been taken but most were manufactured with considerable skill and occasionally they were decorated (fig. 4.25). This care in manufacture is reflected in the length of use they seem to have had for most are smooth and shiny, especially near the points, while some bear transverse striations at

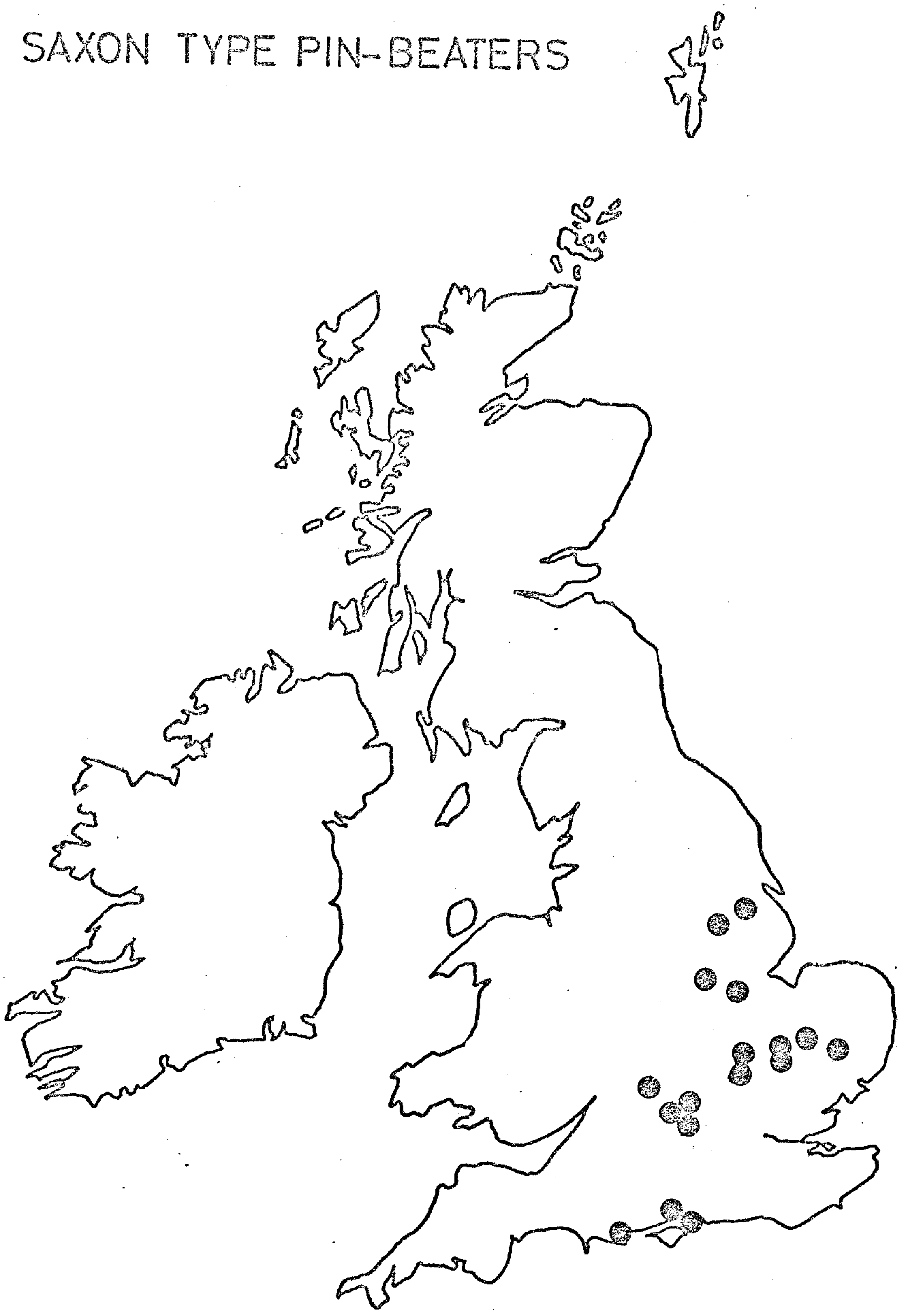


Fig. 4.24 Distribution of Saxon type pin-beaters (appendix V).

their ends; this is particularly marked in the case of one specimen from Wareham, Dorset (fig. 4.25,0).

Prior to Elisabeth Crowfoot's identification, these implements were generally thought of as shuttles (Leeds 1923, 183), spindles (Brown 1915) or heddle sticks for narrow looms (Leeds 1927, 77). The extreme shortness of some specimens makes all these suggestions unlikely but, as pointed out by Leeds (1927, 77) all these implements may not have had the same function. Two, from Oxford and York, have been included in this thesis as spindles (fig. 3.4) and others, particularly from Shakenoak, Oxfordshire, could well have been (fig. 4.25 F & G)

Finds from the Continent, almost all from Germany, (Wild 1970, Table K) indicate that these implements were in use during the Roman occupation. Wild sees them as Roman implements and suggests that they were introduced into this country at that time (1970, fig. 16). His evidence is however too flimsy to support such a thesis and it is far more likely that they were used by the native population on the continent and introduced into this country at the time of the Saxon immigration.

As in England, this particular type of pin-beater continued in use over a large area of north-west Europe up until the eleventh century or later. This area, on the basis of preset evidence, would be comprised of south Scandinavia, north Germany, the Netherlands, Belgium and the extreme north of France (Appendix V). Apart from the minor observation that a greater proportion seem to have been decorated, a variant, which has only one pointed end, and which has occurred at Dorestad, Holland and Brebieres, France, (Roes 1965, 57, pl. XXV; Demelon 1972, 100 fig. 29) has not as yet been found in England - probably because it developed after the concept of the implement had crossed the channel.

(5) Textiles

As will have been appreciated from the description of the operation of the present and recent Scandinavian warp-weighted loom,it is unusual in that the warp is actually attached to a heading which is then sewn to the warp beam. This heading becomes an integral part of the web woven on the loom, the starting border, and is a distinctive feature. These headings help the warp to be spaced and spread the tension but, when it is considered that the ends can only be weighted after they have all been attached to the warp beam, it also keeps things controllable, and it would not be surprising to find that headings had been used elsewhere and at other times with the warp weighted loom. There can however be no doubt that there are other methods of attaching the warp to the warp beam, in fact others are known from the Faroes (Hoffman 1964, 147, 180 figs. 67, 68); therefore while distinctive headings are evidence of the

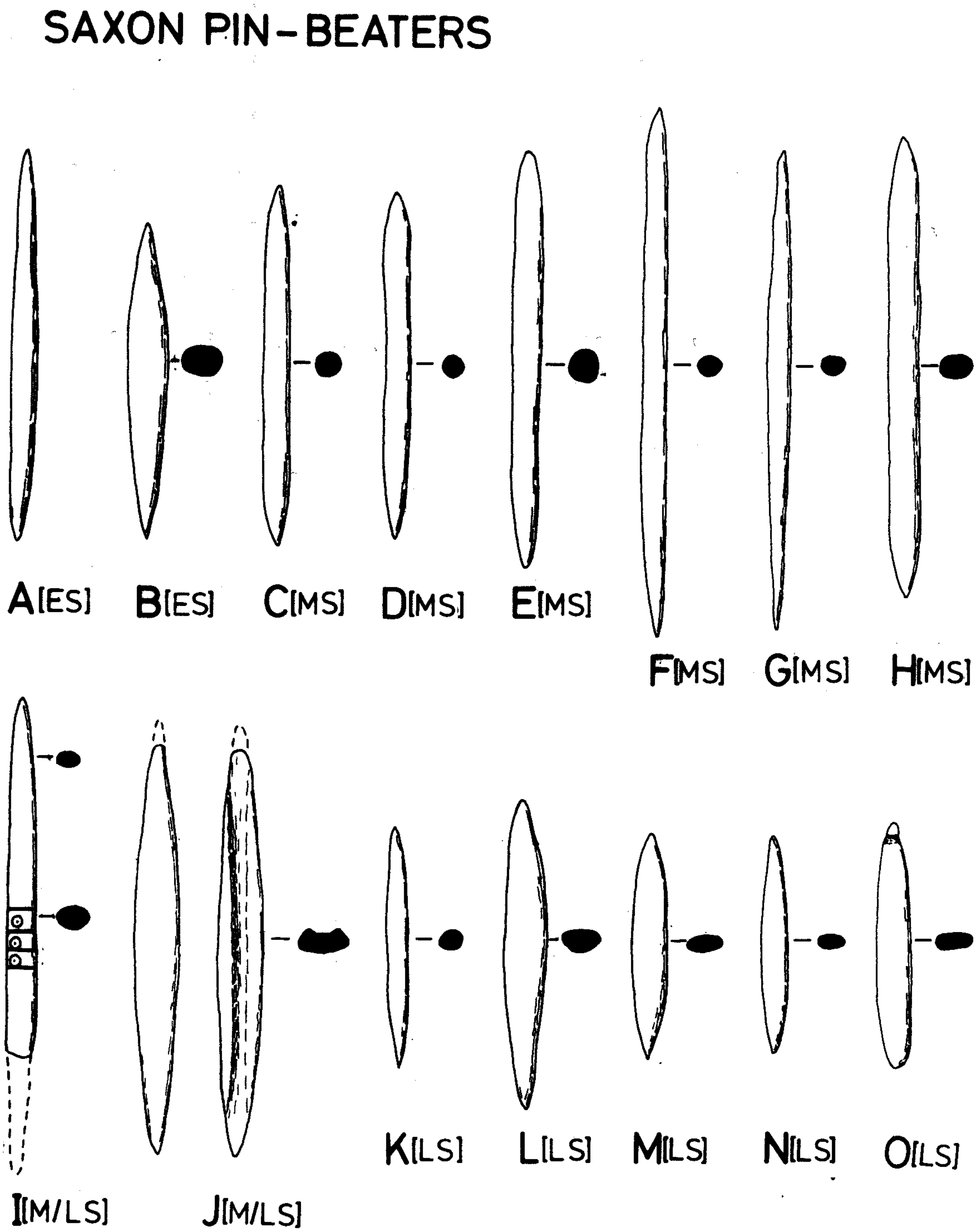


Fig. 4.25 Saxon bone pin-beaters at 1:2 ; A-O (for sites, periods and sources see reverse of figure).

		Site	After
A	ES	Abingdon, Oxon.	Avery 1972, fig 5.
B	ES	Harston, Leics.	Dunning 1952, fig 2.
C-D	MS	Maxey, Northants.	Addyman 1964, fig 16.
E	MS	Normanby le Wold, Lincs.	Addyman 1970, fig 2.
F-H	MS	Shakenoak, Oxon.	Brodribb 1972, figs 62,63.
I-J	M/LS	Hamwih, Southampton.	Hedges forth. (B)
K	LS	Oxford (Clarendon Hotel)	Jope 1958, fig 25.
L	LS	Little Paxton, Hunts.	Addyman 1969, fig 16.
M	LS	Great Paxton, Hunts.	Lethbridge 1931, fig 2.
N-O	LS	Wareham, Dorset.	Drawn by kind permission of D. Hinton.

use of the warp weighted loom their absence cannot be taken as indicative of the use of another type. Known headings can be divided into heading cords and woven borders.

A discussion of heading cords here is only included for the sake of fullness and is purposefully brief since those known are mainly confined to ethnographic collections in Scandinavia, to modern practice in western Norway, and to nineteenth century Icelandic descriptions. None are known on any material before the twelfth century, and indeed the eighteenth, and they appear to have developed in Scandinavia after the loom went out of use elsewhere (Hoffman 1964, 154, 175, 177); they seem to be a simplification which was probably introduced when outside influence demanded lengths of cloth to be woven, i.e. at the introduction of the horizontal loom elsewhere, since it would be nigh impossible to produce a long warp, say twenty ells, with a woven starting border (ibid 128). The simplest way of using a heading cord is to warp a large skein, with or without a cross, and suspend this from the cord, which is comparatively thick and strong and which is sewn to the warp beam (ibid 178). In Iceland, however, a more complex system was used in the recent past where warping was done on pegs stuck in to loom uprights and where the cord was inserted between the ends as the process was under way(ibid 127). Both are in principle the same and this system was certainly not restricted to a Scandinavian simplification, for examples have been found in ancient textiles from Syria and Egypt (ibid 253, 325); we should not therefore be surprised to find them in early material elsewhere - as Hoffman points out however they are a less certain indicator of the warp-weighted loom than woven starting borders which only very doubtfully could have been used on any other type (ibid 181).

Woven starting borders may be divided into those produced by 'ordinary' weaving e.g. using a heddle and those that are tablet woven. The former system is used to the present day by the Lapps (Hoffman 1964 63ff) and the method is very pertinent to our understanding of the textile finds. In basic terms a hand loom is initially set up involving some two dozen yarns which are sorted into sheds by, in this instance, a rigid heddle. The length of this warp determines the width of the web to be woven. The warp to be is then passed through, actually woven through, the warp of the band loom so that, in the end, a band is produced which has protruding from one side loops many yards in length; these loops are made to an exact size by passing the yarn between sheds round pegs as one would normally (e.g. Hoffman 1964, fig. 25). An interesting feature of the Lapp method is that the reservoir of warp, be it ball, hank or spool, is not passed through the band as a whole but only a loop drawn from it is; the result is that in each shed of the starting selvedge are two threads, a feature often noted in early textile finds (chap. 9).

Woven starting selvedges are the first known in Europe, occurring in the Neolithic Swiss lake villages (Vogt 1937) and are found on the earliest textiles in north-west Europe, those of the Early Bronze Age (Hoffman 1964, 159, 165). Their use certainly survived into the late Bronze Age with examples from Armoy, Ireland (Henshall 1950, 135) and Salzberg, (Hoffman, 1964, 165). Finds of the pre-Roman Iron Age are not as common as they might be - possibly due to changed practices - but lack of starting borders may be attributable to a lack of textiles in general. The only Roman example posited for the north-west privinces comes from a 3rd century grave at Verulanium (Wild 1970, 63, 99, fig. 55). Woven starting borders are equally as rare in Dark Age Europe although one attributable to the 6th - 7th centuries A.D. was found at Hessens, Germany (Hoffman 1964, 95) so the idea was never quite dropped or entirely replaced by tablet twisted borders. Borders of the former type become common again during the Viking Age in continental material e.g. 9th century Kaupeng and 10th century Birka (ibid fig. 102-105, 92) and in the Middle Ages (ibid fig. 76) and later where the loom hadn't been replaced and where heading cords hadn't been introduced - as in Lapland (ibid 165). It is worth mentioning here briefly that woven starting borders are beginning to come to light in other areas of the world e.g. a 1st century one from Qumran, Palestine and one of the 8th century BC from Gordion, Turkey (ibid, figs. 88-9).

The warp of the larger web pass through the sheds in pairs and by their construction it can be seen that they were doubtless made in the same way as the modern Lapp ones i.e. a loop from a ball of yarn was taken through the shed, the ball never moving. What is more puzzling is exactly how the sheds were made for the border since the rigid heddle does not seem to be very old or, at least, popular (Hoffman); the only one of any antiquity known from north-west Europe, from South Shields, Durham, is undateable (Wild 1970, 74-5). Hald suggests that tablets were used and were twisted first one way and then the other (Hoffman 1964, 165) but this is difficult to believe, particularly as there are no authenticated tablets earlier than the Iron Age. Hoffman's suggestion that a simple string heddle would be all that was required is much more down to earth (1964, 165).

Corded starting edges have now gone completely out of use so that is was impossible for Hoffman to see them being made and used; there are however a number of fabrics on existing looms and some extant blankets and coverlets from Scandinavia as well as Icelandic written descriptions (1964, 154) which, together with the archaeological material, suggests that corded starting borders were made in the same way as woven ones except that a tablet loom was substituted for a band loom.

In the continental material corded string starting borders start as early as the Roman Iron-age - outside the Roman provinces - and from the Tegle ship find in Norway, dateable to the 3rd - 5th centuries AD, came a prepared but unwoven warp complete with corded starting border of three 4-hole twists, right and left (Hoffman 1964, figs. 69 & 70). This find is said to "give us more information about prehistoric weaving than can be gained from any other single source" (ibid 155) and will be discussed more fully as appropriate. The corded border is the most common type in the Dark Ages and other examples may be quoted from Tegle as well as 3rd century Tofting, Germany (ibid, figs. 93-4), 4th century Corselitze, Denmark (Hald 1950, figs. 59, 170), and migration period Vejen Mose, Denmark (ibid. 166). The latest Scandinavian starting border with cording characteristic of tablet weave is from the 10th century Gokstad ship burial and is woven with three tablets. Tablet woven starting borders are known to have continued in more peripheral areas of the north, for 12th and 13th century examples are known from the Finno-Baltic and E. Finland regions (ibid 173).

It is to this group that the very small example of Dark Age British starting borders belong. The best is one on the back of an Early Saxon brooch from a grave on Blewburton Hill, Berkshire incorporating four 4-hole tablet twists, right and left alternating (Henshall 1959, 69-71). For the Early Saxon period there is also a fragment of tablet weaving from Mucking which could be part of a starting border as the wefts pass through it in pairs. Finally, from the 9/10th century we have a starting border from Gloucester with only two 4-hole tablets threaded right and left.

CHAPTER FIVE

THE 'TUBULAR' OR VERTICAL TWO BEAMED LOOM

Description

In detailing the structure and working of this loom type there are two main areas of recent use to be taken into consideration - the Near East and Asia to the present day (Dalman 1937, 107 ff; Montell 1934; Crowfoot 1937, 40; 1941; Weir 1970, 25-6) and also the Americas (Olson 1929; Hald 1950, 448-50; Hoffman 1964, 322).

The two-beamed vertical loom need not be truly upright but, as there is no advantage in having it slanted, it usually is and is often free standing (fig. 5.1). Essentially it is a frame consisting of two side beams and two cross beams which, by using different lengths and setting them a certain distance apart, can be used to determine the length and width of the cloth. A warping frame is not needed and the operation can be done simply by winding the yarn round and round the upper and lower beams producing a spiral tube; this was the system followed by the Navaho and some Danes until recently (Hald 1950, 448). Using a heddle and shed rod the seated operator may weave a bit and then push this round to the back of the loom to maintain a constant working height; in the end a tubular piece of cloth results.

An alternative method of warping is effected by firstly stretching a cord between the uprights. Instead of continually going round and round,

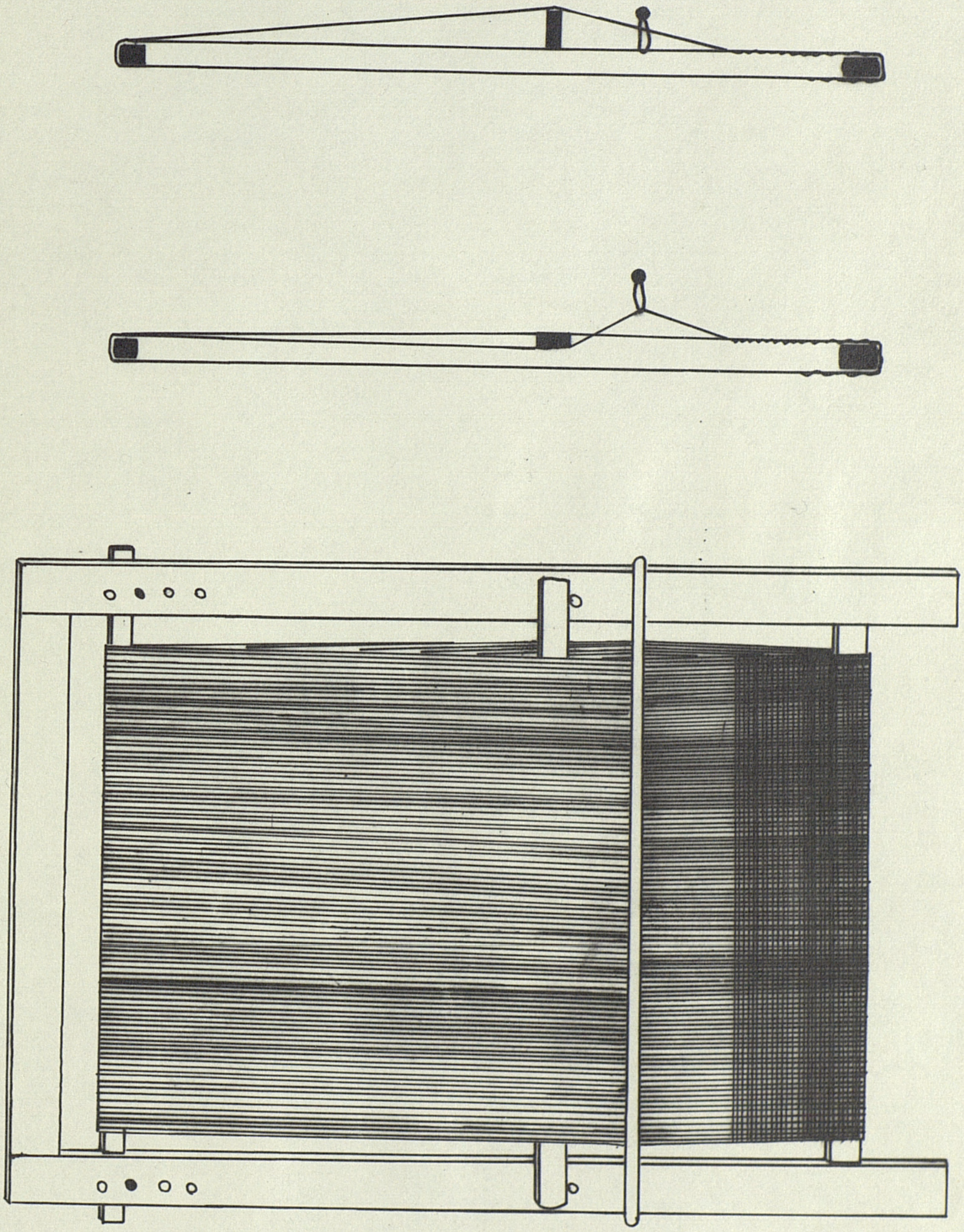


Fig. 5.1 Diagram of the two beamed vertical loom.

the warp is taken to this cord, round it, and then back (fig. 5.2). After warping weaving proceeds similarly but it is to be noted that the tubular product can be turned into a cloth with four selvedges by pulling out the cord originally used in warping.

The advantages of this loom may be summarised as comfort and simplicity in operating - the weaver stays seated - and the production of a seamless garment - the peplos - or a cloth with a selvedge on all sides. One seeming drawback is that the length of cloth is restricted to twice the height of the loom but Palestinian and Syrian weavers overcame this simply by using a secondary warp beam at the back (Weir 1970, 25).

Features to be expected from textiles produced on the loom, other than being tubular or having four selvedges, would be that the starting edge would be more compact than the finishing one, considering the difficulty of inserting the last picks and, this being the case, it is possible that weavers would have just fringed the ends rather than bothering if they knew the tube was to be opened (Hald 1950, 431). Another feature found is that while the warping is suitable for tabby as it is, if a twill is to be produced it is necessary to rearrange the ends to some extent (fig. 5.2) (Hald 1950, 430). The textiles are likely to be the only evidence for this sort of loom there will be since all the parts are organic and would not be expected to survive in the way that, for example, loom-weights or tablets do.

For this loom we do have documentation, in both written and pictorial form, that it was in use in the ancient, literate, world.

Evidence

The two-beamed vertical loom in classical antiquity

We first hear tell of the vertical loom through the early Greek Herodotus when he says,

"Other nations make cloth by pushing the woof upwards, the Egyptians on the contrary press it down". (Ling Roth 1913, 15)

This comment refers to c 450 BC but the loom is known from wall paintings in at least three tombs of the 18th and 19th dynasties (Crowfoot 1937, 36; Ling Roth 1913, 18-21, figs. 9, 14 & 16) i.e. about 1550 BC. Their paintings are neither well executed or preserved but there are no indications that the beams were revolving and it seems that the upper one was adjustable and that the warp was taken continuously around both (Hoffman 1964, 324).

The question of when the loom type became used on the other side of the Mediterranean has been answered intuitively by several writers (Hoffman 1964, 321-2) but the facts have been most clearly laid out by Hoffman herself who considers it "highly probable .... that the Greeks and

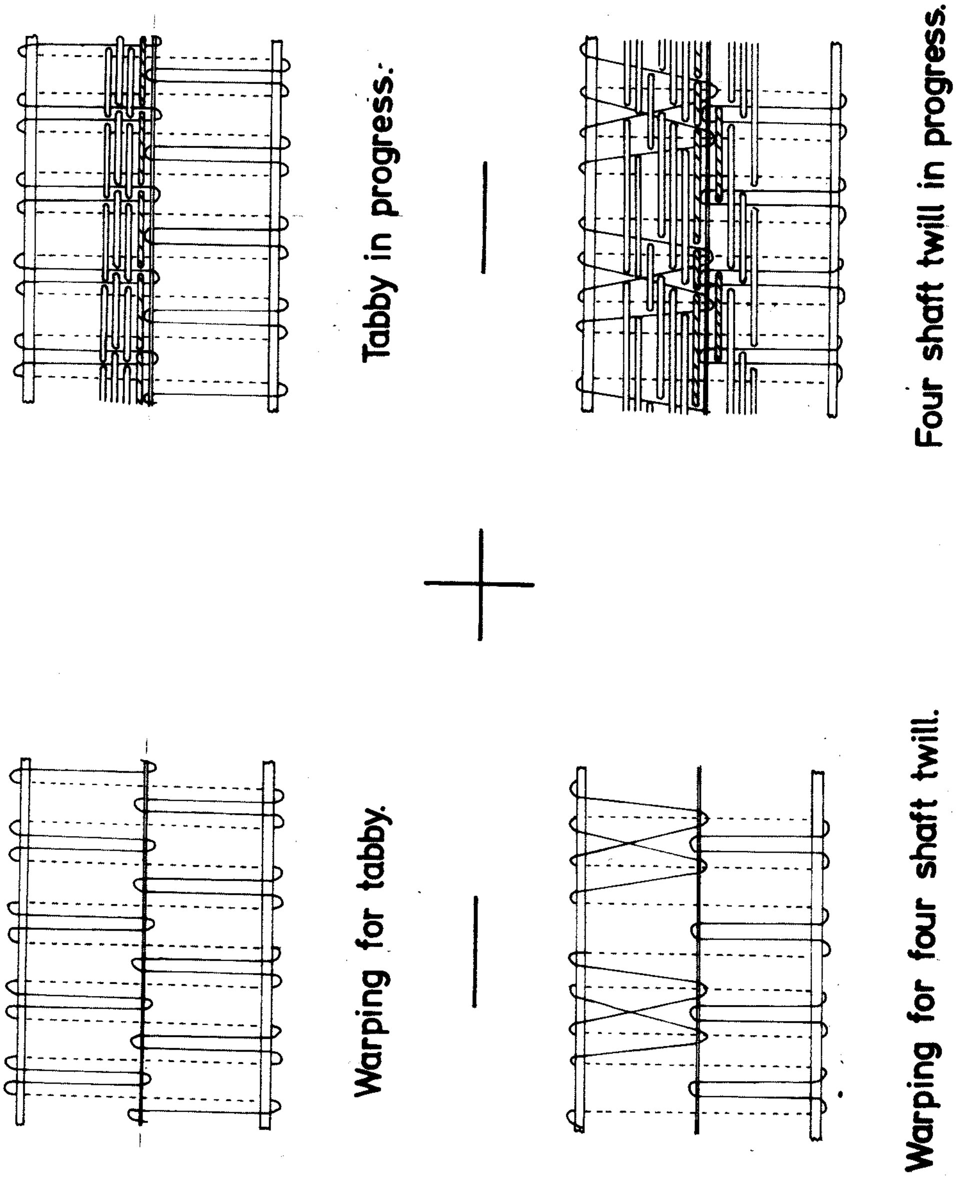


Fig. 5.2 Warping the two-beamed vertical loom for tabby and four shaft twill (after Hald 1950, figs 173-176).

the Romans knew the two-beamed vertical loom at the beginning of the Christian Era" (Ibid 322). References from Ovid (1st century BC) to Servius (4th century AD) mention both the warp-weighted and two-beamed vertical and from these it seems that the former was getting old fashioned by the first century AD (Ibid 322-4).

A small number of illustrations survive from the Roman period. These are illustrated by Johl (1917) and listed by Hoffman and Wild (1964, 326-7; 1970 69-70).

1) A miniature in a Virgil MS of the 4/5th century AD in the Vatican Museum.
2) A painting from the Hypogeum of the Aurelii, a tomb near Rome dating to the 2/3rd century AD.
3) On a grave stone of the 3rd century AD.
4) Reliefs in the Forum of Nerva of the 1/2nd century AD.

All of these show similar looms. They are free standing, rather more than two metres high, and have a 'warp' and a 'cloth' beam which can be adjusted on the two uprights. That from the Hypogeum of the Aurelii is particularly clear showing a heddle with brackets and a shed rod, while the web at the bottom suggests that weaving was done seated (Wild 1970, pl XIb).

The Danish textile evidence

It will be quickly perceived that all the evidence evinced to date is pictorial or written. In regions outside those of the literate nations we would be very lucky to find evidence for the loom type even if it had been used. In analysing the Early Danish textiles known at that time Hald came upon one from Huldremose that was attributable to the Late Bronze Age/Iron Age transition and which had been woven as a tube and remained as such. Another example was without location anddate (1950, 430). In each there was a streak in the fabric and close examination showed this to be a line where warp threads met from both sides and turned round a transversing thread, (Ibid fig. 172). The regularity with which the warp threads were looped over the middle cord ruled out secondary joining and so it had to be admitted that it had been woven as a tube. This is the only evidence for the use of the tubular loom in prehistoric north-west Europe and there was a very slim chance of it having survived.

Continental evidence for the use of the loom in the Dark Age and early mediaeval period

The Dark Ages of course derive their name from the lack of writings and illustrations we have from them. Outside Britain there are the following:-

1) An illustration in the Utrecht Psalter of the 9th century AD showing warping and weaving (Hoffman 1964, fig. 135). The loom is exactly the same as that shown in Roman illustrations except that it is kept vertical by being attached to a roofing timber. Two women appear to be working; one sitting has a comb, and the standing one holds a pair of scissors. Peculiarly, two women are also figured preparing a warp as a skein (fig. 5.3). A copy of the Utrecht Psalter, the Eadwin Psalter in Trinity College Cambridge (12th century) shows the same scene, but while being more detailed in some respects, is more inaccurate in others. There is in any case no certainty that the illustration was produced by a western artist let alone from a western loom (Hoffman 1964, 328).

2) Theophylact, a Bulgarian bishop of the 11th century, wrote -

"Others say that in Palestine they weave their fabrics not as with us, having the warp threads above and weaving below with the bobbin and thus mounting; but on the contrary, the warp threads are below and the web is woven from above."

Evidently this type of loom is the two-beamed vertical and that used in Palestine the warp-weighted but, as Hoffman asks, How much of Europe does 'as with us' include? (Ibid 328).

3) A picture of a loom in the MS of Hrabanus Maurus' De universo (the Monte Cassino Library MS 132) is 11th century (Hoffman 1964, fig. 136). This is unusual as the lower beam is next to the ground and only the upper half of the weaver can be seen through the warp - perhaps he is in a pit. The loom has static though removable beams and there are adjustment holes along the length of the uprights. There is a spacing cord shown but no rods or heddles; nothing has however been woven and the loom may still have been being set up.

It should be noted that not only are these examples few but that they could be seen as distinctly East European. Apart from miniatures no vertical looms occur in the copious later mediaeval manuscripts but, if the loom had been used, it would have been replaced by then by the horizontal one anyway (Hoffman 1964, 332).

Evidence for the two-beamed vertical loom in Dark Age Britain

The positive evidence for the use of the two-beamed vertical loom in Dark Age Britain consists of one reference, the importance of which has not been realised hitherto. The Gerefa (Appendix XII), written by the same person as the Rectitudines Singularum Personum, and putatively part of the same work, dates to the generation before the conquest and treats of the management of an estate, either real or abstract, which

Fig. 5.3 Warping for, and weaving on, the two-beamed vertical loom; from Trin. Coll. Camb. MS R M.I c 1150 AD, (after Hartley 1931,22c).

was probably set in the south west of England (Loyn 1962, 113, 189; Blair 1956, 264). In this there is an inventory of implements used in spinning and weaving and we must assume this to be as complete as the writer could manage, fairly logically presented, and non-repetetive. In Anglo-Saxon it runs:-

'Fela, towtola; flexinan, spinle, reol, gearnwinden, stodlan, lorgas, presse, pihten, timplean, wifte, wefle, wulcamb, cip, amb, cranstaef, sceadele, seamsticcan, scearra, naedle, slic.'

The importance of this to the subject of being immense, and extant translations being mere travesties founded on philology and ignorance of practical detail it has been necessary for the original to be completely reinterpreted (Appendix XII). From that it is clear that the loom in question has:

1) No loomweights - a set of loom-weights is not just a collection of stones or pieces of baked clay but is well prepared and an essential part of the equipment for the warp-weighted loom which would neither have been discarded or omitted from a list of component parts.

2) It has uprights (<u>stodlan</u>) and more than one beam (<u>lorgas</u>).

3) As secondary parts it has temples (<u>timplean</u>); <u>seamsticcan</u> - which can be literally translated as 'seam sticks'; an <u>amb</u>, which has been rendered as a reed (quite possibly incorrectly); and a <u>presse</u>, which just means a press. The real identity of the last three terms is obscure; a heddle (or reed) and a shed rod would be required however.

5) Minor tools mentioned are a <u>pihten</u>, which is certainly a weavers comb and a <u>sceadele</u> which has been given as a shuttle.

There can be no doubt that the loom described, together with equipment for yarn preparation and cloth finishing, is a two-beamed vertical loom; there are no loom-weights, more than one beam, and a comb was used to beat in with. It is moreover clear from the context that this was a perfectly ordinary piece of equipment used to produce commonplace cloth in the mid 11th century in the south of England.

While the passage quoted above may be the only <u>positive</u> evidence for the use of the two-beamed vertical loom in Dark-Age Britain our knowledge does not end there; we also have negative evidence. If we assume that the people of the time needed to weave then they must have had looms. In areas and periods where loom-weights have <u>not</u> been recovered the warp weighted loom was not in use and therefore some other type must have been. The time is too early for the horizontal treadle and Europe too distant for the horizontal ground; unless there was a loom-type which has disappeared without trace anywhere the only candidate remaining is the two-beamed vertical.

The time and place where this argument is most persuasive is Roman Britain. Loom weights are a common find on habitation sites both of the Middle/Late Bronze Age and the Early Iron Age (Hedges 1973, 115-121). Wild (1970, 136) can cite five for the whole of the Roman occupation and the contexts of some of these would not bear much scrutiny. It is quite clear that in the area of Roman influence the two-beamed vertical loom superceded the warp-weighted one entirely; outside the area we are hampered by a lack of excavated sites, finds and dates but it would seem that the warp-weighted loom continued in use.

With the Saxon immigration into Britain we can see the use of the warp-weighted loom being reintroduced, spreading east-west with their movements (fig. 4.5). This does not of course, mean that the two-beamed vertical went entirely out of use. In other parts of Britain the presence of loom-weights of different types to those of the Saxons testify to the continued use of the warp-weighted loom. At the end of our period loom-weights are no longer found on sites - they survive to the twelfth century at the latest; this means a change in loom type but at that time this could be the horizontal treadle as much as the two-beamed vertical.

In theory it should be possible to plot the distribution of loom-weights for a particular sub-division of the Dark Ages thereby giving a negative of the use of the two-beamed vertical loom; in practice the data is too poor to do this with. An overlay of all Dark Age loom weights (fig. 5.4) does however have some interesting gaps; in addition to the poorly populated Highlands there are the West country, the north west of Ireland, and the Borders.

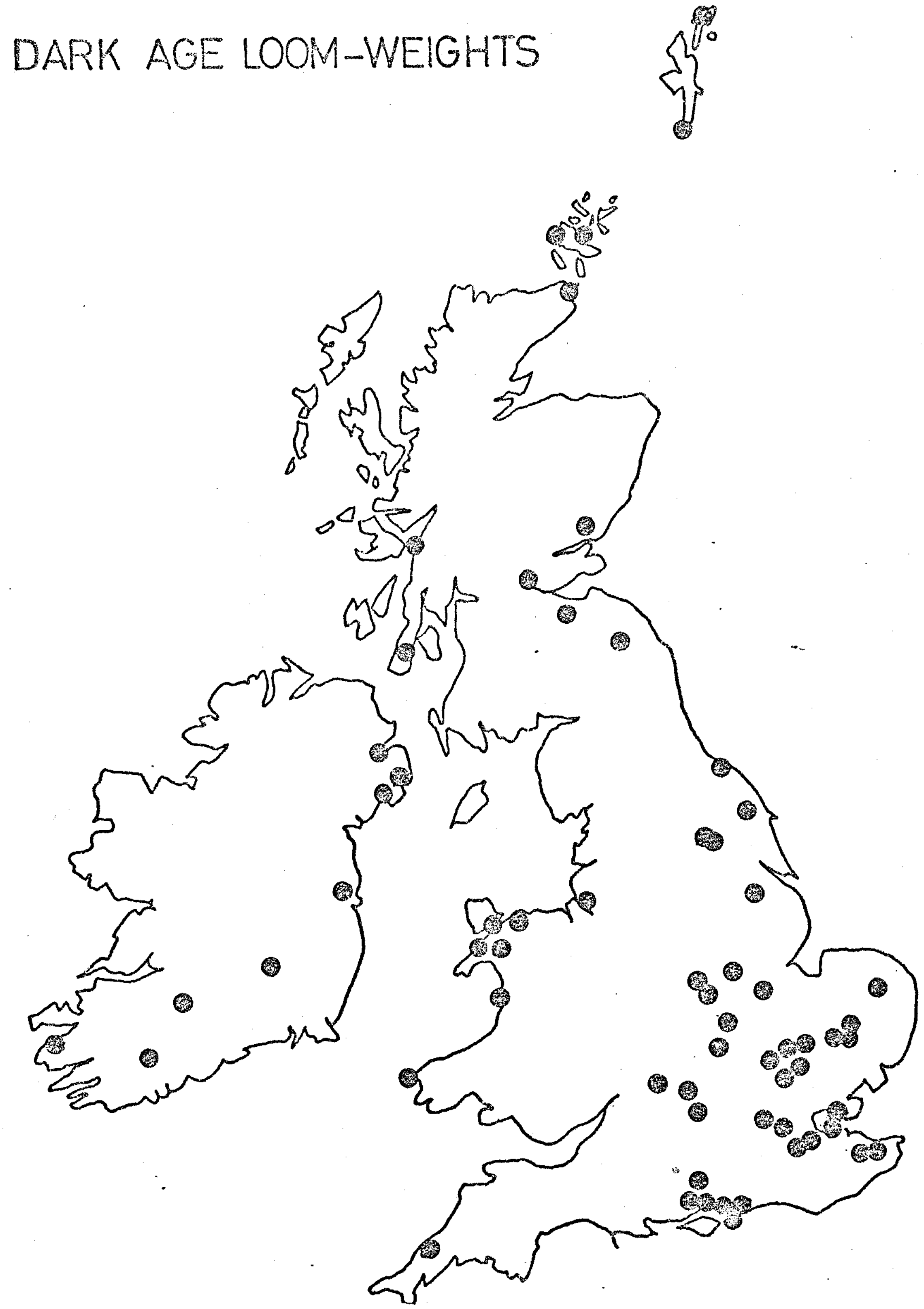


Fig. 5.4 Distribution of Dark Age loom-weights (appendix IV).

CHAPTER SIX

THE HORIZONTAL TREADLE LOOM

Description.

Fig. 6.1 shows the basic parts of the horizontal treadle loom; usually these would be housed within a rigid framework (figs. 6.3 & 6.4). The warp is stretched between the warp beam (at the back) and the cloth beam (where the weaver sits) both of which take the form of rollers so that as weaving proceeds the warp can be wound off the one and the cloth onto the other enabling great lengths to be manufactured. A rod may be used to sort the ends coming from the warp beam into two sheds in order to facilitate heddling. The heddles themselves consist of long frames across which regularly are taut wires with a loop in the middle, and they are raised by strings which go over a pulley above them and down to the activating treadles. Ends involved in a shed are passed through the loops of the heddle while those that are to remain static are passed between the looped wires. A shuttle is usually thrown across the bottom set of threads when a shed is made and the weft is beaten in by a reed batten; this is a frame similar to the heddle except that there are no loops, all the threads passing individually between wires stretched the width of the implement.

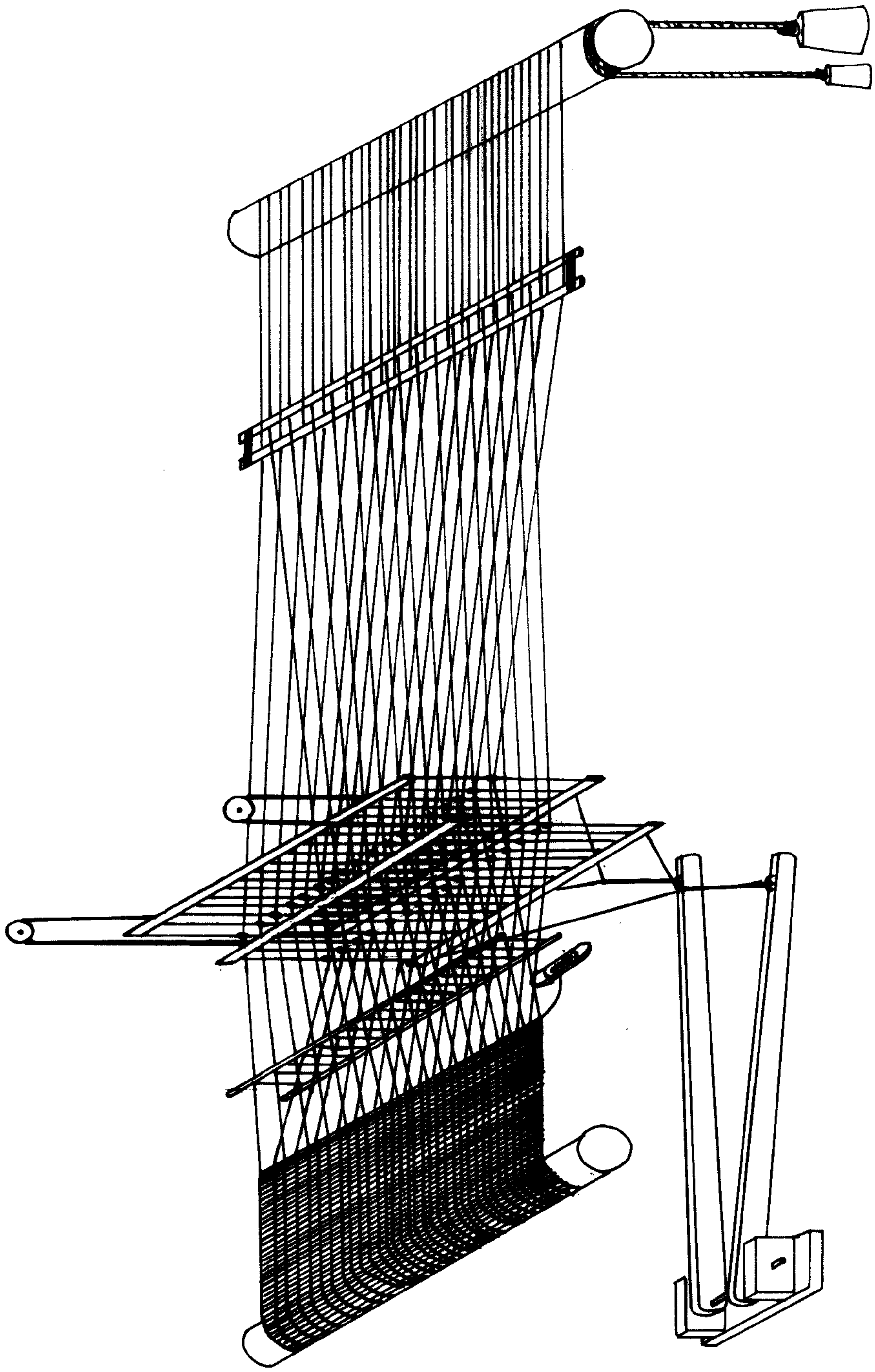


Fig. 6.1 Diagram of the operational parts of the horizontal treadle loom (after Usher 1954, fig 87).

Implements usually associated with the horizontal loom

The introduction of the horizontal loom to Western Europe revolutionised the whole concept of cloth production permitting it to become much more efficient and standardized (p.150). It would be no use just as a solitary introduction and the advent of the horizontal loom is associated with a number of other technological innovations which are considered to be brought in with it (Hoffman 1964, 259, 296). It should be noted however that the essential processes leading up to the weaving remain the same in their basics; it is only the efficiency which is altered by the new equipment. It may be that this increase in efficiency was demanded by the introduction of the horizontal loom and that the implements came with it or shortly after: The spinning (and spindle) wheel have already been dealt with (Ch.3); the first known illustrations of the implements mentioned below are early fourteenth century.

The rotary reel

This consists of a reel mounted on an axle which is either vertical or horizontal (figs.6.2, 6.3) and is used to wind uniform hanks from spindles of yarn. Patterson alleges it originated in the far East, where reeling is essestial to silk manufacture, and entered Europe at about the same time as the spinning wheel (1956, 208).

The wool winder

This bears such a close resemblance to the spindle and spinning wheel that they must be connected. It is basically a wheel mounted on a horizontal axis around which is a drive-band connected to a spindle; on turning the wheel by hand the spindle will rotate rapidly and it is possible to wind cops for warping and spools for shuttles quickly (figs. 6.3, 6.4).

The spool rack

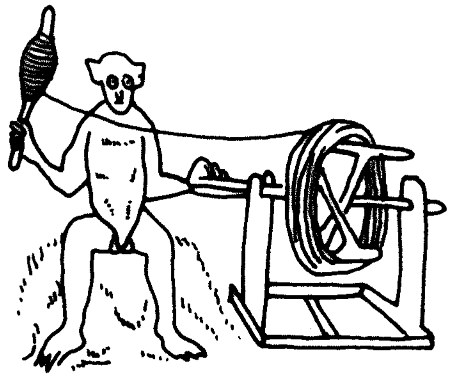
This is a device consisting of a number of pivots or axles on which cops of warp will rotate freely. The object of this is to allow warping to be done faster; a weaver can take yarn from a dozen or more cops as fast as he could from one (fig. 6.2)

The warping board

For short lengths of cloth produced domestically a warping device does not have to be any more sophisticated than three pegs banged in a wall. Long warps, however, require a special implement such as the warping board which consists of two parallel uprights with pegs set in them between and around which the warp is taken (fig.6.2). The warping board in early illustrations has a noticeably close resemblance to the warp-weighted loom.

The horizontal loom in Classical Antiquity.

The problem of the use of the horizontal loom in Classical Antiquity has been beset by the problems of too many would-be theorists enlarging on too little evidence. The resultant literature is just confusion or unsubstantiated



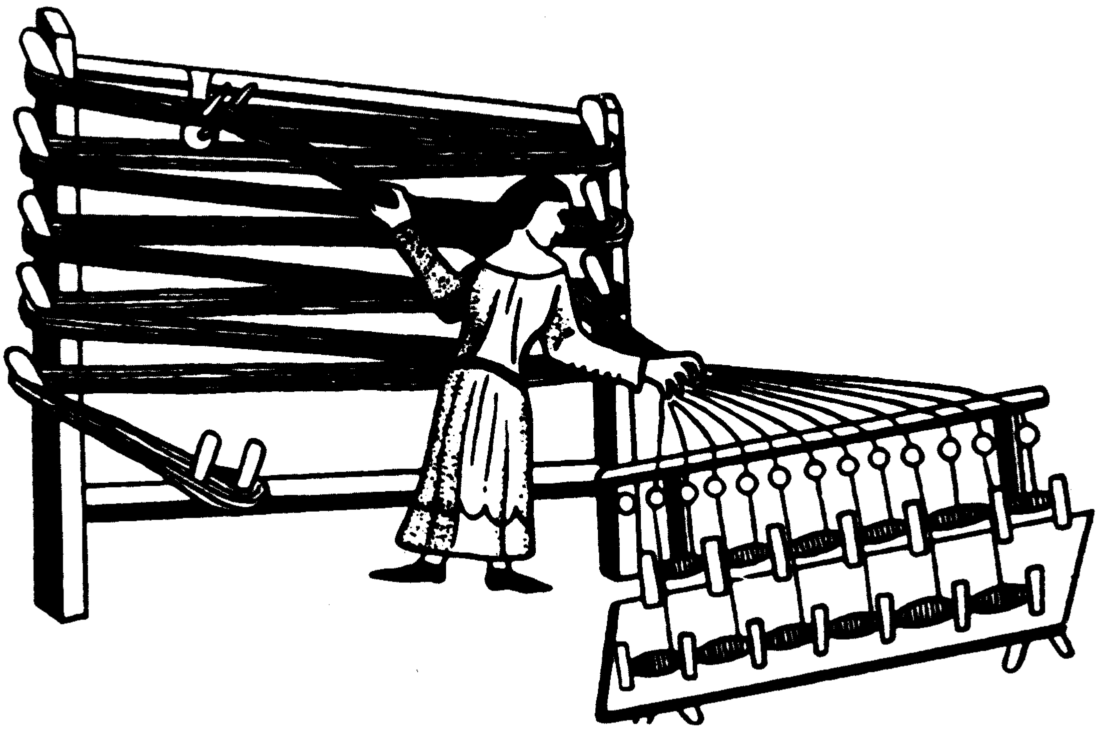


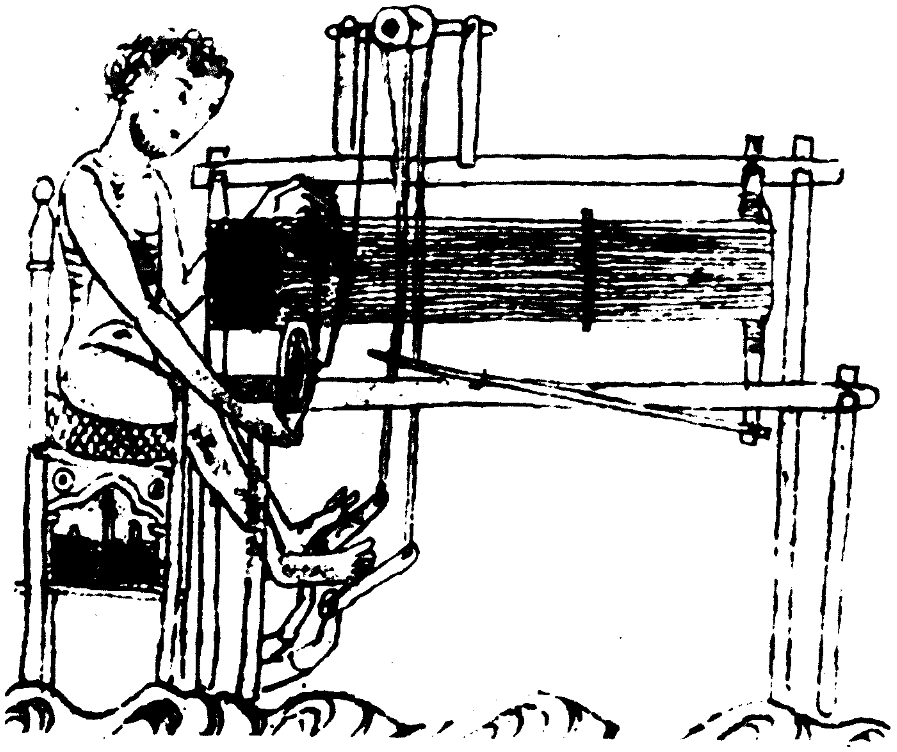
Fig. 6.2 (Top) Hank winding on a rotary wheel; from the Ypres Book of Trades c 1310, (after Patterson 1956, fig 174).
(Bottom) Warping on a warping board; from the Ypres Book of Trades c 1310, (after Patterson 1956, fig 176).

statements in which the Chinese silk loom, the horizontal treadle loom, the draw-loom and the ground loom are all invoked; Hoffman gives a long list of authors who have not been able to resist the temptation (1964, 321-322) and here it is only intended to discuss the subject briefly ignoring irrelevancies.

Perhaps the most salient fact to point out at the outset is that there is no positive evidence for a horizontal loom of any type anywhere in Europe - pictorial, written, or by way of parts - until the Early Middle Ages. The arguments that the Romans used one have two themes 1) Compulsory diffusion - i.e. if it is shown that their contemporaries used a horizontal loom then the Romans must have and 2) Technical considerations based on a few textiles which are almost certainly Near Eastern in origin and involving a prejudice that sophisticated products require a complicated to make them.

The mainstay of the last argument are the damasked silks of third and fourth century date from Holeborough, Kent, Trier, Germany and possibly Tournai, France (Wild 1970, 101, 118-9). The pattern of these is in the weft and so they are not Chinese but a product of the near east at the furthest (Ibid 77). One from Trier is embroidered with a silver of hide to form a factory mark, which, incomplete, can be rendered as FLORENTIA OFFICINA, which would mean in theory it was a western product. The line of argument from there is that this requires a large number of sheds, and therefore there would need to be the requisite number of heddles or draw cords. According to present day ideas the number of shedding mechanisms involved could not have been handled on a vertical two-beamed loom or a warp-weighted one and therefore the Romans in western Europe must have had a knowledge of, at least the horizontal treadle and perhaps even the drawloom (Ibid 77). It is probably best, until further evidence comes to light to say that this is slim proof and to admit that as yet we can trace the horizontal loom no closer than Syria where silks were made up (Hoffman 1964, 334-5). Again there is a tendency in modern minds to assume that a sophisticated product requires complicated machinery to produce it. Hoffman (1964, 342) questions whether these silks are really evidence for the drawloom at all while Endrei (1961, 120) maintains that the ancient Chinese loom had onetreadle only, and according to him the intricate patterns of the early Chinese silks were produced on a very simple non-automated affair. Looms with up to fifty manually operated shed rods were used in Europe in mediaeval times ,(Wild 1970, 77).

To summarize, apart from one piece there is no evidence that complex weaves were produced in the western Roman Empire and there are no further grounds for assuming that the horizontal loom was known in any part of Europe until fledged article replete with treadles and pulleys.



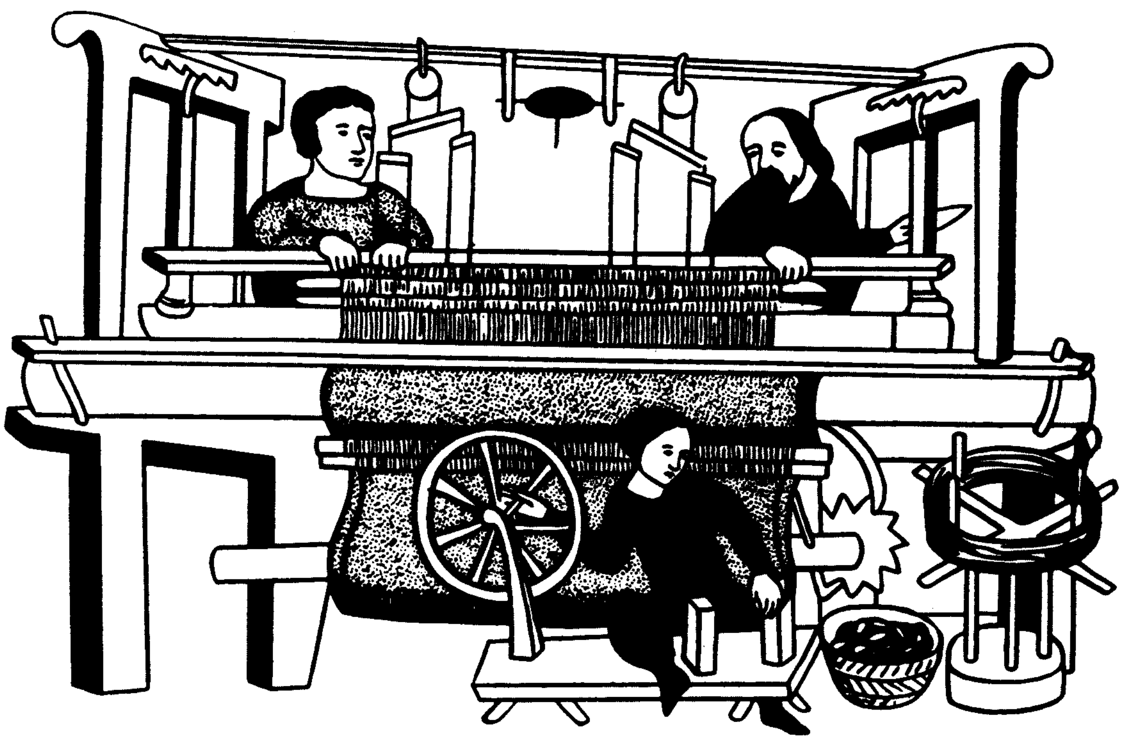


Fig. 6.3 (Top) A horizontal treadle loom of the 13th century; from Trin. Coll. Camb. MS O 9 34, (after Hartley 1931, pl 22b).
(Bottom) A double horizontal treadle loom of the 14th century; from the Ypres Book of Trades c 1310, (after Patterson 1956, fig 183).

Introduction of the loom to Britain and Europe

Illustrations

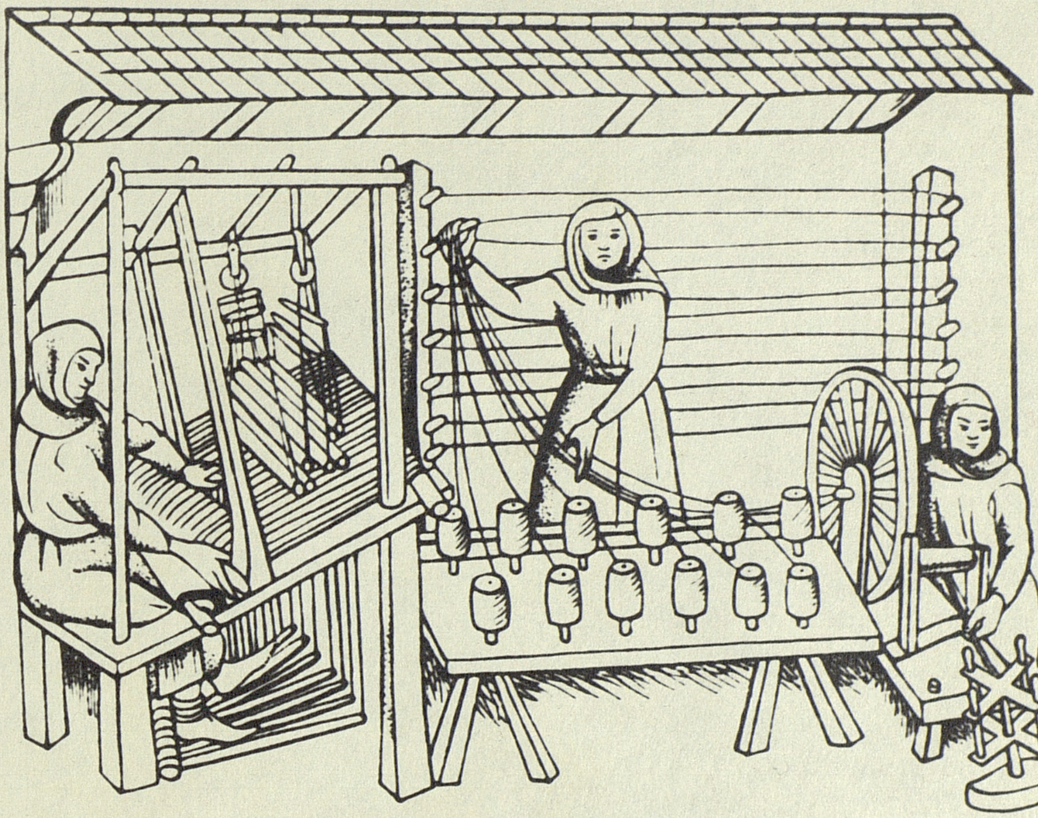
The earliest illustration of this type of loom belong to the thirteenth century. The only 'English' one is in a manuscript of The Romance of Alexander dating to about 1250 AD which survives in Trinity College, Cambridge, Library (James 1902, 489; Hartley 1931 pl. 22b). Crude though it is, it clearly shows a naked man sitting at a horizontal loom complete with treadles, pulleys, heddles and a shuttle and weaving a green diamond twill (fig. 6.3). The first pictorial representation we have in Britain is of the fully fledged article and this is the same on the Continent. Here for the thirteenth century may be enumerated several stained glass windows in France and Germany (White 1962, 117) and an illustration in a Pattern Book MS from Austria which possibly shows a horizontal loom but definitely has both a reed and a shuttle in it. (Hoffman 1964, 259, 260 fig. 110). As early as 1310 the Ypres Book of Trades figures a very sophisticated horizontal loom of double width (Patterson 1956, fig. 183)(fig. 6.3).

After the 14th century there are many illustrations. The two selected, an Italian one of the 15th century and an English one of the 16th are typical (fig. 6.4) Others include two fifteenth century ones; one in Rhodericus Zamorensis' Spiegel des menschlichen Lebens (1479) and another in Boccaccio's Des Cleres et Nobles Femmes (Mummenhof 1901, fig. 19; Salzman 1923, 214; Hoffman 1964, 363.) A fourteenth one, located in Nuremburg is figured by Kaminska and Nahlik (1960, fig. 14); a later copy is also shown by Patterson (1956, fig. 182).

Literary References

The earliest literary reference occurs in the writings of Rashi (1040-1105) who states that men weave with their feet while women have a cane which they move up and down. As Crowfoot and Hoffman say these two movements are those required for the same process on two different types of loom. The reference definitely refers to western Europe as Rashi was born in Troyes, France and, apart from a ten year stay in Germany, he remained there all his life (Hoffman 1964, 260; Crowfoot 1951, 29).

In the late twelfth century Alexander Neckan, making observations on daily life in London and Paris made an allegory between a knight, his horse, and his stirrups and a weaver, his loom and treadles. Originally



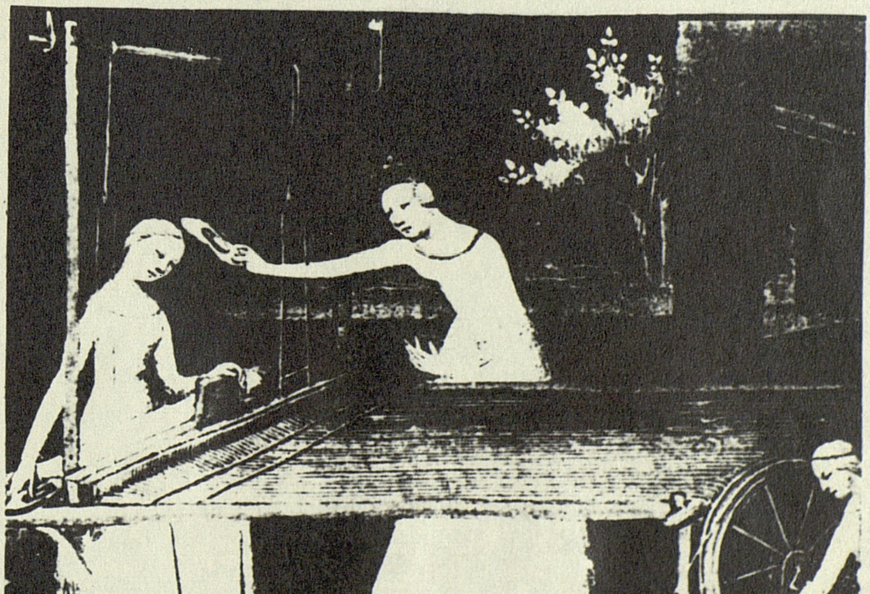


Fig. 6.4 (Top) Nuns making cloth; from an Italian manuscript of 1421, (after Patterson 1956, fig 175).
(Bottom) Ladies making cloth; from a 16th century English manuscript, (after Hartley 1925b, pl 25c).

written in Latin (Wright 1863), this has been rendered in different ways.

> "Like a knight leaning on two stirrups, the weaver keeps prodding his frugal horse. The pedal of his loom, symbolizing the shafts of his fortune, are pleased in their alteration, so that while one of them rises the other goes down without the slightest envy."
>
> (Lopez 1952, 369)

> "A weaver is a horseman on terra firma who leans upon two stirrups and who gives rein constantly to the horse, content with a short journey; but the stirrups representing the condition of his fortune enjoy mutual vicissitudes, since when the one goes up the other is depressed without any indication of rancour."
>
> (Holmes 1952, 146)

In a different part of the same text there is a straightforward, if slightly garbled, description of a horizontal loom together with other aspects of textile production.

> "The weaver has a (breast) collar to which the cloth to be rolled up is fastened. Let there be beam-like strips marked with holes and facing each other from opposing sides, with wires shaped like a shepherd's crook and the strips going the same way as the warp threads, also (let there be) linen threads as slender as those that are properly associated with fringes (tied to) rods in the heddles, these threads set at intervals; let the weaver draw the warp threads (with such a heddle), the upper series of threads and then the lower. When the weft has been passed through by means of a shuttle, let him beat down the work accomplished, and let the shuttle have an iron or wooden bobbin between open spaces".
>
> (Holmes 1952, 157)

Finds

Shuttles, pulleys, treadles and reeds are the distinctive parts of this loom which might be expected to survive under chance circumstances. This has certainly been the case but not, so far, in Britain. The most notable instance consists of pulleys and other parts from 11th century contexts at Gdansk, Poland (Kaminska and Nahlik 1960, 93-97; Hoffman 1964 260). A shuttle and two pulleys came from a 12th/13th century house in old Oppeln, again Poland (Hoffman 1964, 260; Sage 1936, 322, 330). The only find to date in western Europe is a pulley, which cannot be much later than 1200 AD, from the city of Sigtuna, Sweden. (Geijer and Anderbjork 1939, 232).

Circumstantial evidence from finds of textile implements

a) Absence of loom-weights

This is not a good indicator, as lack of evidence for the warp-weighted loom does not prove the existence of the horizontal and, in any case, there is no reason why the two shouldn't be coeval in different milieus. The latest Saxon type weights we have are 11th or even 12th century and they are from the towns of Rochester, Winchester, and Oxford (the last two of which are known to be early centres of professional weaving). Some of the weights from Jarlshof, Shetland, may even be as late as the 14th century indicating the survival of this loom type in peripheral areas.

b) A possible part of a warping board from Gloucester

Warping boards seem to belong to the assemblage of incidental tools that came with the horizontal loom (this may be entirely erroneous). In 9th/10th century layers at Gloucester a piece of wood was found which could be the side of one of these (fig. 6.5) hereby giving very tenuous evidence for the horizontal loom.

Evidence from Textiles

Evidence from textiles hinges on the supposition that the horizontal treadle loom is the only one on which more than four heddles can be accommodated with ease. Any loom will theoretically take any number of heddles, they will just add to the difficulty of working it, but the horizontal one has harnesses, pulleys and treadles which solve any difficulties mechanically. Wild has used this argument to support the case for the horizontal treadle loom, and even the drawloom, being used in Roman Europe, but the textiles he cites, with the exception of one, are all luxuries likely to have been manufactured in the near East (1970, 75-78).

A scrap of textile of 10th century date from Coppergate, York which in all other respects is a perfectly ordinary woollen, proved

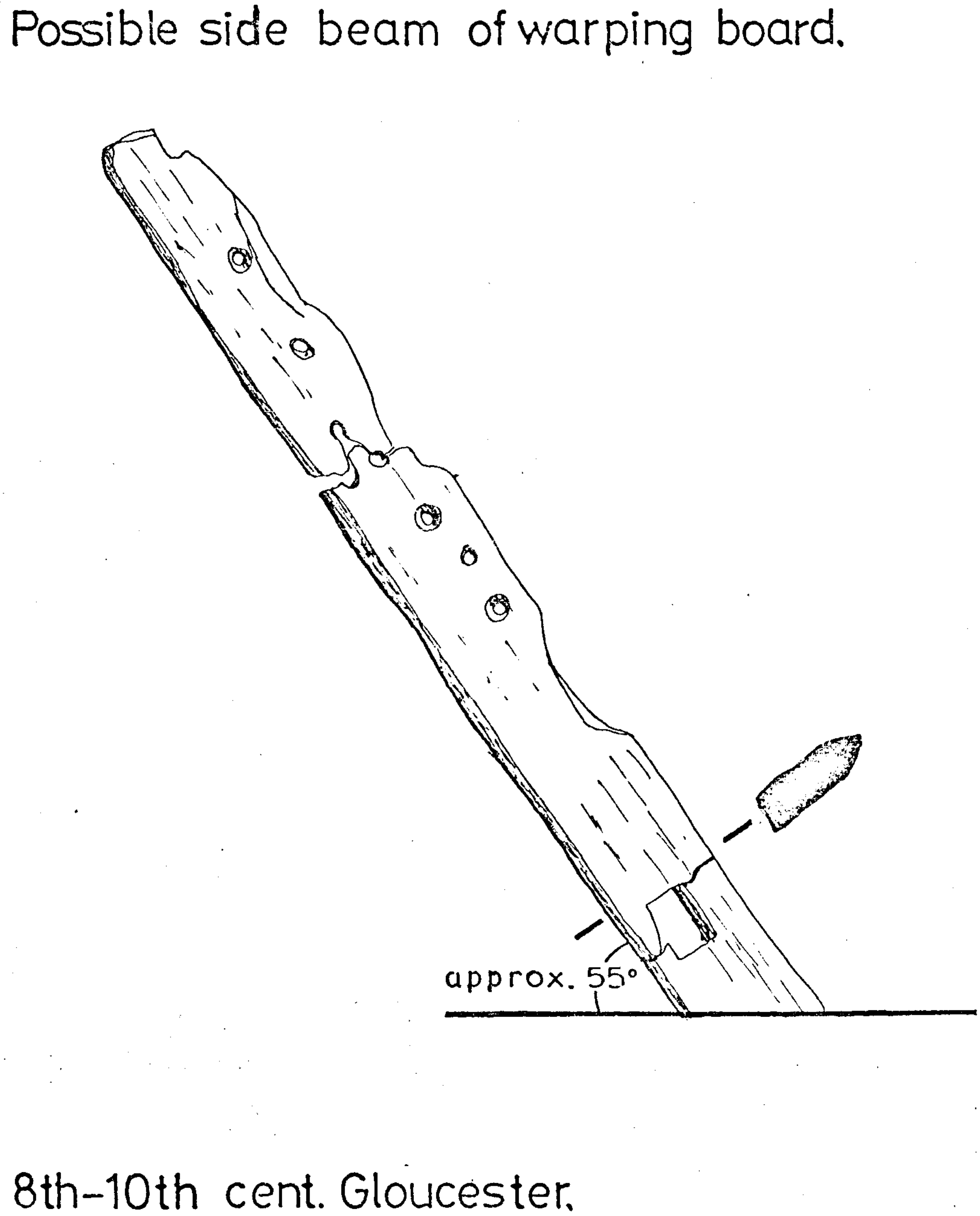


Fig. 6.5 Possible side beam of warping board of 9th/10th century date from Gloucester, (Hedges forth.(J)).

on close examination to be a six-shaft twill (p 214 ;fig. 9.19) (Hedges forth (A)). It would not have been impossible to have woven this on a vertical or a warp-weighted loom but it would have been very difficult; on a horizontal loom with six treadles however it could have been very easily done (e.g. fig. 6,4).

References to products and organisation

Although the exact time it happened is not known - circa 1,000 AD - it is a fact that in western Europe the production of cloth started to be entirely revolutionized. Long rather than short pieces were woven and went by new generic names (e.g. draps, Lalen, Tuche, cloths); they were produced using new sophisticated equipment, including the horizontal loom, to laid down specifications; and it was men rather than women who wove and formed exclusive production groups. Although it is rather a 'chicken and the egg' problem, Hoffman sees the introduction of the horizontal loom as the prime cause of this (1964, 257-8, 197). By the middle of the 12th century this sort of industry had developed to such an extent in Britain that the weavers of London, Winchester, Lincoln, Oxford, Huntingdon and Nottingham, and the fullers of Winchester, had formed themselves into guilds which were sufficiently wealthy to pay from £2 - £12 yearly to the king for various privileges which practically amounted to the monopoly of cloth working in their several districts. There were also centres at Stamford and Gloucester, while dyers are found in Worcester in 1173, and at Darlington ten years later. Laws show that the cloth trade by the end of the 12th century was almost entirely in the hands of capitalist merchant clothiers and there are many documents from the 13th century on, including the Magna Carta, in which specifications for cloth are laid down. (Salzman 1913, 133-7). There cannot be much doubt that this reorganisation went hand in hand with the introduction of the horizontal treadle loom but the problem is that the records give us a picture of something that was already thriving and do not tell us when it started. On this evidence all we can say is that the horizontal treadle loom was introduced into Britain at some time previous to the mid-twelfth century.

Summary of the evidence for the date of introduction of the horizontal treadle loom into north-west Europe and, particularly, Britain

The earliest illustrations of this type of loom, including one British one, are thirteenth century, but pictorial representations of everyday life before this are not common. The revolution in textile production and trade is known to have taken place around AD 1,000 and was an established fact in Britain by the twelfth century. Rashi's statement that men weave with their feet while women have a cane which moves up and down points clearly to the existence of treadle shedding, and therefore the horizontal loom, in western Europe in the last part of the 11th century and this evidence is corroborated by loom weights of the 11th and 12th centuries found in Poland and Sweden. It is possible that a date of introduction into Britain as early as the 10th century, however, is indicated by a sixshaft woollen from York and there seems to be some evidence for equipment thought to be associated with it as well as the 11th century.

CHAPTER SEVEN

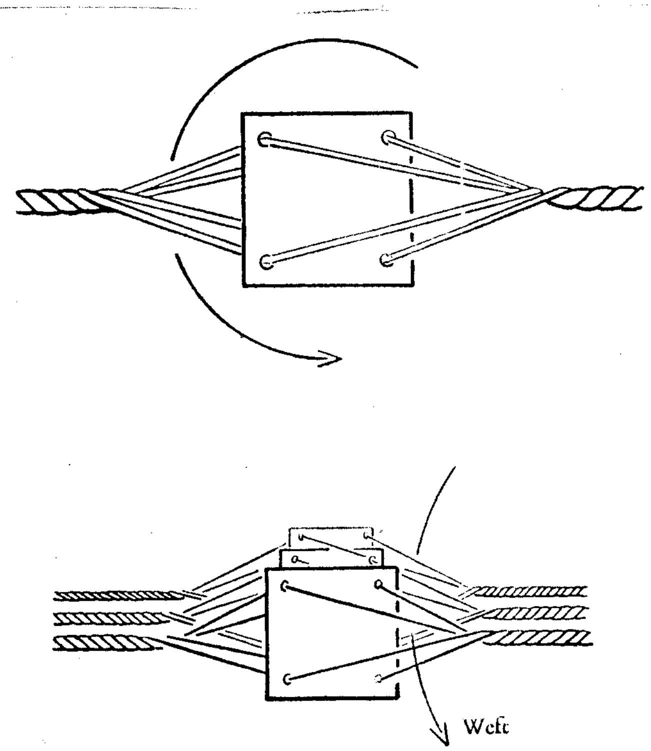
SMALL LOOMS

In this section, four of the smaller looms are treated separately; the tablet loom, band loom, sprang loom and tapestry loom.

a) The tablet loom

Known tablet looms have varied greatly in their sophistication but in all the principle is the same and the vital component is a pack of tablets. These are thin shaped pieces of any suitable material - be it bone, wood, metal or even playing cards - which have perforations near their edges (fig. 7.2). Through these holes single warp ends are passed and tensioned. The simplest method of doing this is for the weaver to have one end of the warp attached to a static object and the other to himself but a framework may be used which, in its most complex form, has a cloth and warp beam and a comb for ordering the warp (e.g. Schuette 1956, figs. pp 3,7).

To return to first principles again, it will be seen (fig. 7.1)



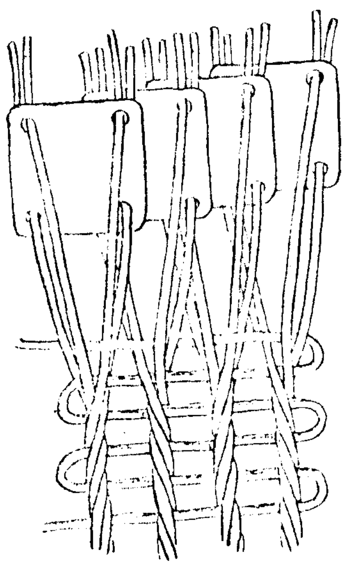


Fig. 7.1 The working of the tablet loom.
(Top) (After Wild 1970, fig 66).
(Bottom) (After Hald 1950, fig 224).

that if the pack is held together a shed is produced through which a weft may be put with e.g. a bodkin or small spool. By giving the tablets a quarter or half turn in either direction another shed will be produced. The effect of constant twisting is to ply the warp going through any one tablet and, in so doing, to trap the wefts, which in turn prevent the warp twists from unwinding; the result of this is very firm warp-dominant material, the maximum breadth of which is governed by the number of tablets that can be handled.

What is known about tablet weaving has largely been reconstructed from archaeological finds and the results of experimentation for, while it would be untrue to say that the skill totally died out, it came so close to it that its rediscovery at the end of last century was a matter of some acclaim (Schuette 1956a,2-3). As a technique, tablet weaving is so very adaptable in skilled hands that it is difficult to know where to start in describing it; there are however four main aspects which can be worked with - the way in which the tablets are twisted; the manner in which they were threaded; the use of different colours in the warp; and the insertion of decorative wefts.

No matter how many holes there are in a card, or tablet, if the pack are always turned in the same direction the outcome will look like a series of plyed yarns side by side (fig.10.2A). If however alternate tablets are threaded from one side and others from the opposite direction and this is done chevrons will result (fig.10.2F). A simple pattern could obviously be composed this way by having some tablets threaded in one direction and others in the opposite (fig.10.2G). By only turning some of the pack for each shed the way in which the twists meet as in, for example, chevrons, may be affected; fig.10.2H illustrates the result if this is done with alternate tablets. The tablets do not, of course, have to be continually turned in the same direction and by turning some first one way and then the other more complex patterns can be produced (fig. 10). Finally, although it does not really concern us here, by using tablets as shown in fig. 7.3, two or more sheds can be produced and a compound cloth produced. Over emphasis on products of such complexity should not however be allowed to distract from the fact that the very simplest weaves - tabby and twills - can be imitated with tablets, although, in the absence of any diagnostic twists, they are indistinguishable from those woven on any other loom.

The manner of threading tablets has already been touched on in

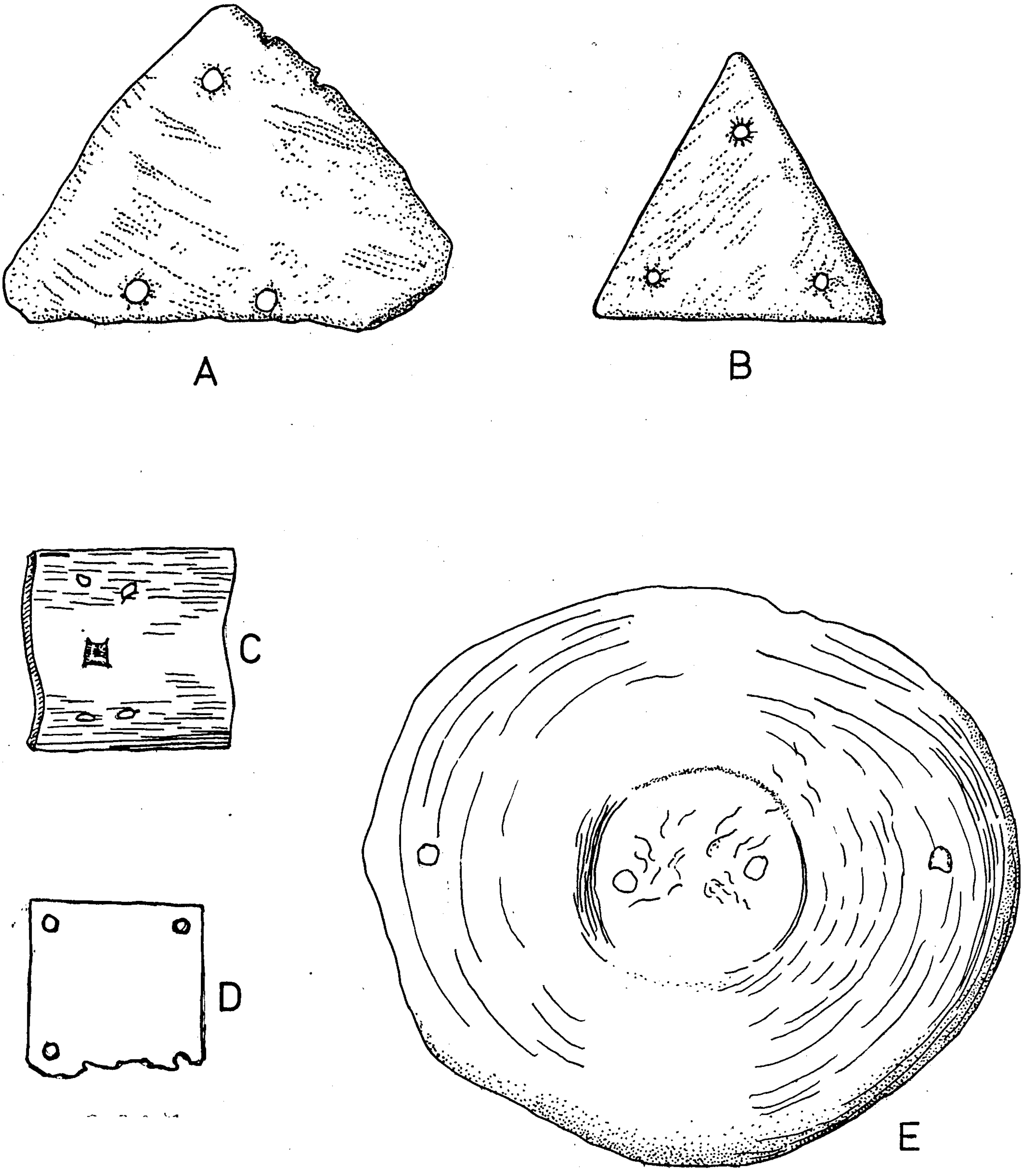


Fig. 7.2 Weaving tablets found in the British Dark Age material at 1:1 ; A–E (for sites, periods and sources see reverse of figure).

		Site	Source
A	EC	Lagore, Co. Meath.	Hencken 1950, fig 106.
B	DA	Keill Cave, Kintyre.	Ritchie 1967, fig 2.
C	DA	Jarlshof, Shetland.	Hamilton 1956, fig 39.
D	VIK	Brough of Birsay, Orkney.	C. Curle, Pers. Comm.
E	DA	Foshigarry, N. Uist.	Beveridge 1931, fig 11.

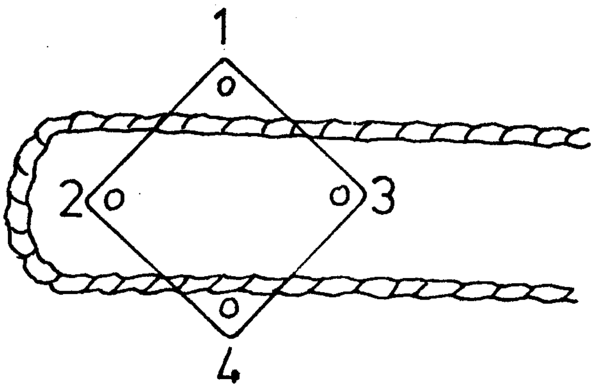
the last paragraph, as it was pertinent to the subject matter; this was that if one tablet is threaded from one side and the other from the opposite and they are both twisted then one will produce a Z-plyed cord and its partner an S-plyed one; the two giving a chevron effect. Another issue completely is the case where tablets are intentionally not completely threaded. By e.g., only threading two adjacent holes of a particular four hole tablet in a pack that warp may be made to predominate on one side while on the other only one thread may appear enough times for the whole to be bound in by the weft. With this technique textures may be introduced into the weave - predominance of warps on one side will cause pitting on the other and mixing the number of threads being corded together for each tablet will produce a variation in the thickness of the twists.

Tablet weaving is ideally suited to the use of colour, in designs. Simply by threading individual tablets with different colours a particular hue may be brought to the front, more or less at will, in order to make a pattern (fig. 10H). Ploys used in producing texture are doubly effective if coloured yarns are used.

From the mechanical point of view tablet weaving creates a very strong, firm product. In certain cases it is just this quality which is sought and in some instances it is used as the basis for decorative work in which a nonfunctional weft is introduced during weaving which, with its long floats, forms a pattern on the surface of the braid; gold and silver thread or yarn of a bright colour would be typically used.

One form of evidence for the use of this loom is the survival of actual parts. Under the extraodinary conditions of preservation present in the ninth century tomb of Queen Asa at Oseberg, Norway, a loom complete with a pack of fifty-two square wooden tablets and a part-woven braid was recovered (Brøgger 1928, 180-1, 335-6). More normally it is only the tablets which stand a chance of surviving, and this depends a large amount on the material they were made of. The number of tablets, all bone, found in Dark Age contexts in Britain is so sparse (Appendix VII), and is in such striking contrast, both numerically and in terms of distribution (fig. 7.4) with other evidence for the use of the loom that it is reasonable to assume that tablets were generally made of wood and have long since perished.

Although a supposed two holed tablet is reported from a Neolithic



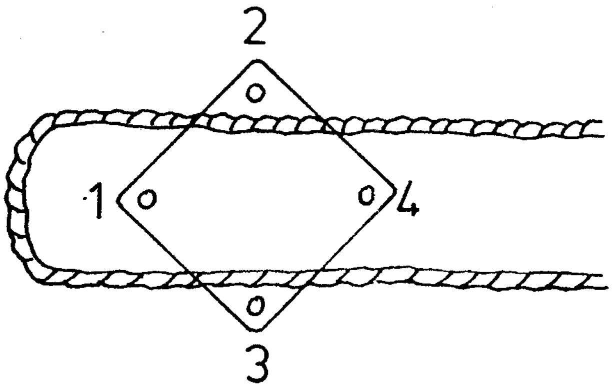


Fig. 7.3 Using tablets to produce two sheds.

site in Denmark (Hald 1950, fig. 185) the prehistory of tablet weaving is only to be reliably traced back to the Early Iron Age. Even here the number of reliable finds are few - two square wooden tablets from a Danish votive deposit (Broholm 1940, 143), two possible two-holed bone ones from a habitation at Chinnor, Oxfordshire (Richardson 1951, 146, pl 19) and two three-holed ones, said to be from Early Iron Age horizons, from Wookey Hole, Somerset (Balch 1914, 115, fig. 17). While none of these examples are impressive in themselves they do suggest that tablet weaving was known in north-west Europe before the Roman occupation. This is corroborated by Wild (1970, 73) who could find no examples of cards from outside of the northern Roman provinces and as they appear elsewhere at a comparatively late date - in Egypt e.g. not until the 6th century (Henshall 1950, 149), there is every chance that the technique of tablet weaving was invented in north-west Europe.

The function of tablets largely predominates their form. If they are to lie in packs then they must be thin and if they are to be easily manipulated to form sheds straight sides will be connected with the holes through which the warps are passed; hence one can expect four-holed tablets to be square, three-holed ones to be triangular; and two-holed ones to be elongated. Form is therefore largely independent of period and the bone tablets found in the north-west Roman provinces (Wild 1970, 140-1) apart from being frequently decorated, are not distinguishable from the square ones found at Skirza Head Broch, Caithness, in wheelhouse levels at Jarlshof, Shetland, in an early Norse context at the Brough of Birsay, Orkney, and in a midden at Tain, Ross-shire, and from the triangular ones found at the 7th - 10th century crannog at Lagore, Co. Meath and in 4th century material from Keil Cave, Kintyre (Appendix V11; fig. 7.2). Circular bone tablets from various Scottish Iron Age contexts (appendix VII; fig. 7.2), with between two and four holes, are slightly more dubious.

It will be appreciated from the above that the few tablets found have come from widely dispersed contexts, both spatially and chronologically. When the number of surviving tablet-woven textiles is taken into consideration, however, the only conclusion that can be drawn is that such weaving was widely used in the whole period over the greater part, if not all, of the British Isles, and that wooden tablets were most common.

The tablet woven textiles, which are dealt with at greater length

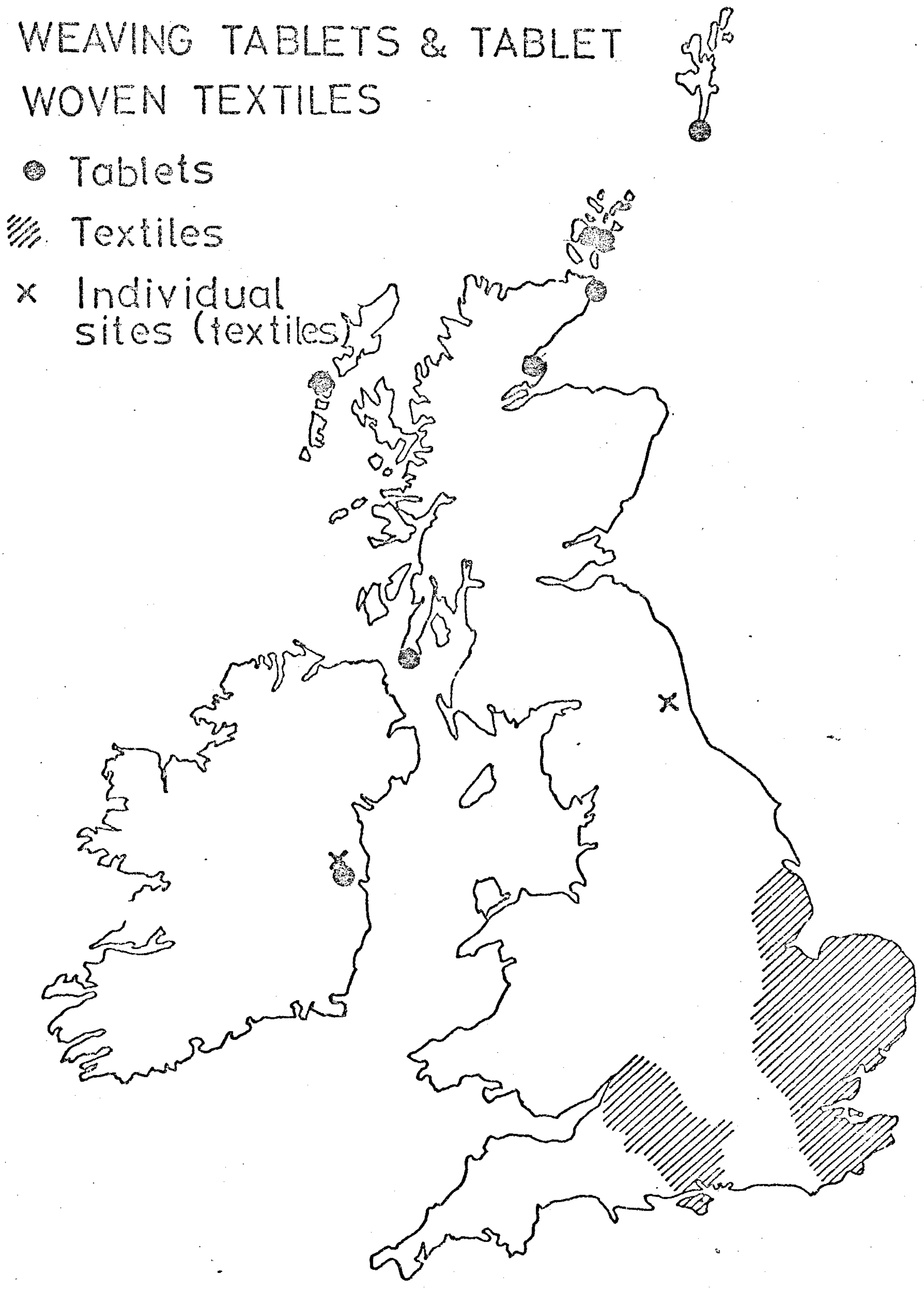


Fig. 7.4 Distribution of weaving tablets and tablet woven textiles (appendices VII & XI).

elsewhere, can help to tell us a few things about the looms. It is not always easy to tell what sort of tablets were used from the textiles but in some cases it has proved possible.

	2 - holed	3 -holed	4 - holed	
Early Saxon	8	0	32	40
Late Saxon	0	0	10	10
Irish D.A.	0	0	2	2
	8	0	44	

Table 7.1 No. warp ends in twists in tablet woven textiles, where known.

As will be appreciated from the above table, on the evidence of the textiles, triangular tablets can be expected to have been a rarity in Saxon England; the two-holed effect may have been produced by only half threading four-hole tablets.

It can be seen from the preserved textile evidence (ch.10) that tablet weaving was used to produce a number of different, but distinct, products; a matter of interst here since some would require the loom to have different attributes than others and in fact the only common feature may have been the principle and the tablets.

The braids could well have been woven on a conventional tablet loom of a higher or lesser degree of sophistication. In the production of heading borders this would have to be linked with lateral pegs in order to get the right warp length and achieve any necessary crossings. Winding up of the product onto a cloth beam, in this case, would be out of the question, so the 'loom' must have been as long as the width of the cloth and as the latter would be variable this suggests simplicity of construction but the definite use of two static beams and lateral pegs. The production of tablet-woven selvedges, especially on a warp weighted loom, is more difficult to envisage as the edge and main cloth would have to be woven at the same time and the looms would have had to have been combined to some extent. The passage of each weft through one set of tablets, through the main shed, and then the second set of tablets would have been a very time-consuming and fiddling job for one weaver; we know however, from internal evidence, that several people were often employed in weaving on the same loom. It may be that tubular borders have to be considered with more obviously tablet-woven ones (p238. Tablet woven finishing borders are more of a problem than they appear at first sight since it is an impossibility to put tablet twists around tensioned threads as each weft for the tablet weave (warp for the main weave) must be inserted individually. The warp may of course have been cut on the main loom and the ends caught in tablet twists, being either left as a fringe or put back into the following shed. Here it is easy to imagine the side beams of the large loom being used as end beams for the extemporized tablet loom. Much more complicated are cases where the end of the warp hasn't been cut and loops are preserved all connected with tablet twists, since this would be impossible to achieve when finishing a piece of cloth. It could however have been done by having two parallel tablet looms in warping, one for the heading and one for the finishing border, but this goes against a number of accepted tenets about how the warp weighted loom was used.

Some indication of the number of tablets involved in a loom is given by the number of twists in the tablet woven materials found (fig. 7.5). It will be seen that in the Saxon material (which is more or less that solely represented) there is a neat division between borders - woven with 4-6 tablets - and braids - woven with anything from 5 - 70. This supports the idea of different models of the loom for these two purposes.

b) <u>The Band-loom</u>

Band-loom is an unfortunate descriptive title, for it is put in terms of a product and does not imply that the mechanisms that produce it have any similarities further than fundamentals. The band, or braid, to be made, has the characteristics of great length over width and may be used as a vehicle for ornamented design by way of complex weaving or colour inserts. The basic requirement for a loom is that it be able to take and tension a long warp: certainly a miniature version of the horizontal treadle loom may have been used (Fox 1881, 433 fig.) but alternatively things may be so simple that one end of the warp is attached to a static object and the other is connected to a belt around the weaver's waist and tensioned thereby (Wild 1970, 72). Ironically, sophistication of design in the product does not imply a complexity in the loom, for although a rigid heddle may be used or a string one, if the weaving is that complex it is easiest to make the sheds by hand since so few warp ends are involved. Beating in equipment would certainly be essential, though not necessarily involved.

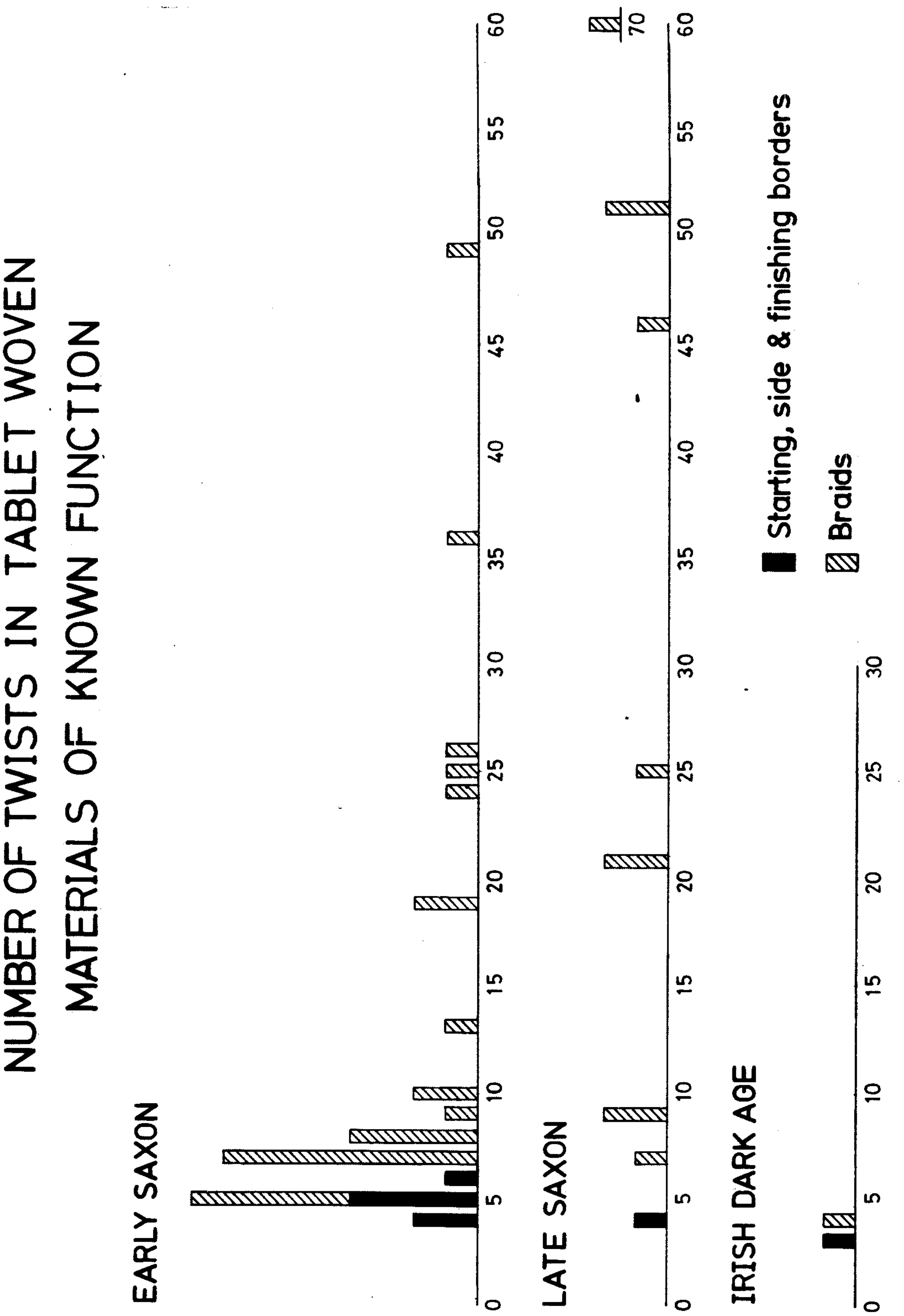


Fig. 7.5 Number of twists in tablet woven materials of known function (appendix XI).

Evidence

From an allegedly Roman context in South Shields there is a rigid heddle (Wild 1970, 74, pl IX a) consisting of a series of slats of bone, each with a hole, set parallel to but at a slight distance from one another and held in place by transverse metal strips; Hoffman illustrates a similar one from a Lappish context. No such heddles can be dated to the Dark Ages and indeed the unstratified example cited is not much evidence that they were used before then. Much more likely to have been employed are string heddles and fingers, and neither would be expected to be preserved although the latter might be indicated by a series of errors inconsistent with the use of any heddle.

The real evidence for the use of the band looms, both before and after the Dark Ages, must be finds of braids which must have been produced on them. The earliest such evidence for band looms in western Europe comes in the form of bronze age girdles, particularly woollen plain-woven ones from Denmark (Broholm 1940, 80, 73, 36), but also a striking, indeed unique, example from Armoy, Co. Antrim. The latter is remarkable in two ways - it is made entirely from single unspun black horse-tail hair of extreme fineness (48 per cm) and is woven in herringbone twill - two features which illustrate how band weaving can give scope for using effects which would have been impractical on the full-size looms of the day (Hedges 1973, 58-9; Coffey 1907, 119). Wild, although he has nothing to say about them, catalogues a number of Roman bands, all from Mainz (1970, 105-7). With the exception of one they are all very utilitarian - wool, plain woven, plain selvedged and with widths preserved of from 5 cms to upwards of 8; the anomaly only differs in that it has the refinement of a selfedge with a single two hole tablet twist (Ibid fig. 32) which probably goes to indicate that it was produced on a tablet loom. In the medieval period there are a few instances of bands, the most notable being three 17th century silk ones from Exeter (Hedges forth. (F)); one of these could have been woven on a simple band loom with three sheds but the other two had complex characteristics including piling and tablet twists. As these latter were made of silk they may have been imported. It finally needs to be stated how many bands have been preserved from Dark Age Britain; with the exception of a dubious example of Early Saxon date from Howletts Kent, there are none. The latter is described as a plain repp Wa/50/Z x We tape by Crowfoot but no selvedges are mentioned or width and a tape is not necessarily a band.

In conclusion, the lack of evidence for the band loom parts is not surprising as they would not be expectd to survive, but the dearth of bands - when set alongside the mass of tablet woven braids - suggests that the band loom was little used in Dark Age Britain, if at all.

c) The Sprang Loom

This peculiar technique for the production of elastic fabrics, alternatively known as 'plaiting with stretched threads' or 'Egyptian plaiting' (van Reesema 1926), is apparently still in use in parts of Europe and north Africa (Henshall 1951, 23).

A loom, in anything but the technical sense, is not really necessary; all that is required is a pair of horizontal bars or even cords (it must be possible to move these together as work proceeds) and a number of thin laths the width of the work. Warping is done by winding thread round the two bars spirally (fig. 7.6) and the laths are used to hold crosses made in the warp temporarily. The first two are inserted at the top and bottom to bring the back threads forward, crosses are made in the warp and these too held with further laths. Work is done at the centre and pushed towards the edge; as can be seen from fig. 7.6 the work stabilises itself and the laths can be drawn out in turn as it proceeds, producing a curious braid the one end of which is a mirror image of the other. The problem is to stabilise this at the centre, as withdrawing the last two laths would otherwise just make the whole thing undo itself; this can be achieved quite simply by crocheting, putting a weft through, or sewing. According to Hoffman (1964, 168, fig. 81) sprang may also be finished in the centre by tablet weaving but it is difficult to imagine how this could be done in practice.

The Continental Textiles

Finds of sprang are sparse. For the Danish Early Bronze Age there are hair-nets from Borum Eshøj and Skrydstrup and from the 2nd century AD a fragment found in a woman's grave at Braende Lydinge (Hald 1950, figs. 253, 259 & p. 417). An undated hair net came from a bog at Arden and a piece of net from Haraldskaer Mose (Ibid figs. 260, 262). A fairly simple piece of sprang, probably another hair net, of first century dates was found in a midden at Vindonissa, Germany and provides our only dated Roman example although what was possibly a piece of sprang was found on the skull in a late burial in Mainz. Wild is probably quite correct in considering that the technique was

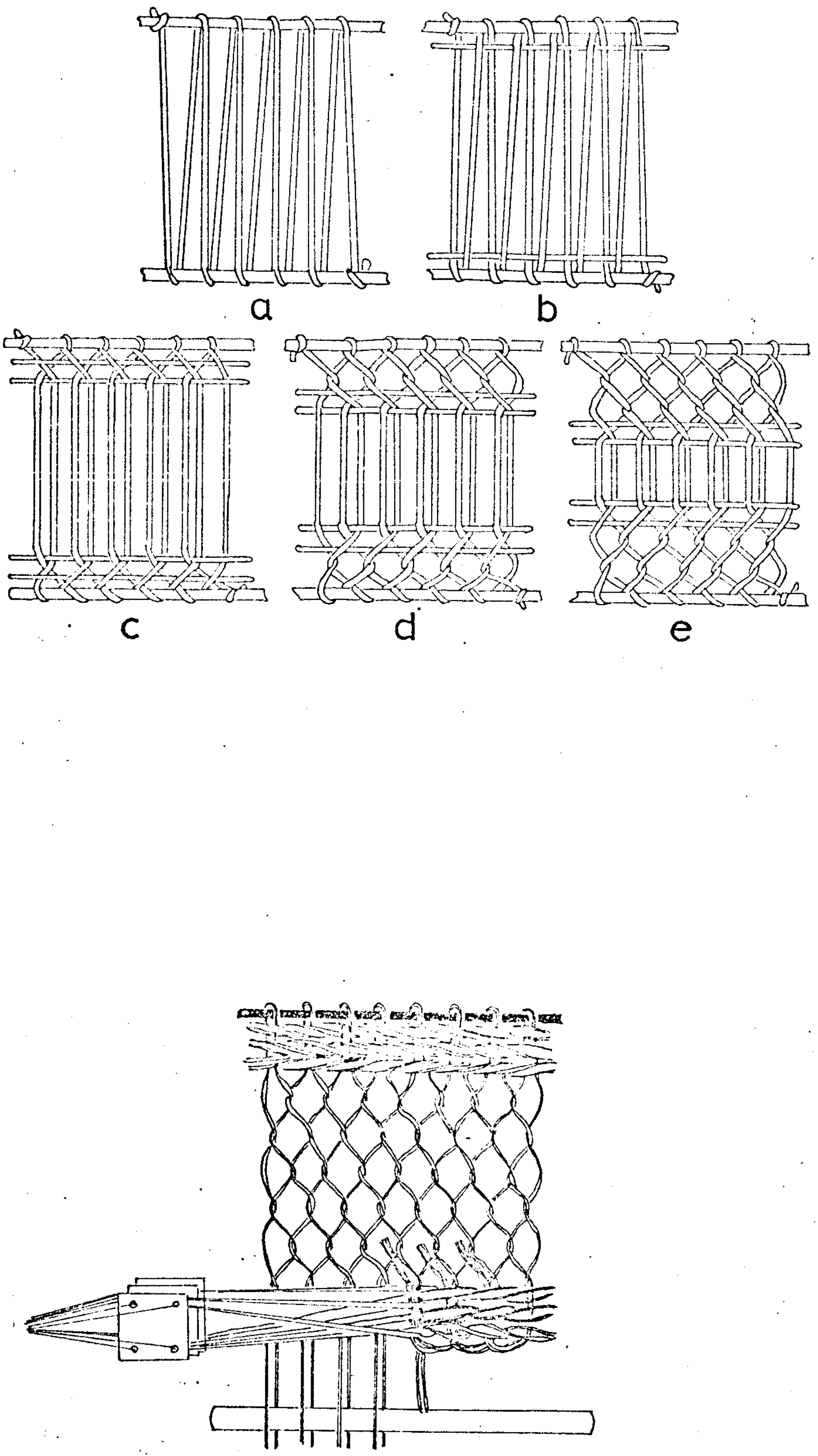


Fig. 7.6 (Top) Warping the sprang loom, (after Hald 1950, fig 258). (Bottom) Finishing off a sprang stocking/sleeve of 3rd-5th century date from Tegle, Norway, (after Hoffman 1964, fig 81).

commonly employed (1970, 59); certainly it was passed on to Egypt in Coptic times (Hald 1950, 456, figs. 263-271). Outside the Roman area, apart from the hair net from Braende Lydinge, there is a stocking or sleeve from the Norwegian Tegle find which belongs to between the 3rd and 5th centuries AD. (Hald1950, 456, fig. 261; Hoffman 1964, 167, fig. 81). Apart from showing that sprang was used for something other than hair nets, this piece is interesting for having a tablet-woven starting and finishing border. In the latter the broken warp threads have been threaded through and back (fig. 7.6) and presumably this was done at the centre of the web.

The British Textiles

The catalogue of examples of sprang from Britain is a short one; there is a mention of 'Knitting' with a Bronze Age inhumation (Mortimer 1905 234); a possible impression on a 10th century Norse broch from Shetland, and a stocking from York which is regrettably undatable (Henshall 1950, 22-3 + figs.). The piece in question was found in a cist disturbed in railway excavations in 1838 near Mickelgate, York. It is 49cm long and 38cm wide at one end where it is finished with a row of knots. The two sides are sewn together making a tube which, flat, is 19cm wide, and as there is reduction, no reverse and no centre sewing Hensall suggests it to be part of a pair of stockings which were each half of a piece of sprang over 1m in length. The object is made in dark brown 2-ply S-spun and Z-twisted woollen yarns which have varying diameters but unfortunately Henshall made no illustration of the work other than photographs; from these it can be seen to be ribbed transversely. The size of this article and its use are quite useful, for they give us the information that the loom used would have had to be over 1m in height and a loom of this size would probably involve a quite substantial framework.

Finds of Equipment

No matter how substantial the equipment may have been in certain instances, it would also have been almost totally devoid of any distinctive features because of its simplicity; two parallels being capable of being moved together and a number of laths. The only real hope of identifying a loom conclusively would be to find one intact with the work on it. This has never occurred; there was however a wooden construction in the Oseberg find (fig. 7.7) which is either a sprang or a tapestry loom. (Hald 1950, 252). The whole frame is only 1.19m in height and 66cm across. The lower beam is adjustable and would permit a warp length of 86cm while the width could be a maximum of 33.5cm. Very much simpler braiding frames than even this are shown in Classical Greek vase paintings (fig. 7.7) (Hald 1950, figs. 256, 255).

d) The Tapestry Loom

Tapestry is a technique which permits great freedom in the design at the expense of ease of weaving; it is reasonable to say that it is only used to produce highly coloured and/or figured textiles. The principle is that a warp is set up spaced and under tension and wefts of different colours/texture are introduced into manually made sheds which only appear at the front of the web where that thread is necessary, although they may float otherwise at the back. Between the decorative wefts there may be a binder weft for mechanical strength. It is characteristic that the background weft is fine and the decorative ones beaten hard in order to mask both it and the warp. The detailed work here has to be done with the fingers - except in a milieu of high technology - and the equipment required is simple - something to tension the warp, heddles to raise sheds for the binder weft, possible spools, and a beater in. Traditionally tapestry weaving is associated with the two-beamed vertical loom (Crowfoot 1954, 458) but as Hoffman has pointed out there is no technical reason why tapestry cannot be made on the warp-weighted loom (1964, 186) or on any other loom that is capable to producing the background weave.

Tapestry is known from Egypt around 1500 BC (Hoffman 1964, 324) where Crowfoot, perhaps mistakenly, associates it with the appearance of the two-beamed vertical loom (Hoffman 1964, 324, 390; Ibid). Wild in instancing four representations of the two-beamed vertical loom from the Roman period in Europe states that in each case tapestry is being woven and certainly this is the sort of loom the mass of Coptic tapestries were produced on. In these instances a comb was used to beat the weft effectively; those surviving have a wide head and short teeth (1970, 71-2).

The process of weaving is described by Ovid when writing about the contest between Arachne and Minerva. According to Wild, the shed is opened by a shed or heddle rod for the ground weave. The brightly

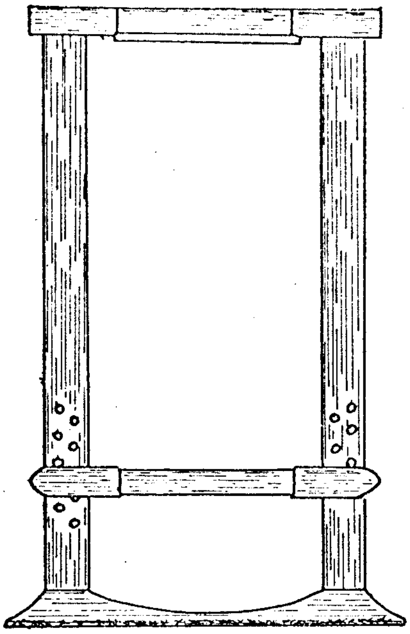


Fig. 7.7 (Top) Woman with braiding framel from a Greek vase painting, (after Hald 1950, fig 256).
(Bottom) Tapestry or sprang loom of 9th century date from Oseberg, Norway, (after Hoffman 1964, fig 137).

coloured weft is introduced on a series of pointed spools into sheds opened with the fingers. The web is beaten up with a weaving vomb. The poet gives a glowing account of the colours, the complexity of the design and the shaded bands (Ibid 71). Lest we associate the tapestry and the two-beamed vertical loom too firmly, it might be mentioned that a Greek vessel of the 5th century BC from Chiusi shows a warp weighted loom being used for this purpose (Hoffman 1964, fig. 129).

Evidence

There is no way one can be certain that any piece of equipment was used to produce tapestry as opposed to any other textile. It is possible that the small vertical loom from the Oseberg ship burial, Denmark, was used for this purpose because of its size; it may also have been used for sprang however and has already been discussed under that heading (p167 fig. 7.7).

Small implements which might be associated are combs - of which no satisfactory specimens have been recovered - and spools. Spools would have to be as numerous as colours and not necessarily large; pin beaters could be used for this purpose. One common class of artefact that would be useful are the numerous so-called bodkins which are found throught the Dark Ages all over Britain (fig. 7.8; appendix VIII). These are made from a convenient bone - often a pig's fibula - the head being pierced and sometimes rounded and the shaft pointed. They are usually about nine centimetres long and frequently bear a polish.

Wild cites textiles from Walbrook, London, of the 2nd century AD as the earliest evidence for tapestry in north west Europe (1970, 54) but they merely employ the technique spoken of of compacting the weft so that its colour masks the warp, and have no other similarity. The only remains of tapestry from the Roman northern provinces are a woollen band and roundel from a late burial at Conthey, Switzerland (ibid 55, fig. 47); these are really geometric in design.

If tapestry was worked in Dark Age Britain none of it has survived; it should be pointed out that 'tapestries' like that from Bayeux (Macglagan 1943, 5 and probably the lost one of the battle of Maldon (Wilson 1971, 126) are embroideries.

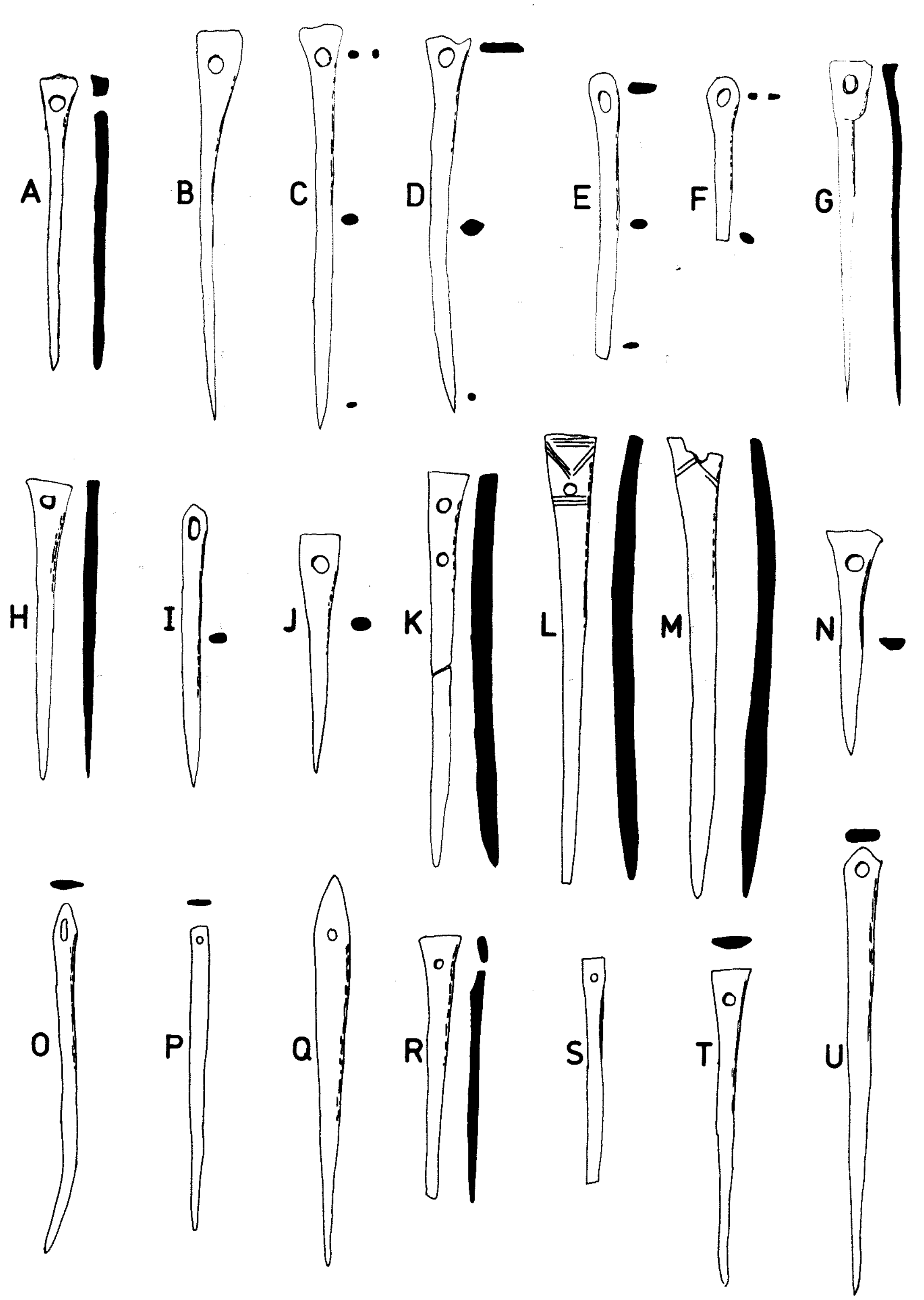


Fig 7.8 Bone bodkins from various Dark Age contexts at 1:2 ; A-U (for sites periods and sources see reverse of figure).

		Site	After
A	ES	Lower Warbank, Kent.	Philp 1973,fig 49.
B	ES	Sutton Courtenay, Berks.	Leeds 1947,pl 22.
C-F	MS	Hamwih, Southampton.	Hedges forth. (B)
G-I	MS	Shakenoak, Oxfordshire.	Brodribb 1972, fig 64.
J	LS	Eaton Socon, Cambs.	Addyman 1965, fig 11.
K-M	LS	Gloucester.	Hedges forth. (J)
N	A/D	Hungate, York.	Richardson 1959, fig 19.
O-P	S/DA	A Cheardach Mhor, S Uist.	Young 1960, fig 13,7.
Q	S/DA	Dun Cuier, Isle of Barra.	Young 1956, fig 14.
R-S	S/DA	Keil Cave, Kintyre.	Ritchie 1967, fig 2.
T-U	VI	Jarlshof, Shetland.	Hamilton 1956, fig 59.

CHAPTER EIGHT

FINISHING

Finishing - all that happens to cloth after it has been woven - can be discussed under a number of headings some of which apply only to animal or vegetable fibre textiles.

Mending

It is first necessary to go over any web systematically with a pair of forceps to remove any impurities and knots, mend breaks, and put right weaving errors. In order to facilitate this the cloth may be spread across a table or over a rail; the former is shown in an Italian manuscript of the early fifteenth century (Patterson fig. 184)(fig. 8.1)

Tentering

Tentering is stretching a web of cloth on a frame when it is wet so that it retains its shape. The design of tentering frames is very simple, consisting of a couple of horizontal rails supported on vertical posts; and Patterson says that they didn't change from the Roman period to the Middle Ages (1956, 216). Tentering is also shown in the illustration

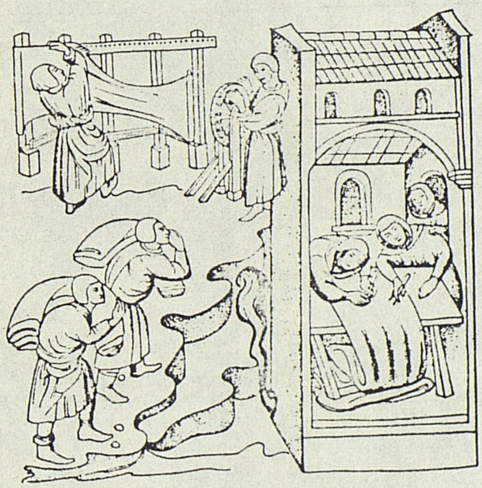


Fig. 8.1 Italian manuscript of 1421 showing tentering and mending (after Patterson 1956, fig 184.)

cited above (fig. 8.1).

Fulling

Milling, or fulling, takes advantage of the natural properties of wool fibres in order to mat together cloth, to preshrink it and to make it more stable, compact and even waterproof. The mechanics of this are based on the fact that wool fibres have a scale structure on their outer surface with the scales projecting at their bases. This means that, in relation to others, a fibre will move more easily in one direction than the other. Wool fibres also have a low coefficient of friction and lengthwise elasticity. In a bundle which is being beaten and compressed, fibres will tend to be pushed into loose masses of other fibres, but when they attempt to return to their original length they bring the mass with them because of the differential coefficient of friction. This, thousands of times over, leads to a compacting of the cloth. This effect works better in water and at an optium temperature of around 45°C; the addition of acids, and to a lesser extent alkalis, greatly enhances the action (Whewell 1972, 157-161).

The actual process of fulling is simply one of beating and pounding cloth for a long period in water, which is preferably warm and has its pH altered. The first mechanical means of doing this were fulling stocks, which probably made their debut in the late twelfth century, as at Gloucester (Whewell 1972, 162). They were well established in 1369, for reference is made to them in Piers Ploughman

> "Cloth that cometh from the Weyving
> Is nought comely to wear
> Till it be fulled underfoot
> Or in fullers stokkes
> Washed well in water
> And with teazles cracked."

Prior to this fulling was manual and would have been simple in the extreme. The most favoured method, used up until very recently in Ireland, was walking (Whewell 1972, pl 11.2); the cloth is put in a tub full of liquid and someone stamps up and down on it. This was also the Roman method. In an early representation of fulling from Pompeii (first century AD), four earthenware bowls are in compartments separated by partitions; three workmen rinse the cloth, while a fourth stands in a large bowl stamping it. A Gallic fuller working in his vat is depicted in a Roman relief at Sens. Medieval illustrations of the same method are also common e.g. one in Semur-en-Auxois cathedral, Cote d'Or dated to c 1460 (Patterson 1956, 214, figs. 185, 186).

Felting agents are described by Pliny. Soap was not used by the Greeks or Romans, who employed various alkaline detergents including plant ashes, natron, and stale human urine. Fullers earth - a natural finely hydrated aluminium silicate which takes up fats - was in general use; as were the juices of certain plants. Patterson claims that all these substances continued to be employed throughout the Middle Ages and until modern times.

The process of fulling is not going to leave any distinctive artefactual remains and as there are no literary references or illustrations in the Dark Ages, the only evidence we can fall back on is the textiles themselves. In the Dark Age material there is nothing like the heavily fulled textiles found in medieval collections (e.g. Hedges forth (H)) but it must be remembered that that was a perfected finish aimed at in the Middle Ages and not before. Then textiles were even exported from Britain to Europe in order for them to be finished expertly (Ponting 1972, 170). The sample of woollen Dark Age textiles preserved in a natural state is small but some look as though they have been finished. It is difficult however, to be one hundred percent certain that the compacting noted is not a result of the conditions under which they have been preserved; at the same time it is almost inconceivable that woollens weren't fulled as it is a simple technique which greatly enhances the quality, appearance and use of cloth.

Raising and Cropping.

The object of raising is to give woollen cloth a softer finish, and is achieved by going over the surface with a stiff brush which pulls up fibre ends. Wire is not satisfactory for doing this and there are prohibitions dating to Elizabethan times; similarly it is not a process that lends itself to mechanisation although there are also Elizabethan prohibitions of machine raising (Ponting 1972, 172-3, 177). These prohibitions only serve to underline that natural materials and hand labour were usual and acceptable. Pliny records that the skins of hedgehogs and sometimes thistles (Patterson 1956, 217) were used. Teazels were generally used in the Mediaeval period and were specially cultivated for the purpose.

These naturally occurring brushes would be most efficient if mounted. In Roman times the implement was the aena and, on the basis of two wall paintings and several references in literature, Wild concludes that this must have been a flat wooden board about 20cm square, the face of which was covered with a layer of thistle heads, and the back having a strap or handle attached to it (1970, 83, fig. 75). The mediaeval equivalent is described by Patterson, who says that the teasel heads would be fastened in a light wooden frame to which there was a handle attached (1956, 217).

The fabric, probably still damp, would be slung over a bench and gone over with the raising board. It is likely that this would be done several times with coarser boards used first and a softer, more worn out, one last.

The process of raising would result in a shaggy nap which would have to be cropped. The Romans used large shears such as those found at Pompeii and at Chesterfield near Cambridge (Patterson 1956, 217); Wild 1970, 83, Pl XII a): the latter pair is 130cms long and has blades with cutting edges 45cms long. Use of these is illustrated on a gravestone from Sens where the Gallic shearsman has the handles tucked under his right arm and is keeping the blades in the same plane as the free-hanging cloth (Wild 1970, 83, fig. 73). This seems a very inefficient method which would give a quite irregular result. More usually the cloth must have been laid over a bench and the shears held horizontally; this is illustrated from the mediaeval period to the nineteenth century (Patterson 1956, fig. 190; Wild, 1970, Pl XII b).

There is very little chance of any of the equipment used in raising in Dark Age Britain surviving although cropping shears are distinctive and might be found. For the most part we have to look at the textiles and some of these have definitely been 'finished' and are so denoted in Appendix X. None are as heavily fulled or cropped as Mediaeval examples (e.g. Hedges forth (H), but as already explained this was a finishing method taken to an extreme during that period.

Equally interesting is the evidence for cloth made of wool not being finished in this way. Here we must take into account the presence of wool combs which lead to the production of worsteds which are unsuitable for raising, and cropping, and also there are intricate weaving patterns such as those from Anglo-Danish York, which would be masked by being finished. The general impression given by the material is that although there are definite indications that some of the textiles were fulled and raised there is no example of this being done to the extreme degree it was later.

Bleaching

Linen cloth once woven is a dirty grey brown and it is usual to bleach it. This is most easily achieved by just leaving it out in the sun and elements but it may also be done chemically. A mural from Pompeii shows the equipment used for sulphur bleaching, for instance, - including a semi-circular cage over which the cloth was laid in a pot in which sulphur would be burnt under it (Wild 1970, 83, fig. 74). Bleaching would leave no trace in the archaeological record.

Calendering

Cloth made from vegetable fibres may be finally given a hard, cool, shiny surface by a process known as beetling or calendering. In this the cloth is rubbed firmly with a hard, smooth object - which may for instance be made of stone, glass, wood or bone - the effect of this being to iron it through a combination of pressure and heat generated by friction.

The very simplest implement - though used in the Irish linen industry until relatively recently (Balch 1914, 112-3) - is a stone. Pebbles bearing a high gloss have been found in a number of archaeological contexts and it is likely that this is what they were used for. Balch noted one from a pre-Roman deposit in Wookey Hole, Somerset (Ibid) and others are known from the middle/late Saxon town of Hamwih, the Welsh Dark Age hill-fort of Dinas Powys, and two early Christian sites in Ireland while one, without context, comes from the Hebrides (fig. 8.2) (Appendix IX). Seven flat, polished slabs of whalebone found in the Broch of Burrian, Orkney, could have well had the same function (Anderson 1871, 560-1), as could some polished ox and deer metatarsi found in Wookey Hole (Ibid).

The most distinctive implement connected with the calendering of linen is the glass linen-smoother. Generally speaking these are dark in colour and roughly hemispherical having a diameter of between 7 and 10cms and a thickness of between 2.5 and 4.0cms. All the examples known are very similar and seem to have been made by the same process. According to Dr. Newton of the British Glass Industry Research Association, a gob of glass would have been poured into a saucer-like depression; the tail would then have been twisted until thin and cut. This would have sunk

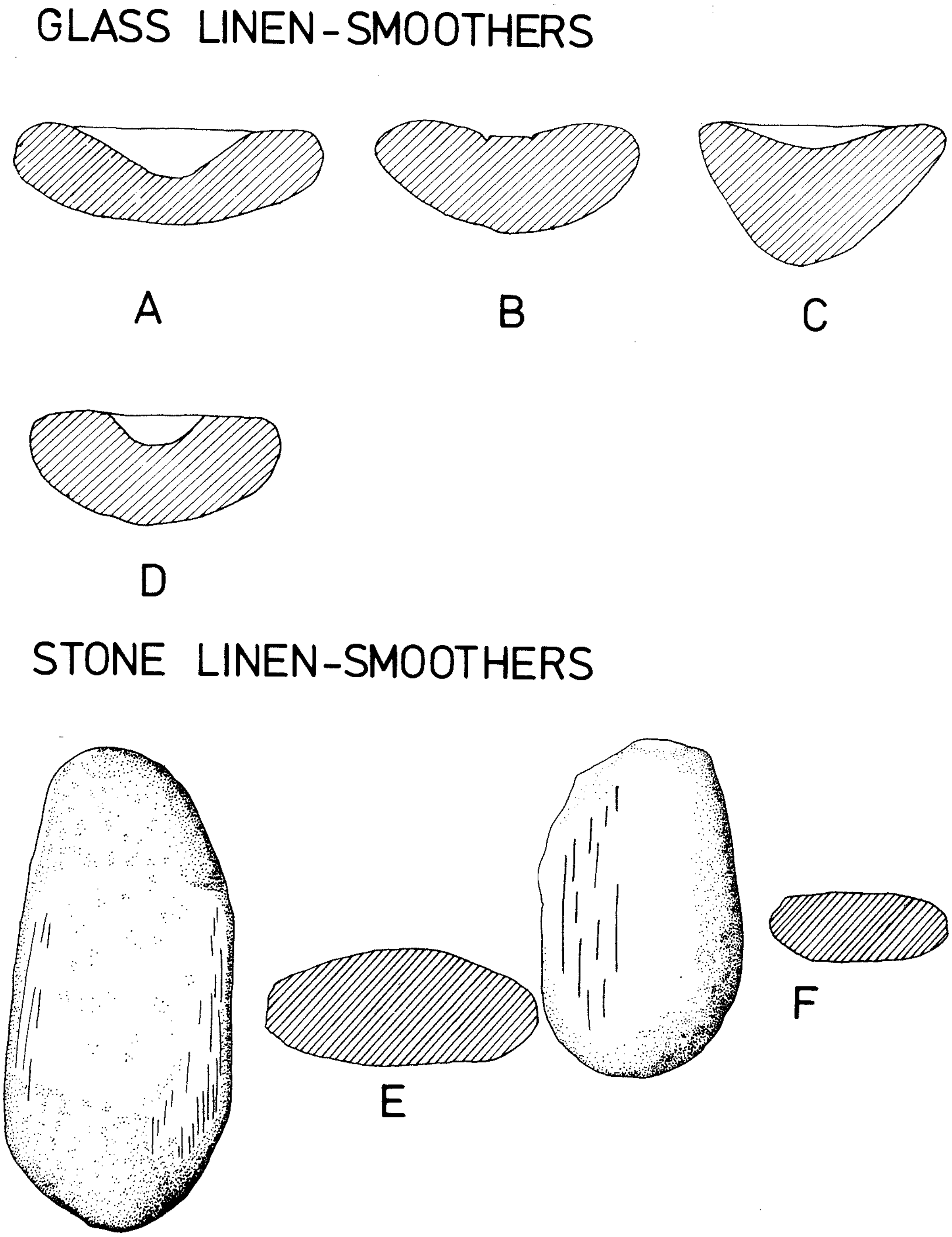


Fig. 8.2 Glass and stone linen smoothers at 1:2 ; A-F (for sites, periods and sources see reverse of figure).

		Site	Source
A	MED	Hangleton, Sussex	Holden 1963, fig 35.
B	VIK?	Broch of Gurness, Orkney.	Unpublished material at Scot. D.O.E. H.Q.
C	LS/	Clifford Street, York.	Waterman 1959 , fig 22.
D	MED		" " " "
E	MS	Hamwih, Hampshire.	Addyman 1969,fig 30.
F	EC	Shaneen Park, Belfast.	Proudfoot 1958, fig 6.

into the mass of the glass and as the whole cooled would form the characteristic navel type depression found on the back of these objects (Holden 1963, 164).

This similarity between the glass linen smoothers of different periods is problematic for, while a large number have been found in north-west Europe (Appendix IX; Wild 1970, 85; Nouel 1968, 259, 260) most of these have been unstratified. On technological grounds it seems unlikely that they were known in prehistoric times and it is reasonable that the first stratified examples are two from third century contexts at Nijmegan, Germany and South Shields, Co. Durham (Wild 1970, 85, fig. 76; Pl XII) and one from Gallo-Roman situation at Nottonville France (Mouel 1968, 260). On the present evidence, which is slight, they seem to have been abandoned at the end of the Roman occupation in favour of simpler implements only to reappear at the end of the first millenium. By far the highest density of finds at this time is in Scandinavia (e.g. Anderson 1879, 63-4; Rygh 1885, fig. 446; Jankuhn 1943 110-1, fig. 40; Arbman 1943, 61, Abb38) and it is likely that the examples from a Viking grave at Ballinaby in the Hebrides and from Anglo-Danish levels at York can be attributed to the influence of this area. Two finds of similar date from France might also be mentioned, one from an 11th century souterrain at Kerguellac, Finesterre (Pers. comm. R. Hodges through the kindness of Dr. Giot) and another loosely dated to the carolingian period from Tavers, Loiret (Nouel 1968, 260, figs. 18, 19). Examples for the medieval period are then relatively common, e.g. those from Hangleton, Sussex, Revaulx Abbey, York, and Cologne (Addyman 1965, 128), and they have been recorded in use in Norway, Scotland and England in the latter part of the nineteenth century (Anderson 1879, 63-4; Holden 1963, 163).

Dyeing

Dyes are coloured substances which dissolve and penetrate fibres; in order to make them fast and give them added bite, some must have a mordant added which turns them into insoluble lakes once in situ (Taylor 1956, 359).

In order to understand the type of dyestuffs that would be used, it is first necessary to appreciate that there have been three phases of availability. At first only naturally occurring local substances of plant and animal origin could be used; with the global transport of the Middle Ages these were added to and replaced by better natural dyes from elsewhere. The third phase is that the actual dyes within an organic extract can be identified and synthesized chemically. In looking at a few of the dyes that would have been available it must be stated that a lot of dye sources which are now lost to knowledge must have been used.

(i) Blue The main natural source of this is indigo which can be extracted from the leaves of several different species. The most important of these in western Europe was woad, first mentioned by Caesar (Wild 1970, 142), which was ousted in the Middle Ages by Indigofera tinctoria L which grows in the tropical regions of Asia. The indigo is bound up in the leaves in a chemical complex and is released by fermentation under alkaline conditions (e.g. with decomposing urine). This gives a dark blue kneadable mass, insoluble in water. To make it soluble it has to be added to an alkaline hot bath, producing a pale yellow solution in which cloth can be boiled and will then go blue on exposure to air (Diehl 1972, 23-4). Wild also lists here whortleberry as mentioned by Pliny (1970, 142).

(ii) Purple Closely related to indigo chemically. True purple was produced from Murex brandaris L and other species of Murex, a type of shell-fish found on subtropical coasts. These whelk-like molluscs each secrete a couple of drops of creamy liquid. In air and light this changes to purple. The shellfish would be boiled and cloth dyed in the liquor (Taylor 1956,367). According to Roman writers a relative of Murex which lives in north west Europe was used to produce purple and he also points out that lichen is recorded too (1970,81).

(iii) Red Madder would be most important here (Rubia tinctoria L) in the roots of which there is a mixture of various dye colours. The roots have to be heated, ground, and then reheated with sulphuric acid; drying produces a soluble brown powder. Pliny said that all the provinces of Gaul abounded with the plant (Wild 1970,81). Roots of several species of the genus Galium contain one of the component dyes in Madder and may have been an alternative source. Alarazin, the pigment, and its derivatives, being soluble, have poor washing fastness and a mordant is necessary.

(iv) Yellow. Flavones are the principle dyes involved and require mordanting. In Europe Weld, which contains one flavone, was often used, as was Genista tinctoria L (Diehl 1972, 25).

(v) Green. Dyeing first with weld then woad would be the easiest way, but however certain vegetable green dyes would dye direct but would tend not to be fast. Green could be obtained by boiling fabrics with verdigris and alum (Taylor 1956, 346).

(vi) Black. Addition of extract of gall to iron sulphite would produce black, as would the superimposition of several dark shades on the same material (Taylor 1956, 364).

With the above alone almost any colour could be produced since all the primaries are provided and variations can be additionally made by altering the mordant. It would be naive however to pretend that the above is a complete list, for many dyestuffs will come from an unknown origin. Even if the chemical class to which a dyestuff belonged can be determined, this will not make it possible to tell which plant or animal source was used.

In practice the material would have to be put into a vat which contained the dye and mordant - normally ammonia alum, potash alum, or a mixture - and kept boiling for 45 - 60 minutes (Clark 1972, 123). The equipment therefore consists of a variety of vats and the means of firing them. In small-scale domestic production any vessel might be used, but with large-scale processing special plants would be necessary for efficiency. Wild cannot point to the irrefutable remains of any Roman dyeworks in north west Europe although they are known elsewhere (1970, 80).

While placed in the 'finishing' section, dyeing may take place when the yarn is in the hank stage or the fibre yet unspun equally as well as when the cloth has been completely woven. Dyeing in the fibre stage seems to have been more popular in the past than might be supposed (Clark 1972, 121; Wild 1970, 80) and some at least of the Dark Age textiles must have been dyed then or at the yarn stage since they incorporate coloured or potentially coloured patterns.

The few instances where colour remains in textiles have been listed under 'decoration' (p 255). The colours involved are reds, blues, yellows and derivatives and could all have been produced by the dyes mentioned above or mixtures of them, they also could have been produced by any other organic extract containing the same pigment.

CHAPTER NINE

PRODUCTS OF THE LARGER LOOMS

Although in this section the primary aim is to compare and contrast the various cloths found in different archaeological contexts, in order to make discussion less burdened, it is necessary first to describe the relevant weaves. These are all illustrated in fig. 9.1. While not pretending to be definitive, this classification must include practically all the weaves in use in western Europe from the Neolithic to mediaeval times. All, of course, are made up of two systems, the warp, which is tensioned on the loom, and the weft, which is woven through it; the complexity of the product depends partly on the number of different combinations of warp ends which have to be raised, (the sheds or shafts), for the passage of the weft, and the weaves listed below have been ranged accordingly.

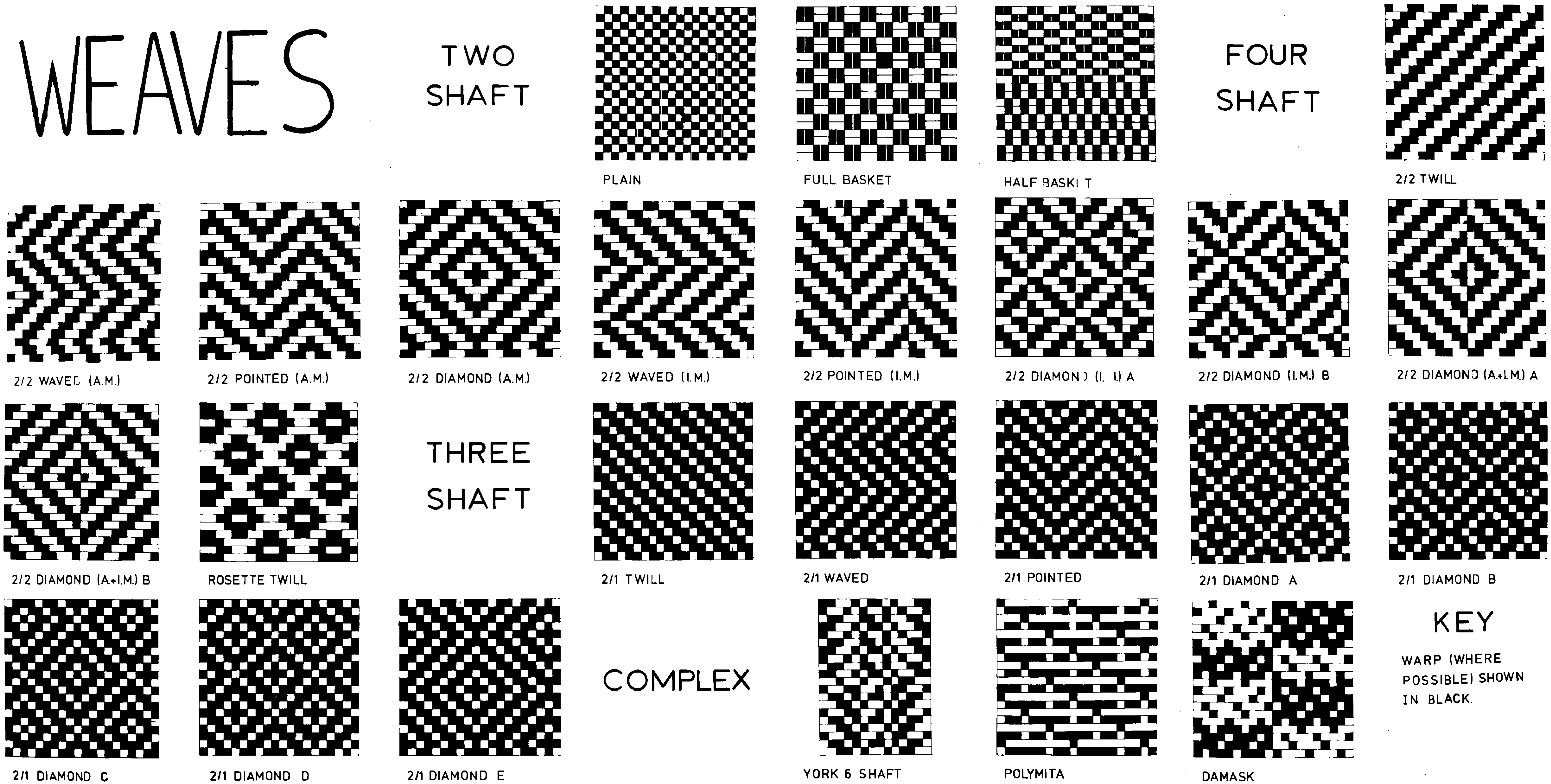


Fig. 9.1 Peg plans of various weaves.

Two shaft weaves

Plain weave, sometimes known as tabby, is the simplest of all constructions, the weft passing over and under alternate warp threads and being made to do the opposite on the reverse passage. Canvas weave is a variant where both warp and weft are comprised of paired threads while in hopsack only one system is like this.

Although not in sensuo stricto a weave, if the count of one system predominates to the extent of hiding the other the cloth is known as a (warp or weft) repp. This is mentioned here as repps are often found to be plain weave although sometimes simpler three and four shaft twills were used in this way; it would have been absurd to have gone to the trouble of a more complex weave only to obscure it.

Four-shaft weaves

The simplest and most commonly encountered four-shaft weaves are varieties of 2/2 twills. These are cloths in which, for the greater part of the width, the weft is passed over and under pairs of warp ends which change with each of the four sheds. The basic construction, known by the generic name as a 2/2 twill, is that shown in fig. 9.1; here the heddles, which determine which pairs of threads are raised in a particular shed, are worked in such an order as to result in a diagonal pattern. By reversing the order in which the heddles are lifted periodically an effect is produced which is well described in the term 2/2 waved twill with accurate meetings although it may also be called 2/2 weft chevron with accurate meetings. A diagramatically similar end, known as a pointed 2/2 twill with accurate meetings, or as a 2/2 warp chevron with accurate meetings may be effected by specially preparing the heddles and not varying the order in which they are raised. A combination of specially knitting the heddles and periodically reversing the order in which they are raised will produce a 2/2 diamond twill with accurate meetings. Although the manner in which the heddles for these and other twills would be knitted nowadays is standard, and in these instances would be as shown with the peg plans, the way in which it would have been done in the past is conjectural and will be the subject of later discussion.

The term 'accurate meeting' is probably best understood by comparison with waved, pointed, and diamond 2/2 twills with inaccurate meetings. One essential difference is that at the reverse in the weft direction the sheds are not just worked backwards, one is missed out. The inaccurate meeting in the warp direction can only be achieved if the heddles have been purposely knitted in a different fashion from that which would have been used if a twill with accurate meetings were desired; apart from a weft chevron, which of course has no reverse in the warp direction, twills with inaccurate meetings in both, or the warp direction, simply cannot be produced on a loom heddled for accurate meetings, and vice versa. Whichever way the warp was heddled, however, the type of meeting in the weft direction could be chosen by the individual operating the heddles; it is remarkable that most examples of diamond twills are symmetrical in this respect, the only exceptions which come to mind being two specimens of Roman origin (fig. 9.1). Where meetings in the seeming warp are accurate and those in the other system inaccurate (Wild 1970, figs 38,39). Although errors are certainly known, and will be considered under a separate heading, the intention when weaving diamond twills was quite obviously to produce a specific pattern for which the loom was purposefully heddled. Variations on both 2/2 (fig. 9.1) and other diamond twills are possible and some have been found in archaeological contexts.

Three-shaft weaves

Three-shaft weaves seem to have been technically more difficult to work than four-shaft ones on a primitive loom for they enjoyed far less popularity. The simplest type is 2/1 twill in which the weft goes over two and under one warp end producing a diagonal stripe in the cloth as in 2/2 twill. Like 2/2 twill, waved, pointed, and diamond twills can be manufactured but it should be noted that all have accurate meetings, as inaccurate ones are impossible. 2/1 twills appear to have been particularly adaptable to pattern variation.

More complex weaves

Complex weaves generally involve a multiplication of the number of sheds used; although they may be produced on primitive looms, their occurrence is often taken, rightly or wrongly, as indicating more sophisticated ones. Among those relevant to the period are the following.

Polymita or compound cloth. This really is a weft repp twill with long floats in which alternate picks will predominate on each side and in which a lot of the warp ends are never raised or lowered for a shed but merely used to fill in. In practice this means that if wefts of different colours are employed in odd and even sheds then one surface of the cloth will be mostly one colour and the opposite side the other.

By specially knitting the heddles, diamonds and other simple patterns which feature in reverse on both sides of the cloth can be produced. The simplest, based on a 3/1 twill, is four shaft; complex patterns could be achieved with just four heddle rods but more intricate designs which almost certainly must have necessitated a novel loom, are known.

A damask is a cloth in which a rectilinear design has been created by the careful contrasting of areas through changes in the direction of the line of displacement of twill or by differently spun or plyed yarns being made to predominate on one side of a cloth of 3/1 or greater complexity. While producing a comparable result, those two methods are technically distinct, the former being a possibly assymmetrical diamond twill and the latter polymita, as discussed above.

Complex twills which involve the use of more than four sheds are not common, only one example at present being known; almost certainly a more advanced type of loom would have been involved and presumably the intention was decorative, probably using different coloured yarns to bring out the weave.

The weaves found

As with other details of textiles of the period, the weaves, where known, are listed in Appendix X. In figure 9.2 this information is presented in histogram form together with, in order to give perspective, that for the Bronze Age, Early Iron Age, and Roman period on the one hand, and that for the Middle Ages on the other.
As the material the textiles are made of, be it animal or vegetal, is pertinent, this is also shown, where possible, although in drawing conclusions from this information the vagaries of preservation must be constantly borne in mind.

Plain weave is the easiest to produce as it only requires two sheds which may originally have been opened by hand as the weft was darned through, or one may have been darned and the other raised with a shed (laze) rod; the invention of the leash heddle was a major advance as it permitted both sheds to be automatically opened either by using two heddles or one and a shed rod. Not surprisingly, plain weave is the earliest known and weaves of greater complexity did not come into use in Europe until the Late Bronze Age (Hoffman 1964, 318). None are known from Britain for this sub-period but this may be simply due to the small number of textiles recovered; that weaves of more than two sheds were conceived of is shown by the unique horse hair girdle from Armoy, the body of which is a broken herringbone twill, while a weaving error in the plain woven cloth which accompanied it proves that heddles were also known (Henshall 1950, 138, 144).

Twills in use in the Late Bronze Age and Early Iron Age are of the simplest variety - four shaft two over two. Although no displacements have been noted in the scant British material, both chevrons and diamonds with inaccurate meetings are not unknown in the continental examples (Hoffman 1964, 189; Hald 1950, 425). Although it has been asserted that 2/1 twill was not known in north-west Europe until the 7th century or later and was an import from the east (Hoffman, 1964, 184), this is simply not true. It is first found, in its simplest form in Roman contexts, and continued in use in all periods from then on. In the area covered by the Saxons simple three-shaft twills, chevrons and diamonds were quite popular and did not vary sufficiently in quality from any other cloth to support the idea of importation from a great distance.

Although the information can be derived from fig. 9.2 it is worthwhile here to note the percentage of plain weave, 2/2 twill, 2/1 twill, and others for each period.

Table 9.1 Percentage of plain weave, 2/2 twill, 2/1 twill & others by period.

	Plain	2/2	2/1	Other	Total
Bronze Age	100				100
Early Iron Age	56	44			100
Roman	58	20	4	18	100
Early Saxon	59	36	4	1	100
Middle & Late Saxon	24.5	46.7	29.6	2.2	100
Viking	88	6	6		100
Other Dark Age	97		3		100
Mediaeval	61	26.75	11	1.25	100
Total percentage (periods equally weighted)	67.93	22.43	6.83	2.81	c 100

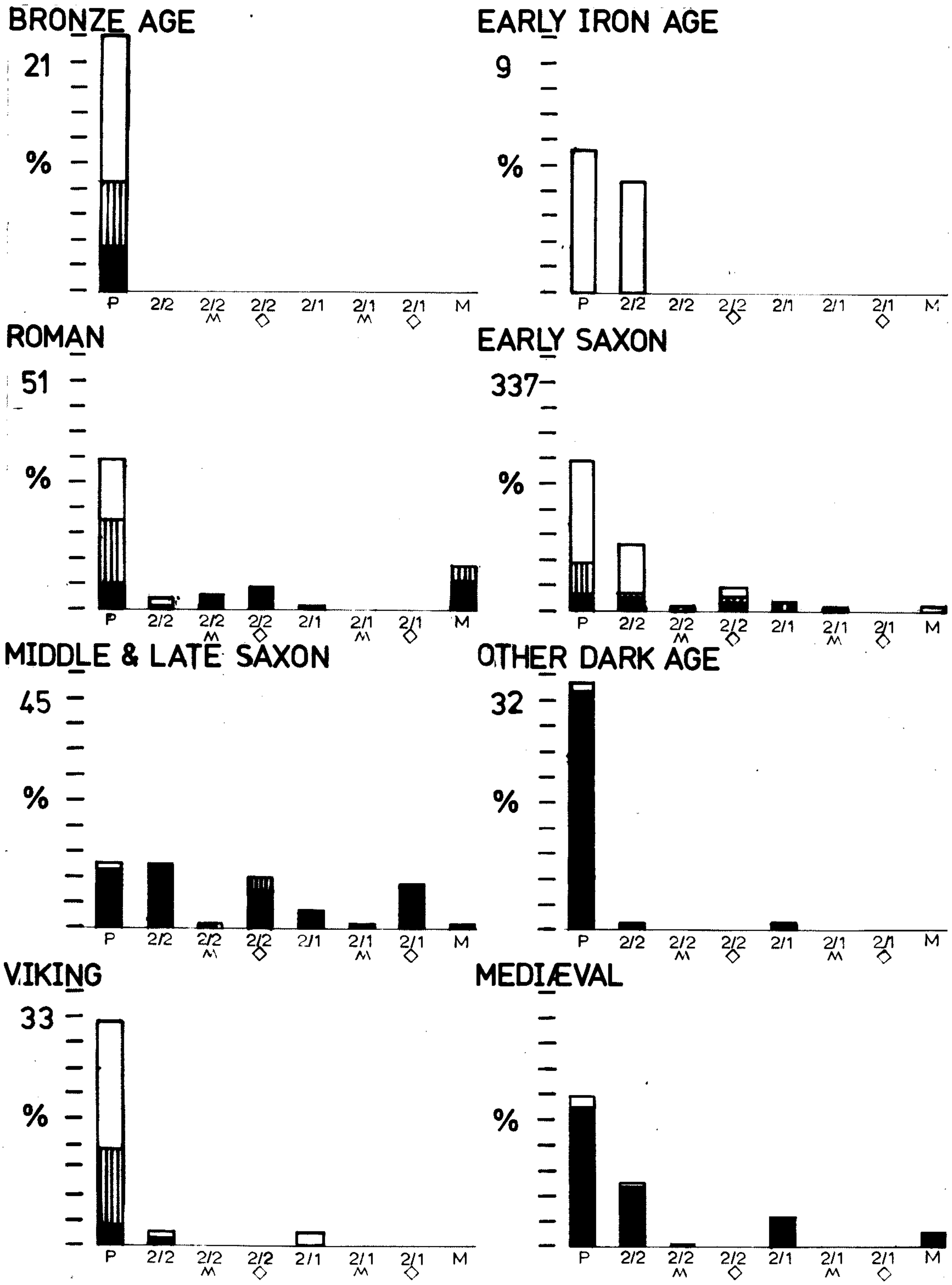


Fig. 9.2 Types of weave found in the British material by period and fibre type (animal = black, vegetable = striped, unidentified = blank) (appendix X).

We can see more clearly from this the fluctuations in proportions used. Technological limitations must be borne in mind. The Bronze Age sample is all plain but in the Early Iron Age the 2/2 is so popular as to account for almost half the sample found. In the Roman period the full range of weaves is present and diversity evident. Plain is still the basic technique with 2/2 twill accounting for 20% of the total and the new 2/1 twills 4%; interestingly other types of weave, hopsack etc., account for a full 18% whereas in all other periods this is a residual category. This can be seen in the Early Saxon period where the proportion of plain is much the same but where the shift of more complex weaves is to 2/2 while the proportion of 2/1 twills is constant. The Middle and Late Saxon material shows a real contrast, with plain weave dropping to a mere quarter of the total, and 2/2 and 2/1 rising to almost a half and more than a quarter respectively. The Viking and other Dark Age samples are small but seem to indicate a much slighter interest in complexity of weave, most of those known being plain. In the Mediaeval sample which follows on from the Middle and Late Saxon in most areas, plain is back to its proportion of about 60% found in Early Saxon and Roman times while just over a quarter and tenth of the specimens are 2/2 and 2/1 twills respectively.

Caution must be taken in discussing the popularity of different degrees of complexity of the same fundamental types (i.e. 2/2 or 2/1 for identification depends a lot on preservation. For a diamond to be recorded as such it is necessary for a piece large enough to show two reverses in different systems to remain; it otherwise will be classed as a waved twill or, if there is a mere scrap, both it and the latter will go down as a diagonal twill. Looking at the situation from the other angle, the figures do not give a true picture of the proportion of diagonal twill woven, for a lot of the examples will be pieces of waved and diamond twills. It must also be remembered that, apart from the Saxon sample, the numbers involved for each period are too small to be statistically significant. Percentages for 2/2 twills are given as round figures in table 9.2.

Table 9.2 Percentage of types of 2/2 twill by period.

	2/2	2/2vv	2/2	Total
Early Iron Age	100			100
Roman	20	30	50	c100
Early Saxon	73.5	3	23.5	c100
Middle and Late Saxon	52	5	43	c100
Viking	100			100

	2/2/	2/2vv	2/2	Total
Other Dark Age				
Mediaeval	99	1		c100
Total Percentage (periods equally weighted)	63.5	5.6	16.64	c100

The Iron Age sample is small and perhaps not significant but the Roman, ten strong, has a distribution in strange contrast to all others, diagonal to waved to diamonds appearing in the proportions 2:3:5. Almost three quarters of the numerous Early Saxon sample are classed as diagonals, a quarter as diamonds and just a few as waved; the heavy weighting towards the simplest kind is possibly due to most of the sample being very small pieces of textiles preserved as grave goods. The Middle and Late Saxon material probably presents a truer picture with waved twills again unpopular but diagonals slightly more numerous than diamonds. The only two Viking 2/2 twills are both diagonals, perhaps fortuitously; and none has been preserved among the small number of other Dark Age textiles. In the Mediaeval period nearly all of the sample are diagonals, and the one exception may have been a mistake.

The only Dark Age British 2/2 chevron twills with inaccurate meetings which were large enough to avoid being classed as a diagonal twill or being suspected of being just part of a diamond are one from Anglo-Danish York and another from Sutton Hoo. This comparative scarcity is also found among the continental material although the numbers it is possible to cite may be a reflection of the difficulty of positively identifying the weave rather than of original lack of production. The only 2/2 chevron twills with accurate meetings known are from the Salzburg Salt Mines of Halstatt date. (Wild 1970, 48).

Table 9.3 Instances of 2/2 chevron twills found in Britain with information available

Location	Displacement etc.	Type and criteria	Reference
Bronze Age			
Armoy, Co. Antrim		Warp chevron - selvedge	Henshall 1950, 137
Roman			
Falkirk, Stirlingshire	Z x Z 9+9	Weft chevron? - if Icelandic heddling used	Crowfoot 1948, 227, fig. 2

Huntcliff, Yorkshire	Z x Z	Weft chevron? - None; the weaving error might help if understood	Wild 1970, 97, fig. 25
London	S x S 22+c36+c14	Weft chevron? - said to be so because of irregular displacement. Side selvedge cited likely to be finishing border	Wild 1970, 97-8
Anglo-Danish			
York	S x Z 11+10+14+10+10 +6+10+10	Warp-chevron? - if system correctly identified	Hedges forth (fig. 9.3)
Undated			
St. Andrews, Orkney	Z x Z 18+26+26+88+22+ 36+42+38+18+24+28+18+ 18+7	Warp chevron - gore	Henshall 1952, 10, Fig. 4

Instances of 2/2 chevron twills found on the Continent with information available

Location	Displacement etc.	Type and criteria	Reference
Bronze Age			
Salzberg, Austria		Weft chevron? - none	Hoffman 1964, 189.
Migration period			
Hessens, Germany	15+25	Warp chevron - starting border	Hoffman 1964, 190, fig. 95
Viking			
Birka Sweden		Warp chevrons? (two pieces) - no evidence but in other textile warp has highest count	Geijer 1938, 26, fig. 3

While it is doubtful if all of these have been examined in sufficient detail, irregularities are known to occur in the case of a second century Roman example from London, the fourth century Roman piece from Huntcliffe, Yorkshire, the supposed Viking hood from Orkney, and the sixth century piece from Hessens, Germany, as well as the Anglo-Danish example from York (fig. 9.3). In the first three cases the number of threads between each reverse is always even although they vary, while in the German piece the only full diagonals that can be seen in the diagram contain an odd number of threads; the York example has mainly even displacements with only one

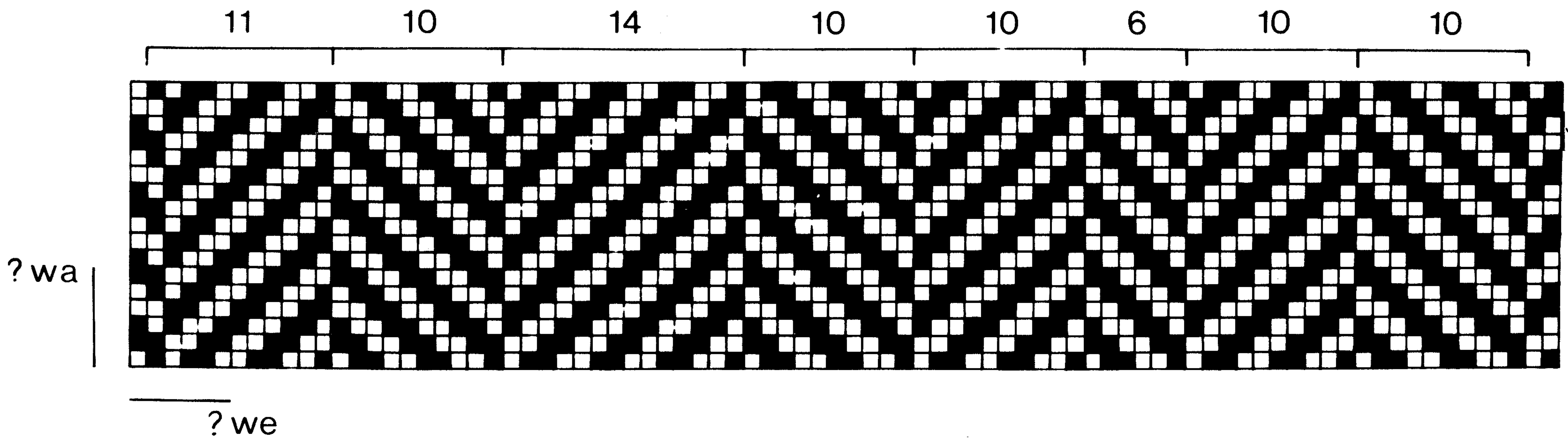


Fig. 9.3 2/2 warp? chevron twill from Anglo-Danish York (Hedges forth. (A) ; table 9.3).

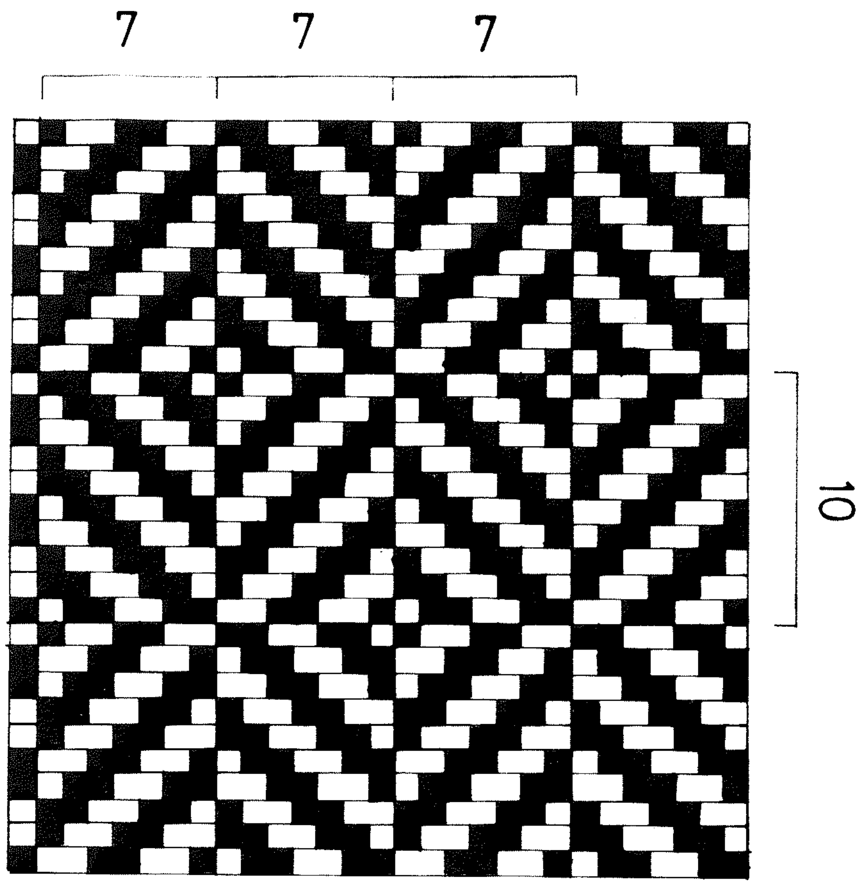
exception. Regular repeats after an odd number of threads are known in the case of the third century Roman piece from Falkirk, Stirlingshire, although more often even numbers of threads seem to have been involved, as at Tofting in Germany.

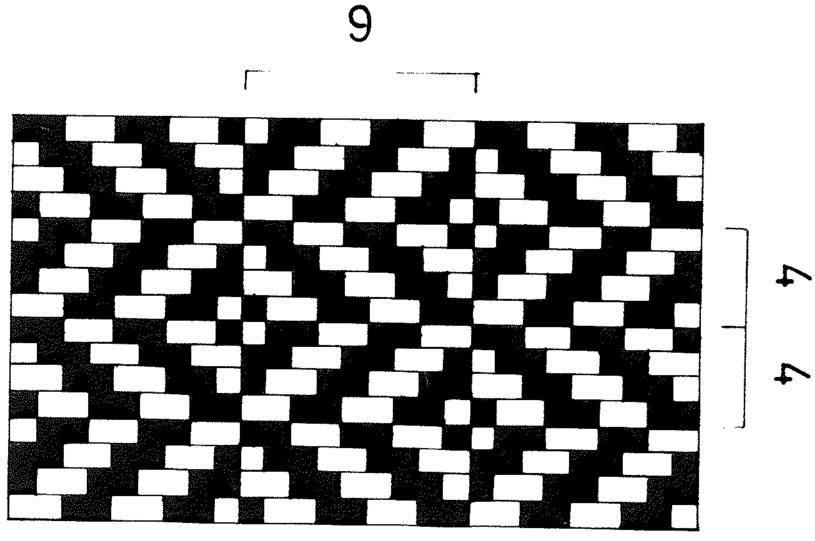
Chevrons may be of two types, depending on whether the displacement is effected by an irregular system of attaching the warp to the heddles (warp chevron) or by a change in which the heddles set up for ordinary twill are lifted (weft chevron). Of the ten examples of chevron twills which have been published in detail and which I am familiar with, four have been claimed to be weft chevrons and six warp chevrons. It can be seen from the tables however that in contrast to the warp chevrons the weft chevrons are very poorly substantiated unless the Icelandic method of heddling was the only one known; this will be discussed later (p 218) but here it might be mentioned that the warp chevron from Hessens could not be produced with the Icelandic method and therefore it cannot be assumed in other instances and cannot be taken as the foundation of proof for weft chevrons. It may be possible in a wide context that even displacements are warp chevrons and odd ones generally weft chevrons (Cf 2/2 diamond twills) but again the Hessens example does not fit in with this.

The weaves glossed above as diamond twills, when examined thread by thread can be found to differ in their design. 2/2 diamond twills with accurate meetings are not found, which in itself is a matter of interest; in the case of the two mixed instances of Roman date from Mainz already cited, unless they are technologically unique, the system with the inaccurate meetings must be the warp. The two distinct types of 2/2 diamond twill with inaccurate meetings are illustrated in fig. 9.1 and may be designated A and B.

Table 9.4 Instances of 2/2 diamonds found in Britain with information on their type etc.

Location	Type	System 1	System 2	Reference
<u>Roman</u>				
Balmaclellan, Kirkcudbright	B	10 + 10 (Z)	7 + 7 (S)	Crowfoot 1948 fig. 1 (fig. 9.4)
Corbridge, Northumberland	?	c10 (S)	c10-16 (S)	Wild 1970, 98
	?	c10 (S)	12 + 17-18 (Z)	Wild 1970, 99
Verulamium, Hertfordshire	?	c8 - 10 (Wa/Z)	c8-10 (We/S)	Wild 1970, 99

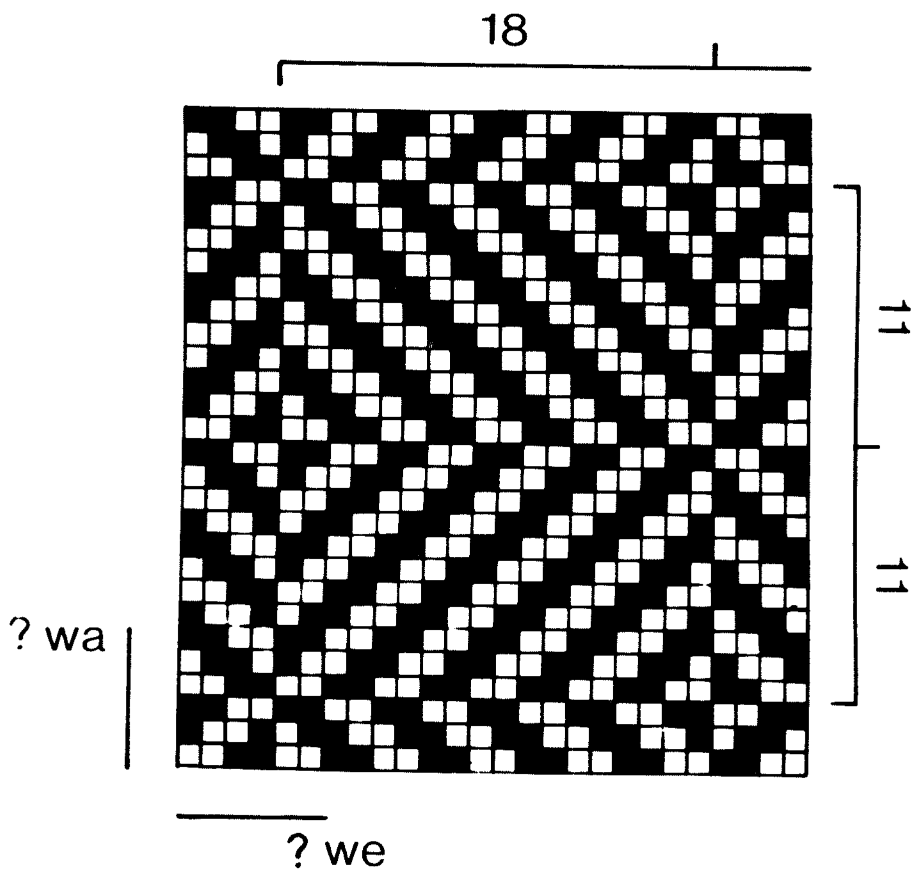




Figs. 9.4 (Top) A Roman 2/2 diamond twill from Balmaclellan, Kirkcudbright (after Crowfoot 1948, fig 1).
(Bottom) An Early Saxon 2/2 diamond twill from Finglesham, Kent (after analysis provided by E. Crowfoot).

Early Saxon				
Barrington Cambridge	A	10 + 10 (Z)	13 + 13 (Z)	Crowfoot, G 1950 30-32, pl 6
Broomfield Essex	A	18 ÷ 2	12 ÷ 2	Crowfoot 1958, 37; 1967, 37; 1969, 51; Carus Wilson 1969, 159
Coombe, Kent	A + variant?	20 ÷ 2 & 12 ÷ 2 (Wa/Z)	18 ÷ 2 & 18 ÷ 2 (We/S)	Crowfoot 1967, 37-9 fig 7 (fig 9.5)
Finglesham Kent	B	9 (Z)	4 (Z)	Crowfoot E. Pers Comm (fig. 9.4)
Fordcroft Kent	A	10 (Z)	9 (S)	Crowfoot 1969. 51-2, fig. 6(fig. 9.6)
Sutton Hoo Suffolk	A			Crowfoot E. Pers. Comm; 1969, 51.
Late Saxon/Anglo-Danish				
Lloyds Bank, York	A	14 + 12 (Wa/Z)	13 (We/S)	Hedges forth (A) (fig. 9.7)
	A	22 + 12 (Wa?/Z)	9 + 9 (We?/Z+S)	(fig. 9.8)
	A	14 + 14 (Wa?/Z)	9 + 9 (We?/S)	(fig. 9.7)
	A	18 (Wa?/Z)	11 + 11 (We?/S)	(fig. 9.5)
Coppergate York	A	18 + 18 (Wa?/Z)	9 + 9 (We?/Z+S)	Hedges forth (A) (fig. 9.8)
Undated				
Greenigoe Orkney	A	10 (Z)	5 (Z)	Henshall 1952, 17 fig. 6 (fig. 9.6)

The amount recorded about the British 2/2 diamonds is not as good as it might be; out of twenty-nine, nothing is known of twelve and some of the remainder have only been analysed superficially rather than thread by thread. It can be seen however that there are two examples of Type B – a Roman one from Balmaclellan and an Early Saxon one from Finglesham – and all the rest, where known, are Type A; roughly speaking the proportion is 5 to 1. To this must be added a variant of A from Coombe, Kent, which may be another type or may be a weaving error (fig. 9.5). The situation on the Continent is similar as can be seen from the following table of published illustrated examples which does not pretend to be complete. It will be seen that here there is an additional type not noted in Britain, C, which is a combination of A + B having an extra thread at each side of the diamond (fig. 9.9).



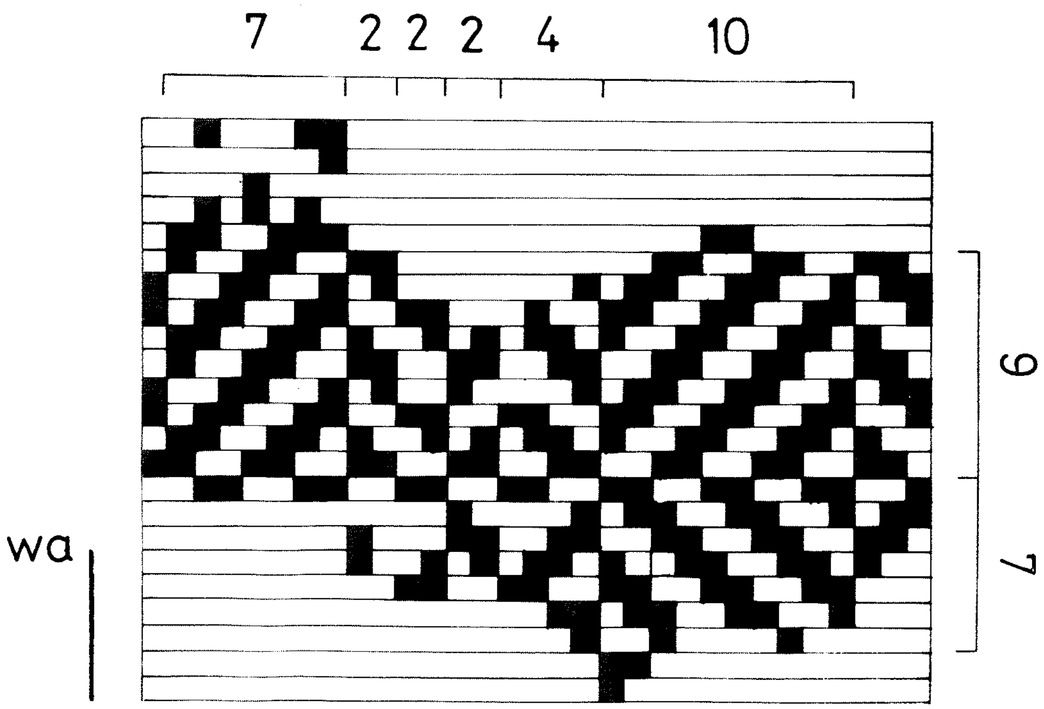
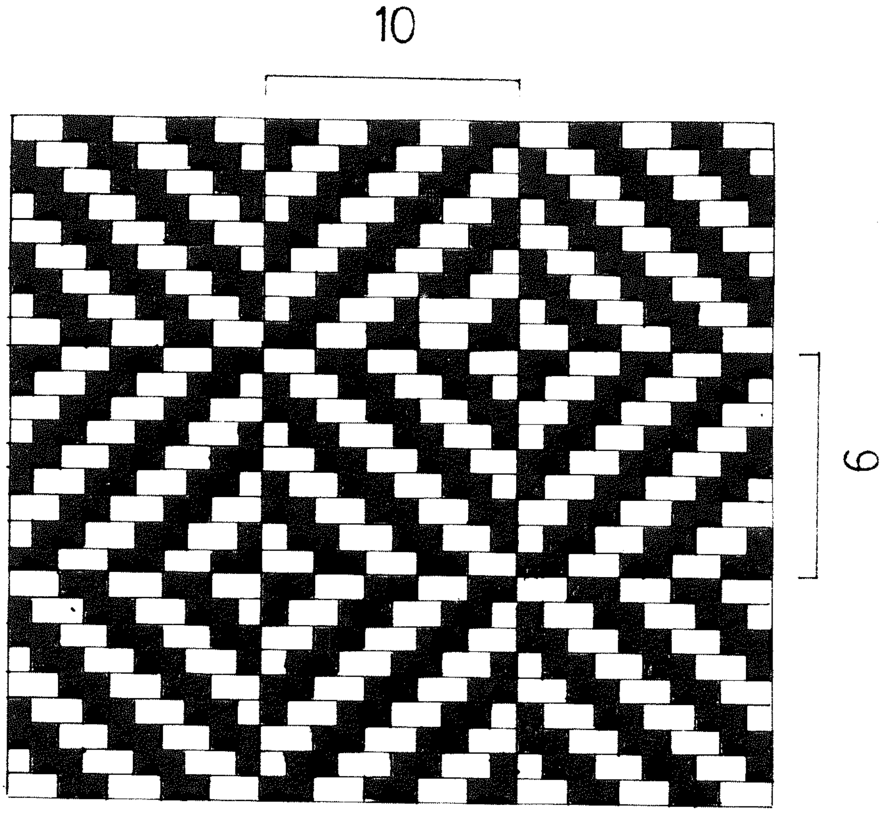


Fig. 9.5 (Top) 2/2 diamond twill from Anglo-Danish York (Hedges forth.(A) ; table 9.4)
(Bottom) Early Saxon 2/2 diamond twill from Coombe, Kent (after Crowfoot 1967, fig 7).



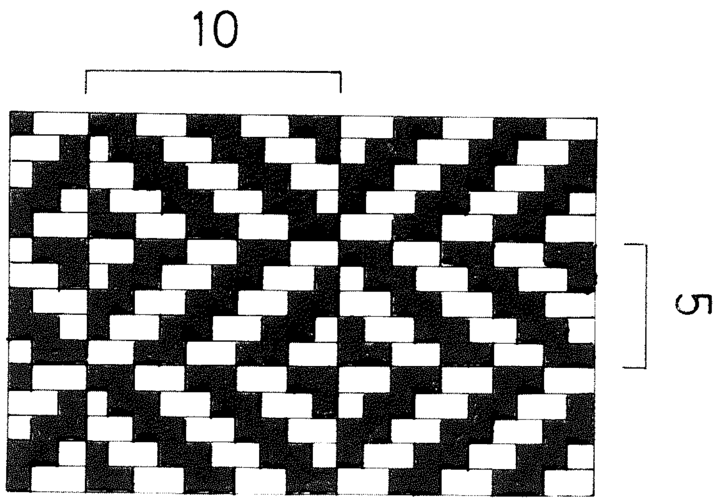


Fig. 9.6 (Top) Early Saxon 2/2 diamond twill from Fordcroft, Kent (after Crowfoot 1969, fig 6 - partly reconstructed).
(Bottom) Undated 2/2 diamond twill from Greenigoe, Orkney (after Henshall 1956, fig 6).

Table 9.5 Instances of 2/2 diamonds found on the Continent with information on their type etc.

Location	Type	System 1	System 2	Reference
Roman				
Mainz, Germany	B	12+ (Z)	12 (Z)	Wild 1970, 116, fig. 38
Roman Iron Age				
Hjørring Denmark	A	50 + 10 + 10	51	Hald 1950, fig. 70
	B			Hald 1950, fig. 72
Lousgaard, Denmark	C	10 + 10 + 10	6 + 6 + 6	Hald 1950, fig. 87
Tofting Germany	A	12 + 12 (Wa/S)	11 (We/Z)	Bantelman 1955, 95, Abb. 3
Vrangstrup Denmark	A	10 + 8	9 + 9 + 9	Hald 1950, fig. 79
Viking				
Birka Sweden	A	10 + 10 (Wa)	5 + 5 (We)	Geijer 1938, 26 Abb 2 (47 examples illustrated) Ibid Abb 4 (1 example)
Kaupang Norway	A	10 + 10 + 10 + 10 (Wa)	5 (We)	Hoffman 1964, figs. 102-5
Undated				
Karlby Mose Denmark	C	48	10 + 5 + 5 + 10 + 10	Hald 1950, fig. 141
Vejen Mose Denmark	A	10 + 10 + 10	13	Hald 1950, fig. 49

The known British 2/2 diamonds have a number of features which are worthy of comment, but here it must be said that some of the older diagrams have a symmetry not to be seen in more recent analyses and one wonders if it hasn't been assumed.

1. The diamonds are not squares on end, there are always more threads in one system than in the other. The range of discrepancy involved is from one to more than double. All of the foreign material drawn on agrees with this.
2. One system always has an even number of threads between displace-

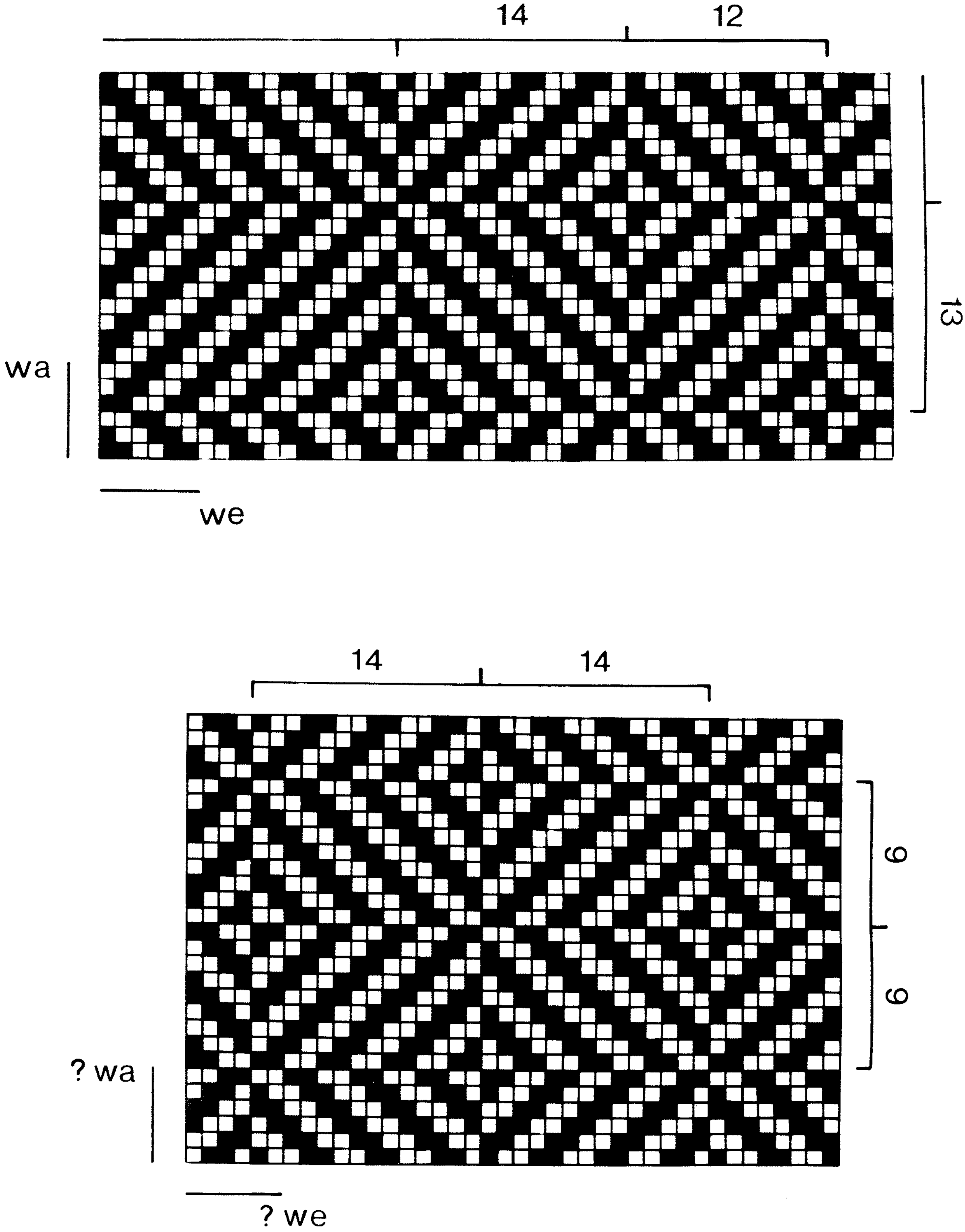


Fig. 9.7 Two 2/2 diamond twills from Anglo Danish York (Hedges forth. (A) ; table 9.4).

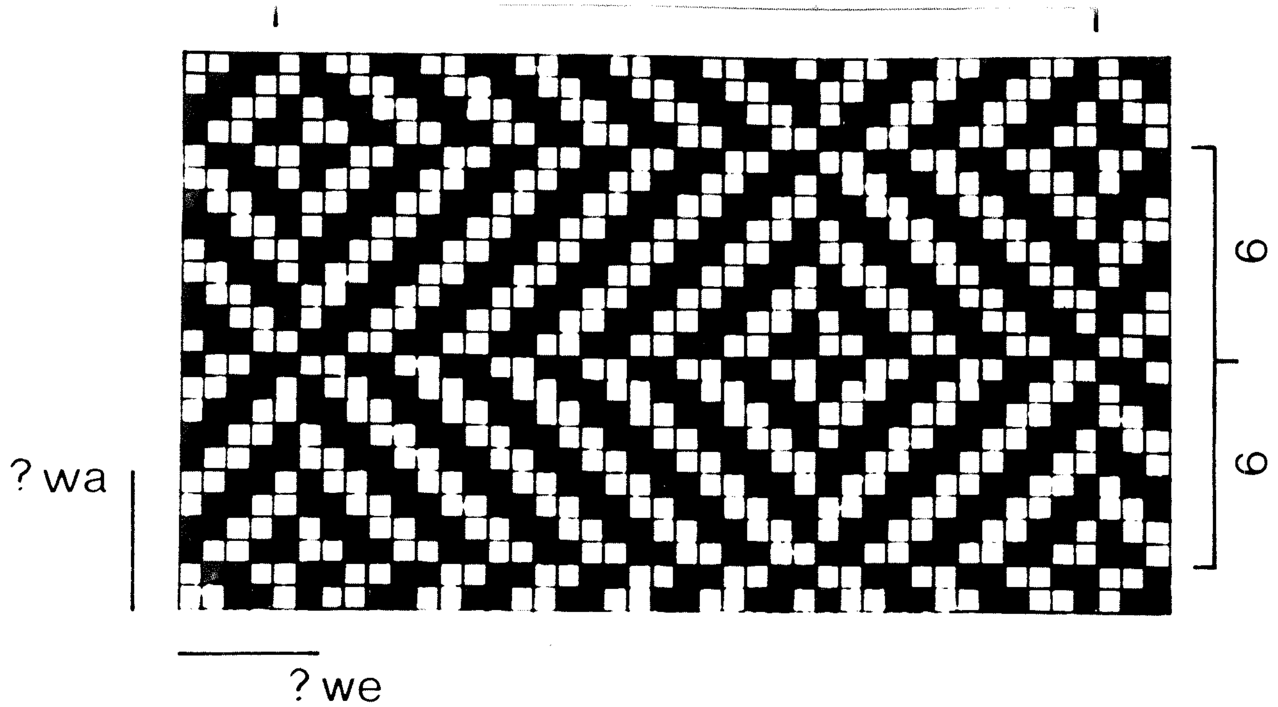
ments while the other always has an odd number. Two of the foreign examples do not agree with this; one from Lousgaard and another from Karlby Mose, Denmark. On examination the reason for this proves to be that they are of pattern type C, a combination of A and B having extra threads in the second system which in the British ones has an odd number in it; these threads fit between the diamonds.

3. Although instances are known where the displacement has been regular in both systems, in the pieces analysed it is as common for them to vary i.e. the diamonds are not symmetrical. There is the same situation among the foreign material and it may be the case that what we are examining are parts of larger textiles such as that found at Hjørring, Denmark (Hald 1950, fig. 70) (fig. 9.9).
4. In all instances where it is known the system with the even number of threads and least frequent displacement is the warp.

These features will be discussed later under warping; the odd textile from Coombe will likewise be discussed under mistakes but it might be mentioned here that there are internal inconsistencies in the diagram.

2/2 diamond twills with displacements which have accurate meetings are perfectly feasible to produce from a technical point of view (fig. 9.1); it would be surprising if they were not manufactured in Dark Age Britain but all the more surprising that one solitary example of Early Saxon date is known from Finglesham, Kent (fig. 9.1). This type of pattern has been made recently under the name of rosette twill but the dearth of the Dark Age finds in Britain is matched on the continent, and in the mediaeval and prehistoric material. For the Roman period there are admittedly the odd diamond twills from Mainz with one system with accurate meetings and the other inaccurate (Wild 1970, 48, 116, figs. 39. 40) (fig. 9.1) but these too, in their way, are unique; from the Halstatt salt mines in Salzberg chevron twills with accurate meetings are known, as has been mentioned.

From the diagrams it will be appreciated that, theoretically, if one system is taken as the warp then in all four sheds there will be some single ends raised, alternately at the centre and edge of the diamonds; if the other system is taken as the warp, however, in two of the sheds there are only paired theads and the single ends of the design all occur



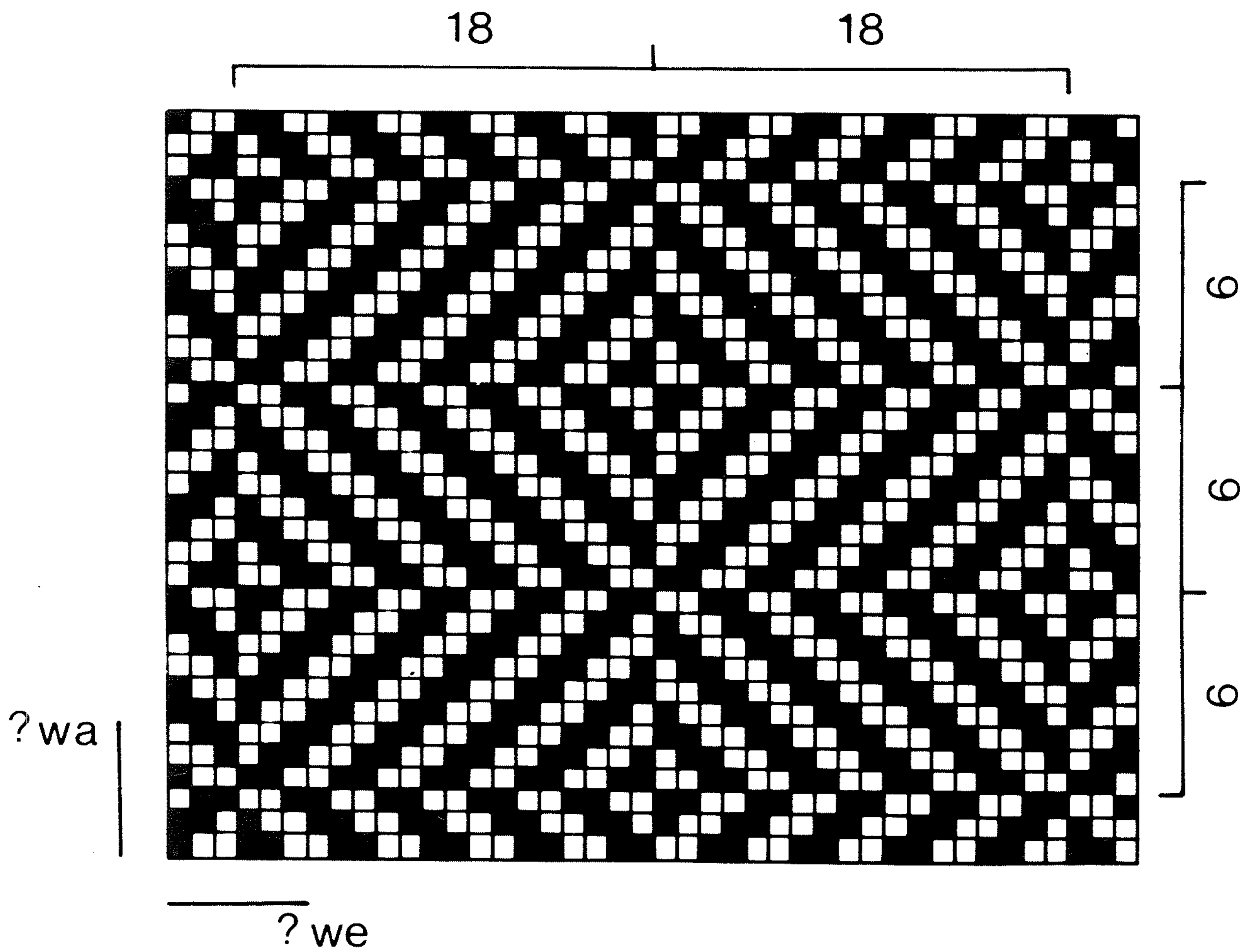


Fig. 9.8 Two 2/2 diamond twills from Anglo Danish York (Hedges forth. (A) ; table 9.4).

in the other two. This is, of course, significant in terms of the way the heddles were knitted and it is of interest that in all instances where the warp is known for certain, the single ends occur in two sheds which would alternate with the sheds containing solely doubled ends.

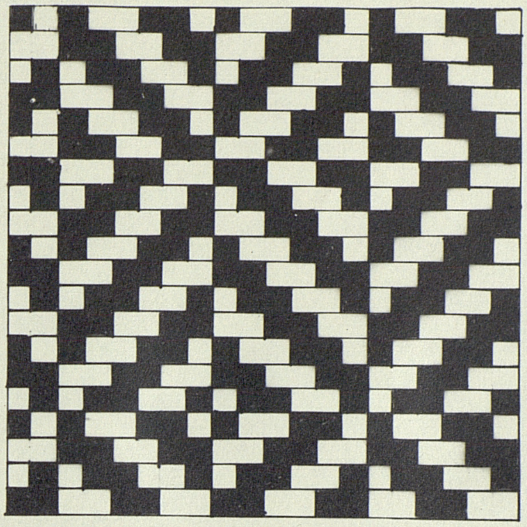
The number of surviving 2/1 twills from Britain is really very small as can be seen from the following table. All have accurate meetings, for it is impossible for them not to.

Table 9.6 Occurrence of types of 2/1 twill by period

	2/1 /	2/1 VV	2/1	Totals
Roman	1			1
Early Saxon	9	1		10
Middle & Late Saxon	2	1	8	11
Viking	1			1
Other Dark Age	2			2
Mediaeval	48			48
Totals	63	2	8	73

It would not be sensible to convert these figures into percentages representing the proportions of each type of 2/1 by period. The mere presence of the weave may be noted for the Roman period in the form of an example of 1st/2nd century date from Corbridge (Wild 1970, 101). In Early Saxon times chevron twill makes its debut with one example matched by nine diagonal 2/1 twills; it must be borne in mind though that these are mostly small scraps replaced on grave goods and some may be part of chevrons and diamonds. The Anglo-Danish sample is remarkable, for eight out of the eleven are 2/1 diamonds, one being a chevron and the remaining two diagonals. The scant Viking and other Dark Age collections contain, as far as can be seen, one and two examples respectively of diagonal weave which is also that shown by the forty-eight mediaeval pieces which are, however, for the most part small scraps. While the low proportion of 2/1 twills to other types of textile weaves and the boom in diamonds in the Anglo-Danish material are both worthy of note, so too is the fact that from the Roman period through the Mediaeval era there is no break in the manufacture of 2/1 twills in Britain. 2/1 twill is a three shed weave which cannot be woven with a warp divided in two or using the Icelandic system of heddling; two important techniligical features to be discussed later.

The situation is much the same, or worse, on the continent. 2/1 twills are so rare that Hoffman pronounced them all to be imports (1964,



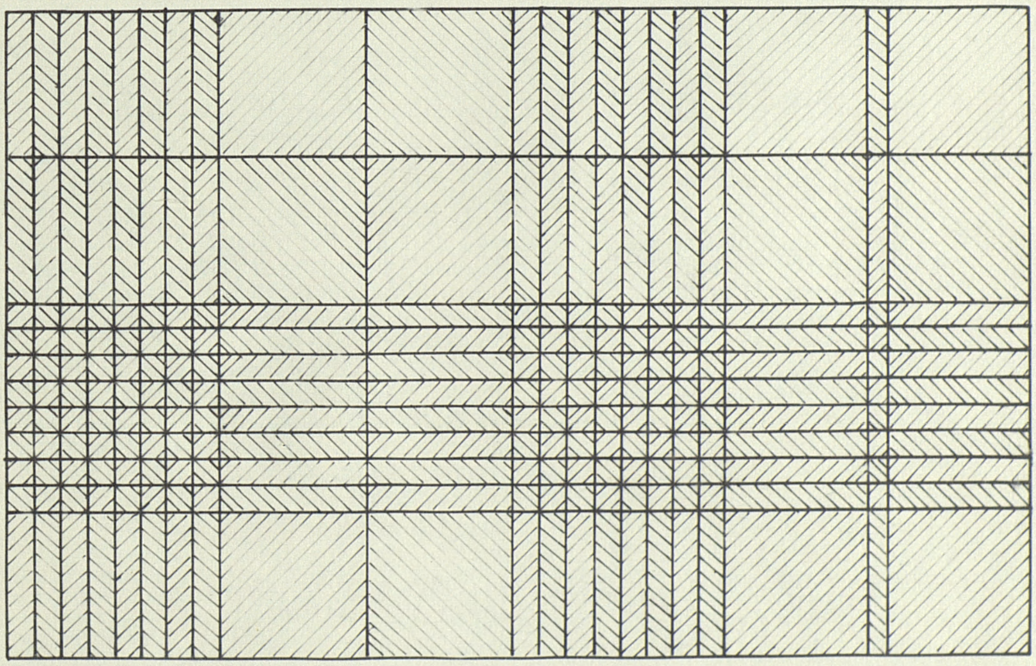


Fig. 9.9 (Top) 2/2 diamond twill type C.
(Bottom) 2/2 twill in a Roman Iron Age fabric from Hjørring, Denmark (after Hald 1950, fig 134).

184) largely because they didn't fit with her dominating theory that the warp-weighted loom was the only loom in the Dark Ages and was used in exactly the same way as in modern day Norway. Wild cites six Roman examples, all diagonals and all from Mainz (1970, 117). The earliest instances in Scandinavia of the 7th century from Vendel 12 and Valsgarde 8 are unusual but subsequent Viking examples e.g. from Mammen, Denmark, Kaupang, Norway, and Birka, Sweden are all diagonals except for eight diamonds at the latter site; a situation similar to Britain (Hoffman 1964, 184).

Dark Age British contexts have produced two 2/1 chevron twills which have not been found elsewhere, although this is no doubt due to a general lack of finds. One is from Sutton Hoo (about which there is no information available) and the other from the Anglo-Danish deposits at York. The York piece is possibly a warp chevron, judging by the preponderance of count of one system and the use of Z threads in it and S in the other; the weave is interesting because it is largely unreversed, there only being two reverses of two threads each noted.

Anglo-Danish York also produced the only British 2/1 diamond twills.

Table 9.7 Instances of 2/1 diamond twills found in Britain with confirmation of their type.

Location	Type	System 1	System 2	Reference
Lloyds Bank				
York 1	D or E	?Wa/Z	?We/Z	Hedges forth A
2	C	22 + 22 ?Wa/Z	10 + 10 ?We/Z	(fig. 9.10)
3	A	33 ?Wa/Z	12 + 12 ?We/Z	(fig. 9.11)
4	E	27 + 27 ?Wa/Z	10 + 12 ?We/Z	(fig. 9.12)
5	E	21 ?Wa/Z	10 + 10 ?We/Z	(fig. 9.13)
6	D	?Wa/Z	8 + 8 ?We/Z	(fig. 9.13)
7	E	24 + 27 ?Wa/Z	13 + 13 ?We/Z	(fig. 9.14)
8	B/C	?Wa/Z	13 ?We/Z	(fig. 9.15)

As has been mentioned, 2/1 diamond twills seem to have been adaptable to differences in pattern. Among the York Anglo-Danish material alone four, and possibly five variants were distinguished, A, B, C, D, and E (Hedges forth (A)) , (figs. 9.16-9.18). The question is whether this was intentional. It is a simple matter to work out whether heddles set up to make one pattern could be lifted in the wrong order and so produce another even locally within the cloth. This line of approach was

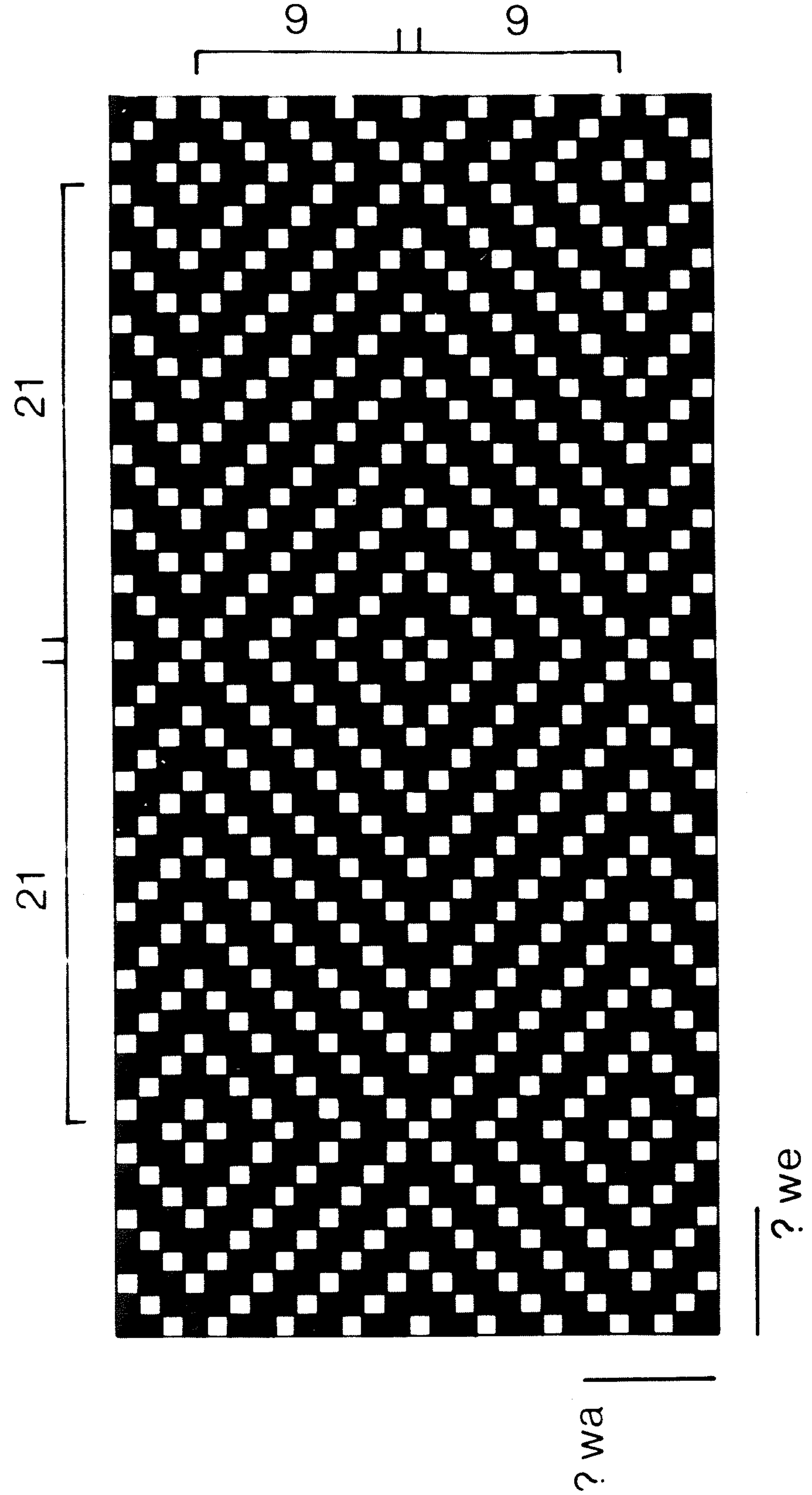


Fig. 9.10 2/1 diamond twill from Anglo Danish York (Hedges forth. (A); table 9.7).

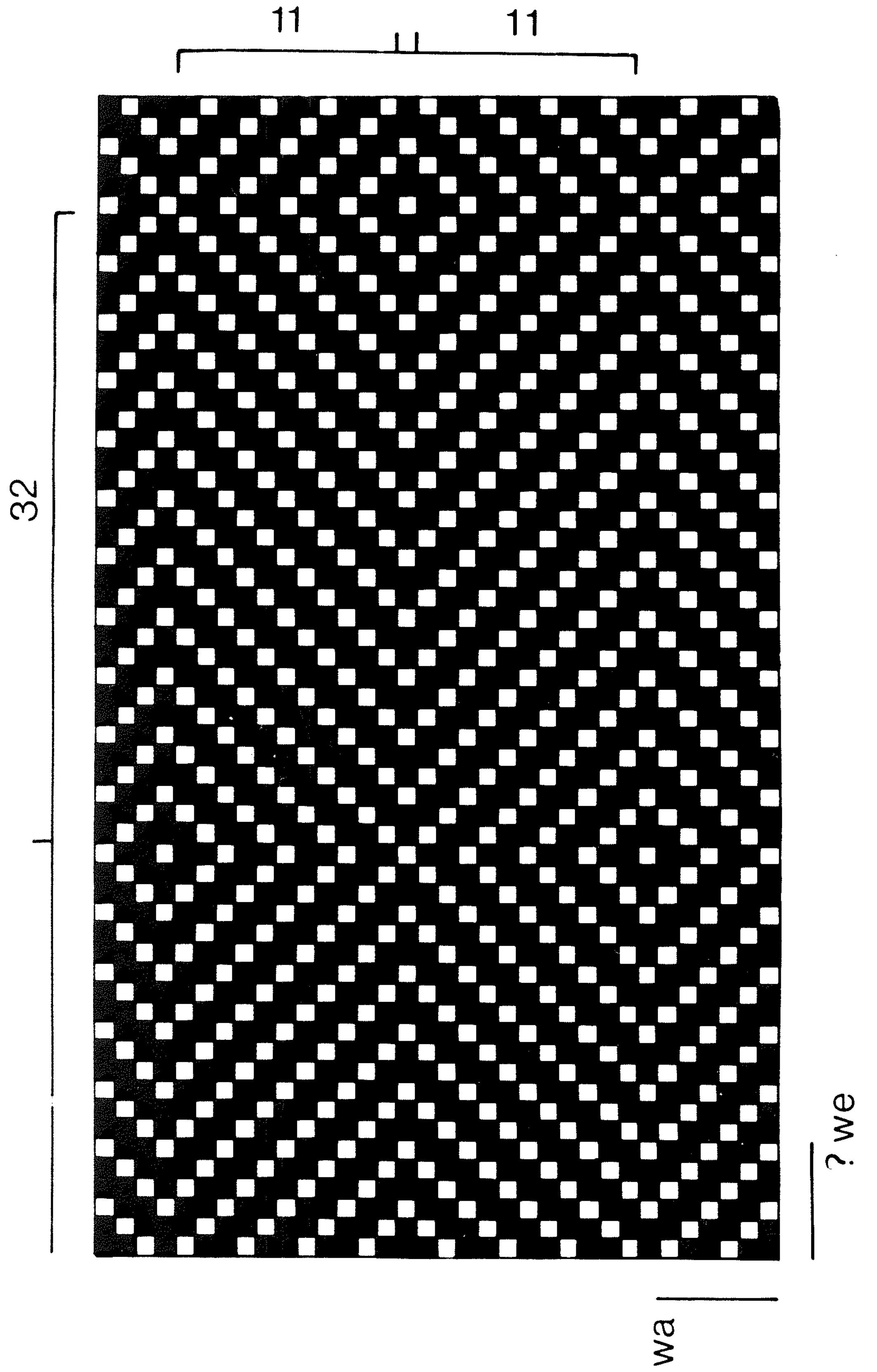


Fig. 9.11 2/1 diamond twill from Anglo-Danish York (Hedges forth. (A); table 9.7).

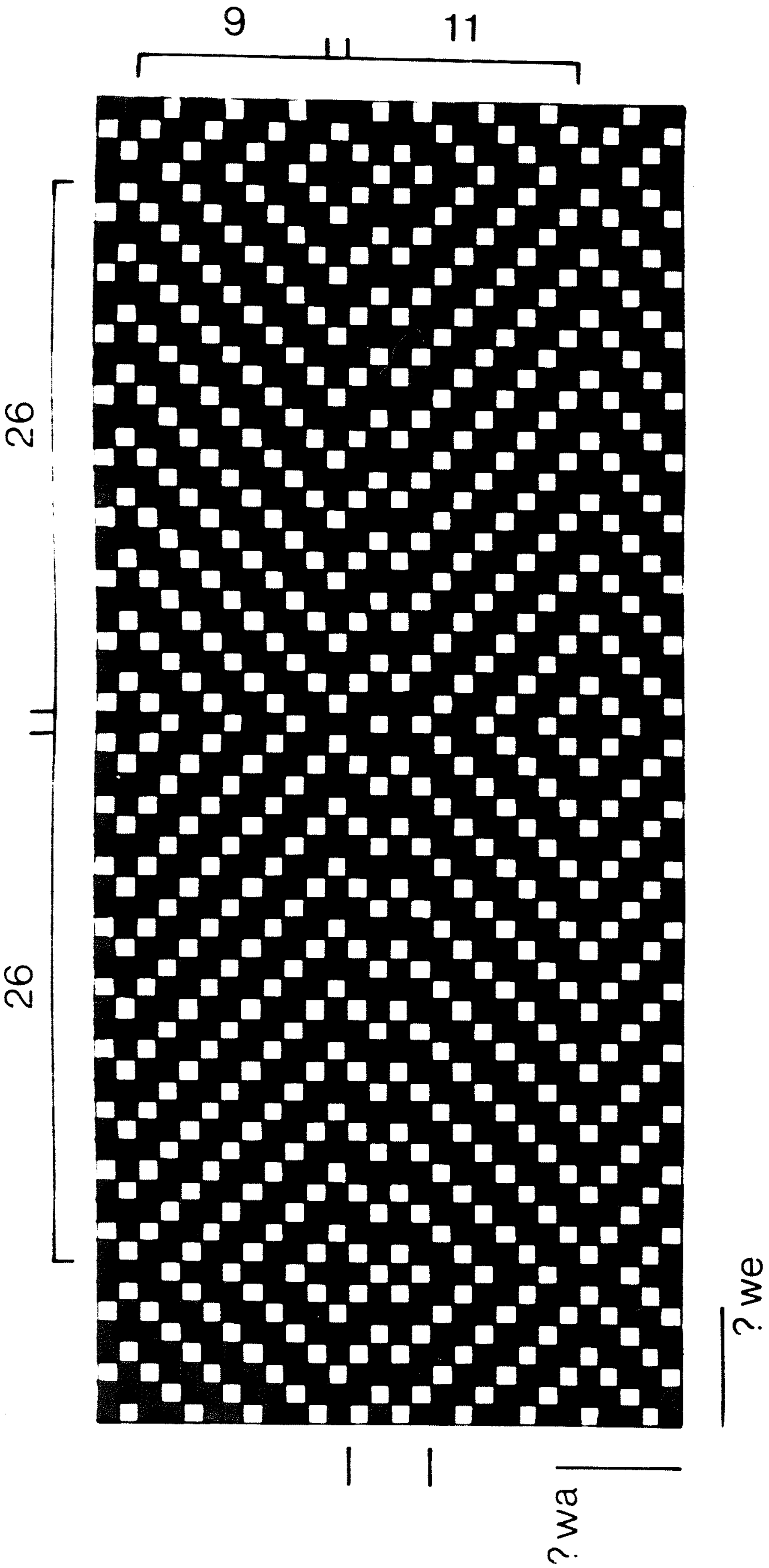
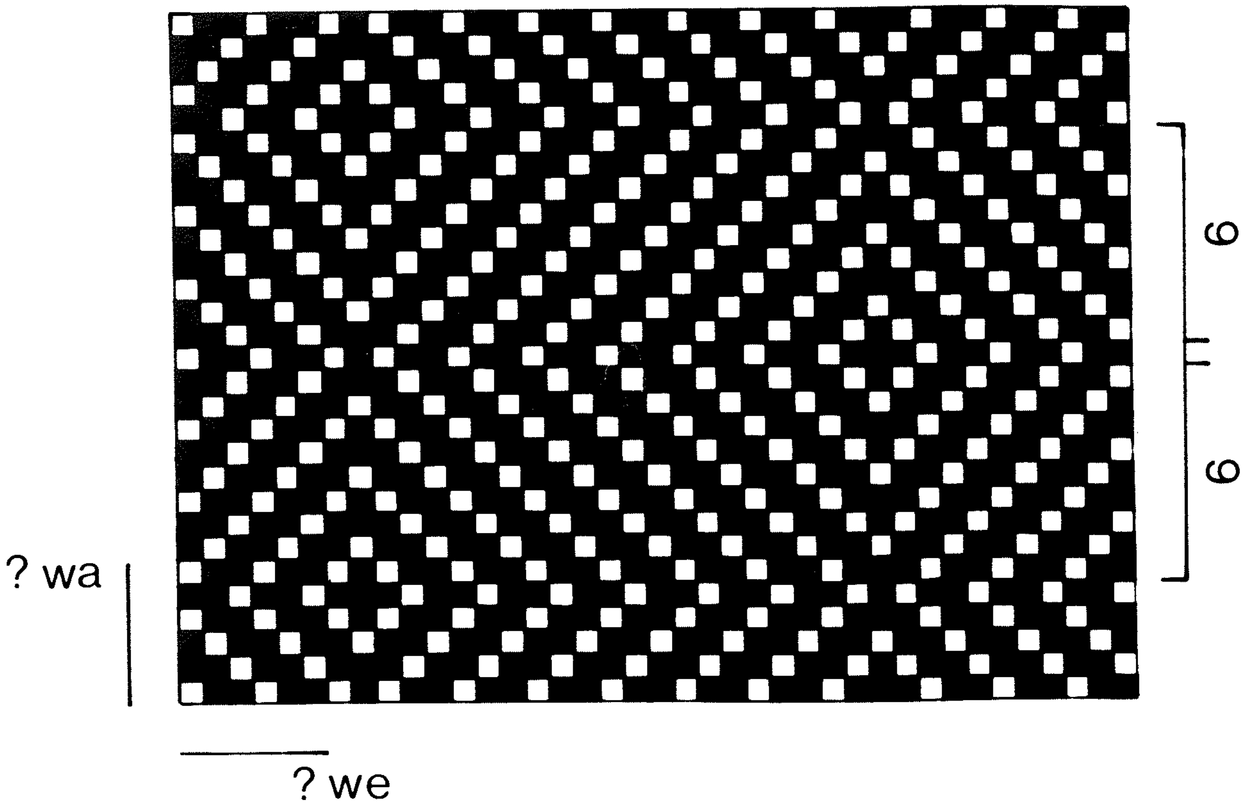


Fig. 9.12 2/1 diamond twill from Anglo Danish York (Hedges forth. (A), table 9.7).



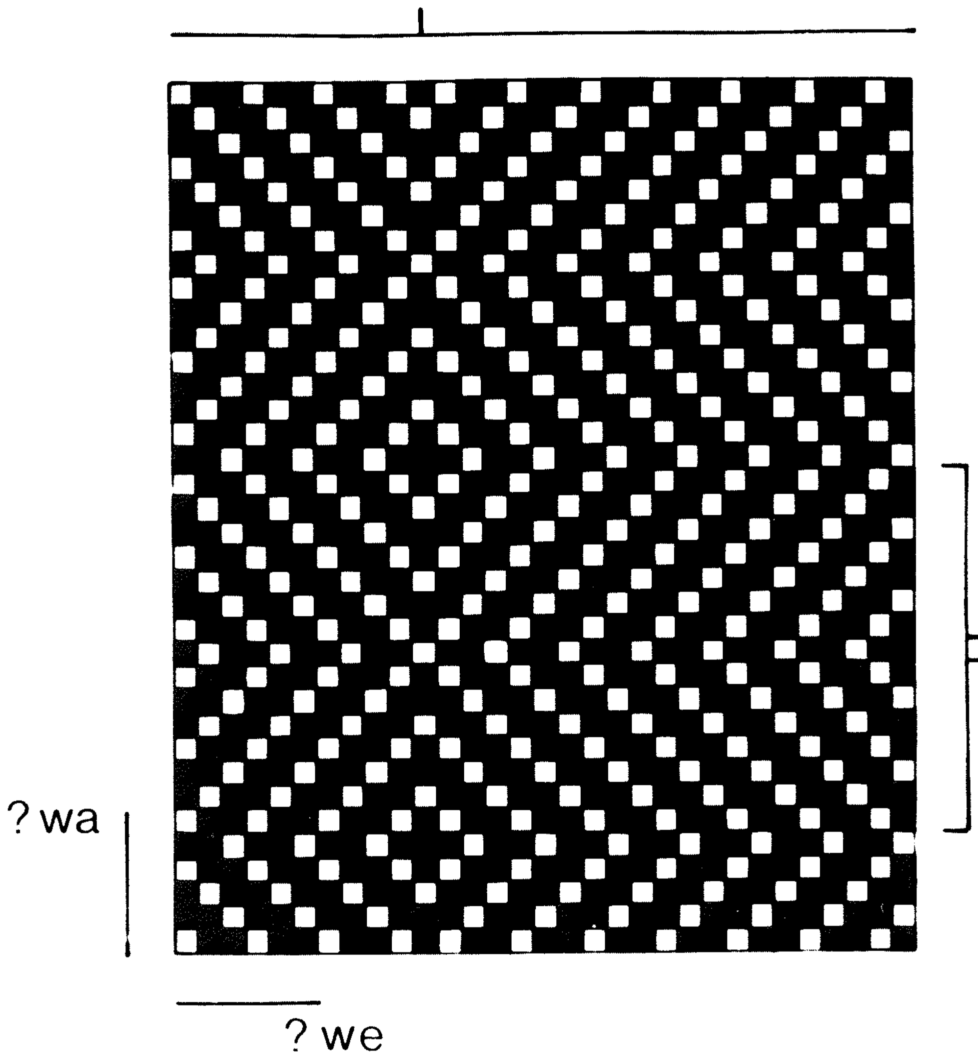


Fig. 9.13 Two 2/1 diamond twills from Anglo Danish York (Hedges forth. (A); table 9.7).

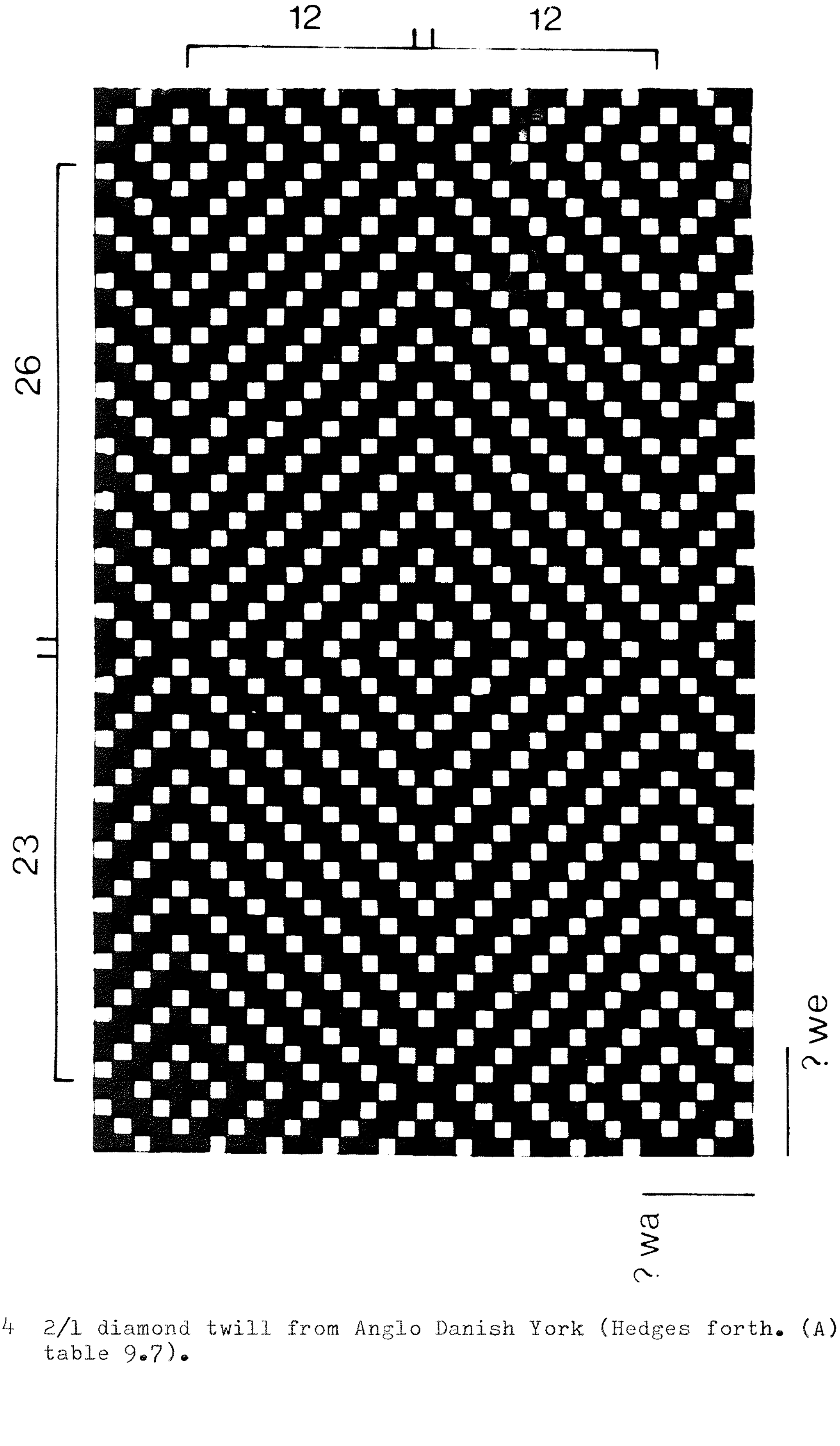


Fig. 9.14 2/1 diamond twill from Anglo Danish York (Hedges forth. (A); table 9.7).

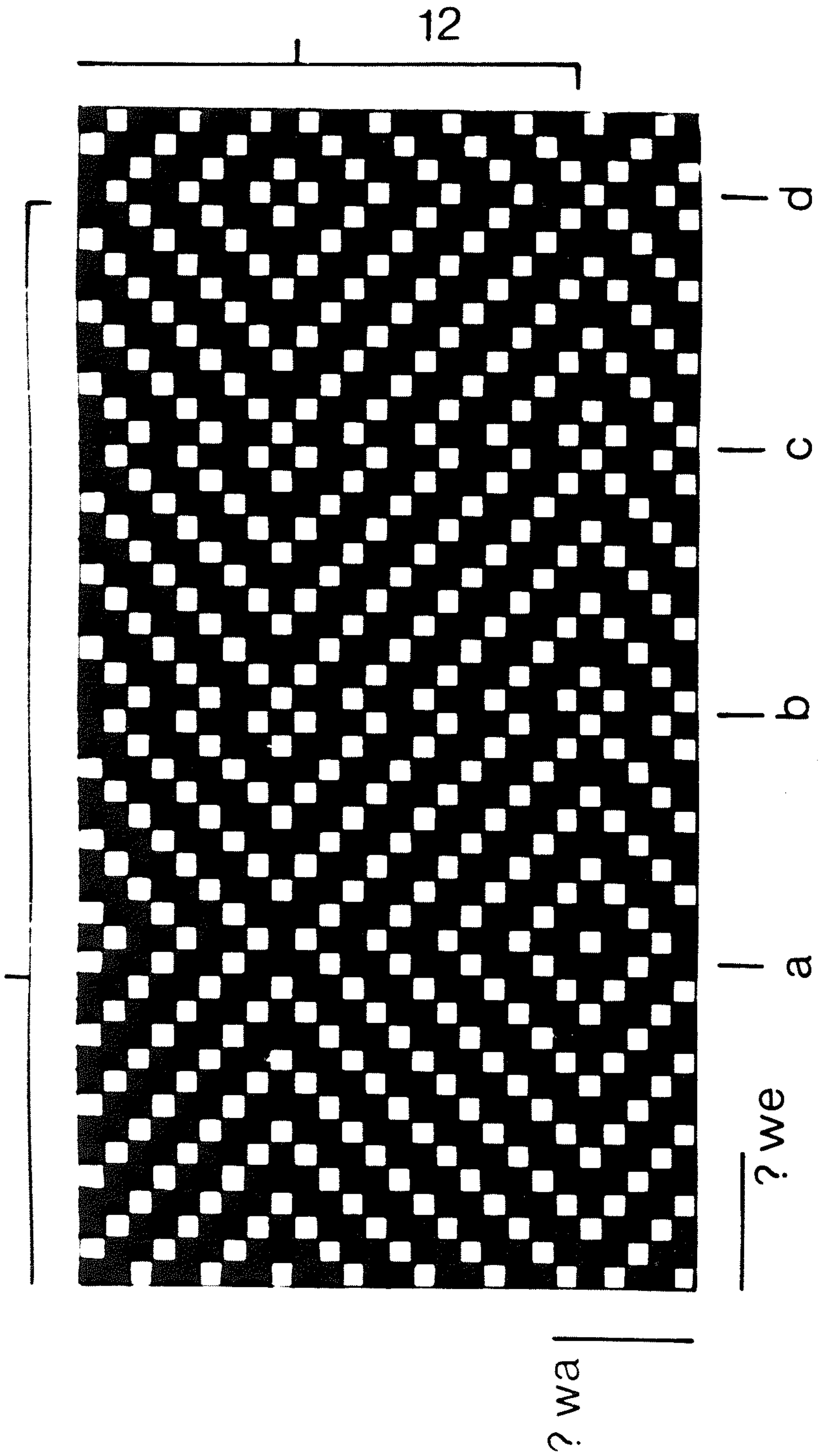


Fig. 9.15 2/1 diamond twill from Anglo Danish York (Hedges forth. (A); table 9.7).

hampered with to some extent by the fact that we do not know for certain which system is which, since an assymetrical pattern would require a different arrangement of warp threads to heddles if it were moved through ninety degrees. While examples where the warp and weft could be distinguished would be desirable it is possible, even with the material in hand, to see that there are three separate ways in which heddles were attached to the warp. These three different patterns of sheds are exemplified by A, C, and D. B could have been produced on the arrangement for C or D depending on which way round it was woven, and similarly E could have resulted from the heddle arrangement of A or C.

The only parallels to these diamond twills are the eight discovered at Birka (Geijer 1938). It is unfortunate that only four of these were published in diagrammatic form but it is interesting that two are of our type A, one of B and one of E. These could have been produced by at the least two different methods of attaching the warp to the heddle and at the most three.

In the case of the 2/2 diamonds it was possible to make four points, and directly parallel ones can be made here for the small 2/1 diamond sample.

1. The diamonds are not squares on end; there are usually around double the number of threads in one system compared to the other.
2. As the displacements have accurate meetings each shares a thread with the previous and the next one. In figs. 9. 10 - 9.15 these have not been counted while in Table 9.6 they have been taken as a half thread each. Whichever method is taken there is no consistence of even displacements being found in one system and odd ones in the other nor is there any general preference for either.
3. Although in the small sample in hand repeats seemed to be regular there are instances in both systems of their not being so.
4. It is suspected on the grounds of high count and harder spin that the system with the least frequent displacements is the warp.

Although not really a weave, repps must be mentioned. A repp is produced when one system dominates by virtue of size or compactness to such an extent that it masks the other entirely. Whether a piece of cloth is a repp or not is a subjective decision; nontheless repps do occur in small numbers throughout the period. Early Saxon ones

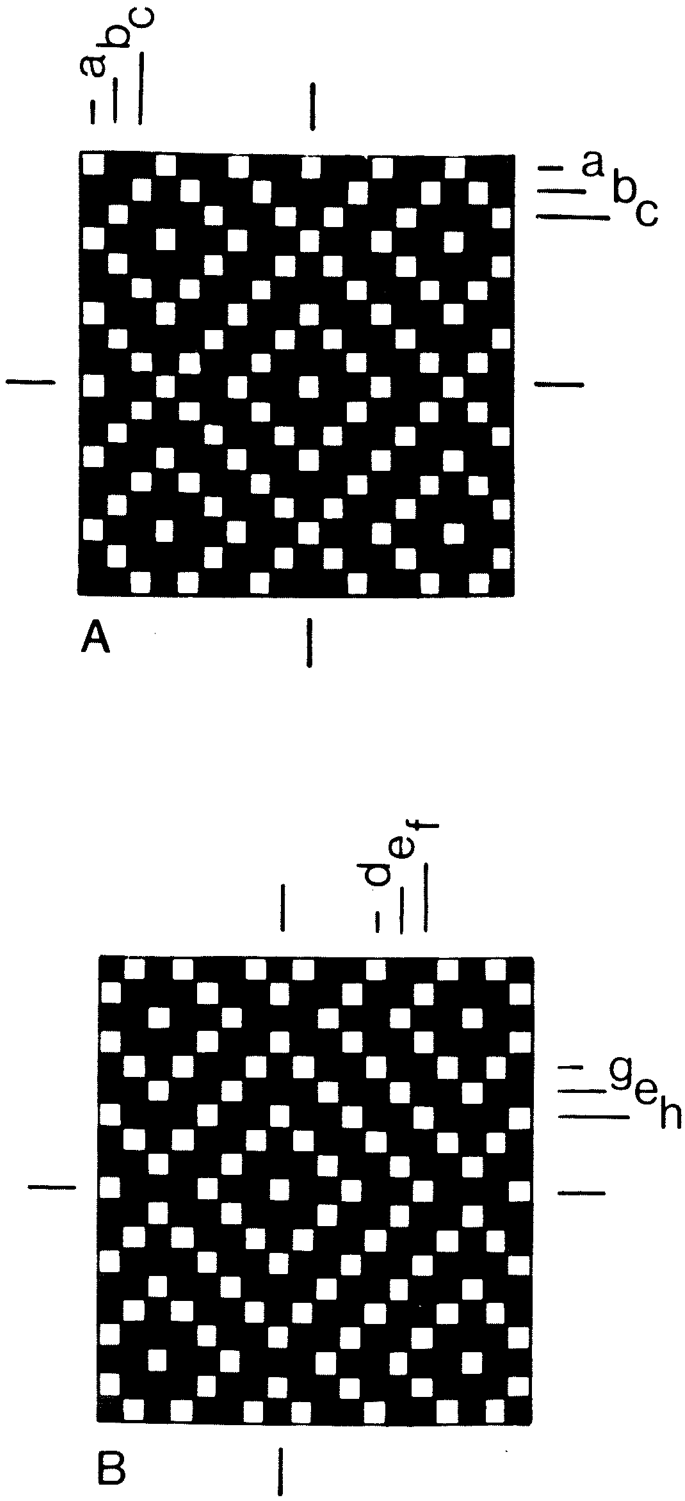


Fig. 9.16 2/1 diamond twills types A & B.

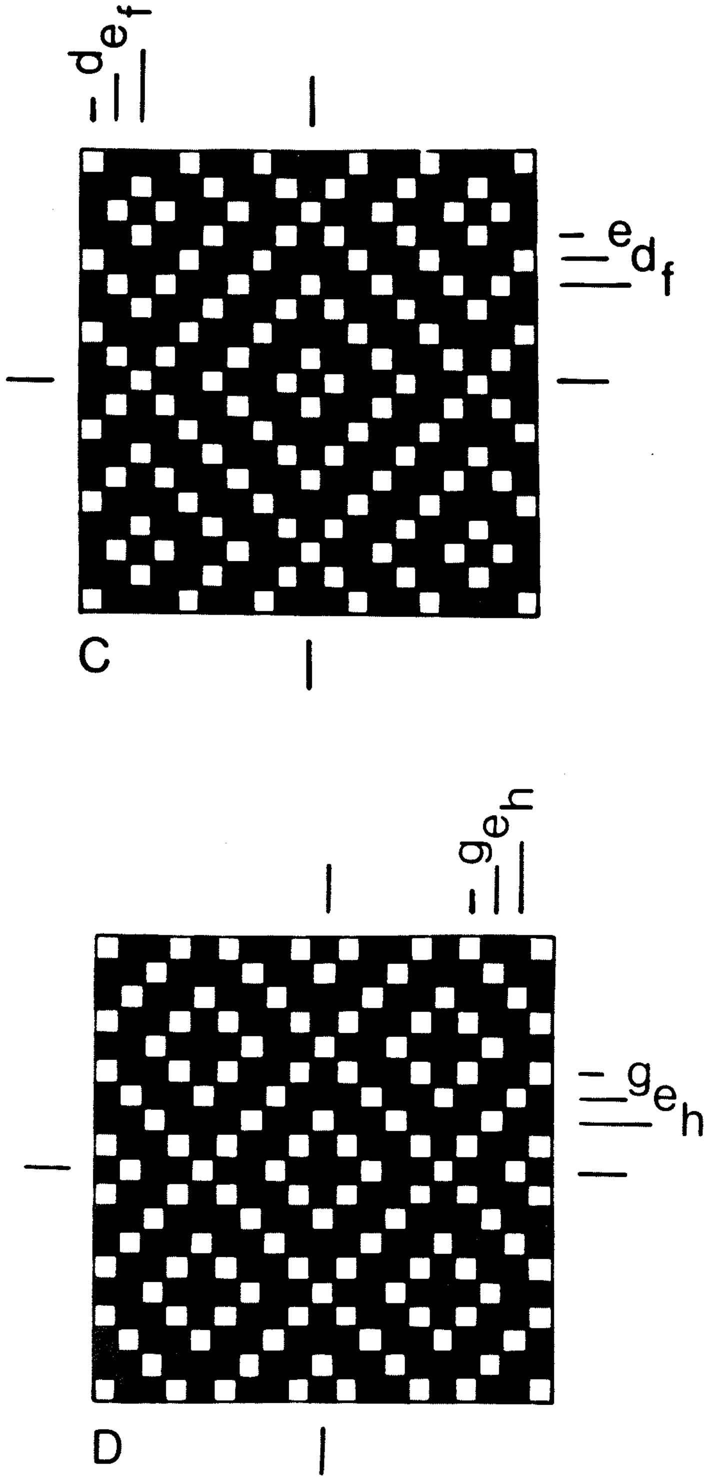


Fig. 9.17 2/1 diamond twills types C & D.

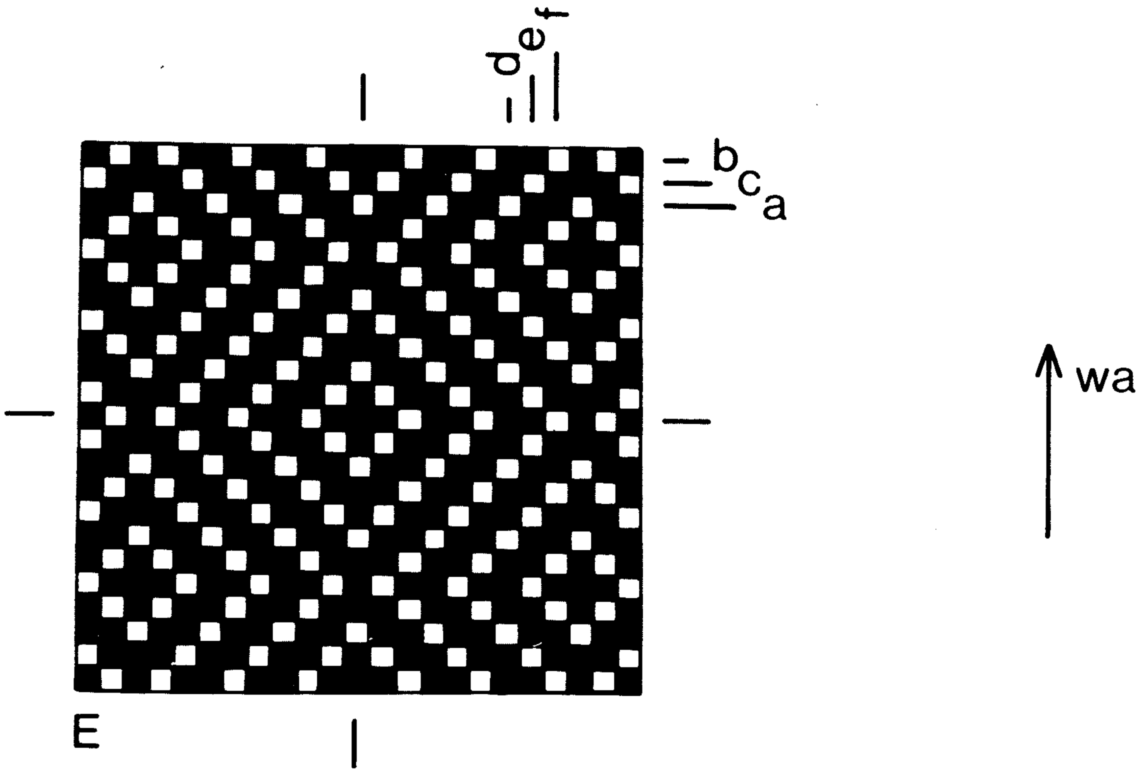


Fig. 9.18 2/1 diamond twill type E.

come from Howletts, Kent and Sewerby, Yorkshire; Anglo-Danish ones from York, including a 2/2 and a 2/1 twill; a Viking example came from Balladoole, Isle of Man; a Dark Age one from Dun Cuier, Barra, Scotland, and another from Lagore Crannog in Ireland. It was then a widely known, if little used, technique.

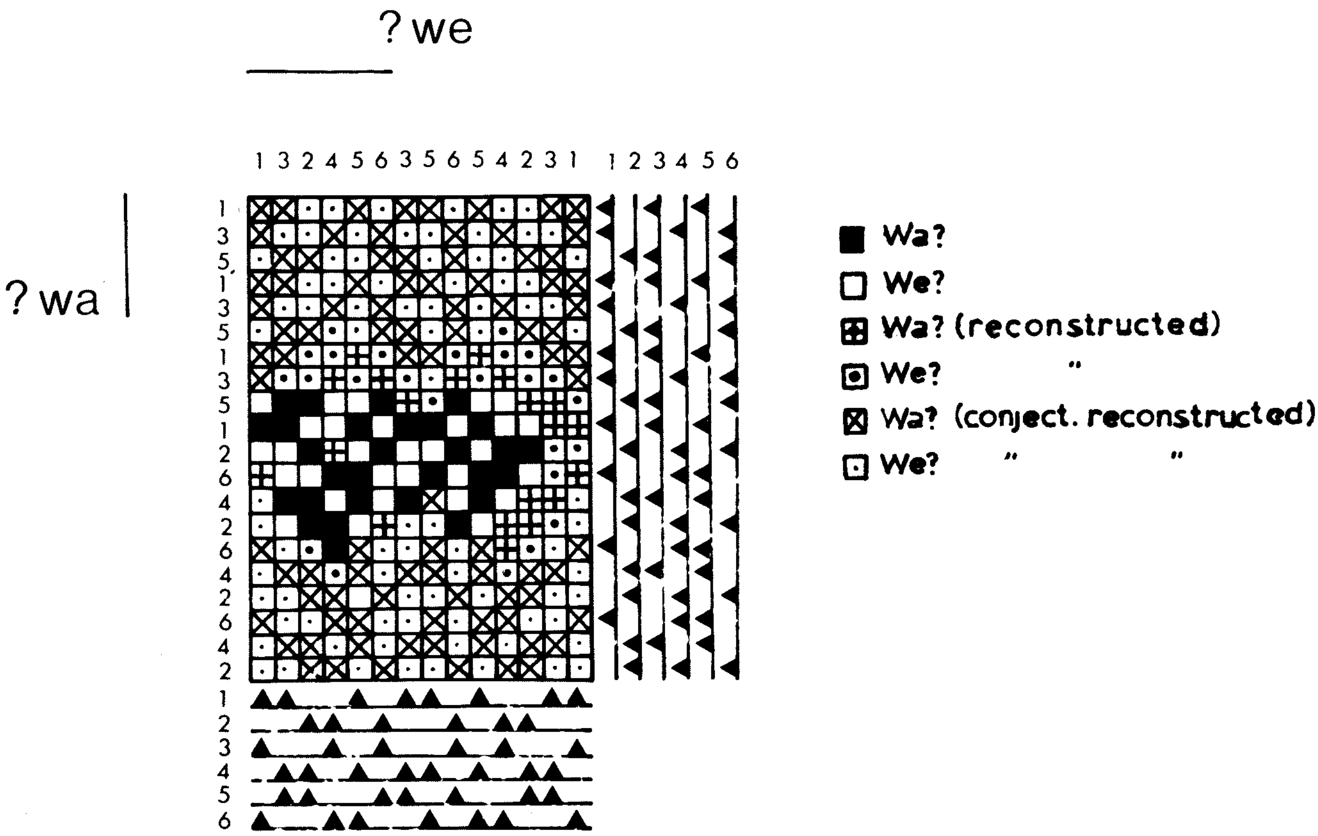
Among all the Dark Age British material, only two half baskets have been reported; both are from the Pagan Saxon cemetery at Finglesham, Kent and both have their peculiarities. One of these, while stated by Elizabeth Crowfoot to be a half basket, is figured as a plain weave (Pers Comm); the other only has a doubled thread every third row in one system (fig. 9.19).

This comparative absence of half baskets and hopsacks is interesting because they were very popular in Britain in the Roman period. Wild lists six half baskets, two full baskets and even a 2/2 chevron with one doubled system (1970, 90-97).

Among the Anglo-Danish material from Coppergate, York were two small mid/dark brown scraps of cloth, both being less than 1cm^2. On inspection of the larger it was noticed that the weave was unusual and the course of the few yarns involved was plotted with care. Assuming the symmetry found in other diamond twills then the weave can be reconstructed and seen to be a six shaft 2/1 diamond twill (fig. 9.19).

The implications of this are far reaching for while it is known that four shaft twills can be produced on both the warp-weighted and two-beamed vertical loom, the use of six heddles on either side is neither documented nor practical, as they would get in each other's way. The raised horizontal loom is really the only one that permits the use of a large number of heddles with comparative ease, and the possibility must be allowed that this is what the piece of cloth in question was woven on. If accepted, this would be the earliest evidence for the use of the loom in Britain - although the cloth could have been imported.

Wild dates the beginning of fancy weaves to the third century A.D., when weavers in the Near East began a series of experiments with new weaves on new looms. He divides those found into 2/2 and 3/1 damasks both of which are very geometric. Examples of the former come from Trier and Conthey (4th century A.D.) and the latter from Holborough, Kent, Brigetio on the Danube, and Palymra (3rd century A.D.) (1970, 50-52, figs. 41-44). Not only is there here the fact that up to eight sheds are required to produce the pattern but also that all the textiles are silk; a near Eastern origin therefore seems almost certain although one does have a Latin factory mark.



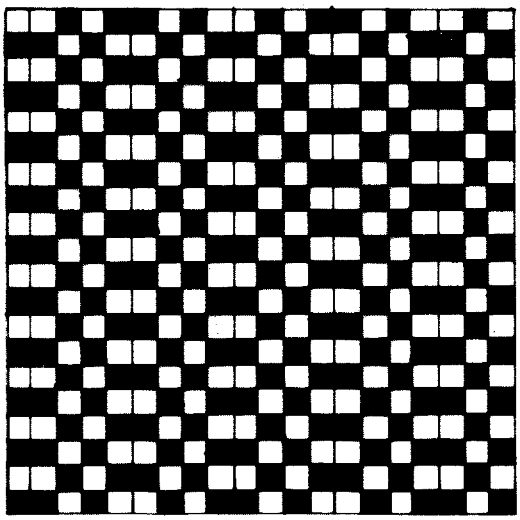


Fig. 9.19 (Top) Anglo Danish 6 shaft weave from York (Hedges forth. (A)). (Bottom) Early Saxon half basket from Finglesham, Kent (after analysis provided by E. Crowfoot).

Such damasks are a pattern of squares of differing sizes which have alternately the weft and the warp dominating. This will produce a light effect on its own but if the warp and the weft are different colours a tartan will result. In several of the pieces cited by Wild differing pigmentation was noted.

Considering the fineness and fibre of these examples it is peculiar that a 3/1 damask from the Pagan Saxon cemetery at Wakerley, Northants is relatively coarse (10 x $10cm^2$) and made of some common fibre such as wool or linen. The pattern here is based on sets of six warps and reverses after twelve wefts but Crowfoot's weaving diagram (translated to a peg plan in fig. 9.20) shows at least two inconsistencies which make it impossible to give a general idea of the overall design. The reason for these errors, and they are most likely to be errors, is that she didn't realise it was a damask, describing it as a tabby with a pattern of float wefts, which of course it is. Like the York piece it has six sheds. Very interesting is that the ground weave (two of the sheds which produce a tabby in alternate threads) is thin so that the pattern weave (with floats) would dominate. Similar arguments can be advanced for this piece as for that from York; it can either be seen as evidence for a very early knowledge of complex weaving and the equipment that goes with it in Britain or, more likely in this case, it can be taken as an example of an import from somewhere more advanced in these matters.

As will have been gathered, the weaves used show an increase in complexity in accordance with period. In the Neolithic and the most part of the Bronze Age only plain weave was used, to be followed in the Late Bronze Age and Early Iron Age by simple four-shaft twills. In the Roman period three-shaft ones were added to the types in use although the more complex forms of these do not appear until the Saxon period when, particularly in the last half, twills were more popular then plain weaves. While more complex weaves such as damasks and compound cloths are found in the north west European Roman material, these are almost certainly imports from the eastern provinces and in Britain the Middle and Late Saxon period was the time when weaving was at its highest point with even a six shaft twill having been found in a 10th century context in York (fig 9.19). In the areas outside Saxon occupation and all over Britain in succeeding periods the complexity of the weaves is so slight that the histograms resemble those for the prehistoric. Initially the bias towards simple weaves was due to lack of technological knowledge but in the mediaeval period it can be attributed to a fashion for fulled woollens with raised naps; this is all connected with technical innovations and will be commented on at greater length elsewhere.

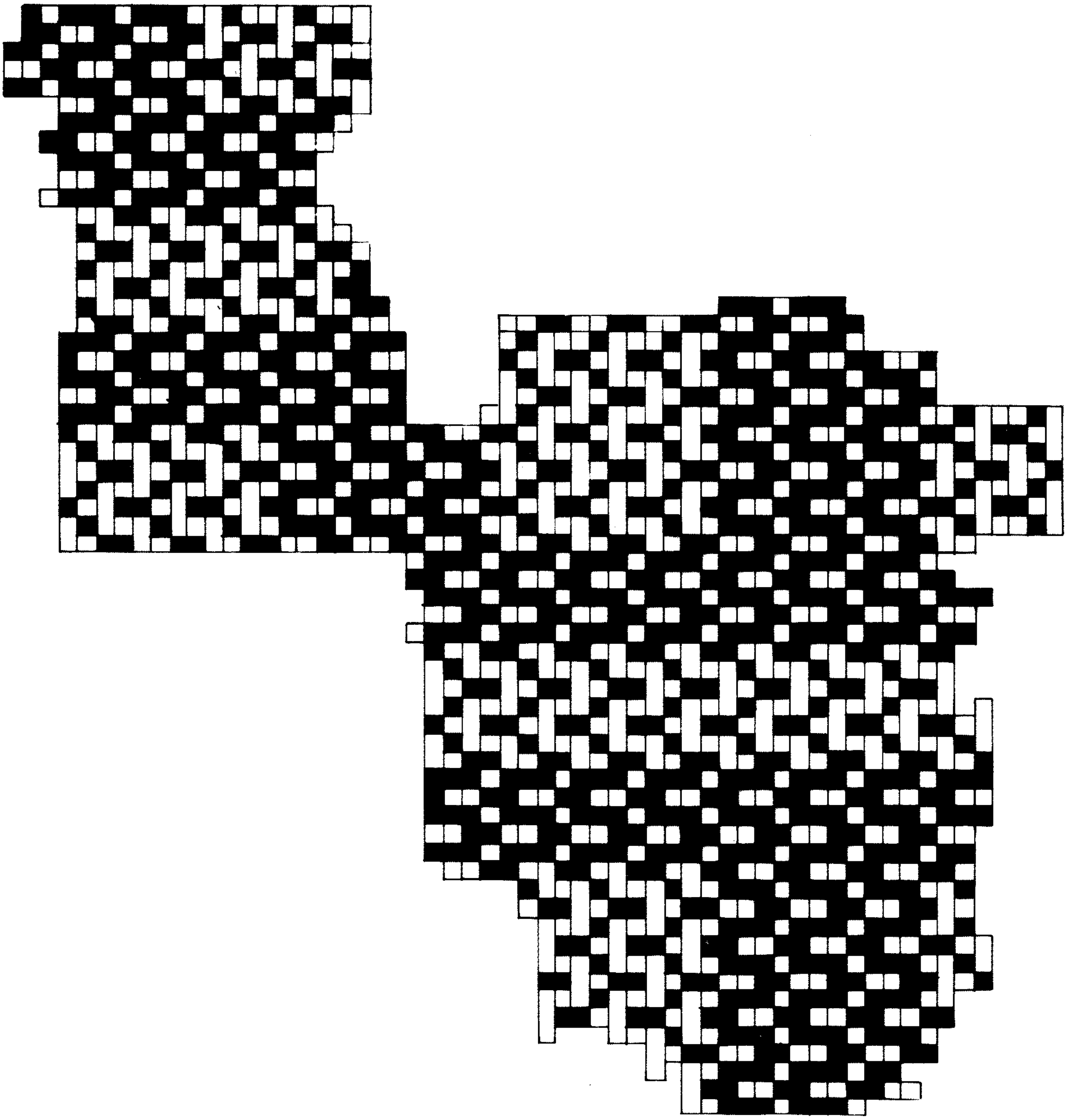


Fig. 9.20 Early Saxon 3/1 damask from Wakerley, Northants (after analysis provided by E. Crowfoot).

Heddling

It is pertinent here to mention the evidence the weaves have for heddling. This is a rather negative section in that its aim is not to demonstrate how heddling was done any further than can be seen by just looking at each shed in the peg plans, but to prove that Hoffman is incorrect in her assertion that the Icelandic system was the only one known (fig. 9.21), with its innuendos that the warp weighted loom was always on the slope with a natural and artificial shed and with the warp being divided thus into two (Hoffman 1964 5, 88 ff).

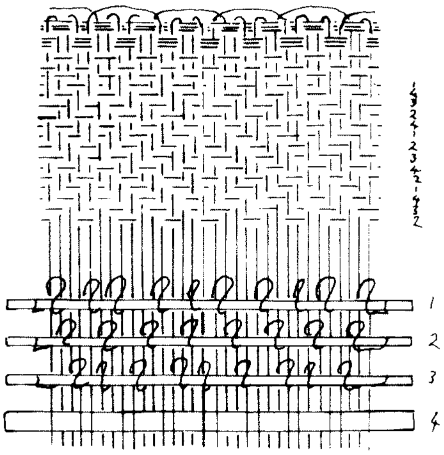
Evidence against Hoffmans misleading general thesis has already been advanced. It has been pointed out that the loom could be vertical because post holes have been found which might have held side beams and because it is illustrated upright. It has also been pointed out that the warp was not always divided into two sheds because loom weights <u>in situ</u> have been recorded in one and three rows (p108).

There are two questions to be asked here. First, whether the Icelandic system was always used, and, secondly, whether it can be demonstrated that it was not used even where it might have been. Hoffman is rather guilty of forcing evidence to fit her mould and passing over material contrary to her thesis, although the point she makes with regard to the way round 2/2 twills with displacements were woven is important.

Weaves found that cannot be woven using the Icelandic system are -

1) 2/2 twills with accurate meetings. Hoffman herself cites four continental examples from Marx Etzel, Mainz, Tofting, and Hessens, Germany, from the third to ninth centuries A.D. but dismisses them on account of poor quality illustrations and their size, the fragments being so small, she says, that the symmetry is simply due to a chance fault in setting up. To these examples must be added chevron twills from the Halstatt salt mines in Austria (Wild 1970, 48), and a rosette twill from the Pagan Saxon cemetery at Finglesham, Kent.

2) 2/1 twills. Hoffman glosses over three shed twills very quickly just saying they are few in number and 'are of a quality that makes it appear certain that they were imported' (Ibid 184). In Britain alone prior to the mediaeval period no less than twenty-five 2/1 twills are known and there is no reason to suppose them to be imported because they are of similar quality to 2/2 twills.



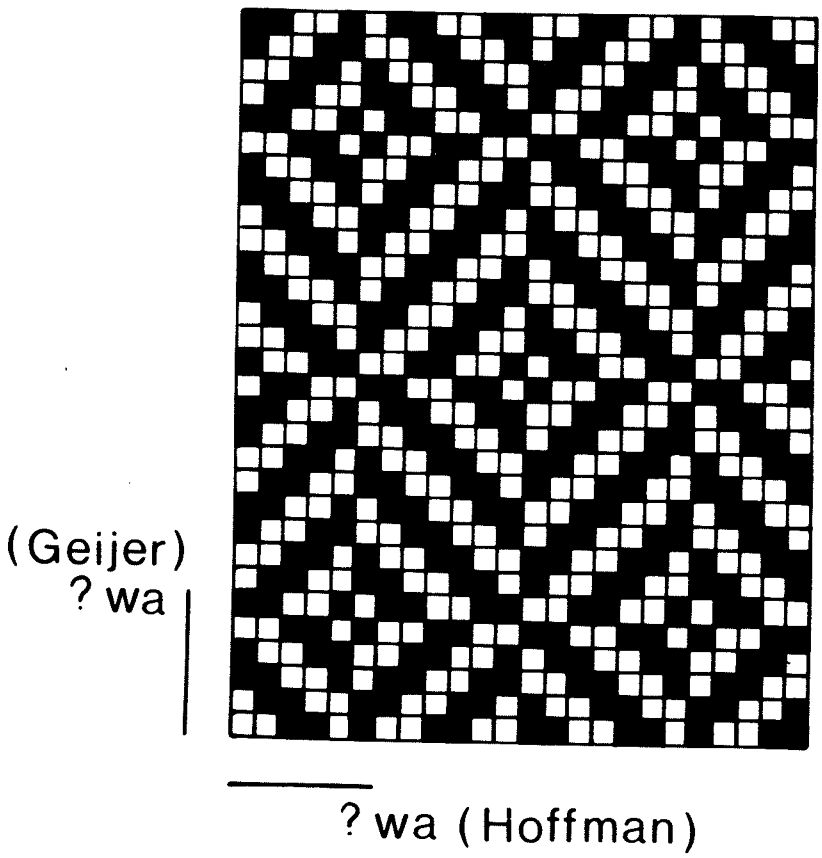


Fig. 9.21 (Top) Icelandic system of Heddling (after Hoffman 1964, fig 91). (Bottom) Geijer and Hoffman's differing theoretical warps in a 2/2 diamond twill.

3) Complex weaves. The two examples of complex weaves from Anglo-Danish York and Pagan Saxon Wakerley may be imports, but this doesn't alter the fact that they cannot be produced using the Icelandic system of heddling.

The question of whether it can be demonstrated that 2/2 twills were definitely not set up by the Icelandic system hinges on the identification of the warp and weft, for the peg plans are not symmetrical; one way up there are odd threads in every shed and the other way up in alternate ones (fig. 9.21) (Hoffman's way). As Hoffman points out there are instances of the latter but no definite example of the former. The British material corroborates her statement; however the warp is determined - definitely or by order of liklihood based on the spin, count, and number of threads between displacements - all 2/2 twills with displacements have odd threads in only two sheds and have a thread count between displacements divisible by two. The Icelandic system could therefore have been used to produce all the 2/2 twills known, but this cannot be proved, and it has been shown that other systems were current.

Systems, spinning, counts, weights and fibres

While it is not uncommon for textiles to be published with their two systems designated as warp and weft there are in fact extremely few instances where this can be substantiated. It is not sufficient for a system to 'look' like a warp or 'look' like a weft. Only one of the following pieces of evidence can be considered as satisfactory; any other criteria should be regarded with suspicion as they either tend to be subjective or assume certain technical features, such as one system of attaching heddles, to be universally true.

1. A heading cord or starting border.
2. A finishing border.
3. A side selvedge.
4. Evidence of tubular warping.
5. A gore inserted to correct an uneven weft.
6. Wefts crossing from shed to shed where more than one has been used.

Two features of interest are the count of the two systems and any distinction in spinning; with the small sample in hand, however, conclusions must be considered tentative.

Consideration of the count is important, in the first place because it is usually assumed that the highest is the warp and, secondly, because a relatively low weft count has been seen as an indicator of a more 'primitive' loom (Henshall 1950, 136). The evidence (fig. 9.22), scant

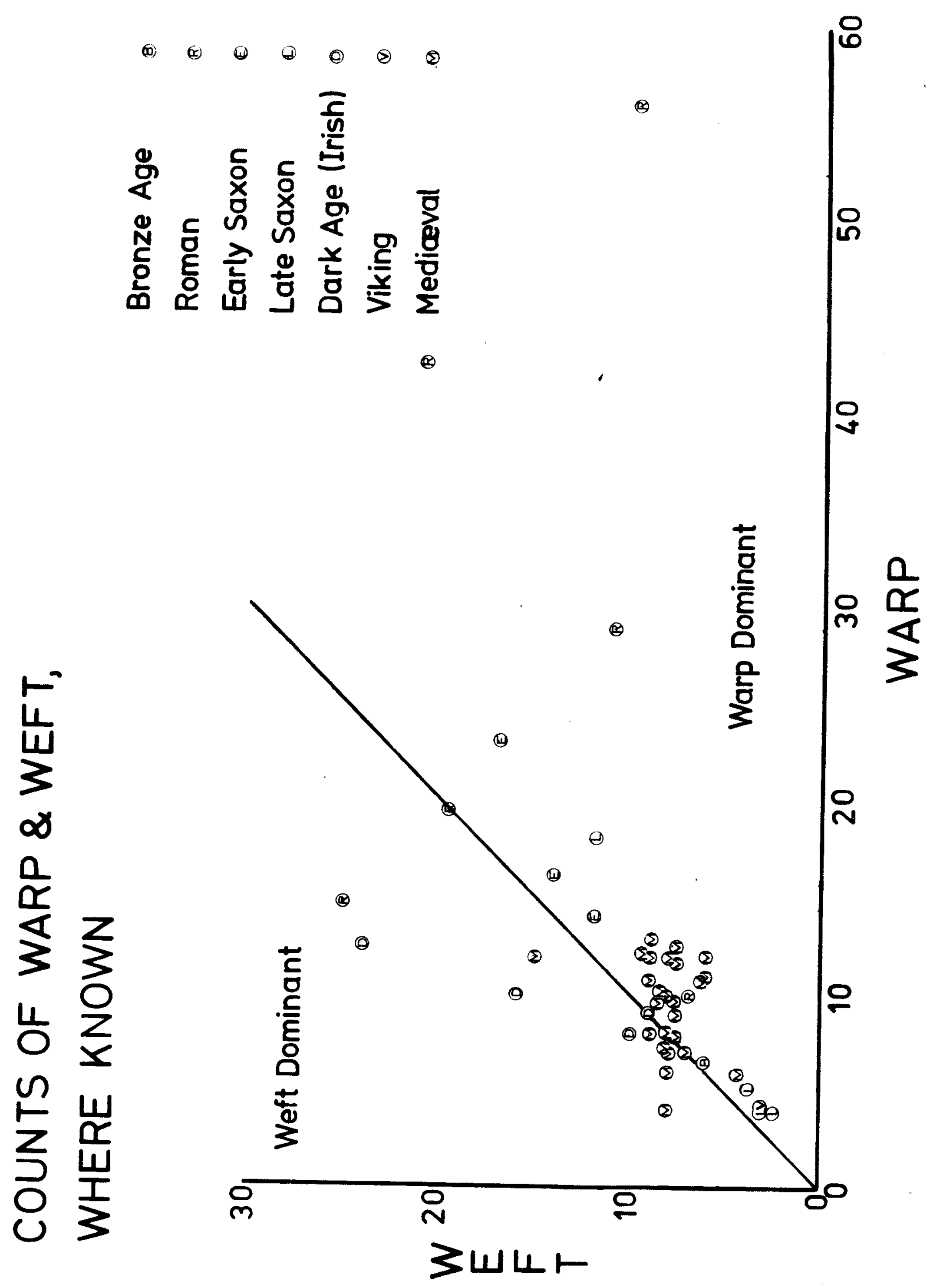


Fig. 9.22 Counts of warp and weft in the British material, where known, appendix X).

though it is, does show that the first assumption is quite incorrect as a generalisation, although it may pertain to certain periods - particularly the whole of the Saxon, but possibly the prehistoric and Viking. In Roman and Mediaeval times, however, it obviously does not apply and it is an interesting fact that these are two periods when the warp-weighted loom was not in common use. In this light the counts of the four textiles from Ballinderry, Co. Offaly (a site lying outside the distribution of loomweights in Ireland (fig. 5.4)), could be taken as evidence that the loom in use there was not the warp-weighted one, which was superceded by a different type in Roman Britain and only reintroduced by the Saxons. The only fault with this otherwise attractive idea is that in at least two of the three textiles found in Denmark which are known to have been produced on a two-beamed vertical loom - really the only competitor to the warp-weighted at this time - have higher warp than weft counts. Although the case is not proven here there is obviously a correlation between the dominance of one system over the other, or their equality, and the period in which a textile was produced; it is very likely that the basis for such a correlation would be technological as much as cultural.

The conclusions of an analysis of the spinning direction of warp and weft, where known, have already been referred to in the section on spinning in general. While warp and weft are known for few textiles and Start (1950) lamentably omitted to give spinning directions for the most important Dark Age collection outside the Saxon area, the indications given by the sample in hand, although statistically unviable, are striking. While combinations of spinning directions are found in different periods in the numbers and relative proportions stated (p60), there is no known instance, vegetal or animal, in which an S-spun warp was used with a Z-spun weft. This is odd for, while hemp is stronger S-spun, flax and nettle are better Z-spun (Textile Institute 1965, 110) and with wool it is technically a matter of indifference; comparison with foreign material shows the reason to be largely cultural (p 58). The warp, as far as can be told, will be always or nearly always the Z-spun system where there is one of each.

Count is important for the weight of the cloth and we can take as an indicator of this the total number of threads found per square centimetre i.e. the summation of the count figures. The results plotted against type of weave are shown by period in fig. 9.23) and really do not show striking changes. True, for the Roman, Early Saxon and Viking periods there are very

BRONZE AGE

	-10	-20	-30	-40	-50	-60	-70	Tot.
T		11	6	3				20
H								
P		11	6	3				20
/								
2/2w								
◇								
/								
2/1w								
◇								
Tw								
Tot		11	6	3				20

EARLY IRON AGE

	-10	-20	-30	-40	-50	-60	-70	Tot.
T	2	3						5
H								
P	2	3						5
/	2	2						4
2/2w								
◇								
/								
2/1w								
◇								
Tw	2	2						4
Tot	4	5						9

ROMAN

	-10	-20	-30	-40	-50	-60	-70	Tot.
T		4	11	7	3	1	2	28
H			2	4	1	1		8
P		4	13	11	4	2	2	36
/		1						1
2/2w		1	2					3
◇		2	1	2				5
/		1						1
2/1w								
◇								
Tw		6	3	2				11
Tot		10	16	13	4	2	2	47

EARLY SAXON

	-10	-20	-30	-40	-50	-60	-70	Tot.
T		28	64	50	73	1	2	158
H				1				1
P		28	64	52	13	1	2	160
/		23	53	12				88
2/2w								
◇		1	7	9	2	1		20
/			1	6	1	1		9
2/1w								
◇								
Tw		39	116	35	4	2		196
Tot		67	180	87	17	3	2	356

Damask -20

MIDDLE & LATE SAX

	-10	-20	-30	-40	-50	-60	-70	Tot.
T	8		1	3				12
H								
P	8		1	3				12
/	1	9	1					11
2/2w				1				1
◇		3	4					7
/	1		1					2
2/1w				1				1
◇			2	5	1			8
Tw	3	13	8	7	1			32
Tot	11	13	9	10	1			44

6 shaft -30

OTHER DARK AGE

	-10	-20	-30	-40	-50	-60	-70	Tot.
T		9	16	1	5			31
H								
P		9	16	1	5			31
/				1				1
2/2w								
◇								
/		1						1
2/1w								
◇								
Tw		1		1				2
Tot		10	16	2	5			33

VIKING

	-10	-20	-30	-40	-50	-60	-70	Tot.
T	2	4	2	7	2	2		19
H								
P	2	4	2	7	2	2		19
/			2					2
2/2w								
◇								
/			1					1
2/1w								
◇								
Tw			3					3
Tot	2	4	5	7	2	2		22

MEDIÆVAL

	-10	-20	-30	-40	-50	-60	-70	Tot.
T	48	184	39	8	1	1	2	283
H	2	4						6
P	50	172	39	8	1	1	2	273
/	3	94	22		2			121
2/2w			1					1
◇								
/	4	25	25	2				58
2/1w								
◇								
Tw	7	119	48	2	2			178
Tot	57	291	87	10	3	1	2	451

Fig. 9.23 Weights of cloth by period against weave (appendix X).

fine textiles known (silk is excluded) but the historic samples generally just show that a variety of qualities were produced. There may well be a correlation between weight of cloth and fibre, which would account for the probably mainly vegetal Bronze Age textiles found being finer than the possibly mainly wool Early Iron Age ones (this only rests on visual examination), and likewise the Medieval being almost all wool and comparatively coarse.

Before going on to discuss this, however, differences between types of weave should be noted. It can be seen that plain and twill in the Iron Age (with the small sample in hand) were used for similar cloths; in the Roman and Early Saxon periods on the other hand there is a discernible tendency for the finer cloths to be plain weave. This is, however, reversed in the Middle and Late Saxon period. The Viking and other Dark Age samples are too small to permit comment but the Mediaeval indicates twills to be finer. One interesting minor point is whether 2/1 twills are of a very much higher quality than 2/2 twills; generally they are not although among the Middle and Late Saxon material they do appear to be slightly finer.

As can be seen from fig. 9.2, there is a tendency in the Roman period for vegetable fibres to have been made into plain woven cloths, i.e. linens. The situation is more spread in the Early Saxon material and unfortunately masked all the other samples by bias caused by mode of preservation. The only samples where there are sufficient of each to make a comparison worthwhile are the Roman and Early Saxon.

Table 9.8 Known fibre against count for the Roman and Early Saxon textile

		-20	-30	-40	-50	-60
Roman	Animal	6	5	5		1
	Vegetal	1	6	4	2	1
Early Saxon	Animal	7	14	2	1	
	Vegetal	1	5	15	1	1

It can be seen from the above table that vegetable fibre cloths were definitely of on average slightly higher count than animal ones and it will therefore be the case that most of the Dark Age samples appear artificially coarse due to conditions of preservation which have only allowed animal fibre textiles to be preserved.

Selvedges

Selvedges may be of three kinds - starting, side and finishing - all of which are capable of being subdivided into those tablet-woven and those not manufactured in this way. Tablet-woven ones, of which there are examples of each, are discussed elsewhere (p 238 ff; table 10.2; fig 10.1; appendix X1) and are therefore only mentioned in passing here.

Starting Borders.

These are characteristic of the warp-weighted loom and are used as evidence for its use (p124). As explained, they would have been produced on a loom, the length being the width of the web being warped and, as far as can be seen, a loop from a ball would be taken through each shed to a required length; this means that in examining a starting border it is normal to find pairs of warps (i.e. warps of the final weave) in each shed (fig. 9.24).

(a) Tablet woven

Three definite tablet-woven starting borders from Britain are known; two of early and one of Late Saxon date. These, together with three possible ones of Early Saxon date which might alternatively be side selvedges, are discussed as indicated.

(b) Non-tablet-woven starting borders

There are no non-tablet-woven starting borders in the British Dark Age material.

*Woven starting selvedges are the first known in Europe, occurring in the Neolithic Swiss lake villages (Vogt 1937) and are found on the earliest textiles in north-west Europe, those of the Early Bronze Age (Hoffman 1964, 59, 165). Their use certainly survived into the Late Bronze Age with examples from Armoy, Ireland (Henshall 1950, 135)(fig. 9.24) and Salzberg (Hoffman 1964, 165). Finds of the pre-Roman Iron Age are not as common as they might be - possibly due to changed practices - but lack of starting borders may be attributed to a lack of textiles in general. The only Roman example posited for the north-west provinces comes from a 3rd century grave at Verulamium (Wild 1970, 63, 99, fig. 55). Woven starting borders are equally rare in Dark Age Europe, although one

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* Recapitulated from p.127

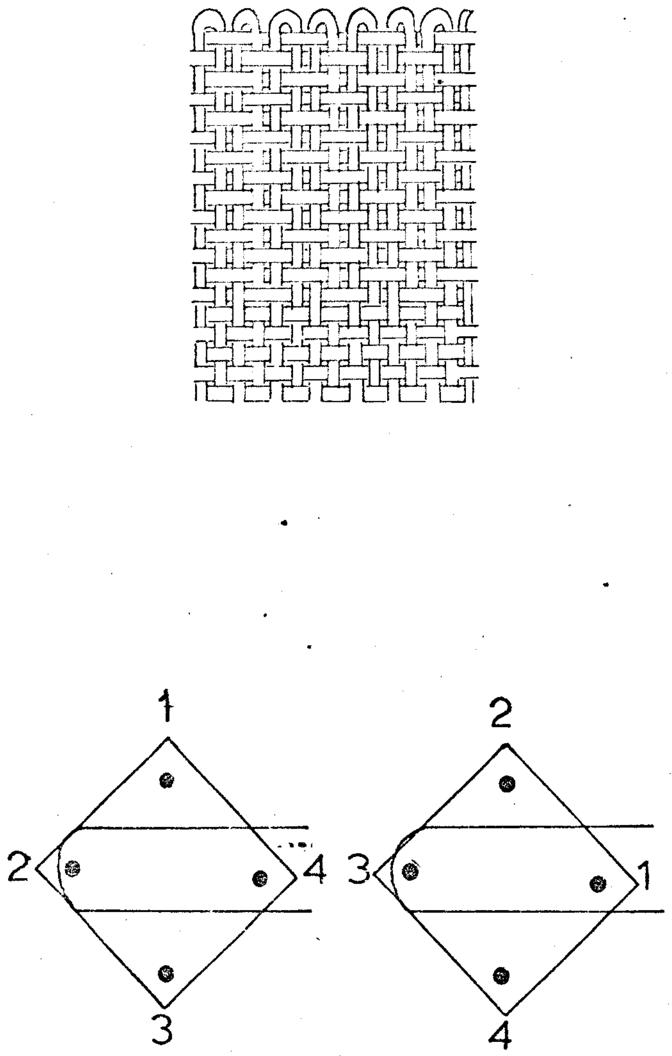

Fig. 9.24 (Top) Woven starting border of LBA date from Armoy, Co. Antrim (after Henshall 1950, fig 1).
(Bottom) Principles of weaving a tubular side selvedge with tablets (diagramatic).

attributable to the 6th - 7th centuries AD was found at Hessens, Germany (Hoffman 1964, 95); we can assume, therefore, that the idea was never quite dropped or entirely replaced by tablet-twisted borders. Borders of the former type became common again during the Viking Age in Continental material e.g. 9th century Kaupang and 10th century Birka (Ibid figs. 92, 102-5) and in the Middle Ages (Ibid fig. 76) and later where the loom hadn't been replaced and where heading cords hadn't been introduced, as in Lapland (Ibid 165). It is worth mentioning here briefly that woven starting borders are beginning to come to light in other areas of the world, e.g. a first century one from Quman, Palestine and one of the 8th century BC from Gordion, Turkey (Ibid figs. 88-9).

In the Continental material, corded starting-borders start as early as the Roman Iron Age - outside the Roman provinces - and from the Tegle ship find in Norway, datable to the 3rd - 5th centuries AD, came a prepared but unwoven warp complete with corded starting border. The corded border is the most common type in the Dark Ages and other examples may be quoted from Tegle as well as 3rd century Tofting, Germany (Ibid figs. 93-4), 4th century Corselitze, Denmark (Hald 1950, figs. 59, 170), and migration period Vejen Mose, Denmark (Ibid 166). The latest Scandinavian starting border with cording characteristic of tablet weave is from the 10th century Gokstad ship and is woven with three tablets. Tablet-woven starting borders are known to have continued in more peripheral areas of the north, for 12th and 13th century examples are known from the Finno-Baltic and E. Finland regions (Hoffman 1964, 173).

Side Selvedges

These, at their simplest, are the edges at which the weft returns after the shed has been changed; complications are often incorporated in order to reinforce them so that the cloth doesn't waist on the loom or fray in use.

(a) Ones containing tablet twists

The three noted above as being side or starting borders fall under this heading; see under. These are present in the Continental material but not numerous (e.g. Hald 1950, fig. 50a; Hoffman 1964, 281).

(b) Tubular

A tubular selvedge is, as it sounds, a tube running down the sides of a web and integrated with it; the tube may be very fine or of a size to, say, push a pencil through (fig. 9.25).

It has always been a problem how such selvedges could be formed - apart from darning by hand - and it is suggested here that 4 - hole tablets were used in a small pack at each side of the loom; if these were turned quarter turns to right and left and the weft entered through one pair and passed through the other, a tube would result (fig. 9.24).

This idea rather hinges on the number of warps in the tube being a multiple of four, but unfortunately in the case of replaced textiles it is not always easy to be certain. All five known from Britain are Early Saxon (p 241 table 10.2 fig. 10.1). The one for which there is the best analysis, from Wakerley, Northants, had 12 threads; two more from the same cemetery, 8-10 and 13-14, while one from Barrington, Cambridge has circa 12, and another from Haslingfield in the same county 16-18.

Ones are known from the Late Bronze Age onwards in north-western Europe, including the Roman period (Hald 1950, 427-8, figs. 150-155; Wild 1970, 56, 113-114, figs. 36-37).

(c) Simple and reinforced

The simplest type of selvedge is where the weft simply returns round the last and penultimate warp in alternate sheds at either side of the web. This gives a rather flimsy edge and is sometimes improved on by having a higher warp count at the selvedge. In the case of an undated belt from Elling Mose, Denmark, the weft turns round a pack of warp ends (Hald 1950 428) (fig. 9.25) but this is not a common variant and is not found in the Roman material (Wild 1970, 55-6) or later.

Simple selvedges are found in five cases among the British Dark Age material, and curiously all these may be described as Late Saxon, Anglo-Danish and Other Dark Age, their being none among the comparatively numerous Early Saxon example. Table 9.9. below is to be read in conjunction with Table 10.2, making between them a complete list of known selvedges for Dark Age Britain.

Table 9.9 Instances of simple and reinforced side selvedges found in Britain

Side

Gloucester	A	2/2	No strengthening 2 wefts	L.S. Hedges forth (J)
Lloyds Bank York	A B	Plain 2/2 D	No details visible Plain, 2 wefts	A.D. Hedges forth (A)

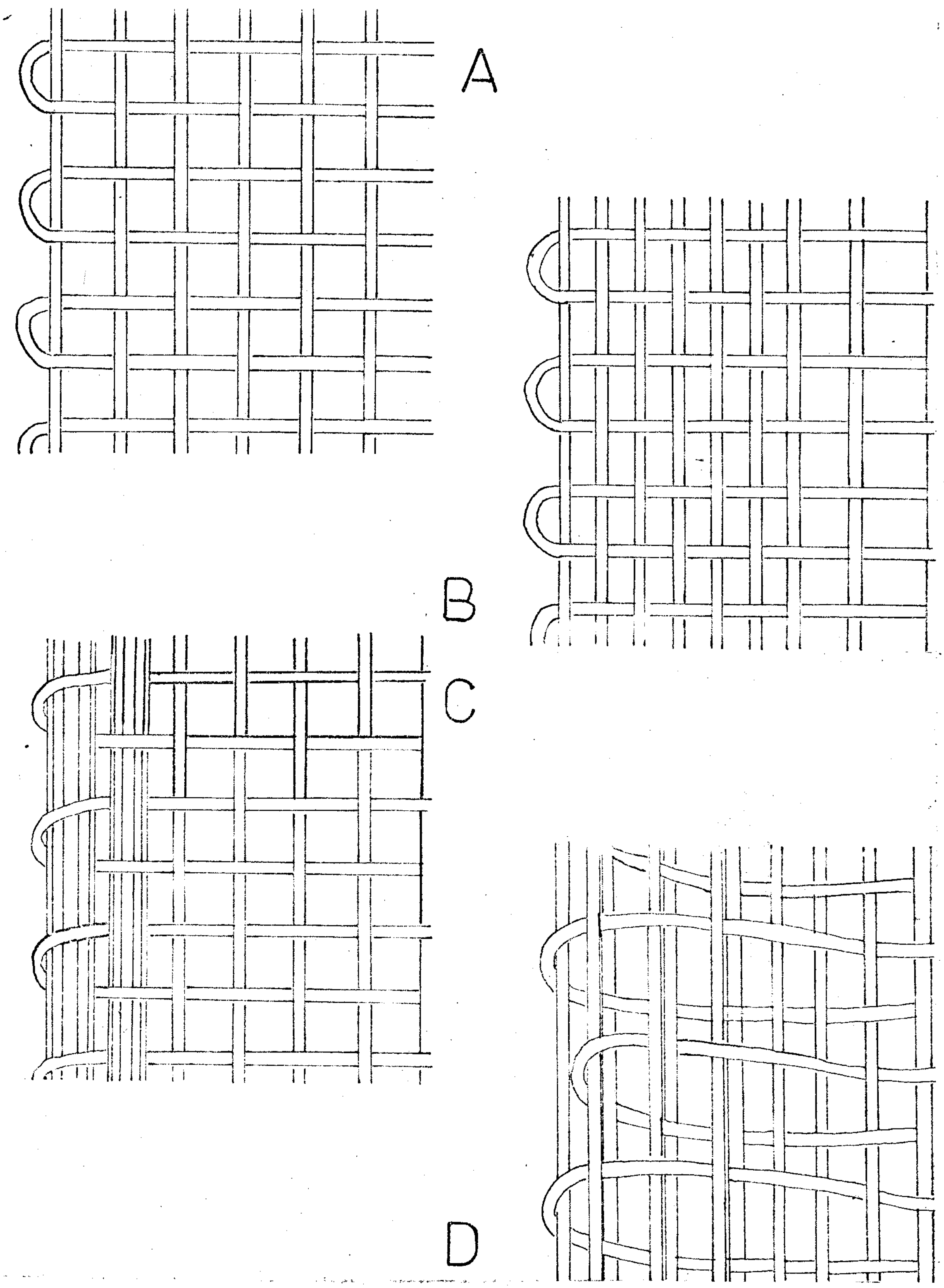

Fig. 9.25 Non tablet-woven and tubular side selvedges.
A) plan ; B) reinforced with crowded warp ; C) reinforced with bundles of warp; D) tubular (after Hedges 1973, fig 11).

Ballinderry Co. Offaly	A	Plain warp	Strengthened by crowding	E.C. Hencken 1942, 58
Lagore, Co. Meath	A	Plain	No strengthening	E.C. Hencken 1950, 223-4
	A	Plain	No strengthening	
Finishing				
Lagore Co. Meath	A	2/2	Fig. Plaited with the aid of 2 threads of spun hair into a 4 strand plait; stitching groups warp ends	E.C. Start 1950, 222.fig. 113
	A	Plain	Loose ends twisted together in groups of 8-10 to form rough frings	Ibid, 224, fig 3

It can be seen from the above Table that apart from the Ballinderry Crannog example there is no crowding of the warp to give strength. Interestingly, two of the English side selvedges show that two wefts were being used, alternately, in weaving; this is not unknown, an undated example having come, for instance from Ronbjerg Mose, Denmark (Hald 1950, fig 160).

Finishing selvedges

These occur after the last weft in a web and are usually, for that reason, worked on cut warp wends. Their purpose is to finish off the piece of cloth by preventing it from fraying and a finishing selvedge is of particular importance when the web is to be used as a piece.

(a) Tablet woven finishing selvedges

Two examples of tablet woven finishing borders are among the British material and both are Early Saxon (p241 table10.2fig 10.1). In these six and four tablet twists were made at the bottom of the web with the cut ends going through individually in one shed and being re-entered with the next end in the following one. No Roman instances are known but similar examples may be cited among the foreign parallels including an undated one from Vejen Mose, Denmark (Hald 1950, fig 50 b) and ones from the first half of the first millenium from Corselitze, Denmark (ibid fig 59) and Snartemo, Norway (Hougen 1935,69). Later Finnish examples are cited by Hoffman (1964,174) who also illustrates the sprang stocking from the 3-5th century AD Tegle ship, Norway, which is finished in the same way (ibid 168,fig 81).

(b) Non tablet-woven finishing edges

Both instances from the British Dark Ages come from the Early Christian

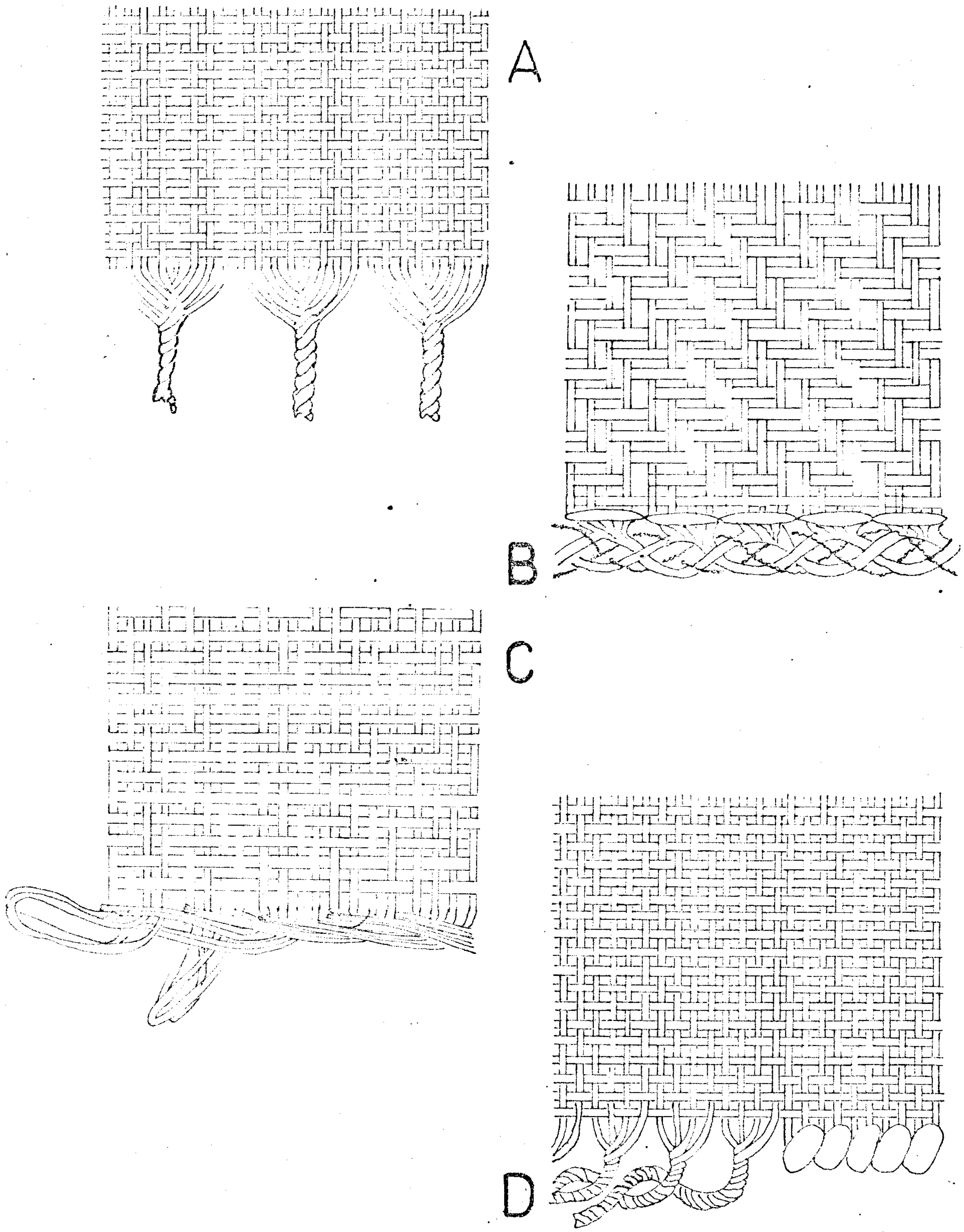

Fig. 9.26 Non tablet-woven finishing borders.
A) Warps twisted in bunches (diagramatic)
B) Bundled warps plaited with supplementary thread; Early Christian, from Lagore Crannog, Co. Meath (after Hencken 1950, fig 113)
C) Uncut looped warp ends threaded through each other; undated, from Krogens Mølle Mose, Denmark (after Hald 1950, fig 186).
D) Cordline (diagramatic) (after Wild 1970, fig 49).

crannog at Lagore in Ireland. One is plaited with the aid of two threads of spun hair into a four-strand plait after the warp ends had been grouped with stitching (fig 9.26), while in the other the loose ends were just twisted together in groups of 8-10 to form a rough fringe.

Borders from Huldremose (supposedly 1st millenium BC) and Krogens Molle Mose and Fraer (both undated), Denmark, form an interesting group (Hald 1950, figs 180,185-7). The uncut ends, still in loops, were taken in groups of four (i.e. 2 loops) and the next but one group pulled through them so that going across the web a plait was formed (fig 9.26). Wild cites two methods for the Roman period. One, like the second Lagore piece, where groups of warp threads were twisted together into a series of strands; two examples come from 3rd century Verulamium and 4th century Trier. Secondly there is what he calls the cordline (fig 9.26) where the already plied strands of the fringe were further twisted together in one direction parallel to the edge, work beginning at one corner; his example came from an early 2nd century context in London (1970,56).

Weaving errors

There are several different types of these which may be discussed by category (Table 9.10).

Paired threads

A paired thread may be caused either by two warps getting put in the same leash during heddling or by two wefts being put across without changing shed. On a small piece this may be produced by a shuttle of weft being finished and another one being started, in which case it is usual to overlap the ends; if it was a broken warp it would be knotted. In some instances doubled threads may not have been a mistake and may have been part of a weaving design as in the case of the textile from Finglesham with such an occurrence every third shed (fig 9.19).

Crossing of wefts (fig 9.27)

This only occurs once in the British material, although it is also known in the Continental (e.g. Hald 1950,427, figs 139 & 140). This means more than one weft was being used - a fact we have already established from side selvedges (p230)- but more importantly it proves that more than one weaver was working on the same loom at the same time, for the crosses would be where their yarns met and the shed was changed.

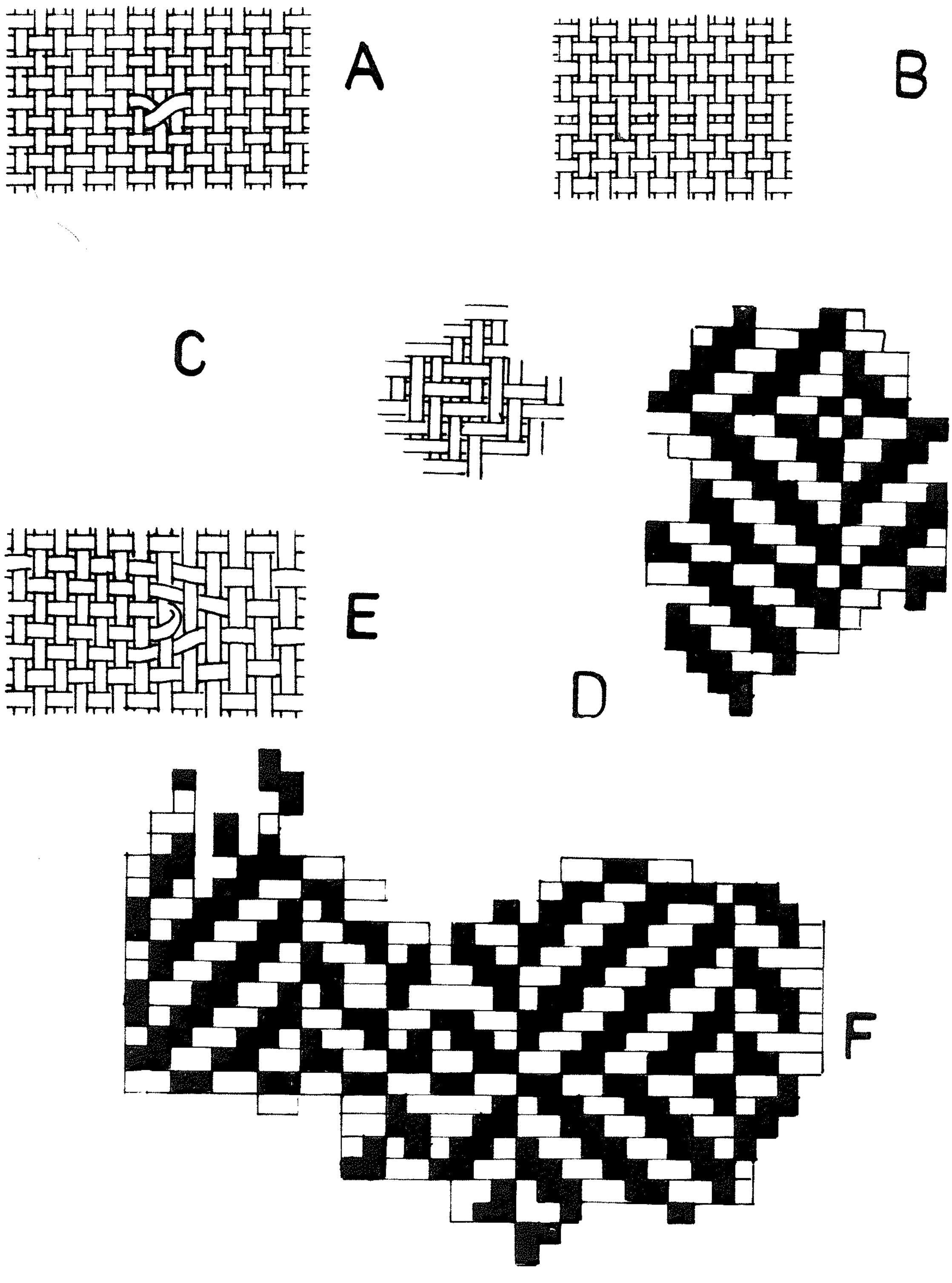

Fig. 9.27 Weaving errors, unscaled ; A-F (for sites, periods and sources see reverse of figure).

A		Crossing wefts	Diagramatic.	
B		Paired threads	Diagramatic.	
C	ES	Heddling error in warp	Coombe, Kent.	Crowfoot 1967, fig 7.
D	ES	Probable shedding error	Swaffham, Norfolk	E. Crowfoot (Pers. Comm).
E	ES	Gore	Snape, Suffolk	" " " "
F	ES	Mistake connecting warp to leashes.	Mucking, Essex.	" " " "

Threads passing over more threads of the other system than they should (fig 9.27)

With small pieces of textile it is not easy to be sure that instances of a thread passing over, say, three, and under one of the ones in the other system are all mistakes, because this happens in reversed 2/1 twills. Displaced 2/1 twills are, however, comparatively rare and a more usual explanation is that in heddling a warp end has been knitted into a leash belonging to the wrong shed for the pattern. This is supported by the fact that in the Coppergate example the system involved is the Z one.

Table 9.10 Catalogue of weaving errors found in British Dark Age textiles

Anglo Saxon			
Barrington B, Cambridge.	Plain	Paired threads	E. Crowfoot, Pers. Comm.
Coombe, Kent.	2/2	Heddling error (in warp) (fig 9.27)	Crowfoot 1967 37-39 fig 7
Finglesham, Kent.	Plain	Doubled or lightly plyed thread	E. Crowfoot, Pers. Comm.
Howletts, Kent.	Twill	Two threads pass over three and under one	"
Mucking, Essex.	Plain	Paired thread.	"
	2/2 D	In two places a thread passes over three threads of the other system - probably a heddling error (fig 9.27)	
	Plain	Two paired threads in adjoining sheds	
Snape, Suffolk.	Plain	In three places a thread in the weft travels half-way across, turns and passes back through in the following shed (fig 9.27)	"
Swaffham, Norfolk.	2/2	Heddling or shedding error (in S system) (fig 9.27)	"
Anglo Danish			
Lloyd's Bank, York.	Plain	Crossing of wefts (fig 9.27)	Hedges forth (A)
	2/1	Heddling or shedding error	
	2/1D	Heddling or shedding error (fig 9.15)	
Coppergate, York.	2/2	On at least one occasion a thread of the Z-spun system passes over three of the S-spun	"
	2/2	Doubled threads occur twice in S spun system	

Viking

Kildonan, Isle of Eigg.	Plain	Double threads in two places	Crowfoot 1949,26

Other Dark Age

Lagore Crannog, Co. Meath.	Plain	Double and trebled threads	Start 1950,220

Undated

St. Andrews, Orkney	2/2 C	Gore	Henshall 1952,10, fig 4

Irregular displacements - which may have been intentional

Anglo Danish

York	2/2 C	11+10+14+10+6+10+10 (in Wa?) (fig 9.3)	Hedgesforth. (A)
	2/2 D	14+12 in warp (fig 9.7)	
	2/2 D	22+12 in Z spun system (fig 9.8)	
	2/1 D	10+12 (in We?) (fig 9.12)	
	2/1 D	24+27 (in Wa?) (fig 9.14	

Undated

St. Andrews, Orkney.	2/2 C	18+26+26+88+22+36+42+38+18+24 28+18+18	Henshall 1952 10, fig.4

Gores

Gores are an attempt to correct uneven weaving. If, for example, the web is going up at the sides, wefts are inserted back and forwards where necessary to put matters right; and similarly if it goes up in the middle. They are commonly associated with early weaving (e.g. Hald 1950,427) but are known later as in the hood from St. Andrews, Orkney and the mediaeval shirt from Rogart (Henshall 1952,3,10, 19-20). In the Early Saxon example from Snape, in three places a thread in the weft travels half way across, turns, and passes back through the following shed (fig 9.27).

Heddling or shedding errors

These produce an inconsistency in a patterned weave such as a chevron or diamond. They may be caused either by a mistake being made in knitting the leashes during heddling or by the heddles being raised in the wrong order during weaving. There are two Early Saxon examples (figs 9.27) and two Anglo-Danish ones (fig 9.15). In the case of the one from Coombe it is definitely a heddling error, since it occurs in the warp, whereas in the Swaffham piece it occurs in the S-system and is therefore probably shedding. Similarly with the two from York, one instance is in the case of the supposed weft and the other the supposed warp.

Irregular displacements

As has already been discussed, (p190), some of the chevrons and diamonds have a different number of threads between individual reverses; this occurs in both systems and may not necessarily be due to the weaver losing count while heddling or shedding (figs 9.3, 9.7 9.8.9.12 & 9.14).

CHAPTER TEN

PRODUCTS OF THE TABLET LOOM

Although remains are often scant and provide little information, just a few twists are sufficiently diagnostic to establish the presence of a tablet woven textile. A large number have been found, (table 10.1; appendix XI), far more than would be expected from the number of tablets known, but mysteriously the distributions of tablets and survivals of their product are almost mutually exclusive (fig 7.4). Undoubtedly preferential preservation is showing itself here; Saxon tablets being generally wooden and therefore unlikely to be found while Saxon graves, with their frequent metal grave-goods, are conducive to textile survival of which, tablet weaves stand most chance being very thick and compact and tending to have been used where brooches & etc would be in contact with them.

Table 10.1 Tablet woven textiles found by period

	Non-tablet two system weaves	Tablet weaves
Early Saxon	524	95
Middle + Late Saxon	50	10
Viking	29	0
Other Dark Age	32	2
	635	107

As has already been preliminarily discussed in connection with the types of tablet looms in use (p160), tablet weaving was used to produce two quite distinguishable products; selvedges on larger textiles, and independent braids.

Selvedges

The most important of the selvedges, technologically, is the tablet woven starting selvedge for, as with reinforced starting borders in other weaves and heading cords, they are indicative of the use of the warp weighted loom. They have already been discussed to some extent in the context of evidence for this loom and its method of working but further detailing would not be amiss. Although few are preserved in the British material this is also the case with other types of starting border and the great numbers found on the continent (e.g. Hoffman 1964, 151-183) indicate that they were in vogue in north west Europe in the period under consideration.

The best of a poor and small selection was found in the corrosion on the back of an Early Saxon brooch from a grave at Blewburton Hill, Berkshire (Henshall 1959, 69-71). Here, one system of a 2/2 twill is caught at an edge by four 4-hole tablet twists arranged in chevrons (fig 10.1). Two features of very great interest, which have already been commented on, are that more than one "weft" (meaning weft to the tablet weaving) was used and that these "wefts" pass in pairs through the twists. Henshall was slightly over-cautious in saying that theoretically both these features could occur in a side selvedge and both taken together are really diagnostic of a heading border. We can feel confident, for instance, that a fragment of Early Saxon 2-hole tablet weaving associated with plain weave from Mucking, Essex (E. Crowfoot, Pers. Comm.) is part of a starting border because the wefts pass in pairs. This was also the case with a Late Saxon example from Gloucester (fig 10.1).

Table 10.2 Tablet woven starting, finishing and side selvedges found in the British Dark Age material

Starting.

Blewburton Hill, Berkshire.	A?	2/2	Fig 10.1	E.S. Henshall 1959,
Mucking, Essex.			Tablet weave : 2 hole; wefts in prs; 12 twists/9 mm. S2S	E.S. Crowfoot, E. Pers. Comm.
Gloucester.	A	2/2	Fig 10.1	L.S. Hedges forth. (J)

Starting or side.

Finglesham, Kent.	V	2/2 D	Fig 10.1 N.B. taken after Crowfoot who couldn't actually see the edge.	E.S. Crowfoot 1958, 36.

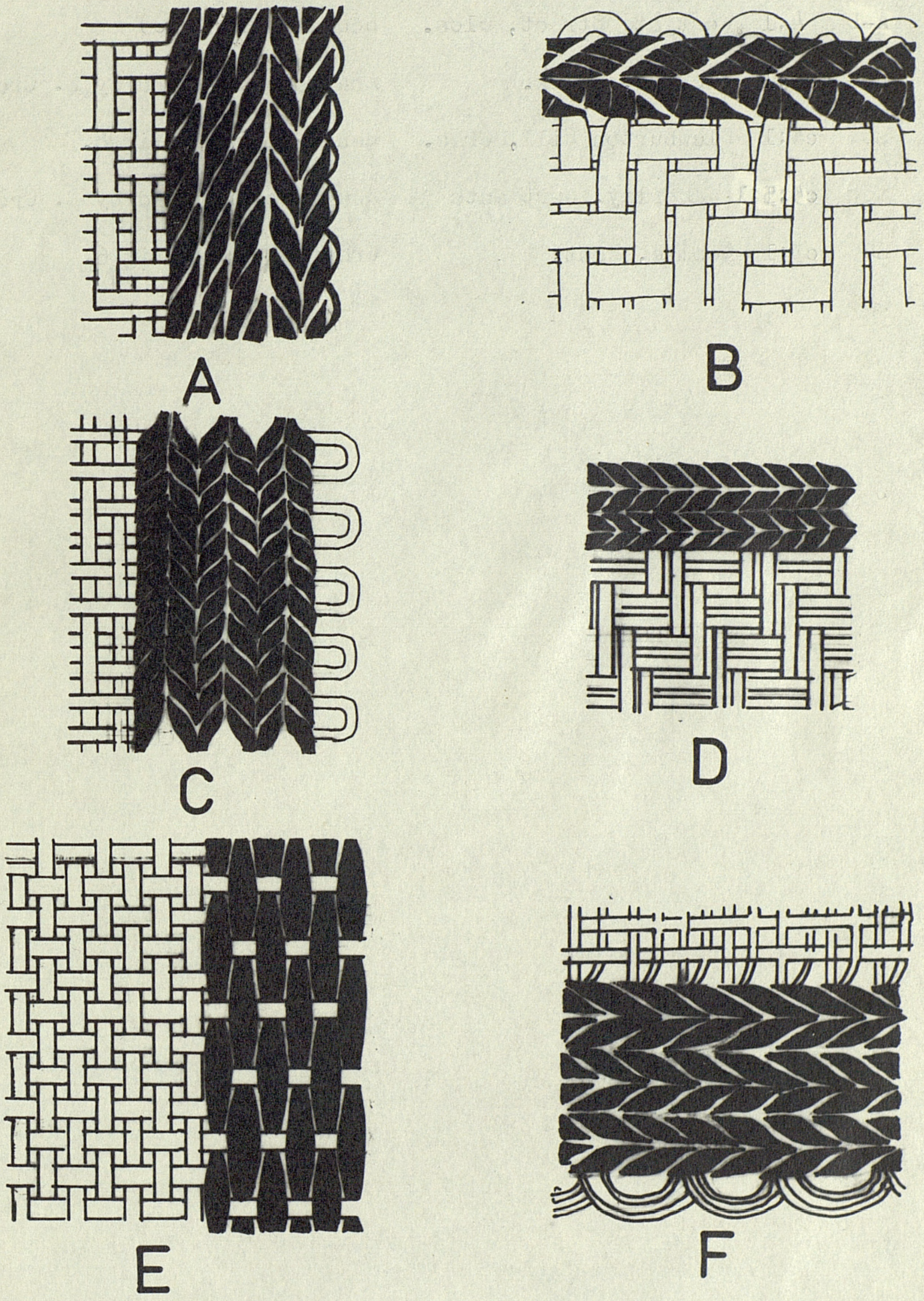

Fig. 10.1 Tablet woven starting, finishing and side selvedges found in the British Dark Age material ; A-F (for sites, periods, sources and scales see reverse of figure).

A	ES	c8:1	Finglesham, Kent.	Analysis provided by E. Crowfoot.
B	MS	4:1	Westgate Street, Glos.	Hedges forth. (J)
C	ES	c8:1	Mucking, Essex.	Analysis provided by E. Crowfoot.
D	ES	c8:1	Blewburton Hill,Berks.	Henshall 1959, fig 8.
E	ES	c4:1	Wakerley, Northants	Analysis provided by E. Crowfoot.
F	ES	c3:1	Coombe, Kent.	Crowfoot 1967, fig 6.

Mucking, Essex.		Plain?	2 hole; c11/Z wefts /cm x 9 Z twists.	E.S.	Crowfoot E., Pers. Comm.
		C or D Twill.	Fig 10.1		" "
Tubular.					
Barrington B, Cambridge.	V	2/2	3mm wide containing c 12 warps.	E.S.	Crowfoot, E., Pers. Comm.
Haslingfield, Cambridge.		Twill?	8/9 threads visible in width & thought to contain 16.	E.S.	" "
Wakerley, Northants.			Round plait or sel - vedge frag 2.5 mm across. 4-5 threads visible, i.e. 8-10		" "
	A	2/1	On 13-14 threads.		" "
	V	Plain	Fig 10.1		" "
Finishing.					
Broomfield, Essex.	A	2/2 D	As Coombe example but only 4 twists.	E.S.	Crowfoot 1967 37
Coombe, Kent.	A	2/2 D	Fig 10.1	E.S.	Crowfoot 1967 37.

Examples of tablet woven side borders are equally rare in the British material, there being only three, and all are Early Saxon. The features taken here as indicating that a piece of tablet weaving is a side border are that it is attached to a piece of cloth and that one system of this forms the weft and passes singly through the twists. It has to be admitted however that these features could be found in a starting border. The finest example, consisting of six 4-hole twists 5mm wide and arranged in chevrons, comes from Finglesham, Kent and is attached to a 2/2 broken diamond twill (fig 10.1). One from Mucking, Essex which is attached to a diamond or chevron twill of unspecified type, consists of five 4-hole twists which are not set up in chevrons (fig 10.1). It is very interesting that in one part Crowfoot notes the twists to be Z,S,Z,Z,Z and in another S,Z,S,S,S as this must certainly indicate a reverse in the weaving of the side selvedge. The final example, also from Mucking, is poorly preserved and a little uncertain but probably the side border to a plain weave. It has a preserved width of four or five 2-hole Z twists and its identification as a side border rests with the wefts in it having the same count as those in the accompanying cloth, indicating that they pass singly.

The probability that tubular side selvedges were tablet woven has already been argued together with the mechanisms whereby they could be manufactured (p 228). It remains here to record the British instances of which there are five, three connected with twills and one with a plain weave. Again, all are Early Saxon. Tubular selvedges must be the most difficult to analyse when replaced and particularly the number of warp threads said to be involved must be taken as approximate only. The one for which we have the best analysis comes from Wakerley, Northants, and here Crowfoot could see 6 warps and made the suggestion that there were originally twelve (fig 10.1). Two more from the same cemetery had 8-10 and 13-14 warps while one from Barrington B, Cambridge has <u>circa</u> 12 and another from Haslingfield in the same county 16-18. Since the whole theory of their being produced with tablets depends on the number of warps involved being a multiple of four it would obviously be desireable to have more certain information about this aspect.

Finally we have tablet woven finishing selvedges and the two British examples, from Early Saxon contexts at Broomfield, Essex and Coombe, Kent are identical, even to being attached to 2/2 diamond twills, except that in the first instance four 4-hole tablets were set up as chevrons and in the second case six were (fig 10.1). It is a little unclear what is going on in Crowfoot's figure but in the text she says - "The warps pass through the border in pairs, and then the cut ends are grouped into bunches of four and turned and threaded back through the border."

<u>Braids</u>

In a lot of instances it is not possible to distinguish braids from selvedges because of poor preservation although the fact that the former often have plyed wefts while the latter only contain unplyed yarns is of assistance. Although few have survived to any degree of completeness the braids known display a variety of techniques indicating a thorough knowledge of the potential of the tablet loom. Most commonly their toughness was exploited in using them to edge garments, as cuffs, or as belts; sometimes, but not always, they were highly decorative and this was particularly the case when used as hair ornaments or in connection with ecclesiastical vestments.

Simple tablet weaving - unembellished twists either all one way, in various mixed directions, or in chevrons - is that most frequently encountered and several illustrative examples of its use may be cited; it should be noted however that these braids may have been much more decorative than they seem as they may have been composed of dyed yarns. A simple example would be a braid from a grave at Faussett, Kent 9 mm wide consisting simply of 10S twists, 4 hole tablets having been given $\frac{1}{4}$ turns throughout (fig 10.2). From Mucking, Essex, there is an instance of chevrons being used in a belt, the end of which was reinforced with leather. Due to the preservative action of wrist clasps, three examples are known of cuffs from Anglo-Saxon graves. One from Mildenhall, Suffolk, is the most perfectly preserved, some thirty six four holed tablets threaded right and left with 2 ply wool yarn being used to produce a braid 3 cm wide (fig 10.2). An example from Mitchell's Hill, Suffolk, in single ply wool yarn, must have originally been a similar width although only twenty-six twists survive; of these all are S except for two Z twists at one end. Only a few twists remain of the vegetable fibre example from Wakerley, Northamptonshire, but sufficient to make their direction seem arbitrary.

Several techniques of enhancing braids simply by the manner of turning and threading the tablets are evidenced although originally they may have been primarily a part of a colour design. From Wakerley, Northamptonshire there is a fragment of a two-hole tablet weave in which a peculiar twill effect with inaccurate meetings has been achieved by advancing alternate tablets half a twist in each shed (fig 10.2). A technique by which a similar twill like effect can be achieved, diagonal weave, has been found in Early Saxon contexts at Finglesham, Kent (where the braid was sewn to the edge of a garment, probably the neck) and Mucking, Essex, where it had been used similarly, as well as among the Late Saxon St. Cuthbert's braids. In diagonal weaving four-hole tablets, only threaded in two adjacent holes are first given a quarter turn one way, the direction depending on their position, then returned, then given a quarter turn the other way, and so on. In the case of one braid from Mucking, the complete width of which is preserved (1.25 cm) diagonal weave was used as a central portion flanked by chevrons (fig 10.2); this is also the case with the two other fragmentary samples from the site as although on a more grand scale, with St. Cuthbert's girdle (Braid I).

The only two examples of tablet weaving found outside of the

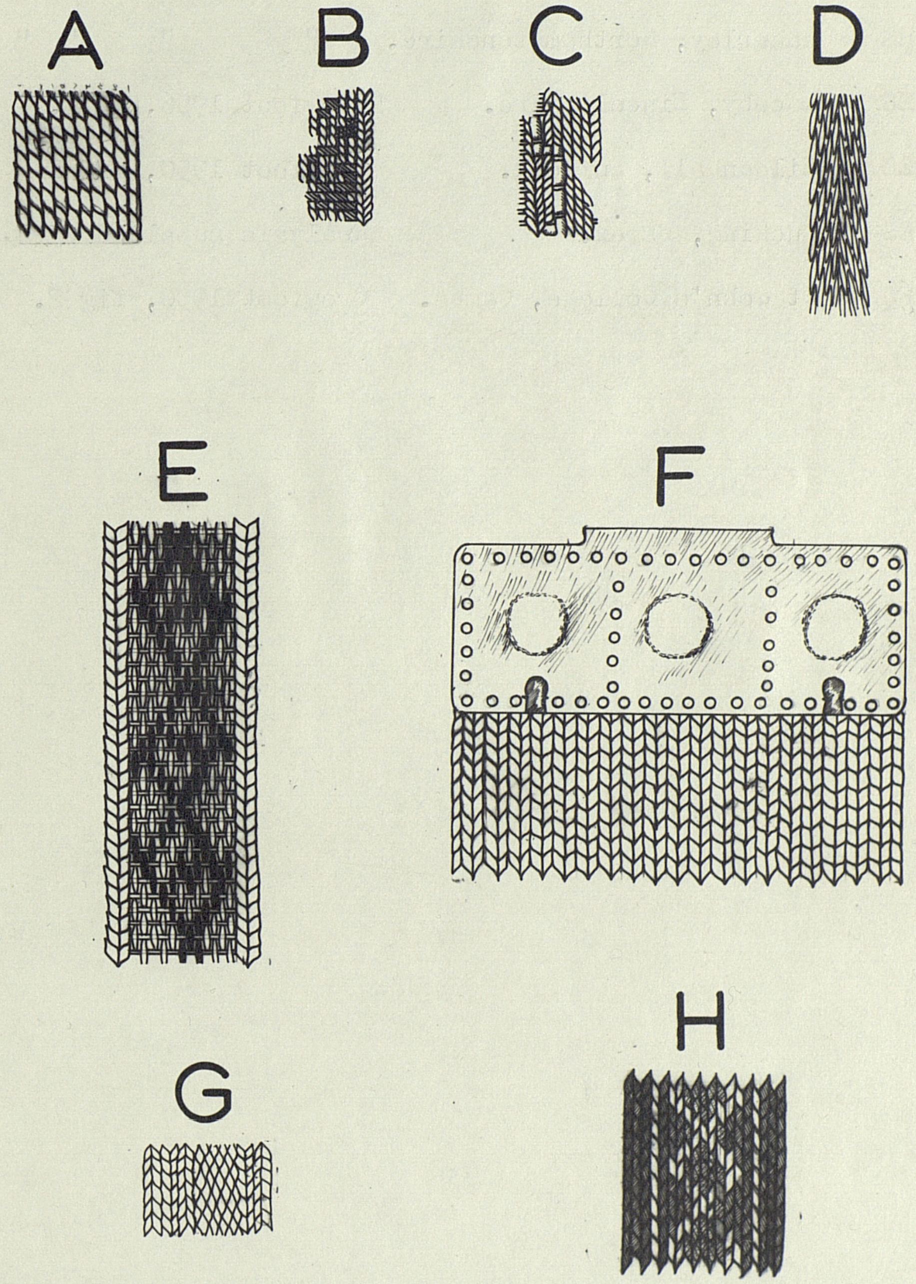

Fig. 10.2 Tablet woven braids found in the British Dark Age material at 2:1 ; A-H (for sites, periods and sources see reverse of figure).

		Site	Source
A	ES	Faussett, Kent.	Analysis supplied by E. Crowfoot.
B	ES	Bekesbourne, Kent.	" " " " "
C	ES	Mucking, Essex.	" " " " "
D	ES	Wakerley, Northamptonshire.	" " " " "
E	ES	Laceby, Lincolnshire.	Crowfoot 1956, fig 3.
F	ES	Mildenhall, Suffolk.	Crowfoot 1950, fig 1.
G	ES	Mucking, Essex.	Analysis supplied by E. Crowfoot.
H	ES	St John's College, Cambs.	Crowfoot 1950, fig 2.

Saxon area, from Lagore Crannog, Co. Meath, show the use of three further techniques of interest. One is woven with wool and hair yarns of different colour and thicknesses with the effect of this heightened by the only partial threading of four-hole tablets. Slightly less esoteric is the other example, a tablet woven band 1 cm in width made simply with three four-holed tablets given quarter turns; the unusual aspect of this is that the wefts had been taken around a thread or bar parallel with the warp between each shed producing a fringe 2.5 cms long.

The possibility that patterns in the twist of tablets were merely vehicles for the use of colour has been stressed above because there are three instances from Early Saxon Graves where this is known to have been the case; part of a linen braid found at St. John's College, Cambridge (fig 10.2) which had been a belt another of the same material, from Laceby, Lincolnshire (fig 10.2) which probably once bordered a garment, and fragments from Mucking, Essex and Fonaby, Lincolnshire.

The St. John's College example, 1.1 cm wide has a central pattern of pale blue? diamonds outlined in white with the darker blue? field having an indented white margin at either side. Grace Crowfoot managed to reproduce this with nineteen four-hole tablets, the same number as the twists in the braid, by having them threaded in the fashion shown under (1950,29). The unusual chevrons, meeting in a Y rather than a V are the result of giving alternate tablets only a quarter turn in each shed.

Table 10.3 Threading of tablets to reproduce the St. John's College coloured braid.

Tab no		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Hole	1	B	B	B	W	B	W	W	PB	PB	PB	PB	PB	W	W	B	W	B	B	B
	2	B	B	B	W	B	B	W	W	PB	PB	PB	W	W	B	B	W	B	B	B
	3	B	B	B	W	B	B	B	B	W	W	W	B	B	B	B	W	B	B	B
	4	B	B	B	W	B	B	B	W	W	PB	W	W	B	B	B	W	B	B	B

The Laceby linen braid, also 1.1 cm broad, is rather unusual in that it consists of a centre area of 24 warps, seemingly in plain weave, bordered on either side by a chevron. Closer inspection of the plain weave however by Grace Crowfoot (1956, 188-9) showed great floats at the back and although no pigmentation was preserved a lozenge shaped pattern could be reconstructed which must have been picked out in colour. The manner in which this was done is conjectural, if it was achieved with the tablets at all. Any tablet turned alternately clockwise and anticlockwise will produce plain weave but this will neither introduce colour nor create floats. Possibly, as Mrs. Crowfoot suggested, there were two warps in different colours and they were brought forward by the weaver, probably with tablets, as required for the pattern. Similar plain weave in braids has been noted in fragments from Haslingfield, Cambridge and Sewerby, Yorkshire by Elisabeth Crowfoot.

The Mucking fragment apparently consists of three four-hole twists, SZS, in purple or red bordering a twill pattern weave in gold and blue. A detached series of four twists ZSZS may have been the other side of this braid. Information about the Fonaby fragment is as yet unavailable but it is said to be blue and red or purple.

Another technique of great importance in tablet weaving is brocading where a non-functional but highly decorative secondary weft is used to produce a surface pattern. No doubt a commonplace yarn was generally used and four instances may be cited where coarse plyed threads were employed for this purpose. In two of the examples from Mucking, Essex, merely their presence was noted but in the other slightly more could be seen (fig 10.2) while a reasonable amount of the pattern on a braid from Bekesbourne, Kent (fig 10.2) was recoverable. Most of the surviving evidence is for gold brocades, due to the immutability of this metal, and these may be conveniently divided into those from Early Saxon graves and those accompanying St. Cuthbert's vestments. Both have formed the subject of excellent studies (Crowfoot 1967 ; Crowfoot 1939) and it is only intended here to give some synoptic details based on these.

The twenty-five known Early Saxon gold braids come from ten sites which are restricted to south-east England and which are predominantly in Kent. By and large they consist of single finds in rich female burials where they appear to have mostly functioned as head ornaments although two may have been bracelets. Gold braids have only been found with two male burials to date; the very rich Taplow inhumation is unique in having contained at least two, one a baldric, the other a belt, and a fragment has been noted in the corrosion of a ring sword from Faversham. There is little doubt that grave goods are indicators of social status and Crowfoot and Hawkes (1967,64-6) have argued persausively, using foreign parallels, that the presence of gold braids in Early Saxon graves may denote not only high but even royal rank. If so, this is likely to have been in the sense that only those of high rank could afford such objects for they were a short lived fashion occurring only in graves of from the middle of the 6th century to the beginning of the 7th.

To return to technical considerations, the gold employed as a brocading weft is all seemingly unadulterated and consists of strips varying from 0.5 to 2mm in width. These would have been cut from gold foil, itself the product of heating, stretching, hammering and burnishing, as noted by Crowfoot (1967,43). In only one instance have any of the non-metallic fibres been preserved and in this case, the broad braid from Taplow, these are wool; this is the only example where it can be proven that tablet weaving was the base for the brocading but it is an assumption which is very likely true for the other braids.

The best preserved Taplow braid is brocaded to a width of 3 cm with strips of gold only 0.5mm in width and under 30 cm in length, each making less than 5 mm of the pattern. In the base braid a four hole tablet weave was set up on 196 warps with the tablets turned a quarter in the same direction giving forty-nine Z twists. The thread used, of wool as said, is now dark brown and has left slight pressure marks on the gold strip. The method of weaving would be that after the functional weft had been passed through a shed the gold strip would be threaded through the warp twists according to a predetermined pattern and independent of any sheds. The braid under discussion is the most complex of the Early Saxon ones (fig 10.3) and the design, only partially recoverable, is one of running diagonals and diamonds which as Crowfoot says of the braids in general (1967,45) 'must have resembled bands of solid gold inlaid with niello or coloured stones, or sheet gold cut out in openwork to permit the colour of an underlying fabric to show through from behind'.

In the case of all the other braids the patterns have been reconstructed from the pressure marks left by the now non-existent tablet twists on the gold strip (fig 10.3). The thinner braid from Taplow, 1.4 cm wide, can be seen to be very similar in design to the wider one as are the triangular shaped pieces which probably had a connection with the latter. The women's graves containing braids are between a quarter and three quarters of a century earlier than the Taplow burial and this may account for their being both thinner, only 2.9 - 9 mm wide, and their designs being more formal. The patterns found, although simple, are better seen than described and have therefore been figured in their entirety (fig 10.3). Crowfoot suggests on the basis of similarities in the patterns that the braids are the product of a restricted number of professional workshops (1967,51) but they are surely just a costly version of ones wrought in more common materials and in general use. Particular types of design would therefore be in general favour and they are after all fairly limited when only a few warp twists are involved.

Crowfoot and Hawkes list some seventy instances of gold brocaded and embroidered textiles from Continental Germanic graves of the 5th-7th centuries as well as a few finds in hoards and cremations in Sweden of gold threads which are attributable to the Migration and Vendel periods (1967,72-85). It is obvious from this as well as details they give of grave finds and literary references that gold braids were in widespread vogue for a longer period on the continent than in Britain and were used to a large extent for edging garments and as belts for both sexes as well as for female hair adornment. The earliest of these, and also the most prolific for an area, are from the Merovingian kingdom and there can be little doubt that this is the point from which the fashion reached Kent as trade and kinship connections are known to have existed.

Gold worked textiles were introduced by the Romans into western Europe; they are mentioned by some writers of the period and a few braids have been found in late Roman graves. This makes it likely that most were produced in the areas in which they have been found rather than being imported, although some are silk based, and this applies equally to the Kentish examples as brocaded tablet braids are known in more common materials.

The vestments of St. Cuthbert were removed when his grave was last disturbed in 1827. Some of the textiles, particularly pieces of linen, were attributable to 12th century investigations but other than these there were a number, at least nine, of obviously imported silks and the only two extant examples of Late Saxon embroidery - the stole and its companion maniple. Identical inscriptions on the latter affirm that they were made by order of Queen Aelflaeda (Aefflaed), the wife of Edward the Elder, for Bishop Frithestan (of Winchester) which puts their date of manufacture between 909 and 916 A.D. It is suggested that they found their way into the coffin reliquary of St.

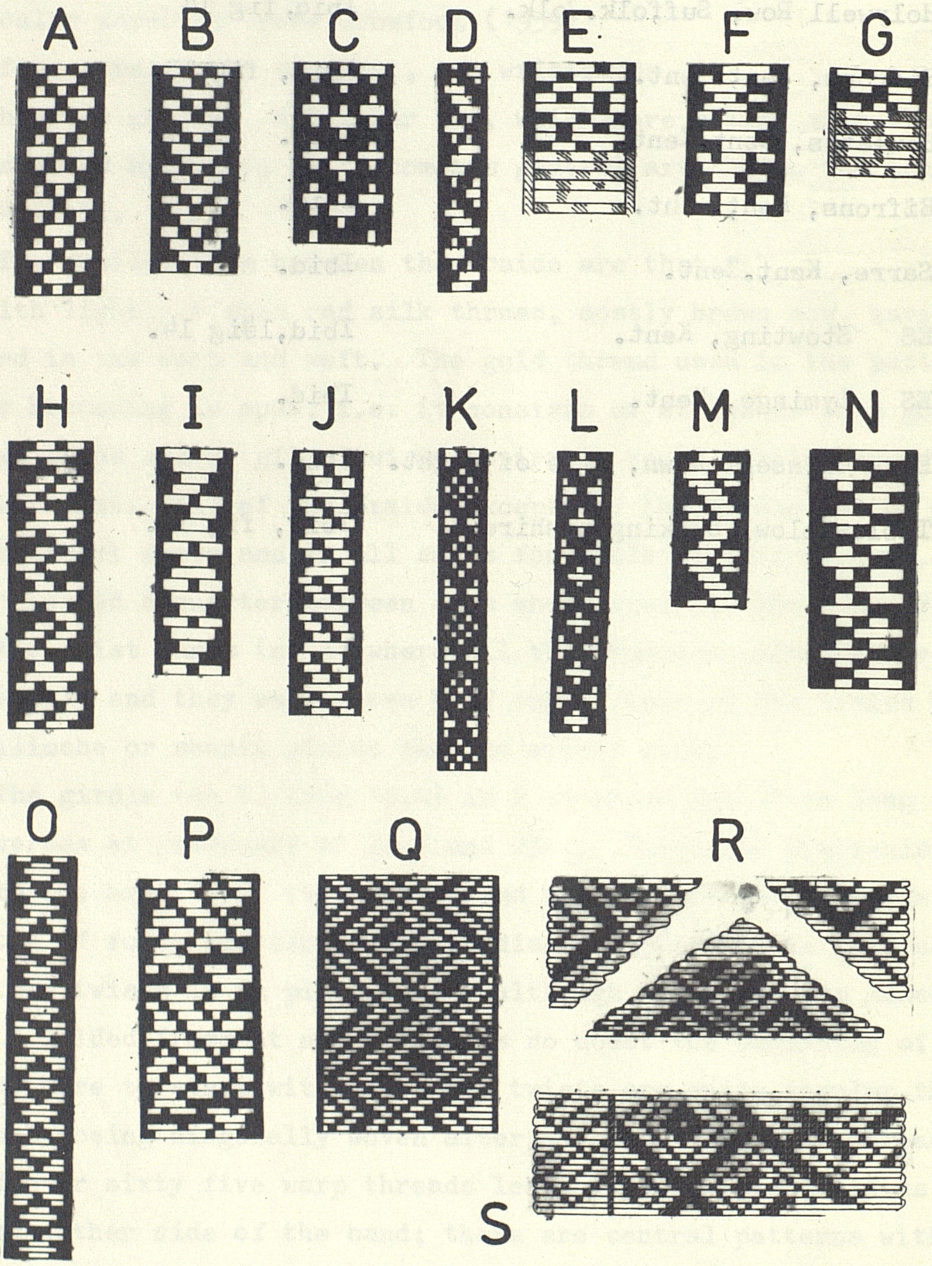

Fig. 10.3 Early Saxon gold braids at 3:2 ; A–S (for sites, periods and sources see reverse of figure).

A-C	ES	Bifrons, Kent.	Crowfoot 1967, fig 13.
D	ES	Sarre, Kent.	Ibid, fig 14.
E	ES	Chatham Lines, Kent	Ibid, fig 13.
F	ES	Howletts, Kemt	Ibid.
G	ES	Holywell Row, Suffolk.	Ibid, fig 14
H	ES	Bifrons, Kent.	Ibid, fig 13.
I	ES	Howletts, Kent.	Ibid.
J-L	ES	Bifrons, Kent.	Ibid.
M	ES	Sarre, Kent.	Ibid.
N	ES	Stowting, Kent.	Ibid, fig 14.
O	ES	Lyminge, Kent.	Ibid.
P	ES	Chessell Down, Isle of Wight.	Ibid.
Q-S	ES	Taplow, Buckinghamshire.	Ibid, fig 12.

Cuthbert when Aelflaeda's stepson King Athelstan, who had Winchester connections, visited it at Chester-le-Street in 934 A.D. (Crowfoot 1939,57-9; Battiscombe 1956,2-4).

The stole and maniple are described elsewhere, as are, more briefly, the silks but there were also a number of gold brocaded tablet braids which received scant attention in the early publications (e.g. Brown 1913, Christie 1938). These were later the subject of a particular paper by Grace Crowfoot (1939) who discussed a total of eight; five sewn to the vestment, two wristbands, and the remains of St. Cuthbert's girdle; a further two, which were silver gilt brocaded were discussed by her in Battiscombe's general article on the textiles (1956,445-447).

The similarities between the braids are that they are tablet woven with lightly S spun red silk thread, mostly brown now, having been used in the warp and weft. The gold thread used in the pattern weft for brocading is spun, i.e. it consists of strips of pure gold, or in two cases silver gilt, twisted spirally round a silk thread and beaten out flat. All of the braids except for the girdle (no 1) are in plain tablet weave and in all cases four-hole tablets were used and were turned a quarter between each shed except in the case of one of the wrist bands (no 3) where all the brocaded patterns are on one side only and they were given half turns; most of the braids have tiny guilloche or sennit plaits sewn to either side.

The girdle (no 1) (fig 10.4) is 2 cm broad and 61 cm long with reverses at intervals of 22.3 and 23cm. There are sixty-nine twists to the braid i.e. two hundred and seventy six warp threads and the centre of forty one tablets is in diagonal weave while each border of fourteen twists is in plain tablet although threaded from mixed sides. A folded fragment at one end is no doubt the beginning of the braid and here to start with, the warp twists are quite regular the centre only being diagonally woven after a while. The gold thread is brocaded over sixty five warp threads leaving two twists plain as an edging on either side of the band; there are central patterns with a border each side. These are brought out by the gold being darned only over and under one warp twist where they are while in the background it is much more profuse being taken over three and under one. The pattern therefore is in the silk, the gold being merely the background, and there is evidence that it was enhanced by two shades of red having been used.

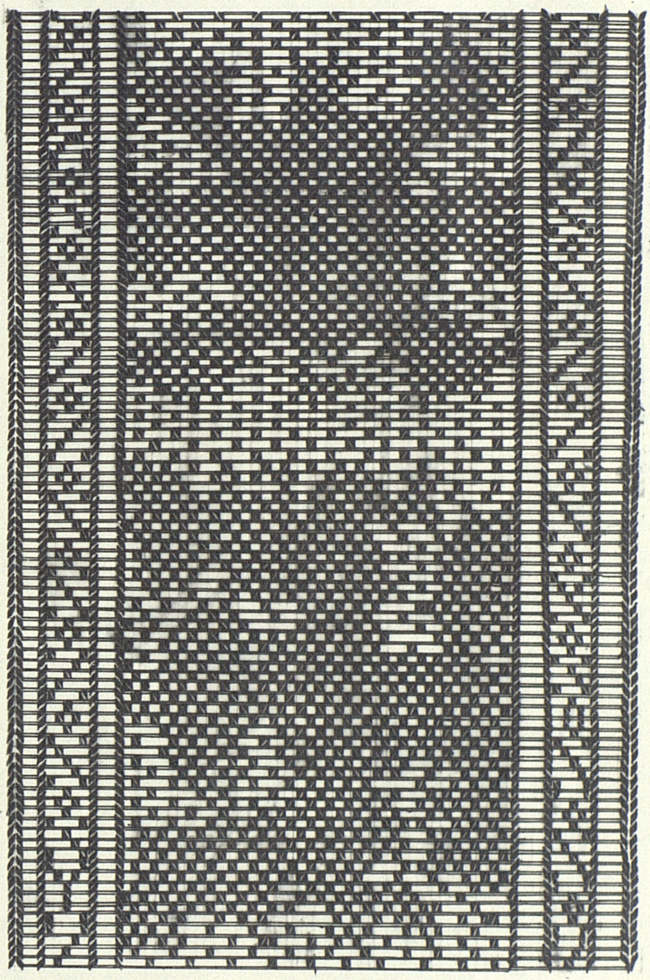

Fig. 10.4 Late Saxon gold and silk tablet woven braid from the tomb of St. Cuthbert, Durham (his girdle) at 4:1 (detail) ; (after Crowfoot 1939, no. 1).

The wrist bands (nos 2 and 3) are some 20 cm long and 2 cm broad and are likely to both have been made with two hundred and four warp threads in fifty one twists which were all in the same direction except for the first and the last (fig 10.5). The patterns are very similar consisting of a border taking up fourteen warps on either side, the central area having changing designs, in silk with gold as background, which include birds facing vines in vases with sometimes twists and sometimes scrolls at either side. In spite of these similarities the two wrist bands did not come from the same braid for in one the twists are in quarter and in the other half turns.

Braids 4,5, and 6, which all came from the back of the vestments are narrow (7, 4 & 4 mm respectively) and the simplicity of design in their patterns (fig 10.5) is reminiscent of Early Saxon examples. Here however the twists are preserved; in the first instance there are nine (SZZSZSZZS) with the brocading being over the central four only; in the second there are also nine (ZSSZSZSSZ) both with the gold worked only over the central three warps; the last, slightly different again, has seven twists (ZSSSSSZ) with a pattern over the central three.

Braids 7 and 8 both formed a border to the stole and are very similar being 8 mm broad and consisting of eighty four warp threads passed through twenty one tablets which were given quarter turns throughout (fig 10.6); the only difference lies in the combination of threading directions used. In each case the gold weft was worked over the centre fifteen warp twists leaving a border of three on either side; the next two twists were blocked in with gold and then, after an uncovered twist, came the central pattern. In this the non patterned areas were worked in gold going over three and under one while the designs were picked out in silk; these included lions facing a cross design, birds facing a leaf and cross pattern, winged dragons either side of leafy branches of the acanthus type surmounted by a cross & etc.

The remaining two braids, 9 and 10, are both unusual in that the brocading thread is silver gilt (fig 10.6). Only in the case of 9 is the full width preserved and this is c 6 mm with twenty-five tablets set up right and left to produce chevrons. Unlike the foregoing braids the design is not symetrical, is apparent on both sides, and is picked

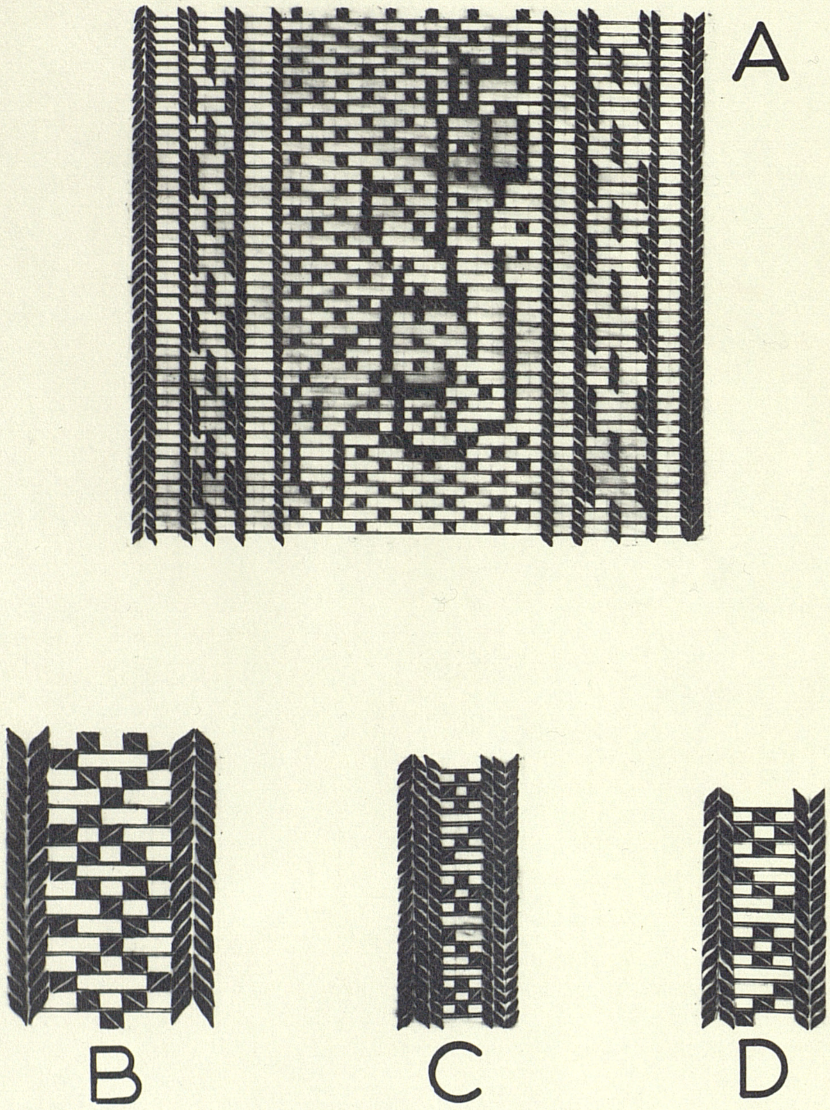

Fig. 10.5 Late Saxon gold and silk tablet woven braids from the tomb of St. Cuthbert, Durham at 4:1 ; A-D (after Crowfoot 1939, nos. 2 (detail), 4-6).

out by the metallic threads and not the silks. The latter is also true of 10 only 1.2 cm of the width of which is preserved; the extant piece would have required forty-six four holed tablets which were, again, set up to create chevrons. Were the patterns symetrical with a border of five twists at either side the braid would have been 14.5 mm broad and have incorporated fifty-five twists.

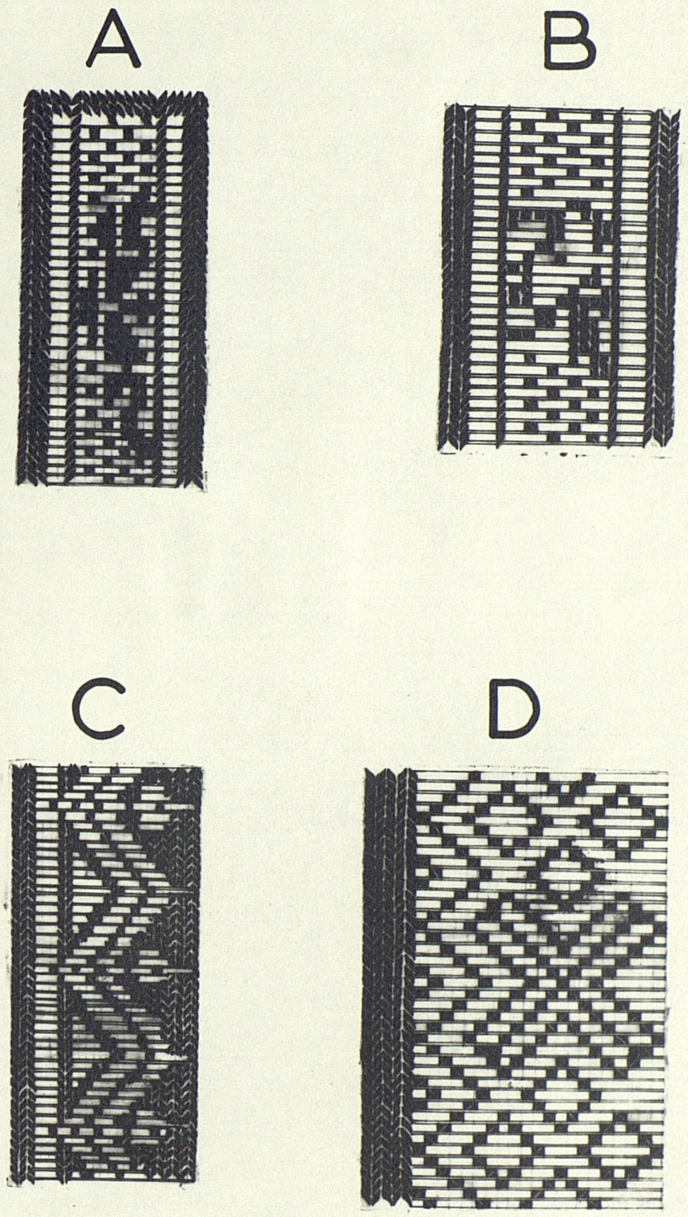

Fig. 10.6 Late Saxon gold and silk tablet woven braids from the tomb of St. Cuthbert, Durham at 4:1 ; A-D (after Crowfoot 1939, nos. 7-10).

CHAPTER ELEVEN

OTHER TECHNIQUES

Dyeing

Few textiles are recovered with any vestige of their original colour left; those found in acid waterlogged conditions tend to be various shades of brown while those preserved by metal oxides are often brown, green or blue depending on whether iron, copper, or silver was involved. Discounting such colourations in these instances the evidence for dyeing is disappointing even bearing in mind that a large amount of textiles must have been self coloured. Briefly the instances in which dyeing is irrefutably present are as tabulated below.

Table 11.1 Dark Age British textiles retaining traces of dyeing

Fonaby, Lincolnshire.	Blue & red/purple tablet braid.	Early Saxon
Mitchell's Hill, Suffolk.	Stained or dyed yellow wool 2/1 twill.	" "
Mucking, Essex.	Purple/red tablet twists bordering blue and golden twill pattern weave.	" "
St. John's College, Cambridge.	Pattern woven tablet braid in dark blue?, pale blue? and white.	" "
Wakerley, Northants.	A vegetable fibre round plait stained yellow.	" "
St. Cuthbert's Vestments, Durham.	The tablet braids are made of red silk in two colours.	Late Saxon
Lloyd's Bank, York.	Reddish brown 2/1 twill Plain weave with one system red brown and the other light brown.	Anglo-Danish

EARLY SAXON SPINNING & COLOUR PATTERN : MUCKING.

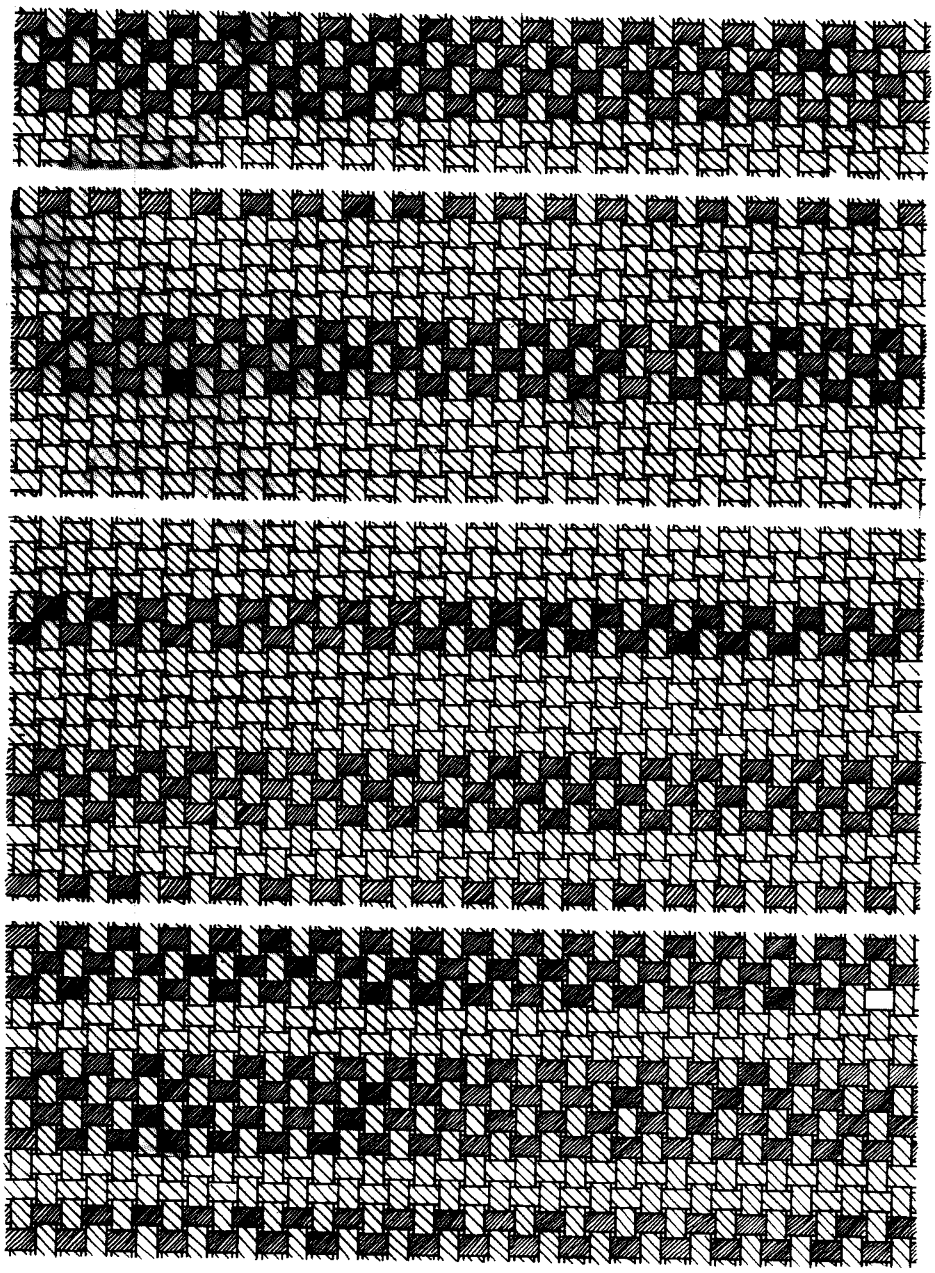

Fig. 11.1 Early Saxon spinning and colour pattern from Mucking, Essex, (after analysis provided by E. Crowfoot).

Yellow, red and blue, the primary colours are all therefore in evidence but, frankly, the above information tells us little apart from that some textiles contained dyed yarns; the examples are few and the colours crudely recordable, while only expert chemical analyses could tell the nature of the dye and this would not tell us the source of it or very much about how it was applied. Commonly available materials could have been used to produce these colours e.g. nettle roots for yellow (Hald 1942,43); whelks, archil lichen and madder for red; and whortleberry and woad for blue (Wild 1970, 141). A summary of the principle of dyeing and the methods by which it might have been simply achieved are given on p. 178.

A large number of instances, from Early Saxon graves and Anglo Danish York could be cited of textiles in which one system is, e.g. dark brown and the other light but in the absence of microscopic analysis it is impossible to say whether this is due to the presence of differentially dyed yarns which have been affected by the preserving environment or patterns produced by the use of pigmented animal fibres. The availability of such fibres, largely wool, would depend on sheep having primitive fleeces, giving black, a range of browns, and white (p 12). The latter technique is well attested in early textiles both here and in the continental material; close at hand, though earlier than our period, is the so called Falkirk tartan from Roxburgh (Wild 1970, 96-7) while similar textiles from Scandinavia dated between the Middle Bronze Age and the fourth century A.D. are reported by Henshall and Hald (1950,439-40 ; 1950, 409-19) from Gerumsberg, Huldremose, Karlby and Vangstrup although they no doubt occur in later contexts. From Britain there are two certain and one possible examples from Mucking, Essex in a plain weave (figs 11.1 & 11.2), two being checks and the other having stripes. A 2/2 twill from Broomfield, Essex has Z spinning throughout but there are irregular light and dark stripes in one system. Finally, there is a piece of tablet weaving from Lagore Crannog, Co. Meath in which wool and hair have been used (Start 1950, fig 115).

The use of dyed yarns may also be indicated when there are patterns in the weave which, unless in a contrasting colour, would not show. This is certainly the case with some tablet woven textiles, including those that have been brocaded , (p 244) and is also shown by spinning patterns, tapestry, soumak etc.

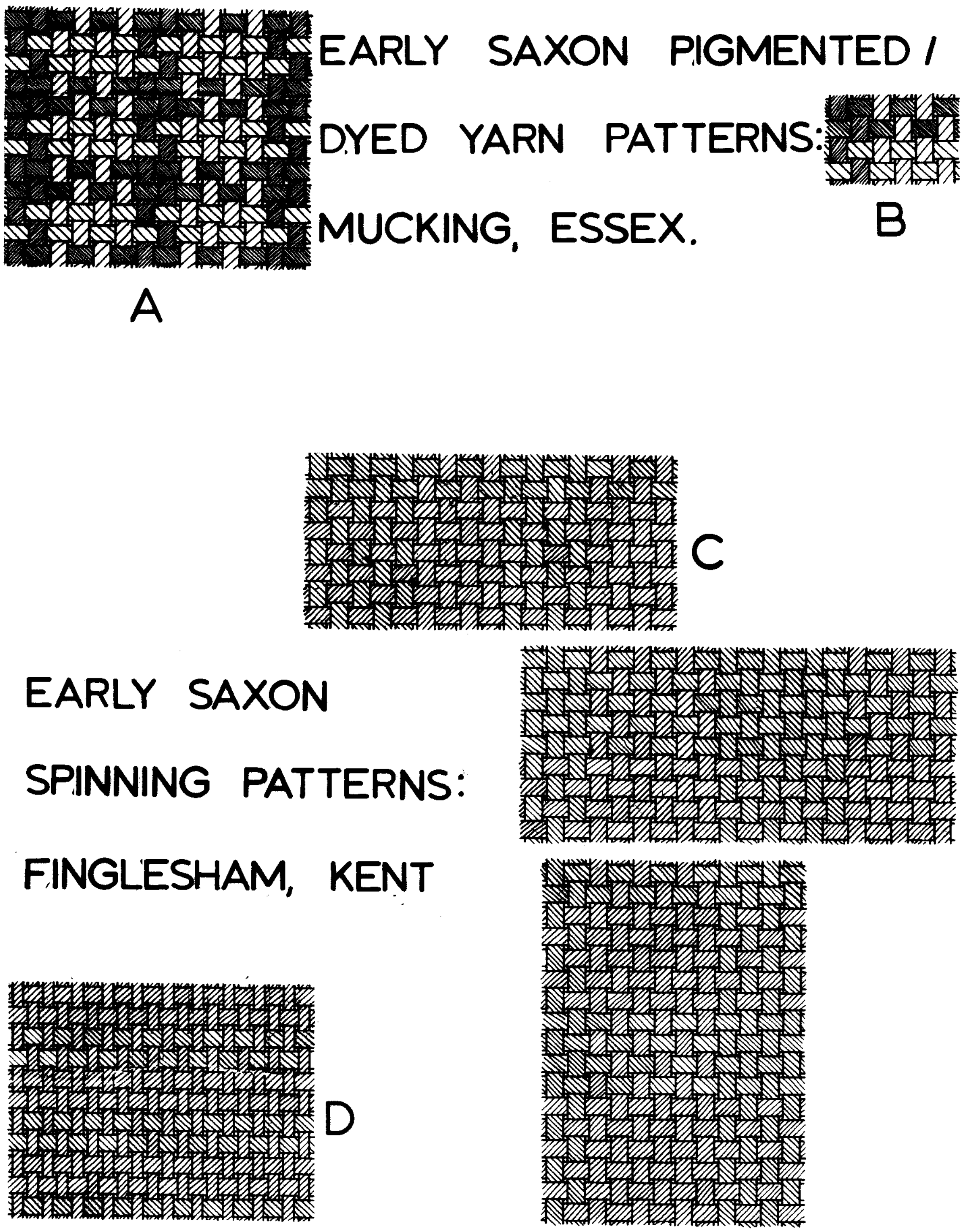

Fig. 11.2 (Top) Early Saxon pigmented/dyed yarn patterns from Mucking, Essex, (after analyses provided by E. Crowfoot).
(Bottom) Early Saxon spinning patterns from Finglesham, Kent, (after analyses provided by E. Crowfoot).

Spinning patterns

A spinning pattern, putatively a misnomer, is the product of using groups of S and Z spun yarns sequentially in either or both the warp and the weft. The question, which is not finally settled here, is whether such patterns were the desired end result or whether they are merely composed of yarns which were dyed, and incidentally spun, differently; before discussing this instances of their occurrence should be related although, as with a large number of technical details regarding textiles, the actual patterns are better illustrated than described (figs 11.1-11.3). In tabular form, the following finds have been made.

Table 11.2 Instances of spinning patterns in the D.A. British material.

Mucking, Essex.	2/2 twill	Z + S x Z (stripes)	(SZŹ)	Early Saxon	
	Twill	Z+S x Z (stripes)	(ZZŚ)	" "	
	Plain	Z+S x S (stripes)	Wool. Pig & dye	" "	fig 11.1
	Plain	Z+S x Z+S (check)	No pig. No dye	" "	fig 11.1
Finglesham, Kent.	Plain	Z+S x S+S (check)		" "	fig 11.2
	Plain or ½ basket	Z+S x Z (stripes)		" "	fig 11.2
Wakerley, Northants.	Plain weave(Z x Z) base with thicker float threads (S) alternating in one system. Probably polymita, possibly 8 shaft twill		Check pattern caused by the thick threads of one system being predominantly at the back in some parts & in the front in others	" "	fig 11.3
Lloyd's Bank, York.	2/2 D twill (I.M.)	Z+S x Z (alternating single yarns)	Wool	Anglo-Danish	

Although it was only possible to say for certain in two cases, the cloths in question are likely to have been wool as vegetable fibres are usually only spun in one direction. Several instances were in fact noted among the Lloyd's Bank and Coppergate woollens of mixed spinning in one system but only in one case did this show regularity and here they alternated. All the other cases cited are Early Saxon and come from the unpublished sites of Mucking, Finglesham, and Wakerley and information about them is through the kindness of Elisabeth Crowfoot whose specialist analysis are awaiting publication of the complete site reports. Her discussion of these, the first British examples of spinning or dyed yarn patterns is quite

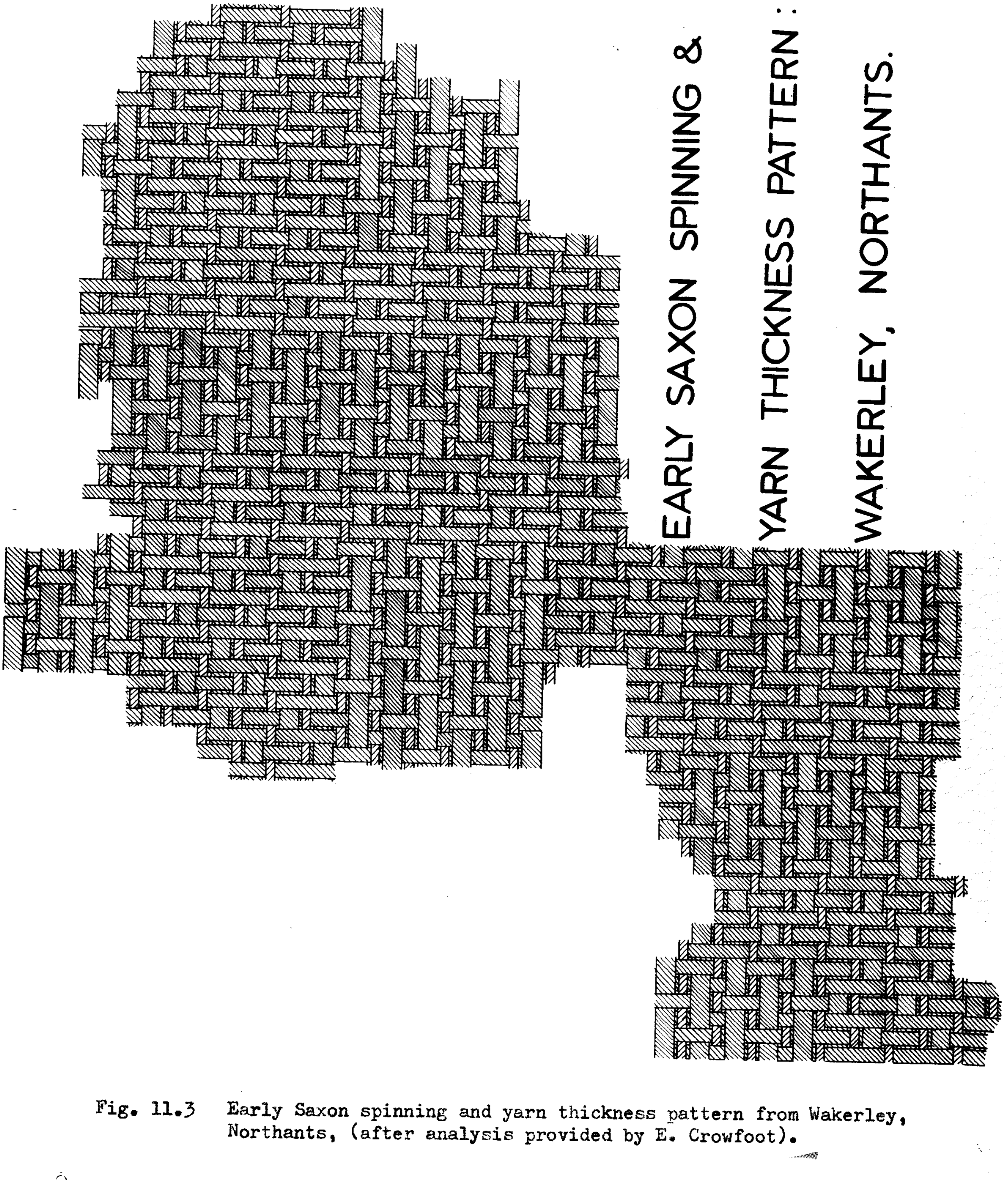

Fig. 11.3 Early Saxon spinning and yarn thickness pattern from Wakerley, Northants, (after analysis provided by E. Crowfoot).

extensive and it would be not fair to reiterate it here in full, as it would pre-empt her publication, and in summarising the situation it must be stressed that this relies very heavily on unpublished information of hers.

As Crowfoot says, checked weaves were popular in the north during the pre-Roman and Roman Iron Ages and it has been suggested that they were the scutulata of the Gauls (Wild 1964). A number of examples of two colour checks have been found in Scandinavia, again twill weaves, (Hald 1950, 423,figs.27,29,31,82) with S spinning throughout in the earlier pieces; however, from the late Roman town at Mainz, as well as twills, a piece of Z spun two-colour plain weave check is also recorded (Wild 1970,53,105,113). Although Crowfoot does in fact believe that the spinning patterns found in Britain reflect dyeing some of the pieces have to be admitted to be close to the group of twills from Denmark with patterns using different spinning directions in one or both systems described by Hald (1950,143,417-8, figs.68,69,74,82). In some of these the pattern is produced entirely by the changes in spinning direction, a sort of shadow check; in others there are two colours to which the differently spun threads give additional emphasis. She considers that the British cases, being largely tabby, would have needed to have been coloured as this does not throw up a simple spinning pattern as well as a twill.

The Danish examples are checks rather than the stripes which predominate• in the British material and Crowfoot suggests that this may be because some are fragments of larger checks. There is however, as she points out, an early example from Friesland, the man's shirt from Reepsholt Mose (probably 2nd century A.D.) in which the Z spun yarn is all light and the weft Z spun light and S dark yarn (Hald 1950,440).

There seem to be no two-colour plain weaves among the Scandinavian textiles but some replaced plain weaves came from the Germanic sites of Sirnau, Donsdorf, and Niedertotzingen have regular stripes of four S then four Z threads in one system and all Z threads in the other while others have stripes in warp and weft of varying widths (Hundt 1969,Abb 1, 3, 188 ; 1967, 2,36,66,75,8)

The evidence collected by Crowfoot, and cited above, is unfortunately limited both in terms of sample numbers and what can actually be stated as fact. In a very, very few instances we know that differently spun yarns were dyed in a contrasting fashion but in most instances known of coloured checks and stripes warp and weft were spun in identical directions. Can we therefore conclude that examples of spinning patterns are ipso facto examples of dyeing? We cannot really without more evidence in the form of analyses for dye traces in such textiles.

Piled fabrics.

The term is used here in a restricted sense to refer to woollens which have tufts integrated in their composition in such a way that they must originally have resembled sheepskins. Several instances of this interesting type of fabric have been discovered in the British Isles and before discussion they should be listed.

Table 11.3 Dark Age British piled fabrics.

Early Saxon		
Black Patch, Wiltshire.	Replaced soft curled fibres suggestive of threads from a pile or nap.	Crowfoot, E., Pers. Comm.
Broomfield, Essex.	No information available.	Bruce Mitford, 1952, 6.
Bury St. Edmunds, (W. Garth Gdns), Suffolk.	Replaced soft curled fibres suggestive of threads from a pile or nap.	Crowfoot, E., Pers. Comm.
Dover, Kent.	" " " " "	" "
Sewerby, Yorkshire.	" " " " "	" "
Snape, Suffolk.	No information available.	Bruce Mitford, 1952, 6.
Stretton on Fosse.	Three graves with instances of replaced soft curled fibres suggestive of threads from a pile or nap.	Crowfoot, E., Pers. Comm.
Sutton Hoo, SH3, Suffolk.	Replaced soft curled fibres suggestive of threads from a pile or nap.	" "
Sutton Hoo, SH10, Suffolk.	Spaced rows of overlapping pile with long rows of tufts or loops.	" "
Anglo-Danish.		
York, Lloyd's Bank.	Pile inserted after weaving.	Hedges forth.(A)
York, Lloyd's Bank.	" " " "	" "

Viking.

Cronk Moar, Jurby, I.O.M.	Pile probably inserted during weaving. (Three types.) (fig 11.4)	Bersu 1966,80-83; Crowfoot 1949,27.
Kildonan, Isle of Eigg.	Pile probably inserted during weaving. (fig 11.4)	Crowfoot 1949, 24.
Knoc y Doonee, I.O.M.	Tufts.	Crowfoot 1949, 27.

It will be immediately apparent from the above list that, while a number of examples of possible piled weaves have been found very little is known about them beyond their existence. All of the Early Saxon ones could just be naps, although this is unlikely, except for one from Sutton Hoo. The only information presently available about this is that it has 'spaced rows of overlapping pile with long rows of tufts or loops' (Crowfoot, E. Pers. Comm.): This suggests that the pile was inserted during weaving as it was in the Viking examples from Kildonan (fig 11.4) and, probably, those from Cronk Moar (fig 11.4). The construction of the Kildonan piece is not as clear as the diagram would suggest. G. Crowfoot (1949,25) could see tufts up to 4 cm long of very slightly S spun yarn. These had clearly been inserted at the same time as the shed was open for the weft passing under, over, and under three warps together with the latter. They were unknotted and two empty rows of weft in the centre of the small fragment preserved may have been due to their having fallen out or may have been intentional. Two of the Anglo-Danish textiles from Lloyd's Bank, York have a piled surface. In both cases loosely S spun yarn had been darned into the already woven fabric and was occasionally anchored by being looped around a thread, be it warp or weft. The pile was definitely not inserted during the weaving process although a yarn of similar colour to that of the main weave was utilised.

Piled weaves have recently been the subject of a study by Gudjonsson (1961); while this could not be described as exhaustive and in spite of the author having an aversion to stating the sources used for the conclusions reached, it is still the most useful publication we have on the subject. In it pile weaving, per se, is traced back to 3,000 BC in Mesopotamia and 2,000 BC in Egypt where

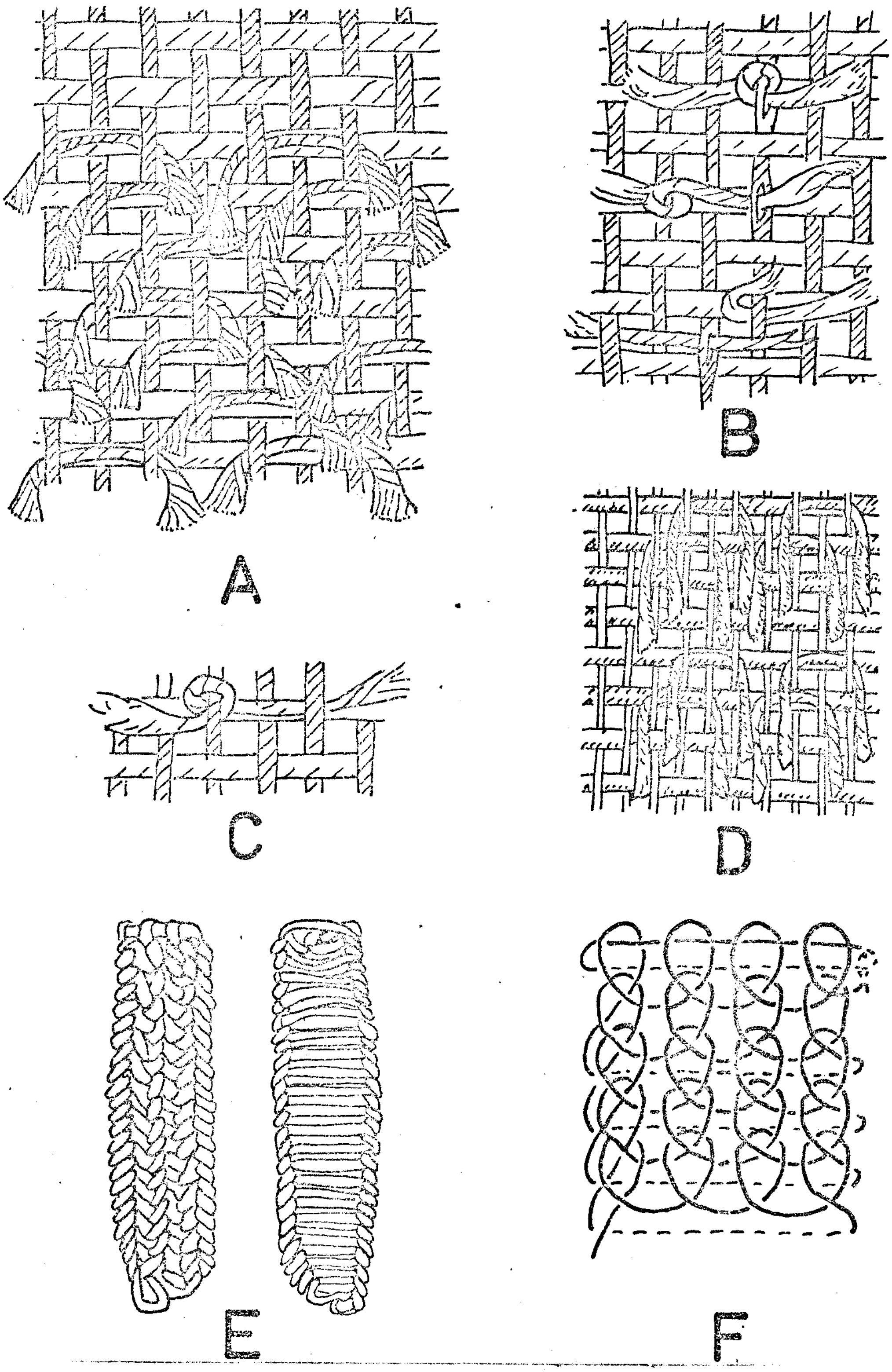

Fig. 11.4 (Top) Various piled Norse fabrics.
A-C Cronk Moar, Isle of Man (after Crowfoot 1966, fig 47).
D) Kildonan, Isle of Eigg (after Crowfoot 1949, fig 1).
(Bottom) Danish Osentich from Ingleby, Derbyshire.
E) Fragment at 2:1 (after Crowfoot 1956, fig 6).
F) Variety used (after Crowfoot 1956, fig 6).

both tufted and looped pile was known. Such pan global trait-tracking is interesting but not very useful and all the piles in question here are 'cut' rather than looped because the production of the latter, to any degree of quality, requires machinery that did not exist until medieval times in Europe (Burnham 1959, 17; E Crowfoot, Pers. Comm.) A shaggy cloak of Early Bronze Age date is cited from Denmark (Gudjonsson 1961, 70) and must be that from Kolding, Jutland referred to by McClintock (1950,98). Gunjonsson continues to say that references were also found to ancient Persian woollen pile mantles which were in use in Asia Minor and Greece in the 5th century BC and pile woven fabrics belonging to Imperial Rome as well as Coptic Egypt. Returning nearer home, this author, says that shaggy cloaks were used among the Goths and the Vandals. Such garments continued in use and the Frisians were the main traders in them in the 7th, 8th, and 9th centuries A.D. although they were also a major Irish export at that time too. Written sources apparently indicate that shaggy mantles were in use in the Viking period in western Europe and Gudjonnson presents archaeological instances from Valsgarde, Sweden (c750 A.D.) and Birka, (C950 A.D.) as well as the ones from Kildonan and Cronk Moar. There are in fact numerous references in the Icelandic sagas - most of which were written in the 13th century but relate to happenings in the 10th and 11th and old Icelandic literature abounds in descriptions; they were very important to that island and were one of its major exports until 1200 when they ceased to be of importance. Gudjonnson then mentions their continued use in various western countries up to the present century but her research is a trifle piecemeal.

Piled mantles are probably associated in most minds with the Irish as they form part of the costume characteristic of that country and were something very much commented upon by Elizabethan Englishmen (McClintock 1950,96), at a time when they were a principal export. We know that this was a definitely shaped garment like a long sleeveless cloak or cape and generally made of stiff woollen homespun or a special shaggy cloth (Ibid) An early Welsh source, for example , - a life of St. Cadog written in Latin about 1100 A.D., but probably following a much earlier traditional version, an angel addressing the holy man refers to the 'many runglets or tufts' of his cocula -' as is commonly called a certain king of garment which the Irish use out of doors, full of prominent tufts or coils, like hair'. It is ironic that no Irish examples have survived but in the Cathedral Treasury at Bruges in Belgium there is a piece of cloth covered with tufts of curly wool. This relic is claimed to be of Irish origin and is known as 'the Mantle of St. Brigid'; there is an amount of circumstantial evidence that indicates that this really did come from Ireland via England in the 11th century (Megaw 1945,175)

All this evidence is a little art historical. We know from it that in widespread areas of the world at different times shaggy cloth has been popular and has found its main use in mantles. These are all based just on external appearance, a feature excellently described in the following amusing anecdote related by a sixteenth century Anglo-Irish writer (Megar 1945,175).

"As the distil the best Acqua vitae (in Waterford) so they spin the choicest rug in Ireland. A friend of mine being late demurrant in London, and the weather by reason of a hard frost being rather nipping, repaired to the Paris garden, clad in one of those Waterford rugs. The mastiffs had no sooner espied him but deeming him to had been a beare, would fain have baited him. And were it not that the dogs were partlie muzzled and partlie chained, he doubted not that he would have been tug'd in this Irish rug; whereupon he solemlie vowed never to see baiting in anie such weede."

We have really very little substantial evidence of exactly how these piled cloths were manufactured. We may postulate that either locks of wool or yarns were used and our cases look like the former with a slight twist or examples of the latter which have become untwisted. The pile could have been added as the cloth was being manufactured - as with the Jurby, Kildonan, Sutton Hoo, and Valsgarde examples or darned in after as in Bronze Age Denmark (Broholm 1940,137) or Anglo Danish York.

Embroidery.

Embroidery, popular in the medieval period (Christie 1938) was certainly in vogue at least at the end of the Dark Ages for there survives the stole and maniple of St. Cuthbert (Brown 1913). Other instances are the 9th century Oseberg ship 'tapestry', and the 11th century ones from Bayeux and Skog in Sweden (Brøndsted 1965,128,133,222); no doubt the recorded one presented to the Abbey of Ely by the widow of the English leader to commemorate the Battle of Maldon, Essex in 991 was similar (Wilson 1971,126). A small Early Saxon part replacement from Mucking may have been embroidered as Crowfoot describes it as having 'surface brocading'. A metal variety known as Ösenstich (Geijer 1938,109-11) was found in a Danish burial at Ingleby, Yorkshire datable to the last quarter of the 9th century (Posnansky 1956). Crowfoot, who examined the work, described it as 'being done with a continuous thread looped as if in a spiral across the front with the thread carried straight across the back (fig 11.4) (Ibid 52-3); there are parallels from Birka and elsewhere of similar date in Scandinavia (Geijer 1938,109-11 abb 25).

Sprang.

Knitting and crochet were relatively late in coming to western Europe; the earliest examples of the former are definitely medieval (Hedges 1973,52) and certainly no Dark Age instances of the latter are known. Before this sprang was the only elastic fabric available but as mentioned (p 166) the British examples are a possible impression in a 10th century Norse brooch from Shetland and a stocking from York which is regrettably undatable (Henshall 1950,22-3 + figs).

Soumak.

Soumak only occurs in four cases - all in the Early Saxon ship burial at Sutton Hoo. Details of these are not available but their presence may be noted. In soumak the weft is darned by hand being frequently twisted round individual warps.

Plaits.

Few but varied plaits are known, usually in association with textiles they bordered. For the Early Saxon period from Finglesham, Kent, Mucking, Essex and Wakerley, Northants, come, respectively, a 3 plait, 6 plait, and a 6 plait which is definitely a round plait. A round plait also came from Anglo-Danish York; here there were 9 Z2S threads in one system and a similar binder weft. Many of the St. Cuthbert's braids had plaits sewn to their sides and here sennets of 8 strands, guilloches with 5 and flat sennets of 5 are represented.

Trichinopoly.

Trichinopoly, or French Knitting, is curiously only recorded in silver work from Viking hoards at Ballinaby, Islay, Croy, Invernesshire and Skaill, Sandwick (Anderson 1879,67; Ross 1885,91; NMAS); no doubt this technique was also employed with softer materials.

CHAPTER TWELVE

ADDENDA

This chapter consists of a few references which were brought to my attention by D. Hinton when it was too late to integrate them into the manuscript which, by that time, was in an advanced stage of typing. They are included for the sake of completeness but do not affect any conclusions already drawn with the sample which was used nor do they throw new light on any aspect of the subject.

1/ Walton, Aylesbury (Farley 1976)

Five house sites with sunken or partly sunken floors and three groupings of post holes suggesting halls. From House 1 there came three bone needles (Ibid 198 fig 14); from House 3, spindle whorls, a thread picker and two fragments of normal type Anglo-Saxon loom-weights (Ibid 202-204, fig 18, 19) Additionally there were a number of other loom-weight fragments, and an unstratified thread picker 11.2 cm long and .6 cm in diameter (Ibid 211, fig 27,25). From a Late Saxon context belonging to the 10th/11th century there came a stone spindle whorl (Ibid 228, fig 35).

2/ Waltham Abbey, Essex (Higgins 1976)

From Middle and Late Saxon contexts came:- A pin beater broken at one end and slightly oval in section (.75 x .85 x 9.8 cm) (Ibid 119 fig 42): Four pieces of the normal type baked clay loom-weights with the following dimensions (Ibid 119, fig 42).

D	T	DH
13.2	3.6	3.0
10.8	3.6	2.4
9	4.5	3.0
12.6	4.2	2.4

One piece of a loom weight was found in a late medieval context (Ibid 120) but it may well have been redeposited. In addition to the material already mentioned from Middle and Late Saxon contexts there was a baked clay spindle whorl (Ibid 119, fig 42).

3/ (Addyman 1976)

This was pointed out as the source for a translation of the Gerefa; the translation is actually that of Skeat which appears in Cunningham 1915, 571-5 and suffers from the same defects as others that were made without a working knowledge of the equipment being described.

4/ Goltho, Lincolnshire (Belkirk 1977)

In periods D & E of the site, 9th-10th century, there was a clear layout which included a hall, kitchen, bower and what is described as a weaving shed; the function attributed to the latter building was based on the numerous pin-beaters found in association with it (Ibid 266-267).

5/ (Wilson 1976)

The section in this pertaining to textiles is just a broad summary of the evidence and, as such, contains little that is not included in this thesis. There are however two important pieces of information related which had been overlooked.

A square bone weaving tablet with a hole at each corner was apparently found in an Early Saxon grave (no, 299) at Kigston Down, Kent (Ibid 272; Faussett 1856,93.

According to Wilson a casula of St Harlinde and St Relinde at Maeseyck in Belgium is made up of a number of textiles of which some are Anglo Saxon embroideries executed in southern England in the late eighth or early ninth centuries. The ornament is made up of a series of roundels containing birds and animals, and two strips of arcading enclosing and incorporating interlace and inhabited scroll work. A fragment of embroidery from St Ambrogia in Milan is executed in the same technique as St Cuthbert's stole and maniple and may well have been made in England too (Ibid 273).

6/ Old Erringham, West Sussex (Holden 1976)

A sunken hut datable to the 8th-10th century was found in quarrying. In it were discovered two groups of loom weights, two spindle whorls, and a bone needle and it was therefore taken to be a 'weaving hut'. Additional finds were a brooch, pottery, quern fragments, a whetstone and food refuse.

The weights occurred in two groups in both of which some were in a straight line. The eastern group, numbering forty three, ran at right angles to the aligment of the hut and measured 1.5 in length. The western group, of which there were at least forty three, were along the centre of the hut; with these there were post holes but, following Hoffman, Holden discounted these as being related to a loom. The majority of the weights could be described as 'intermediate' and four had dimpled holes in them. Average masses and dimenions for the more complete weights, together with the ranges, were given by Holden as follows

Wt (gms)	D (cms)	T (cms)	DH (cms)
833 (53)	133 (62)	48 (62)	43 (62)
532-1396	109-150	38-65	30-50

(Ibid 308-310,313-316,fig 1, 3, plIII, IV).

7/ (Sawyer 1965)

Sawyer points out the wealth of England in the 11th century - it was so wealthy that it became a prey to invaders and had to pay them off with vast sums of ransom money. This wealth was expressed in coinage but the question is why England was so rich and what was the means by which it gained the silver to manufacture the coins. He is able to produce little evidence for trade except some London regulations that might predate the conquest but he is able to show that by that time areas such as Lincolnshire, Wiltshire and the Berkshire Downs were sheep producing regions. There is certainly evidence that, because of the increase in arable, there was more possible sheep grazing in the 11th century as opposed to the 12th and 13th and he thinks wool was one of England's principal exports. In summary, in his own words, 'The evidence is admittedly slight, but such a trade seems the best explanation for England's growing wealth of silver at that time. England was, I suggest, rich not because of silver bearing ores or because of the riches of antiquity but because of its wool'. This is an interesting hypothesis albeit one for which there is no firm evidence; Sawyers work is perhaps most useful in showing up the almost complete lack of written information about trade prior to the conquest. (Ibid 145,161-163).

CHAPTER THIRTEEN

CONCLUDING REMARKS

All the evidence relating to textile production in Dark Age Britain, known to the writer, has been laid down in the foregoing chapters. Some readers will have noted omissions - I hope they are minor: What I hope all readers will have noted is the quality of the evidence and the amount of interpretation that can be reliably placed on it. It is salutory to take an objective view and these concluding remarks have therefore been written after the main body of the text has been finally typed and are intended as a critical commentary on it rather than as a summary.

Sampling is a wonderful thing; it enables us by looking at the part of something to make generalizations about the whole. Samples vary however and the only type that is statistically reliable is a random one which forms a significant proportion of the whole. When we look critically at the evidence collected and synthesised here it can immediately be seen to be deficient in all respects. This, I think, is a problem common to a number of areas of archaeology and this example is perhaps valuable as an illustration.

The sample numbers, in all instances, are derisory; there are statistical parameters and tests for small samples - e.g. Student's T -

but they are for random samples. What we have here is one that has been forced on us and it is useful, in estimating its worth, to outline the forces that have shaped it.

1) <u>The variability in the standard of the data at a unit level.</u>

This is a matter of the varying quality of observation not just between specialists of the present - or the absence of their use, - but over the whole period of the growth of archaeology. The information recorded about single items varies wildly as does the accuracy with which we can place them chronologically and culturally. Another aspect of the problem is the difficulty of identifying with certainty what belongs to the sample and what doesn't; textile equipment has certainly been overlooked and stray objects have found themselves included, undeservedly, in such a category.

2) <u>The variability of the data between first level units of comparison.</u>

It is a simple fact that England - in this case Saxon England - has had the lion's share of archaeological work done on it. This is partly due to apathy in other quarters and partly due to political and population reasons. The effect can be seen by contrasting e.g. our knowledge of Saxon habitation with that of the whole of Pictland. There is only one Pictish habitation site known, Buckquoy, Orkney. The Picts occupied approximately the same area of the British Isles for approximately the same length of time as did the Saxons.

3) <u>Survival of the evidence relating to physical conditions.</u>

Wool is preserved under acid conditions; vegetable fibres under alkaline. The non-acidic conditions of the most of England have preserved the wealth of bonework associated with textile equipment; the acidic highlands have destroyed it. Wooden artefacts can be preserved under waterlogged conditions but they are only to be found in certain situations. Are we to assume that the wooden distaffs, spindles and spindle whorls found in the Irish crannogs were peculiar to that era and area or were they in common use elsewhere?; was bone weaving equipment commonplace in the highlands?; and for every article of woollen clothing found in a bog - mainly undatable - were there as many made of vegetable fibres?

4) Survival of the evidence relating to culture traits.

The majority of our textile sample is Pagan Saxon and the reason for this - apart from the greater level of archaeological enquiry - is that the Pagan Saxons buried their dead with metal grave goods and metal oxides preserve, or replace textiles. Similarly the Pagan Saxons, particularly those in Kent, were taken at one time with the idea of iron weaving swords and tablet woven braids decorated with gold thread; these have survived but wooden weaving swords and woollen tablet braids were probably far more commonplace.

5) Changes in the nature of the original evidence that affected its chances of survival and hence inclusion in the present sample.

Generally only the more durable materials survive, although this is tempered by micro-environmental conditions. This means that in the case of a loom we will only find the non-wooden pieces; the warp weighted one had weights and the tablet one may have had tablets made of some other material for different types of looms nothing is likely to survive. This is the same for all artefacts which were usually made of wood but which, on occasion, may have been made of another material.

Nature, chance, cultural tradition, politics, interest, specialist abilities and a number of other factors have brought us the sample we have and, impressive though it may be as an accumulation of information, it is not randomly selected and generalisations drawn from it have to be treated with the utmost caution.

There are mitigating factors in this slightly gloomy picture for certain aspects of textile technology do hang together and where evidence is weak in one aspect it may be strong in another. We may have hardly any weaving tablets for the most part of the British Isles but we do have the tablet woven textiles and they throw light on one another and on the nature of the loom they were part and product of. Similarly although looms may be differentially preserved their products can give evidence for their existence as can the minor tools which are known to have formed part of their equipage.

A further point to be made is the way in which the Dark Ages are sandwiched between the Roman occupation and the Middle Ages, both so rich in literary references to textile production. One only has to look over Wild's splendid study of Roman textile production (1970) and to take out all the information contained in it gleaned from literary sources to realise the impoverishing effect the lack of such sources has. The person who undertakes a study of textiles and textile production in the Middle Ages will have a forbidding but fruitful task; the writer who has been dealing with the Dark Age material has found the work similar to dealing with the prehistoric (Hedges 1973). This lack of documentation has to be realised and the flimsy evidence brought forward by e.g. Sawyer (1965) for wool being the wealth of pre-conquest England is as good an example as any.

As fortune had it the time between collecting the material this thesis is based on and the actual production of the manuscript has been three years. In assessing its worth as an M. Phil., as opposed to a Ph.D., the failing was pointed out that material published in this time was missing and therefore the work could not be said to be truly up to date. Such publications as have been subsequently brought to my attention have been relatively minor and have added little new information of worth or changed any of the conclusions reached.

In some ways it is easiest to be negative; in others it is most difficult since it goes against the grain to belittle the fruits of ones own labour by putting them in perspective. The positive side of the matter is contained within the preceding chapters and I hope that I will be forgiven for not wishing to synthesise it here: I would rather it stood in its fullness and in the chapter and paragraph it has been placed. It has been methodically set out and is easily referred to with the help of the contents pages. I hope that I have set down all the evidence there is for textile production in Dark Age Britain from the fibres that were used to the final product together with the processes and equipment that were necessary. From interest and in order to put the material in perspective I have sometimes strayed a little geographically and chronologically but I feel the work to be better for it. For the very reasons given above both dating and cultural assignation have been made purposefully vague; precision should not be forced on basic information that cannot stand up to it.

If it is possible to take an overall view of a millenium over the whole of the British Isles then these concluding remarks are the place in which it ought to be done. The Romans could be highly organised in their textile production; the Dark Age production was very much a home based one. The general impression is one of uniformity and slow change with textile production being part of the domestic round - the distaff and the spear - except perhaps for the small upper strata, who still embroidered, but imported costly fabrics and garments. For the most part production must have been small scale and disorganised; part of a subsistence economy in which excess was marketable. Were it not that way then there would not be the plethora of regulations and guilds that were to arise with the incoming of the horizontal treadle loom and its associated equipment when production became the work of people whose livelihood was weaving.

APPENDIX I

ANALYSES OF WOOL SAMPLES USED FOR FIG. 2.2

Prehistoric. (Bronze Age)

Rylstone, Yorkshire	-	Hairy medium 1: gen medium 1: (Ryder 1969,498).
Bloheia, Norway	-	Generalised medium 1 (Ryder 1969,499).
Guldhoj, Vester Varnhup, Denmark	-	Hairy medium 2. (Ryder 1969,498).
Harrislee, Germany	-	Generalised medium 1; fine 1 (Ryder 1969,498).
Unterteutschenthal, Germany	-	Generalised medium 1 (Ryder 1969,498).

Roman

Balmaclellan, Yorkshire	-	Hairy medium 1: fine 1 (Ryder 1969,508). Latter referred to elsewhere as 'generalised medium fine' (Wild 1970,98).

Huntcliffe, Yorkshire	-	Gen. medium 1: fine 1. (Ryder 1969,508).
Falkirk, Stirlingshire	-	Hairy medium 1: fine 1. (Ryder 1969,508).
London	-	Hairy medium 3. (Ryder 1969,508). Referred to elsewhere as 'generalised medium fine' (Wild 1970,90).
Newstead, Melrose	-	Hairy medium 1: medium 1 (Ryder 1969,508).
St. Albans, Herts.,	-	Fine 1 (Ryder 1969,508).
Vindolanda, Northumberland.	-	Hairy 1: hairy medium 17: gen. medium 15: fine/gen. medium 8: fine 4: medium 1: short 2 Ryder (pers. comm.).
Lønne Hede, Denmark	-	Hairy medium 2: fine/gen. medium 3: fine 5 (Ryder and Hedges 1973,362).
Mainz, Germany	-	(a) Schillerplatz Fine/gen medium 8: fine 4. (Ryder 1969,508-9) (b) gen medium 1: fine/gen medium 1: medium 1: short 1. (Ryder 1969,508-9) (c) hairy medium 3: gen medium 8: fine/gen medium 11: fine 4: short 5. (Ryder and Hedges 1973,360).
Saalburg, Germany	-	Fine 2 (Ryder 1969,509). One referred to elsewhere as 'generalised medium-fine' (Wild 1970,108).
Xanten, Germany	-	Hairy medium 1: gen. medium 2: fine/gen. medium 1 (Ryder 1969,508). The hairy medium is referred to elsewhere as 'generalised medium fine' (Wild 1970,109).

Migration

Broomfield, Essex	-	Fine/gen medium 1: fine 4. (Ryder 1969,515).
Coombe, Kent	-	Hairy medium 2: generalised medium 2. (Davidson 1967,39). One hairy medium is referred to elsewhere as 'gen. medium (Ryder 1969,514).
Sutton Hoo, Suffolk	-	Fine/gen. medium 2: fine 3 (Ryder 1969,515).
Ezinge, Netherlands	-	Fine 2. (Ryder 1969,514).
Gronigen, Netherlands	-	Hairy medium 2. (Ryder 1969,514).
Leens, Netherlands	-	Hairy medium 5: gen. medium 1. (Ryder 1969,514)
Saetrang, Norway	-	Gen. medium 2. (Ryder 1969,514
Schleswig, Germany	-	Hairy medium 7. gen. medium 2: medium 1: short 1. (Ryder 1969,514).
Steinfeld, Germany	-	Gen. medium 2. (Ryder 1969,514).

Viking

Kildonan, Isle of Eigg, Hebrides	-	Hairy medium 3: gen. medium 1: medium 1. (Ryder 1968,137).

St. Andrew's Parish, Orkney	-	Hairy medium 9. (Ryder 1968,137).
York, Yorkshire	-	Hairy 3: hairy medium 7: generalised medium 5: medium 4. Ryder (pers. comm.)

Medieval

Caerlaverock, Dumfriesshire	-	Hairy medium 1: gen. medium 1. (Ryder 1968,138).
Closeburn, Dumfriesshire	-	Gen. medium 2. (Ryder 1968,138).
Exeter, Devon	-	Hairy medium 4: gen. medium 7. (Hedges forth (F))
Loch Trieg, Invernesshire	-	Gen. medium 1: fine 1. (Ryder 1968,138).
Southampton, Hants.,	-	Hairy medium 2: gen. medium 11: fine 4: medium 1: short 1. (Ryder and Hedges 1975,340).
Winchester, Hants.,	-	Hairy 1: hairy medium 4: gen medium 2. (Ryder and Hedges forth).
York, Yorkshire	-	Hairy 3: hairy medium 4: gen. medium 3: medium 2. (Ryder 1970,426).

APPENDIX II

A DESCRIPTIVE CATALOGUE OF COMPLETE AND FRAGMENTARY WOOL-COMBS

Middle Saxon

Maxey, Northants	-	Three possible teeth; two are eleven centimetres long while 8.6cms remains of one with the point broken off (Addyman 1964,60,Fig.16,15-17).
Shakenoak, Oxfordshire	-	Fourteen possible teeth; lengths are given below (the numbers are those of the excavators').

296	10cms.	297	9.6cms.	298	8.7cms.
299	8.2cms.	300	9.0cms.	301	8.8cms.
302	8.7cms.	303	11.0cms.	304	5.8cms.
305	5.5cms.	307	7.5cms.	308	6.8cms.
309	7.3cms.	310	6.2cms.		

Wicken Bonhunt, Essex	-	A pair of wool combs and four possible teeth. The lengths of the latter are 9.5cm, 7cm (incomplete), 10.5cm and 8.0cms. The former are described at length in the text (p. 31) (Hedges forth (E)). Analysis by Dr. R.F. Tylecote, Dept. Metallurgy, Univ. Newcastle showed the teeth to be steel.

Middle/Late Saxon

Hamwih, Hants.	-	Two iron spikes which are about 7cms. in length and are described as headless nails. (Addyman 1969,65,Fig.24,3,4).

Late Saxon

Eaton Socon, Huntingdonshire	-	Two possible teeth; one is complete and is 10.2cm long while 6.2cm. is preserved of the other. (Addyman 1965,65).
Little Paxton, Huntingdonshire	-	An iron spike with a length of 8.4cms but an anomalous triangular cross section. (Addyman 1969,87,Fig.16,7.).

Anglo-Danish

Lloyd's Bank, York	-	Four iron spikes found in occupation deposits are described as possible teeth for wool combs. One figured is 9.5cms long and has a maximum diameter of 0.5cms. (Addyman forth).

Viking

Harrold, Bedfordshire	-	(possibly a female Viking burial of the 9th. or early 10th. century but could be Saxon). Thirty-nine spikes 9.5cms long were found near the feet of the burial in an upright position. Traces of rust at the blunt end indicate that they were set in a wooden board to a depth of 1.5cms. (Eagles 1970,42,Fig.12,i,j,k).

Jarlshof, Shetland	-	Finds from the first phase, which dates to the first half of the 9th. century, included a shaped antler handle which may be that of a wool comb and three teeth. Two of the teeth are described as being 12cms in length. The handle is described fully in the text (p. 31). (Hamilton 1956,124,128,129,Fig.57,4,8).
Westness, Rousay, Orkney	-	A 9th century Viking woman's grave which contained a pair of wool-combs, shears and a ?weaving sword in addition to other grave furniture. The combs are described fully in the text on p. 31 . (N.M.A.S.).
Ballinaby, Islay, Argyll, Hebrides	-	Two graves side by side, one of a man and the other of a woman were discovered at the end of the last century through sand erosion near the shore. A linen smoother and silver knitted chain were said to accompany the female and fragments of helmet the male but the latter are in fact pieces of one or more wool combs and it is likely that there was some error in their attribution. The five extant fragments are in poor condition and it is only possible to say that there are the remains of at least eleven teeth with a maximum preserved length of eleven cms. and diameter of six mm. The manner in which they are fused together by rust would suggest that, as with the Westness combs, the comb or combs only had a single row of teeth. (Anon. 1876,600 in passim ; Anderson 1880, 52,63,Fig.18 ; N.M.A.S.)

APPENDIX III

CATALOGUE OF DARK AGE SPINDLES AND DISTAFFS FOUND IN THE BRITISH ISLES

Location	Material	Length (max. diam.)	Comments	Reference
England				
Oxford, (Cornmarket St.) (11th cent.)	Bone	19.8 (1.0)	Wear mark of whorl	Hassall 1971,32, Fig.6
Sutton Courtenay, Berkshire (5th-6th cent.)	Iron	24cms. (-)	Lower end hammered square; found with bone whorl wedged on.	Leeds 1947,84,pl.XXII, a,d.
York (Lloyd's Bank) (10th cent.)	Bone	20.5 1.0		Addyman forth

Location	Material	Length (max. diam.)	Comments	Reference
Ireland				
Ballinderry, Co. Offaly. (7th-9th cent.)	Wood (yew)	26cms. 1.4cms.)	Spindle?	Hencken 1942,60,fig.26 (W158).
	Wood (yew)	14.8+cms. (1.4cms.)	Distaff(?) with central embellishment	Ibid, fig.26 (W186).
	Wood (yew)			Ibid.
	Wood (yew)			Ibid.
	Wood			Ibid.
	Wood	24cms. (1.4cms)		Ibid,fig.26 (W123)
Lagore Crannog, Co. Meath. (7th-10th cent.)	Wood (hazel)	15cms. 1.3cms.)	Peg-shaped distaff?	Hencken 1950,162,fig. 82 (W99).

Location	Material	Length (max. diam.)	Comments	Reference
	Wood (yew)	6+cms. (1.3+cms)	Head of peg-shaped distaff?	Ibid,162,fig.82 (W42).
	Wood (prunus)		Frag.	Ibid,163.
	Wood (poplar)		"	Ibid.
	Wood (ash)		"	Ibid
	Wood (ash)		"	Ibid.
	Wood (ash)		"	Ibid.
	Wood		"	Ibid.
	Wood	20cms. (1.3cms)	Distaff(?) with central embellishment.	Ibid,fig.82 (A).

Location	Material	Length (max.diam.)	Comments	Reference
	Wood	14+cms. (-)	Frag.	Ibid,fig.82 (B).
	Wood (yew)	13.6cms. (1.4cms.)	Peg-shaped distaff?	Ibid,166,fig.84 (W85).
Lough Faughan, Co. Down. (7th-10th. cent.)	Wood	16cms. (1.8cms.)	Peg-shaped distaff?	Collins 1955,67,fig. 12 (73).

APPENDIX IV

CATALOGUE OF DARK AGE LOOM-WEIGHTS FOUND IN THE BRITISH ISLES

a) Loom-weights made of lead

Location	Type	Wt. (gms)	Diam. (cms.)	Thick. (cms)	Perf. (cms.)	Comments	Ref. and Mus.
Hanwell, Middlesex. (5th-6th cent: inconclusive)	A (4)	340-370 (max)	7.0	1.0	1.0	Dimensions are for one figured.	Wheeler 1935,138-9,fig.19. London mus.
Linford, Essex (5th cent.)	A	289	5.1	1.4	1.7	22 mentioned in ref; only 17 seen in mus. All, except the first, from one house.	Barton 1965,100, fig.17. Thurrock mus.
	A	263	4.7	1.4	1.7		
	A	192	5.0	1.1	1.9		
	A	259	5.3	1.4	1.8		
	A	168	5.1	0.9	1.8		
	A	210	5.4	1.1	1.7		
	A	179	5.4	0.9	1.6		
	A	276	4.8	1.6	1.2		
	A	266	6.0	1.0	1.1		

Location	Type	Wt. (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
	A	305	6.1	1.1	1.4		
	A	374	6.6	1.1	1.5		
	A	140	5.9	0.7	1.0		
	A	252	5.2	1.2	1.8		
	A	144	5.2	1.2	1.8		
	A	282	5.2	1.4	1.4		
	A	229	5.1	1.1	1.8		
	A	232	5.5	1.0	1.6		
Lower Warbank, Kent (5th-6th. cent.)	A		6.6	1.1	1.4	Appears to bear a pattern from the illustration.	Philp 1973,159, fig.49,480.
Mucking, Essex.	A	284	6.5	1.1	1.1	Excavation still in	Unpublished.
(5th-6th cent.)	A	165	6.0	0.8	0.9	progress.	Courtesy of M.
grub. 9.	A	197	4.5	1.5	0.9-1.5	Very irregular mould.	Jones Ancient Monuments
grub. 10.	A	242	5.0	1.2	1.8		Lab. and Thurrock mus.
grub. 18.	A	225	4.7	1.6	1.1		
grub. 66.	A	216	5.8	0.8	0.9	Hole off centre.	
"	A	151	5.7	0.7	0.8		
"	A	158	5.8	0.7	0.7		
"	A	205	6.1	0.9	0.9		
"	A	197	5.9	0.9	0.9	Hole off centre.	
grub. 77.	A	159	6.0	0.7	1.0	Hole off centre.	
"	A	209	6.1	0.7	1.1		
"	A	223	6.2	0.9	0.9	Hole off centre.	
"	A	172	5.9	0.8	1.1	3 marks on back - made with knife? when cooling.	

Location	Type	Wt. (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
grub.77.	A	176	5.9	0.8	0.8		
grub.79.	A	160	6.0	0.8	0.9	Not properly cast.	
	A	261	5.2	1.5	1.7	Roughly polygonal.	
grub.4.	A/B	256	6.3	0.9	2.3	Hole off centre.	
grub.17.	B	209	7.5	1.0	4.4	On back five small incomplete punctures in a row and at least 9 parallel scored lines.	
"	B	160 (200)	7.0	1.2	4.0	Incomplete (80%)	
grub. 60.	B	291	6.8	1.0	3.3	Not as well formed as this type usually are.	
-	B	247	8.0	1.0	4.8		
Stevenage,	A	340	6.9		1.0		Unpublished.
Hertfordshire	A	250	6.7		0.8		Courtesy of B.Adams.
(5th. cent.)	A	250	6.7		0.9		

b) Saxon clay loom-weights

Location	Wt. (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms)	Comments	Ref. and Mus.
Early Saxon						
Bourton-on-the-Water, Glos.		11.0		4.0	About 70 frags found	Dunning 1932,290, Pl.LV,2.
		12.4		4.0		
		10.8		4.0		
		11·6		4·0		

Location	Wt. (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Darenth, Kent	375E	11.7E	3.9	6.3E		Philp 1973,155,Fig. 46.
	490E	11.7	4.2	4.5		
Harston, Leics.		11.0	5.4	3.2		Dunning 1952,51,Fig. 5.
Linford, Essex	302	9.5	3.2	4.0		Barton 1965 73,Fig. VII. Thurrock mus.
	240	10.0	2.8	3.0		
London (Savoy site), Middsx.	508E	12.0	4.2	4.8		Wheeler 1935,139, Pl.VI. London Mus.
		11.2		3.2		
		11.2		2.6		
		13.5		3.7		
Mucking, Essex		18.0	3.1	10.0	Site in process of excavation. Information about only a sample.	M. Jones (pers. comm). Thurrock mus.
		14.0	3.5	3.0		
		10.0	3.0			
	862	12.0	6.0	4.5	Two finger holes.	
	740+	12.0	5.3	5.0	" " "	
	148	8.0	2.5	2.0		
		14.0	4.7	5.0	Unbaked	
		9.0	4.5		"	
		12.0	4.0	5.0	"	
	637	12.0	3.7	3.5	"	
	709	13.0	4.0	3.5	"	
	779	12.0	4.0	3.5	"	
	790	12.5	4.2	3.5	"	
	650	13.0	4.0	3.5	"	
		12.0	6.0	3.5	"	

Location	Wt. (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
	990	12.0	6.0	3.5	Unbaked	
	1070	13.0	5.2	3.4	"	
	1070	13.0	5.2	3.4	"	
		13.0		3.0	"	
	252	9.8	3.0	3.4		
	439	12.6	3.5	5.2		
		10.0	3.3	5.0		
		13.0				
Portchester, Hants.	261E	10.8	3.8	5.2		**Cunliffe** 1970,68, Fig.2.

Location	Wt. (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Postwick, Norfolk	215E	10.1	2.5	3.2		Clarke 1937,Fig.3. Norwich mus.
Sutton Courtenay, Berks.		8.4	2.5-	3.3	15 complete weights found + frags.	Leeds 1922,180,Pl. XXVI,Fig.3; 1926, 75,77; 1947,84,86. Ashmolean mus.
		8.7	4.0	3.0		
		8.6	"	4.2		
		8.7	"	3.6		
		13.6	"	6.0		
Upton, Northants		10.9		4.3	over 60 weights, many partially baked.	Jackson 1969,210, Pl.XXXIVb. Ashmolean mus.
		10.6		4.6		
		11.6		5.3		
		10.0		4.6		
Middle Saxon						
Hamwih, Southampton, Hants.	680E	11.3	4.6	2.3	Site in process of excavation. Information about only a sample.	Southampton Archaeological Research Committee (pers. comm.)
		10.7E				
	300	7.2E	3.5			
		10.5E	4.0			
	1400	13	7.1	2.3		
		12.5	4.3			
		10.0	3.0	2.5		
			4.5			
		11.2		1.6		
	456E	11.0	6.5			
			8.5			
	1,285E		9.0			
	430E	10.0	5.0	2.0		

Location	Wt. (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Maxey, Northamptonshire	173E 675E 860E	8.0E 11.2E 13.2E	2.0 4.2E 3.2	2.7E 2.8E 4.8E		Addyman 1964,52,54, Fig.12.
Normanby le Wold, Lincs.	675E 405E	10.4 8.2	4.4 5.2	1.8 2.0		Addyman 1970,102, Fig.2.
Shakenoak, Oxfordshire	356E	11.5	2.5	2.8	1 complete weight and 141 frags.	Brodribb 1972,148, Fig.21
Whitby, Yorkshire	630E 320E 187E	10.0 8.3 7.2	4.0 3.2 2.4	1.5 1.8 1.4	100 weights; 30 'large', 60 'medium', 10 'small'.	Peers 1933,83,Fig. 24.
Wicken Bonhunt, Essex	11.0 11.6E 11.5E	4.5 4.2	2.8 5.0E 2.4E			Hedges forth (E)
Late Saxon						
Emsworth, Hants.	866E	10.0	6.4	2.4		Bradley 1973,37, Fig.14. Portsmouth mus.
Medmerry Farm, Selsey,		11.7 11.7 11.9 12.6	6.0 approx.	1.8 1.7 2.5 2.4	Other frags found	Jope 1958,73, Fig.23, White 1934, 398-9.

Location		Wt. (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Oxford (Clarendon Hotel)			13.8	5.7	2.7	A number mentioned but details only given of 3	Jope 1958 14, Fig.23.
			13.5	4.1	1.8		
			12.0	4.2	1.8		
Rochester, Kent		1460	14.5		2.7	33 complete + frags. of at least 7 more in a kiln? Average figs given.	Harrison 1972 156, Fig. 20, No. 12.
Winchester, (St. Cross), Hants.	F10	324E	10.0	2.4	2.2	Weights found in a line (F10), in a dump (F9) and on the floor of a single hut (F5).	Hedges forth. (G).
		339	11.0	2.8	2.7		
		279	10.0	2.9	3.0		
		313	10.4	3.0	2.4		
		280E	10.0	2.9	2.5		
		326	11.1	2.7	3.0		
		294E	10.0	2.7	2.6		
		273E	10.3	2.7	2.7		
		330	10.2	3.0	2.7		
		323	10.8	2.8	3.0		
	F9	189	9.3	2.7	1.9		
		223	10.0	2.2	1.3		
		199	9.5	2.3	1.8		
		248	10.3	2.9	2.4		
		201	9.6	2.7	1.7		
		193	9.5	2.5	1.9		
		229	10.0	3.0	2.2		
		255	10.4	2.9	2.0		
		222	10.0	2.7	2.0		
		255	10.2	2.9	2.5		
		187	9.2	2.4	1.7		
		182	9.0	2.8	1.9		
		215	10.0	2.7	2.0		

Location		Wt (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
		237	9.8	2.8	1.5		
		239	9.6	2.9	1.8		
		296E	10.1	2.8	2.6		
		204	9.8	2.5	2.2		
		318	10.1	2.8	3.2		
		229	9.7	2.6	2.2		
		216	10.1	2.5	1.8		
		219	10.0	2.3	2.3		
		236	9.9	2.4	1.8		
		240E	10.0	3.0	2.0		
		225	9.8	2.5	1.8		
		213	9.4	2.5	2.0		
		208	9.7	2.5	2.0		
		221	9.9	2.2	2.0		
		215	9.9	2.4	2.2		
		204	9.5	2.5	2.0		
		234	10.0	2.3	2.5		
		218E	9.4	2.7	2.2		
		227E	9.8	2.5	1.7		
		226F	9.7	2.3	2.0		
		218	10.0	2.4	1.7		
		241	10.0	2.9	1.6		
		266E	10.0	2.7	1.9		
	F5		11.0	2.5	2.5		
York (Lloyd's Bank)		223E	9.9	3.0	3.5		A MacGregor (Pers. comm.)

Location	Wt (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Weights of Saxon form published with limited data						
Barrow-on-Soar, Leics.						Dunning, 1952,53.
Canterbury, Kent						Frere 1970,108
Carfax, Oxford		11.5				Mitford,1940,49.
Chichester, Sussex (10th cent.)						Wilson 1952,175.
Desborough, Northants.		10.5 11.4 12.9		4.2 4.2 4.0		Smith 1907,335,Fig.2.
Faversham, Kent	598E	10.9	5.1	2.4		Grove 1955,208-10, Fig.2. Maidstone mus.)
Granchester, Cambs.						Smith 1907,335, British Museum.
Grimstone End, Pakenham, Suffolk					In lines as from two collapsed looms	Brown 1954,190,198, 199.

Location	Wt (gms)	Diam. (cms)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Leicester, Leics.						Dunning 1952,53.
London (G.P.O. St. Martins le Grand)						Wheeler 1935,155.
London (Paternoster Row)						Ibid.
London (Leadenhall St.)	1320E	12.0	6.0	2.1	Four weights and frags.	Ibid, Fig.31.
London (Thames at Battersea)						Ibid.
Lower Heyford, Northants.		8.1		3.0	4 weights.	Leeds 1922,181,Fig.3. Ashmolean.
Macclesfield, Cheshire						Smith 1907,335. British Museum.
Middle Aston, Oxfordshire						Leeds 1922,181. Ashmolean.
Oxford (Headington Hill)						Leeds 1922,181. Ashmolean.

Location	Wt (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
St. Neots, Hunts. (9th cent?)						Lethbridge 1931,141, 149 ; Dunning 1959, 25. Cambs. Mus. Arch and Eth.
Shipton on Cherwell, Oxford						Leeds 1922,181 Ashmolean.
Sutton Courtenay, Berks.						Leeds 1922,181. British and Pitt-Rivers Mus.
Thetford, Norfolk	315E	9.6E	3.2	2.4E		Knocker 1967,152, Fig.15.
Waterbeach, Cambs.						Lethbridge 1931,149.
West Stow, Suffolk						S. West (Pers. comm.)
Wykeham, Yorks.						Moore 1966,417-8. Scarborough.
Yarnton, Oxfordshire						Leeds 1923,181.

Location	Wt (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
York (Hungate)	178E	8.4	3.4	4.0		Richardson 1959,85.
York (Castle)	660E	11.3	4.5	3.3	3 others mentioned	Grove 1939,113, Clifford Tower Mus.

c) Perforated stone disc loom-weights

England

Location	Wt (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
St. Mawgan-in Pyder, Cornwall (early 1st-middle 2nd cent. A.D.)			0.6	1.1	Schist	Threipland 1956, Fig.37.
			0.8	1.3	"	
		6.0E	1.1	1.4	"	
		6.6E	0.8	1.0	"	
			1.1	1.3E	"	
		5.6	0.6	0.6	"	
		8.8	0.7	1.5	"	
		5.4	0.4	1.6	"	

Scotland

Location	Wt (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Dun an Fheurain, Gallanch, Argyll (Dun)		6.0	1.1	0.9	Micaceous schist.	Ritchie 1971,109, Fig.4.
Finavon, Angus. (Vitrified fort)		10.2	1.7	1.2		Childe 1935,75.

Location	Wt (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Foshigarry, N. Uist. (Earth House)		12.0	5.5	3.1		Callander 1931,324.
Jarlshof, Shetland (Broch)		8.3		1.0	Another mentioned.	Hamilton 1956,62, Fig.29.
Kildonan Bay, Kintyre (Dun)		15.2	2.7	1.6	Schist.	Fairhurst 1939, 218-9.
		15.2E	2.7	1.8	"	
Midhowe, Rousay, Orkney (Broch)		6.3-7.6		1.0	Could be a perf. pebble loom-weight.	Callander 1934, 496,Fig.40.
Sandwick, Orkney (stray find)		8.2	1.9	1.9	Claystone.	Marwick 1928,122.
West Plean, Stirlingshire (1st cent. B.C. & A.D. settlement)		12.0		5.0	Sandstone.	Steer 1956 246, Pl.XIX.
		7.0			Micaceous schist.	
Wales						
Caerau, Caernarvon ("Romano-British" settlement)		22.4E		1.2		O'Neill 1936,316, Pl.LIV.
		5.6		1.2		
		14.0		1.6		
		20.0		0.9		
		15.4		2.4		
		5.6		0.8		
		4.4-8.4		0.6		
		4.9			Partially perforated	
		8.8			" "	

Location	Wt (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Dinas Emrys, Beddgelert, Caernarvonshire (Unstratified on hill fort; Dark Age?)		5.8	0.8		Slate	Savory, 1954, 69
Pen Dinas, Cardigan (Dark Age hill-fort)					Two stone loom-weights mentioned.	Forde 1963, 153.
Penmaenwawr, Caernarvon (Unstratified on hill fort - Dark Age?)		7.5	1.9	2.1		Hughes 1923, 260-1. Fig. 14.
Rhostryfan, Caernarvon ("Romano-British" settlement)		7.0		0.8	Slate. Several mentioned.	Williams 1923, 92-3, Fig. 3.
St. David's Head, Pembroke (Dark Age hill-fort)						Gould 1899, 124.
Ireland						
Ballinderry, Co. Offaly (8th cent. crannog)		10.0	1.7	0.4	Irregular. Sandstone. A shale one mentioned.	Hencken 1942, 65, Fig. 32.

Location	Wt (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Beginish, Co. Kerry (Early Christian settlement)		8.0-10.3	1.5	1.8	Hole not central.	O'Kelly 1956,Fig.5
Belfast, (Shaneen Park) Co. Antrim (Rath)		9.9	3.7	1.1		Proudfoot 1958, Fig.6.
Clea Lakes, Co. Down (Early Christian Crannog)		9.8	3.6	1.6		Collins 1959,98, Fig.3.
Cush, Co. Limerick (Early Christian ring forts)		8.4 9.9	2.6 1.8	1.2 1.8	Sandstone. "	O'Riordain 1940, 158,Fig.40.
Freestone Hill, Co. Kilkenny (4th cent. hill fort)		5.8 8.4 6.0	0.8 1.5	1.1 0.8	Irregular.	Raftery 1969,60, Fig.26.
Garranes, Co. Cork (Ring fort)						O'Riordain 1942, 111,Fig.13.
Lagore, Co. Meath (Unstratified on 7th-10th cent. crannog)		8.1 8.4 8.1	3.8 2.9 1.5	1.7 1.2 1.0	Sandstone. " Limestone	Hencken 1950,177, Fig.92.

Location	Wt (gms)	Diam. (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Lough Faughan, Co. Down (7th-10th cent. crannog)		6.9 8.8	2.4 4.0	1.1 1.9		Collins 1955,69, Fig.10.

d) Perforated pebble loom-weights

Location	Wt (gms)	Height (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
England						
York (Clifford St.) (Viking?)						Bjørn 1940,95, Fig.61.
Scotland						
Braidwood, Midlothian (1st cent? A.D. hill-fort)		8.0	6.5 x3.0	1.5		Stevenson 1949,11.
Freswick, Caithness (late Viking house)		7.0	3.0 x4.0		Two	Childe 1943,14
Hownam Rings, Roxburgh (3rd cent. hill-fort.)						Piggott 1948,217, Fig.11.

Location	Wt (gms)	Height (cms.)	Thick. (cms.)	Perf. (cms.)	Comments	Ref. and Mus.
Jarlshof, Shetland (9th-14th cent. Viking settlement)					150+	Curle 1934,301,303-4,Fig.39. Hamilton 1956,117, Figs. 37,54. N.M.A.S.
Midhowe, Rousay, Orkney (Broch.)		9.0	3.5 x3.5			Callander 1934.
Underhoull, Unst, Shetland (9th cent. Viking settlement)						Small 1965,244.
Ireland						
Church Island, Co. Kerry (Early Christian monastery)					Slate.	O'Kelly 1958,98,101 Fig.9.

APPENDIX V

CATALOGUE OF DARK AGE PIN-BEATERS FOUND IN THE BRITISH ISLES

a) Saxon pin-beaters

Location	Length (cms.)	Thick. (cms.)	Description/ Comments	Reference
Early Saxon				
Abingdon, Oxon.	12.2	0.8	Piece split cattle long bone pointed at both ends.	Avery 1972,71, Fig.5.
Harston, Leics.	9.8	1.2	"	Dunning 1952,49,Fig.2.
Sutton Courtenay, Berks.	9.8	0.7	"	Leeds 1923,157,163
	13.4	0.7	"	167,168,Pl.XXVIII;
	8.0	0.7	"	1927,70,Pl.VII;
	9.2	0.7	"	1947,88,Pl.XXII.
	8.0	0.7	"	Ashmolean mus.
	6.8	0.8	"	
	11.4	0.8	"	
	5.4	0.5	"	
	12.6	0.6	"	
	7.2	0.6	"	
	3 Frags.			

Location	Length (cms.)	Thick. (cms.)	Description/ Comments	Reference
West Stow, Suffolk	9.2	0.9		S. West pers. comm.
Wykeham, Yorks.	10.0	0.8	"	Addyman 1964,64. Moore 1966,410, Pl.II. Scarborough mus.
Middle Saxon				
Maxey, Northants.	11.8 11.0	0.8 0.8	"	Addyman 1964,64, Fig.16
Normanby le Wold, Lincs.	2.8	0.9	"	Addyman 1970,102, Fig. 2.
Shakenoak, Oxon.	16.5 15.0 14.4 13.2 13.1 Frags.	0.75 0.8 1.0 0.7 0.7	"	Brodribb 1972,122, 129, Figs. 62,63.
Wicken Bonhunt, Essex	14.6 13.0	1.0	" " but crude and assymetrical.	Hedges forth (E)

Location	Length (cms.)	Thick. (cms.)	Description/ Comments	Reference
Middle and Late Saxon				
Hamwih, Hants		1.0	" decorated.	Hedges forth (B).
	14E	0.6-1.4	" crude.	
	12.8	0.8	"	
	11.0+	0.8	"	
	10.8	0.9	"	
	15.0	1.2	"	
	10.0+	1.0	"	
	13.0	0.95	"	
	8.8	0.9	"	
	8.5	0.8	"	
	10.4	1.0	"	
	Frags.			
Late Saxon				
Eaton Socon, Hunts.	Frag.		"	Addyman 1965,68, Fig.11.
Gosport, Hants	13.6	0.8	"	Lewis 1973,46, Fig. 19.
Great Paxton, Hunts.	7.1	1.1	"	Lethbridge 1931, 100,Fig.2.
Little Paxton, Hunts.	10.0	1.2	"	Addyman 1969,87, Fig.16.

Location	Length (cms.)	Thick. (cms.)	Description/ Comments	Reference
Oxford (Clarendon Hotel)	7.8	0.7	"	Jope 1958,73,Fig.25.
Wareham, Dorset	7.6	0.6 -1.0	"	D. Hinton pers. comm.
	7.0	0.5 -0.7	"	
Undated but Saxon				
Cambridge (Mill Road)	8.4	0.9	"	Hughes 1906,392,Fig.5.
	16.4	0.8	"	
Grimstone End, Suffolk	10.8	0.9	"	Brown 1954,199, Fig.30.
Example quoted as Roman by Wild (1970,134)				
Cirencester, Gloucester	14.2	1.0	" "Roman town"	Corinium Mus. Cirencester .
Eastington, Gloucester	14.6	0.9	"A.D.50-"200?"	

Location	Length (cms.)	Thick. (cms.)	Description/ Comments	Reference
Richborough, Kent	8		"Unstrat" on fort site	Bushe-Fox 1949, 132,Pl. XXXIX.
York (Railway Station Cemetery	8	0.9	"Female" grave with comb. Fourth century?.	York Mus.
York	18	1.2	"Roman?" (Possibly a spindle)	Mus. Antiquities, Newcastle.

b) Pin-beaters of Saxon type found on sites in north-west Europe dated from the 4/5th century to the 11/12th. (For examples from European contexts of the Roman period see Wild 1970,table K.)

South Scandinavia.

Location	Length (cms.)	Thick. (cms.)	Description/ Comments	Reference
Birka, Sweden			Viking. Late 9th/10th.	Roes 1965,42.
Rings, Gottland, Sweden			Migration.	108, Fig.374.
Vallhagar, Gottland, Sweden			Migration. Mostly 2nd-6th	Stenberger 1955 1071, 1108,Fig.457.

Location			Reference
North Germany			
Hedeby, Germany	Viking 9th-mid 11th.		Roes 1965,42.
Tofting, Schleswig-Holstein, Germany	Migration 4th-5th.		Bantelmann 1955, 71,Taf.36
Netherlands			
Ezinge, Groningen, Holland.	5th		Van Giffen 1936, Abb. 2.
Domburg, Zeeland, Holland	Carolingian		Roes 1963,34.
Dorestad, Wyk, Holland	Carolingian. 9th.	Single ended variant found.	Roes 1965,54,Pl. XXIII, 57,Pl.XXV.
Frisian terpen.	Carolingian?		Roes 1963,34,Pl. XXXVI
Frisian	11th.		Bantelmann 1955, 71
North France			
Brebieres, Douai, Pas-de Calais, France	Merovingian 6th-7th.	Single ended variant found.	Demelon 1972,74, Fig.21, 100, Fig. 29.

APPENDIX VI

CATALOGUE OF DARK AGE SWORD BEATERS FOUND IN THE BRITISH ISLES

Location	Context	Material	Length (cms.)	Width (cms.)	Thick. (cms.)	Comments	Ref. and Mus.
Pagan Saxon : England							
Bifrons, Kent		Iron	52	4.2	0.4 (approx)		Chadwick 1958 30. Maidstone.
		Iron				Same as the above?	Millard 1969 18. Maidstone.
Broomfield, Essex	Rich barrow burial.					Male as well as female accoutrements were with this burial suggesting it was double; it is possible that one of the swords (discarded) was a sword beater.	Davidson 1967, 10.

Location	Context	Material	Length (cms.)	Width (cms.)	Thick. (cms.)	Comments	Ref. and Mus.
Chessel Down, Isle of Wight, Hampshire	Rich woman's grave.	Iron	51	4.2	0.5 (approx)	By r. arm.	Hillier 1860 30,35,(Fig.) 29. Wyatt 1868, 146,(Fig.) 147. Chadwick 1958,30, Fig.7,d. British.
Dover (Buckland), Kent	Rich woman's grave.	Iron					Millard 1969 18,22.
	Rich woman's grave.	Iron					Ibid.
	Rich woman's grave.	Iron					Ibid.
Finglesham, Kent	Rich woman's grave.	Iron	52.5	4.5	0.45 (approx)	By r. leg Pattern welded.	Chadwick 1958 12, Fig.7,F.
	Rich woman's grave.	Iron					Millard 1969, 18,22.
Holywell Row, Suffolk	Rich girl's grave.	Iron				Outside coffin	Lethbridge 1931, 4-5,Fig. 3.2 Chadwick 1958,30, Fig.7,b. Cambridge Mus. of Arch. and Ethnog.

Location	Context	Material	Length (cms.)	Width (cms.)	Thick. (cms.)	Comments	Ref. and Mus.
Luton (Wallud's Bank), Bedfordshire		Iron	24				Austin 1928,182. Luton.
Mitcham, Surrey	Woman's grave.	Iron	58	3.6		L. waist	Anon 1905,4 5,Fig.2. Bidder 1905,52,55,Fig.8.
Ozingell, Kent	Grave.	Iron	59	4-5			Hillier 1850 35. Smith, 1860,147. Fig.3.Wyatt 1868,146
	Grave.	Iron	55.5	4.5			Millard 1969 12,17,Fig.2.
Sarre, Kent	Rich woman's grave.	Iron					Brent 1860, 534; 1863,31-12,Wyatt 1868,146.
	Rich woman's grave.	Iron.					Brent 1863,310. Wyatt 1868,146.
Late Saxon : England							
Wallingford, Oxon.		Bone	20+5		0.5	Inscribed	Reading Mus.

Location	Context	Material	Length (cms.)	Width (cms.)	Thick. (cms.)	Comments	Ref. and Mus.
Early Christian : Ireland							
Ballinderry, Co. Offaly	Crannog site.	Wood	104	9.6	1.6		Hencken 1942.60, Fig.26.
Viking : Scotland							
Westness, Rousay, Orkney	Rich woman's grave.	Iron	60+	3.5	0.6	Handle (?) 16cms long	N.M.A.S.
Viking : Ireland							
Dublin	Habitation	Wood (yew)	25.4	5.4	1.2		O'Riordain 1971,73 Fig.22.
Unknown Date : England							
Cambridge, nr. Ely	Unprovenenced	Iron	61	5.8	0.3		Allen 1967,334, Pl.XXXII Cambridge Mus. Arch. and Ethnog.
Cambrdige, nr. Barrington	Unprovenenced	Iron	58+	5.8			Ibid. Cambridge Mus. Arch. and Ethnog.
Northamptonshire, nr. Brixworth	Unprovenenced	Iron	45	3.8			Allen 1967,334. Northampton.

Location	Context	Material	Length (cms.)	Width (cms.)	Thick. (cms.)	Comments	Ref. and Mus.
Northamptonshire	Unprovenenced	Iron					Ibid.
Northamptonshire	Unprovenenced	Iron					Ibid.

APPENDIX VII

CATALOGUE OF DARK AGE WEAVING TABLETS FOUND IN THE BRITISH ISLES

Location	Context	No	Shape	Material	No holes	Dimensions	Comments	Ref. and Mus.
Scottish								
Broch of Burrian, N. Ronaldsay, Orkney	'Pictish' levels.	1	Circular	Bone	2	3.2		N.M.A.S. Beveridge 1931, 353.
Brough of Birsay, Orkney	Early Norsel or pre-Norse		Square	Bone	4	3.2 x 3.2		C. Curle. Pers. comm.
Foshigarry, N. Uist	Earth House	1 1	Circular Circular	Bone Bone	4 3	13.0	Holes in a row	Beveridge 1931, 353, Fig.11
Jarlshof, Shetland	Broch	2	Circular	Bone	2	3.2	One with pair surplus holes	N.M.A.S. Beveridge 1931, 353.
	Wheelhouse	1	Square	Bone	4	3.6 x 3.6	Incised central square. Only possibly a tablet	Hamilton 1956, 77, Fig.39.

Location	Context	No	Shape	Material	No holes	Dimensions	Comments	Ref. and Mus.
Keill Cave, Kintyre	4th cent?	1	Triangular	Bone	3	4.8 x 4.4		N.M.A.S. Ritchie 1967,105,fig 2.
Skirza Head Caithness	Broch	1	Square	Bone	4			Beveridge 1931, 353.
Tain, Ross-shire	Midden	1	Square	Bone	4	3.5 x 3.5		Beveridge 1931, 353.
Irish								
Lagore, Co. Meath	7-10th cent Crannog	10	Triangular	Bone	3	8.0 x 6.0	Found seperately	Hencken 1950, 196,fig 106.

APPENDIX VIII

PARTIAL CATALOGUE OF DARK AGE BONE BODKINS FOUND IN THE BRITISH ISLES

Location	Type	Length (cms)	Max. W. (cms)	D. Hole (cms)	Reference
Early Saxon					
Bourton-on-the-water, Gloucestershire	A B	7.0 5.0 +	1.2 1.0		Dunning 1932, Fig.6.
Lower Warbank, Kent	A	9.0	1.2	0.6	Philp 1973, Fig.49.
Sutton Courtenay, Berkshire.	A	12.0	1.4	0.6	Leeds 1947, pl 22.
Waterbeach, Cambridgeshire	?	7.5+			Lethbridge 1932, Fig.2
West Row, Hunts.	A	9.0+	1.1	0.5	Lethbridge 1932,Fig. 2

Location	Type	Length (cms.)	Max. W. (cms.)	D. Hole (cms.)	Reference
West Stowe, Suffolk	A	9.7	1.1		West, Pers. Comm.
Middle Saxon					
Hamwih, Hampshire	A	12.0	1.3	0.6/0.4	Southampton Archaeological Research Committee.
	A	12.2	1.3	0.5	
	A	11.5	1.3	0.5	
	A	10.4	0.9	0.4	
	A	9.6	0.9	0.35	
	A	8.2	0.7	0.3	
	A	12.0	1.4	Unperf.	
	B	8.6+	0.9	0.6/0.4	
	B	4.0+	0.9	0.5/0.4	
	B	4.3+	0.7	0.4/0.3	
	& fragments.				
Shakenoak, Oxon	A	10.5	1.3	0.6/0.4	Brodribb 1972, **Fig.**64
	A	9.0	1.2	0.5	
	B	8,6	0.8	0.7/0.35	
		6.3+	0.9	0.4/0.3	
Whitby	B	11.2			Peers 1943, Fig.21
Wicken Bonhunt, Essex	A	9.2		Unperf	Wade Pers. Comm.
	A	9.0+			

Location	Type	Length (cms.)	Max.W. (cms.)	D. Hole (cms.)	Reference
Late Saxon					
Eaton Socon, Cambs.	A	7.0	1.0	0.5	Addyman 1965, Fig.11.
Gloucester, Glos.	A Dec	14.5	1.4	2 perf 0.4	Hedges forth. (J)
	A Dec	16.0	1.7	0.35	
	A Dec	13.5	2.0	0.35	
	A Dec	7.5+	1.3	0.4	
	A Dec	4.5+	1.7	0.35	
	A Dec	9.5+	1.5	0.5	
	& fragments.				
Anglo-Danish					
York	A	6.6	1.4	0.6	Richardson 1959, Fig.19.
Irish Dark Age					
Clea Lakes Crannog, Co. Down	A	10.8	1.4	0.5	Collins 1959, Fig.2.
Freestone Hill, Co. Kilkenny	B	9.6	0.65	0.25	Raftery 1969, Figs. 25, 23.
	B	7.5+			

Location	Type	Length (cms.)	Max.W. (cms.)	D. Hole (cms.)	Reference
Scottish Dark Age					
Keil Cave, Kintyre	A	8.4	1.4	0.4	Ritchie 1967, Fig.2.
	B	7.0+	0.8	0.2	
Viking					
Jarlshof, Shetland	A	8.0	1.1	0.4	Hamilton 1956, 126-7, Fig.59.
	A	9.2			
	B	13.0	1.2	0.5	
		14.0			
Brough of Birsay, Orkney	A, B & C present				C. Curle Pers. Comm.

APPENDIX IX

CATALOGUE OF DARK AGE AND MEDIAEVAL LINEN-SMOOTHERS FOUND IN THE BRITISH ISLES

a) Glass

Location	Diam. (cms.)	Thick. (cms.)	Description/ Comments	Ref/Mus.
Norse				
Ballinaby, Islay, Argyll, Hebrides	7.0	2.6	Black	Anderson 1879,63-64, Figs.19-23 Marwick 1928,121,Fig.1.
Anglo-Danish				
Lloyd's Bank, York				A. MacGregor (Pers. Comm.)

Location	Diam. (cms.)	Thick. (cms.)	Description/	Ref./Mus.
Medieval				
Hangleton, Hove, Sussex (13th-14th)	7.2 7.0	2.8 3.4		Holden 1963, 163 Fig.35. Barbican House, Lewes.
Rievaulx Abbey, Yorks. (Founded c1128)				Holden 1963, 163.
Not closely dated				
England				
Cambridge (Mediaeval?)	(12.8)	(6.0)	Scale of figure surely incorrect	Addyman 1965, 128, Fig.21.
Chester, Cheshire (Viking?)			Dark	Bjørn 1940,69, 71. Grosvenor Mus.
Pevensey Castle, Sussex (Mediaeval)	8.0E	3.5E		Holden 1963,164, Barbican House, Lewes.
Pulborough, Sussex (Mediaeval)	8.0E	3.5E		Holden 1963, 164, Barbican House, Lewes.

Location	Diam. (cms.)	Thick. (cms.)	Description/	Ref./Mus.
Selmeston, Sussex (Mediaeval).	8,0E	3.5E		Holden 1963,164. Barbican House, Lewes.
Therfield, Herts. 11th, 12th or ? 13th	5.3	1.9	Dark	Biddle 1964, 81-2, Fig.23.
York (Clifford's Street) (Late Saxon to early mediaeval)	9.2 7.4	3.0 4.4		Bjørn 1940,95,96. Waterman 1959, 96, Fig.22.
Scotland				
Broch of Gurness, Orkney (Viking?)	8.2	3.1	Dark	Unpublished material at Scot. D.O.E. H.Q.,
Howe, Cairston, Nr. Stromness, Orkney (Viking?)	10.0	4.0		Marwick 1928, 121.
Perth (Viking?)	8.2	3.1	Dark green	Grieg 1940,156,Fig.72. National Museum Antiquities, Scotland.
Ireland				
Dublin (Viking?)	7.6		Dark	Bjørn 1940,49.

Location	Diam. (cms.)	Thick. (cms.)	Description/	Ref./Mus.
b) Stone				
Middle and Late Saxon				
Hamwih, Hants	6.6 x 5.4 x 2.4 16.5 x 7.7 x 3.7			Addyman 1969,70, Fig.30.
Welsh Dark Age				
Dinas Powys, Glamorgan (5th-6th)				Alcock 1963, 162.
Irish Early Christian				
Clea Lakes, Co. Down	11.5 x 6.5 x 2.0			Collins 1959,98.
Belfast (Shaneen Park) (early 10th-early 12th)	10.2 x 5.9 x 2.7			Proudfoot 1958, 301, Fig.6.

Location	Diam. (cms.)	Thick. (cms.)	Description/	Ref./Mus.
Scottish (not closely dated)				
N. Uist, Hebrides	7.6 x 6.6 x 2.7			National Museaum Antiquaries, Scotland.
c) Whalebone				
Scottish Dark Age				
Broch of Burrian, Orkney				Anderson 1871, 560-61. National Museum of Antiquaries, Scotland.

APPENDIX X

CATALOGUE OF DARK AGE TEXTILES FOUND IN THE BRITISH ISLES

Early Saxon

Barrington A, Cambridgeshire (Cemetery)	R			Z x Z		Crowfoot E., pers. comm.
	R				Tablet braid	
	R			Z x S		
	R		Twill	14/Z x 13/Z		
	R		Twill	Z x Z		
	R			Z x S		
	R		Plain?	Z x Z		
	R		Twill	Z x Z		
	R		Plain	24/Z x 12		
	R				Tablet braid	
	R		Twill	12/Z x 12/Z		
	R				Tablet braid	
	R		Twill?	Z x S		
	R			Z x S		
	R	Wool?	Plain	10/Z x 10/Z		
	R	Wool?			Tablet braid	
	R				Tablet braid	
	R		Plain Z x Z			

Barrington B, Cambridgeshire (Cemetery)	R		Twill	Z x S		Crowfoot E., pers. comm.
	R		Twill	Z x S		
	R		D twill	Z x S		
	R			Z x S		
	R		2/2 twill	12/Z x 10/Z		
	R		Twill?	9/Z x Z		
	R		Twill	16/Z x 12/Z		
	R		Plain	16/Z x 12/Z		
	R		2/1 twill	18/Z x 12/Z		
	R		Plain	Z x Z		
	R			Z x Z		
	R			Z x Z		
	R		Plain	14/Z x 14/Z		
	R		Plain	16/Z x 12/Z	Weaving error	
	R			Z x S		
	R			Z x Z		
	R		Twill	Z x Z		
	R		Twill	Z x Z		
	R	Veg.	2/2 twill	14/Z x 12/Z	Tubular side selvedge	
	R	Veg.			Tablet braid	
	R		Twill	Z x S		
	R				Tablet braid	
	R		Twill	Z x Z		
	R				Tablet braid	
	R		Twill	16/Z x 16/Z		
	R				Tablet braid	
	R		Twill?	Z x S		
	R			Z x Z		
	R			Z x S		

Barrington, Cambridgeshire (Cemetery)	R			Z x S		Crowfoot E., Pers. Comm.
	R		Twill	Z x Z		
	R		2/2 twill	18/Z x 16/Z		
	R		Twill	Z x S		
	R				Tablet braid	
	R	Flax	2/2 D twill (IM) type A)	17/Z x 17/Z		Crowfoot, G. 1950,30-32,pl 6, Fig. 3.
Bekesbourne, Kent (Cemetery)	R	Flax?	Plain	8/Z x 7/Z		Crowfoot E., Pers. comm.
	R	Wool?			Tablet braid	
Bifrons, Kent (Cemetery)	R		Plain	16/Z x 9/Z		Crowfoot E., Pers. comm.
	R		Plain	23/Z x 12/Z		
	R		2/1 twill?	Z/ x Z		
	R		Plain	14/Z x 14/Z		
	R		2/2 twill?	Z x Z		
	R		Plain	12/Z x 12/Z		
Bifrons or Sarre, Kent (Cemetery)	R		Plain	18/Z x 14/Z		Crowfoot E., Pers. comm.
Bifrons, Kent (Cemetery)	I				Gold braid	Crowfoot 1967, 67.
	I				Gold braid	
	I				Gold braid	
	I				Gold braid	
	I				Gold braid	
Bishop's Cleeve, Gloucestershire (Cemetery)	R	Wool?	Plain	12/Z x 8/Z		Crowfoot, E., Pers. comm.
	R	Veg.			Tablet braid	

Black Patch, Wiltshire (Cemetery)	R				Pile or nap?	Crowfoot E., Pers. comm.
	R			Z x Z		
	R		Twill?	Z x Z		
	R		Plain	12/Z x 12/Z		
	R			Z x Z		
	R		Plain	14/Z x 12/Z		
	R				Tablet braid	
	R		Plain	12/Z x 12/Z		
	R				Tablet braid	
	R		Twill	Z x S		
	R		Plain	20/Z x 20/Z		
	R	Flax?	Plain	16/X x 16/Z		
Blewburton Hill, Berkshire (Cemetery)	R	Wool?	2/2 twill	10/Z x 11/Z		Henshall 1959, 68-72
	R				Tablet braid	
	R				Tablet braid	
Brightwell Heath, Suffolk (Barrow)	R	Flax	Plain	24/Z x 15/Z		Crowfoot 1967, 38.
Broadway Hill, Worcestershire (Cemetery)	R					Cook 1958,66, **Fig. 7.**
Broomfield, Essex (Barrow)		Wool?	2/2 D twill (IM type A)	22 x 19		Crowfoot 1958, 37 ; 1967,37 ; 1969, 51. Carus-Wilson 1969,159.
		Wool?	2/2 D twill (IM type?)	Z x S	Tablet woven finishing border	
					Tablet braid	
		Wool?	2/1 twill	23/19		Crowfoot 1966,30.

Broomfield, Essex (Barrow)	R				Pile?	Bruce-Mitford 1952.6
Buckden, Kent (Habitation)	I I		Twill 2/2 D twill (IM type?)	Z x Z 16/Z x 14/S		Crowfoot, E., Pers. comm.
Burwell, Cambridgeshire (Cemetery)						Lethbridge 1928. 98, 100, 103.
Burwell, Cambridgeshire (Cemetery)	R					Lethbridge 1931, 60.
Bury St. Edmunds, (W. Garth Gardens), Suffolk (Cemetery)	R				Pile or nap	Crowfoot, E., Pers. comm.
Caistor by Norwich, Norfolk	R R R	Flax? Flax? Flax?	2/2 twill 2/2 twill 2/2 twill	10/Z x 10/Z Z x S Wa/16/Z x We/14/Z	 Selvedge of some sort	Chambers 1973, 232-3.
Caistor on the Wolds, Lincolnshire (Cemetery)	R				Tablet braid	Crowfoot, E., Pers. Comm.

Cambridge, (St. John's Cricket Field) Cambridgeshire (Cemetery)	R	Veg.			Tablet braid	Crowfoot 1950, 28-30, P16, Fig. 2.
Cassington, Oxfordshire (Cemetery)						Leeds 1942, 64.
Chatham Lines, Kent (Barrow burial)	I				Gold braid	Crowfoot 1967, 68.
Chessell Down, Isle of Wight (Cemetery)	I				Gold braid	Crowfoot 1967, 71.
Coombe, Kent (Barrow)		Wool Wool Wool	Plain 2/2 D twill (IM type A + variant ?)	9/Z x 6/Z Wa/14/Z x We/12/S	 Tablet woven finishing border + weaving mistake. Tablet braid	Crowfoot 1967, 37-9.
Dover, Kent (Cemetery)	R		2/2 D twill (IM type)	25 x 18		Crowfoot 1958, 37; 1969,51
Dover, Kent (Cemetery)	R				Pile or nap	Crowfoot, E. Pers. comm.
Ewell, Surrey (Cemetery)	R					Lowther 1963, 296.

Faussett, Kent (Cemetery)	R		Plain	24/Z x 20		Crowfoot, E., Pers. comm.
	R				Tablet braid	
Faversham, Kent (Cemetery)	I				Gold braid	Crowfoot 1967, 69.
	I				Gold braid	
	I				Gold braid	
	I				Gold braid	
	I				Gold braid	Crowfoot 1968, 210.
Finglesham, Kent (Cemetery)	R		Plain	20/Z x 15/Z		Crowfoot E., Pers. Comm.
	R			8/Z x 8/Z		
	R	Flax?	Plain	20/Z x 15/Z		
	R		Plain	22/Z+S x 17/Z+S	Spinning pattern	
	R		Twill	22/Z x Z		
	R		Plain	16/Z x 14/Z		
	R		Plain	28/Z x 22/no spin		
	R		Twill?	Z x Z		
	R		Plain	16/Z x 12/Z		
	R		Twill	Z x S		
	R		Plain	12/Z x 12/Z		
	R		Twill	Z x S		
	R		Plain	20/Z x 18/Z		
	R		Twill	Z x Z		
	R		Twill	Z x S		
	R		Plain?	Z x Z		
	R	Flax	Plain	22/Z x 12/Z		
	R		Twill	Z x S		
	R	Flax?	Plain	30/Z x 16/Z		
	R		Plain	18/Z x 16/Z		
	R		Plain	17/Z x 11/Z		
	R		Plain	18/Z x 14/Z		
	R		Plain	20/Z x 14/Z		
	R			20/Z x 14		

R		Twill	Z x Z	
R		Plain	17/Z x 14/Z	
R		Plain	20/Z x 16/Z	
R		Plain	22/Z x 15/S	
R		Plain	Z x Z	
R	Flax	Plain	17/Z x 14/Z	
R				Plait
R		Plain	36/Z x 26/Z	
R		Plain	6/Z x 6/Z	
R			Z x S	
R		Plain	20/Z x 15/Z	
R		Plain?	Z x S?	
R		Plain	24/Z x 18/Z	Weaving error
R		D or C twill	14/Z x 14/Z	
R	Flax?	Plain	16/Z x 16/Z	
R		Plain	18/Z x 16/Z	
R		Plain	16/Z x 16/Z	
R		Plain	18/Z x 10/Z	
R		2/2 twill	14/Z x 14/Z	
R		Plain	25/Z x 16/Z	
R		Plain	16/Z x 16/Z	
R		Plain	27/Z x 21/Z	
R		2/2 twill	18/Z x 16/S	
R	Flax?	Plain	14/Z x 10/Z	
R	Flax	Plain	25/Z x 16/Z	
R			Z x Z	
R		Plain	28/Z x 22/Z	
R		Plain	18/Z x 11/Z	
R		Twill	Z x S	
R	Flax?	Plain	22/Z x 16/Z	
R		Plain	22/Z x 14/Z	
R		2/2 twill	14/Z x 12/S	
R	Plain or	$\frac{1}{2}$ basket	24/Z x 10/2S + 2Z	
R		Plain	14/Z x 14/Z	
R		C or D twill	18/Z x 14/S	

	R		Plain	20/Z x 14/Z		
	R		Twill	Z x S		
	R		Plain	20/Z x 14/Z		
	R		Plain	16/Z x 12/Z		
	R		Plain	16/Z x 12/Z		
	R		Plain	10/Z x 10/S		
	R			24/Z x 15/Z		
	R			Z x Z		
	R	Flax	Rosette twill	16/Z x 16/Z		
	R		Devolved ½ basket	20/Z x 20/Z		
	R		Plain	22/Z x 22/Z		
	R				Tablet braid	
	R				Tablet braid	
	R		2/2D? twill (IM?)	17/Z x 14/Z		
	R		Plain	15/Z x 15/Z		
	R		C or D twill (IM)	12/Z x 11/S		
	R		2/2 D twill (IM type B)	20/Z x 18/Z		
	R		Plain	14/Z x 13/Z		
	R		Plain	21/Z x 12/Z		
	R		Twill	11/Z x S		
	R		Twill	14/Z x 12/S		
	R		2/2 D twill (IM type)	23/Z x 18/S	Tablet woven starting or side selvedges	Crowfoot 1958, 36.
	R				Tablet braid	
Fonaby, Lincolnshire (Cemetery)	R		2/2 D twill (IM type)	16 x 14		Crowfoot 1969, 51.
					Tablet braid dyeing.	Crowfoot E., Pers. comm.

Fordcroft, Kent (Cemetery)	R	Wool?	2/2 D twill (IM type)	14/Z x 12/S		Crowfoot 1969, 51-2.
	R	Wool?	2/2 twill	9/Z x 9/Z		
	R	Flax?	2/2 twill	15/Z x 15/Z		
	R		Plain	15/Z x 15/Z		
	R	Flax?	Plain	14/Z x 14/Z		
Foxton, Cambridgeshire (Cemetery)	R					Fox 1923, 39
Great Tew, Oxfordshire (Cemetery)	R	Flax	Plain	13/Z x 18/Z		Crowfoot, E., Pers. comm.
Guildown, Surrey (Cemetery)						Lowther 1931 40-1.
Haslingfield, Cambridgeshire (Cemetery)	R			Z x S		Crowfoot, E, Pers. comm.
	R		Plain?	Z x Z		
	R		Twill	Z x Z		
	R				Tablet braid	
	R				Tablet braid	
	R			Z x Z		
	R		Plain?	Z x Z		
	R		Twill	Z x S?		
	R	Veg.		Z x Z		
	R				Tablet braid	
	R			Z x Z		
	R		Twill	16/Z x 12/Z		
	R				Tablet braid	
	R				Tablet braid	
	R		Twill	13/Z x 12/Z	Tubular side selvedge	

Holywell Row, Suffolk (Cemetery)	R	Flax?	Plain	19/Z x 13/Z	Gold braid	Lethbridge 1931, 4-5. Crowfoot 1967, 72, Fig.14. Lethbridge ibid. Crowfoot, E., Pers. comm.
	R	Wool?	2/2 twill	7/Z x 7/Z		
	R		Plain	11/Z x 8/Z		
Horndean, Hants. (Cemetery)	R		Plain	18/Z x 9/Z		Crowfoot E., Pers. comm.
	R		Plain	16/Z x 14/Z		
	R		D? twill	20/Z x 17/Z		
	R		D twill?	22/Z x 13/S?		
Howletts, Kent (Cemetery)	R		2/2 twill?	12/Z x 10/Z		
	R		Plain			
	R		Twill			
	R		2/2 twill	11/Z x 10/Z		
	R		2/2 twill	Z x Z		
	R		Plain	16/Z x 16/Z		
	R		Plain(repp)	Wa/50/Z x We	Tape	
	R		Twill	S x S	weaving error?	
	R		2/1 twill?	S x S		
	R		Plain	14/Z x 12/Z		
Howletts, Kent (Cemetery)	I				Gold braid	Crowfoot 1967, 69.
	I				Gold braid	
Ipswich (Hadleigh Rd.,), Suffolk (Cemetery)	R	Veg.	Plain	20/Z x 12/Z		Crowfoot, E., Pers. comm.
	R		2/2? twill	Z x Z		
	R		Plain	18/Z x 12/Z		
	R	Veg.	Plain	16/Z x 9/Z		
	R	Veg.	Plain	10/Z x 8/Z		

	R				Tablet braid	
	R		Twill?	Z x S		
	R		Twill	Z x S		
	R	Veg.	Plain	22/Z x 18/Z		
	R				Tablet braid	
	R		2/2 twill	10/Z x 10/Z		
Laceby, Lincolnshire (Cemetery)	R	Flax			Tablet braid	Crowfoot 1956 188-9
	R		2/2 twill	14/Z x S		
	R	Flax?	Plain	14/Z x 14/Z		
Little Eriswell, Suffolk (Cemetery)	R			Z x Z		Crowfoot 1966, 30-32.
	R		Twill?	Z x Z		
	R	Veg	Plain	11/Z x 11/Z		
	R	Flax	Plain	20/Z x 14/Z		
	R		2/2 twill	12/Z x 12/Z		
	R		Plain	15/Z x 12/Z		
	R	Flax	2/1 twill	30/Z x 22/Z		
	R		Twill	Z x Z		
	R		2/2 twill	19/Z x 19/Z		
	R		2/2 twill	8/Z x 8/Z		
	R		2/2 twill	16/Z x 12/Z		
	R		2/2 twill	9/Z x 8/Z		
	R		Plain	12/Z x 12/Z		
	R		2/2? twill	14/S x 10/Z		
	R		Plain	12/Z x 12/Z		
	R		Twill	12/Z x 12/Z		
	R		2/2 twill	9/Z x 8/Z		
	R		2/2 twill	8/Z x 8/Z		
	R			Z x Z		
	R		2/2 twill	10/Z x 8/Z		
	R				Tablet braid	
	R		2/2 twill	9/Z x 9/Z		
	R				Tablet braid	
	R		2/2 twill	12/Z x 12/Z		
	R		Plain	16/Z x 14/Z		

Lovedean Hill, Lincolnshire (Cemetery)	R					Davidson 1967, 13.
Lyminge, Kent (Cemetery)	I				Gold braid	Crowfoot 1967, 70.
Melbourn, Cambridgeshire (Cemetery)	R					Wilson 1956, 31
Mildenhall, Suffolk (Cemetery)	R	Wool	2/2 twill	10/Z x 10/Z		Crowfoot 1950, 26-8,pl 5, Fig. 1. ; 1952, 188.
	R	Wool			Tablet braid	
Mitcham, Surrey (Cemetery)	R					Bidder 1905,55-8.
Mitchell's Hill, Suffolk (Cemetery)	R	Wool	2/1 twill	21/S x 20/Z	Dyeing	Crowfoot 1952, 189-191.
	R	Wool			Tablet braid	
	R		2/2 twill	15/Z x 14/Z		
Mucking, Essex	R	Flax?	Plain	16/Z x 16/Z		Crowfoot, E., Pers. Comm.
	R		Twill	Z x Z		
	R	Wool?	2/2 twill	12/Z x 12/Z		
	R		Plain	10/Z x 10/Z		
	R				Tablet braid	
	R	Flax	Plain	14/Z x 13/Z		
	R	Animal	2/2	12/Z x 12/Z		
	R	Wool?		Z x S		
	R	Flax?	Plain	12/Z x 12/Z		
	R	Flax?	Plain	12Z x 9/Z		
	R	Flax?	Plain	16/Z x 14/Z		
	R	Flax?	Plain	8/Z x 8/Z		
	R	Wool	2/2 twill	10/Z x 10/Z		

R			Z x S	
R	Wool	Plain	10/Z x 8/Z	Patterned
R		2/2 twill	Z x Z	
R	Veg	Plain	8/Z x 8/Z	
R		2/2 twill	6/Z x 8/Z	
R		2/2 twill	9/Z x 9/Z	
R			Z x S	
R	Wool?	2/2 twill	14/Z x 12/Z	
R	Animal	2/2 D twill (IM type ?)	14/Z x 14/Z	
R				Tablet braid
R		Plain	8/Z x 8/Z	
R		2/2 twill	13/Z x 13/Z	
R		2/2 twill	11/Z x 10/Z	
R		Twill	15 x 15	
R		Twill	6 x 6	
R			12/Z x 16/Z	
R	Animal	Twill	13/Z x 12/Z	
R	Animal	Plain	10/Z x 12/Z	
R		2/2 twill	16/Z x 12/Z	
R		Twill	12/Z x 12/Z	
R		2/2 twill	12/Z x 12/Z	
R		Plain	12/Z x 10/Z	
R		2/2 twill	16/Z x 13/Z	
R		Twill	10/Z x 10/Z	
R		Twill	Z x S	
R		2/2 twill	14/Z x 12/Z	
R		2/2 twill	10/Z x 10/Z	
R				Tablet braid
R		Plain	16/Z x 8/Z	
R	Animal	2/2 twill	16/Z x 16/Z	
R	Animal		Z x Z	
R				Tablet braid
R		Twill	12/Z x 12/Z	
R		2/2 twill	16/Z x 12/Z	
R		2/2 twill	9/Z x 8/Z	Weaving error

R		Plain	9/Z x 8/Z	
R		Plain	18/Z x 18/Z	
R			Z x Z	
R		Plain?	Z x Z	
R		2/2 twill	13/Z x 12/Z	
R	Veg.	Plain	14/Z x 10/Z	
R	Veg.	2/2 D twill (IM type?	22/Z x 18/Z	
R		Twill	10/Zx 8/Z	
R		Twill	Z x Z	
R		2/2 twill	14/Z x 12/Z	
R		Twill	10/Z x 10/Z	
R		Plain	18/Z x 16/Z	
R		Plain	10/Z x 10/Z	
R		Twill	Z x Z	
R		2/2twill	8/Z x 8/Z	
R		2/2 twill	14/Z x 12/Z	
R		2/2 twill	13/Z x 10/Z	
R		Twill	Z x S	
R		Plain	22/Z x 18/Z	
R				Tablet braid
R		Twill?	Z x Z	
R			Z x Z	
R		Plain	Z x Z	
R				Tablet braid
R				Tablet braid
R		Twill	Z x Z	
R		Twill	16/Z x 14/Z	
R	Animal	Plain	15/Z x 11/Z	
R		Plain	14/Z x 8/S	
R		2/2 twill	14/Z x 12/Z	
R		Twill	10/Z x 8/Z	
R	Animal			Tablet braid
R				Tablet braid
R		Plain	12/Z x 12/Z	Tablet woven starting or side selvedge.
R	Animal	2/2 twill	14/Z x 13/Z	

R		Twill	18/Z x 16/Z	
R		Plain	12/Z x 12/Z	
R		2/2 twill	14/Z x 12/Z	
R	Animal	2/2 twill	16/Z x 14/Z	
R		Plain	22/z x 21/Z	
R		Twill	12/Z x 10/Z	
R	Wool	Twill	13/Z x 11/Z	
R		2/2 twill	20/Z x 18/Z	
R		Plain	Z x Z	
R		Plain	18/Z x 18/Z	
R				Plait
R				Tablet braid
R	Animal		Z x Z	
R		Plain	14/Z x 9/Z	
R		2/2 twill	14/Z x 12/Z	
R		2/2 twill	16/Z x 12/Z	
R				Tablet braid
R		Twill	Z x Z	
R	Wool		Z x Z	
R		2/2 twill	12/Z x 11/Z	
R		Plain	18/Z x 18/Z	
R				Tablet braid
R		2/2 twill	12/Z x 11/Z	
R	Wool	Twill	16/Z x 12/Z	
R		2/2 twill	11/Z x 10/Z	
R		2/2 twill	14/Z x 11/Z	
R	Veg.	Plain	14/Z x 16/Z	
R	Wool	2/2 twill	17/Z x 13/Z	
R				Tablet braid
R		2/2 twill	12/Z x 12/Z	
R		Plain	10/Z x 10/Z	
R		2/2 twill	17/Z x 14/Z	
R		2/2 twill	16/Z x 12/Z	
R		2/2 twill	8/Z x 8/Z	
R		Twill	12/Z x 12/Z	
R	Flax?	2/2 D twill? (IM type ?)	20/Z x 20/Z	Weaving error

R		Twill	Z x Z	
R		Plain	8/Z x 8/Z	
R		Plain	10/Z x 10/Z	
R		2/2 twill	12/Z x 12/Z	
R		Twill	10/Z x 10/Z	
R		Plain?	12/Z x 6/Z	
R		Plain	22/Z x 16/Z	
R				Tablet braid
R		Twill	12/Z x 14/S	
R				Tablet braid
R		Plain	18 x 15	
R		Twill	Z x Z	
R	Animal	Plain	16/Z+S x 12/Z+S	Spinning pattern
R		Twill	12/Z x 12/Z	
R		2/2 twill	13/Z+Sx 13/Z	Spinning pattern
R				Tablet woven braid
R		Plain	14/Z x 12/Z	
R		Twill	11/Z x 11/Z	
R				Tablet braid
R				Tablet braid
				Pig/dyeing
R		C? twill	8/Z x 5/Z	
R		2/1? twill	16/Z x 14/Z	
R		Plain	Z x Z	
R				Tablet braid
R		Twill	10/Z x 8/Z	
R		Plain	14/Z x 14/Z	
R		Twill	12/Z x 12/Z	
R		Twill	10/Z x 9/Z	
R		Twill	12/Z x 12/Z	
R		Twill	12/Z x 12/Z	
R		Twill	12/Z x 12/Z	
R	Animal	Plain	9/Z x 7/Z	Weaving error
R	Flax?	Plain	15/Z x 15/Z	
R				Tablet braid
R		Twill	Z x S	
R		Twill	12/Z x 10/Z	
R		Plain?	12/Z x 12/Z	

R		Plain	13/Z x 9/Z	
R		Twill	10/Z x 8/Z	
R	Flax	2/2 D twill (IM type?)	18/Zx 16/Z	
R		Twill	12/Z x 12/Z	
R		Twill	8/Z x 8/S	
R		Plain	Z x Z	
R		Twill		
R		Twill	11/Z x 10/Z	
R				Tablet braid
R		Twill	11/Z x 13/S	Finishing
R		Twill	14/Z x 14/Z+S	Spinning pattern
R		Twill	12/Z x 10/Z	
R		Plain	Z x Z?	
R		Twill	Z x Z	
R		Twill	12/Z x 12/Z	
R		Twill	14/Z x 12/Z	
R			Z x Z	
R				Tablet braid
R		Twill	15/Z x 12/S	
R		Twill	Z x S	
R		Twill	13/Z x 10/Z	
R		C or D twill	16/Z x 12/Z	
R				Tablet braid
R		Twill	20/Z	Pattern weave/ dyeing.
R				Tablet braid
R		Twill	Z x Z	
R		Twill	Z x Z	
R		Plain	12/Z x 8/Z	
R		Twill	Z x Z	
R		2/2 D twill (IM type?)	14/Z x 12S	
R	Flax?	Twill	13/Z x 13/Z	
R		Plain	7/S+2S x 5/Z	Surface brocading
R		Plain	14/Z x 14/Z	
R		Plain	14/Z x 14/Z	
R	Wool	Plain	9/S x 9/Z+S	Pattern weave/ dyeing

	R				Tablet woven side or starting selvedge	
	R		C or D Twill	16Z x 14Z		
	R		C or D twill	12/Z x 10/S		
	R	Wool	Twill	9/Z x 9/Z		
	R	Wool	2/2 D twill (IM type?)	13/Z x 10/Z	Dyeing	
	R		2/2 D twill (IM type?)	Z x Z		
	R		Twill?	Z x S		
	R		2/2 twill	8/Z x 8/Z		
	R		Twill	Z x Z		
	R		Plain	10/Z x 9/Z	Pig/dyeing pattern weave	
	R		2/2 twill	11/Z x 10/Z		
	R		Plain	12/Z x 12/Z		
	R		Twill	12/Z x 10/S		
Ozingell, Kent (Cemetery)	R		C or D 2/2 twill	10/Z x 10/S		Crowfoot, E., Pers. Comm.
	R		2/1 twill	20/Z x 14/Z		
	R					Millard 1969,17.
Petersfinger, Wiltshire (Cemetery)	R	Wool?	2/1? twill	12/Z x 12/Z		Crowfoot 1953, 61
	R	Wool?	Plain	15/Z x 15/Z		
	R	Wool?	2/2? twill	Z x Z		
	R	Wool?	Twill	12/Z x 12/Z		
	R	Wool?	Plain	Z x Z		
	R	Wool?	Twill	Z x Z		
	R	Wool?	Plain			
	R	Wool?	2/1? twill	14/Z x 14/Z		
	R	Wool?	Plain	12/Z x 8/Z		

Polhill, Kent	R				Tablet braid	Crowfoot 1973,
(Cemetery)	R		Plain?	Z x Z		203.
Riseley, Kent	R		Plain?	9/Z x Z		Crowfoot, E.,
(Cemetery)	R		2/2 twill	Z x Z		Pers. Comm.
	R		Plain	12/Z x 9/Z		
	R		Plain	18/Z x 12/Z		
	R		2/1 twill	19/Z x 16/Z		
Sarre, Kent	R	Wool?	Plain	24/Z x 14/Z?		Crowfoot, E.,
(Cemetery)	R	Flax?	Plain	22/Z x 20/Z		Pers. Comm.
	R	Flax?	Plain	15/Z x 12/Z		
Sarre, Kent	I				Gold braid	Crowfoot 1967,
(Cemetery)	I				Gold braid	70.
	I				Gold braid	
Scunthorpe, Lincolnshire	R					Davidson 1967, 13.
Sewerby, Yorkshire	R	Animal	Twill?	Z x S		Crowfoot, E.,
	R	Wool?	2/2 twill	15/Z x 11/Z		Pers. Comm.
	R		Plain	12/Z x 12/Z		
	R		Twill	10/Z x 10/Z	Finishing	
	R		2/2 twill	10/Z x 10/Z		
	R		Plain	10/Z x 10/Z		
	R	Wool	Plain	14/Z x 10/Z		
	R	Flax?	Plain	32/Z x 18/Z		
	R	Wool	2/2 D twill (IM type ?)	16/Z x 13/S		
	R		2/2 twill	14/Z x 10/Z		
	R		Plain (repp)	24/Z x 12/Z		

	R		Twill?	Z x Z		
	DR		Plain	16/Z x 16/Z		
	R		2/2 D? Twill	11/Z x 11/S		
	R		Twill	12/Z x 12/Z	Finishing.	
	R					
	R		2/2 twill	15/Z x 13/Z		
	R		Twill	Z x S		
	R		Plain	10/Z x 8/Z		
Snape, Suffolk (Boat burial)	R	Flax	Plain	Wa/23/Z x We/17/Z	Weaving error.	Crowfoot, E., Pers. Comm.
Snape, Suffolk (Boat burial)	R				Pile?	Bruce-Mitford 1952,6.
Snell's Corner, Hampshire	R	Wool?	Plain	18/Z x 9/Z		Crowfoot 1957, 170.
	R	Flax?	Plain	16/Z x 16/Z		
	R	Wool?	D? twill	20/Z x 17/Z		
	R	Wool?	Twill?	22/Z x 13/S?		
Standlake Down, Oxfordshire (Cemetery)	R		Plain	17/ x 16/Z		Crowfoot 1973, 257.
Stowting, Kent (Cemetery)	I				Gold braid	Crowfoot 1967, 71.
Stretton on Fosse (Cemetery)	R				Pile or nap	Crowfoot, E., Pers. Comm.
	R				" " "	
	R				" " "	

Sutton Hoo, mound 3, Suffolk (Barrow)	R	Wool?	Plain	20/Z x 8/Z		Crowfoot, G. 1964, 19,pl 4.
	R	Flax?	Plain	32/Z x 32/Z		
	R	Wool?	Twill	20/Z x 10/Z		
Sutton Hoo, mound 4, Suffolk (Barrow)	R	Flax	Plain	25/Z x 15/Z		Crowfoot, E., 1967, 37-39.
	R		Twill	24/Z x 18/S		
	R	Flax	2/2 D? twill (IM?)	19/Z x 15/Z		
Sutton Hoo, Suffolk (Ship Burial)		Wool?	2/2 D twill (IM type A)	36/Z x 21/S		Crowfoot, E., Pers. Comm.
		Wool?	2/2 C twill (IM)			
		Wool?	2/2 twill		Finishing	
		Wool?	2/2 twill			
		Wool?	Soumak (remains)			
		Wool?			Tablet braid	
	DR	Flax?	2/1 twill	22 x 11		
		+ wool	+ soumak	22 x 14		
	DR					
		Wool?	2/2 D twill (IM type?)			
		Flax?	2/2 D twill (IM type?)			
		Wool	Plain, piled		Dyeing	
		Flax?	Plain			
	DR		Plain			
		Wool?	Soumak etc. (remains)			
		Flax?	Plain			
			Plain			
		Flax+ wool?	Plain			
	DR		Plain		Tablet braid	
		Wool?	Plain + soumak			
		Wool?	Plain			

	DR	Flax?	2/1 C twill			
	DR		Plain			
	I		Plain			
	DR		Plain			
Swaffham, Norfolk (Cemetery)	R		2/2 twill	12/Z x 10/Z		Crowfoot, E., Pers. Comm.
	R		Plain	16/Z x 10/Z		
	R		Plain	28/Z x 18/Z		
	R		Twill	Z x Z		
	R		2/2? twill	4/Z x 12/Z		
	R		Plain	14/Z x 10/Z		
	R		Twill	14/Z x 12/Z		
	R				Tablet braid	
	R		2/2 D twill (IM type?)	9/Z x 8/S	Weaving error.	
Tallington, Lincolnshire (Cemetery)	R	Flax?	Plain	14/Z x 12/Z		Crowfoot, E., Pers. Comm.
	R		2/2 twill	16/Z x 18/Z		
Taplow, Buckinghamshire (Barrow burial)	N	Wool + Gold			Gold braid.	Crowfoot 1967, 66-7.
	I				Gold braid.	
	I				5 triangular pieces gold braid.	
Wakerley, Northants (Cemetery)	R		Twill	Z x Z	Tablet braid	Crowfoot, E., Pers. Comm.
	R					
	R		Twill	Z x S		
	R		Twill	18/Z x 14/Z		
	R				Round plait or tubular side selvedge.	
	R		Twill	14/Z x 12/Z		
	R		Twill	11/Z x 10/Z		
	R		2/2 twill	12/Z x 12/Z		

R		C or D	12/Z x 9/S	
R		Twill		
R		Twill	12/Z x ?/S	
R	Flax?	2/2 twill	16/Z x 16/Z	
R	Wool?	2/1 twill	17/Z x 16/Z	Tubular side selvedge
R	Flax?		Z x Z	
R	Veg.		16/Z x Z	
R		Twill	Z x S	
R		2/1 twill	15/Z x 12/Z	
R		Twill?	Z x S	
R		Twill	10/Z x 10/Z	
R			Z x S	
R		Twill	Z x Z	
R	Veg.			Tablet braid
R		Plain	16/Z x 14/Z	
R		Twill	18/Z x 12/Z	
R		Twill	13/Z x 12/Z	
R			Z x S	
R			Z x Z	
R				Tablet braid
R		Twill?	Z x S	
R	Flax?			Plait
R			Z x S	
R		2/2 twill	10/Z x 10/Z	
R		Plain	10/Z x 10/Z	
R		Twill	Z x S	
R		2/2 twill	15/Z x 12/Z	
R				Tablet braid
R	Veg.			Tablet braid
R			Z x S	
R	Veg.	Plain	14/Z x 18/Z	Tubular side selvedge
R	Animal	2/2 twill	14/Z x 12/Z	
R		D twill	Z x S	
R		(IM)		Tablet braid
R		Twill	7/Z x 7/Z	
R		Twill	Z x Z	
R		Damask	9/Z x 5/Z + 5/S (2ndary weft)	
R	Veg.			Plait. Dyeing

Welbeck Hill, Lincolnshire (Cemetery)	R		2/2 D twill (IM type?)			Crowfoot, E., 1969, 51.
Winterbourne Gunner, Wiltshire (Cemetery)	R		2/2 twill?	15/Z x 15/Z		Crowfoot, E., 1964,89,91,108.
	R	Wool?	2/2 twill	9/Z x 9/Z		
Middle Saxon						
Hamwih, Hampshire (Occupation deposits)	N	Wool	Plain	20/Z x 12/S		Hedges forth (B)
Late Saxon						
St. Cuthbert's vestments, Durham (Burial)	N	Silk + gold			Tablet braid + brocading + dyeing	Crowfoot 1939, 57.
	N	Silk + gold			Tablet braid + brocading + plaiting + dyeing	
	N	Silk + gold			Tablet braid + brocading + plaiting + dyeing	
	N	Silk + gold			Tablet braid + brocading + plaiting + dyeing	
	N	Silk + gold			Tablet braid + brocading + plaiting? + dyeing	

	N	Silk + gold			Tablet braid + brocading + dyeing	
	N	Silk + gold			Tablet braid + brocading + dyeing	
	N	Silk + silver-gilt			Tablet braid + brocading + dyeing	
	N	Silk + silver-gilt			Tablet braid + brocading + dyeing	
Gloucester, (Westgate St,) Gloucestershire. (Occupation deposits)	N	Wool	Unrev. 2/2	Wa/11/Z/0.8 fine and hard spun x We/8/S/1.0 thick and soft spun.	Non tablet woven side selvedge + finishing	Hedges forth (J)
	N	Wool	Unrev. 2/2	5/Z/1.8 x 5/S/2.0		
	N	Wool	Unrev. 2/2	Wa/6/Z/1.0-1.5 x We/6/Z/1.0-1.5	Tablet woven starting border + selvedge?	
	N	Wool	Odd Twill	6/Z/1.0 hard spin x 5/S/2.0 soft spun		
	N	Wool + hair?		Z fine and hard + S thick and soft spun		
Lincoln	N	Silk	Plain	Wa/28 x 2/2/0.1 x We/21/-/0.4	we/21/-/0.4 Non tablet woven Side selvedge Head-dress	Crowfoot E. Pers. comm.

Thetford, Norfolk (Cemetery)	N		Plain?	15 x 10		Knocker 1967, pl IV.
Coppergate, York (Occupation deposits)	N	Wool	6 shaft 2/1 D twill.	?Wa/16/Z/0.5 x ?We/9/S/0.7		Hedges forth (A).
	N	Wool	2/2 twill	?Wa/10/Z/1.0 x ?We/7/S/1.1		
	N	Wool	2/2 twill	?Wa/11/Z/0.8 x ?We/7/S/1.4		
	N	Wool	2/2 twill	9/Z/1.0 x 9/S/1.0	Weaving error	
	N	Wool	2/2 D twill (IM) type	?Wa/12/Z/0.8 x ?We/8/Z+S/1.0	Mixed spinning	
	N	Wool	2/2 twill	10/Z/0.8 x 9/S/1.0		
	N	Wool	2/2 twill	10/Z/1.0 x 9/S/1.0		
	N	Wool	2/2 twill	8/Z/1.0 x 4/S/2.0		
	N	Wool	2/2 twill repp	15-20/Z/0.6 x 5-8/S/0.9	Weaving error	
	N	Silk	Plain	Wa/28x2/Z/0.1 x We/21/-/0.4	Non tablet woven side selvedge Head-dress.	
Lloyd's Bank, York (Occupation deposits)	N	Wool	2/1 D twill (AM) type	?Wa/22/Z/0.5 x ?We/16/Z/0.4		Hedges forth (A).
	N	Wool	2/2 C twill (IM)	?Wa/18/Z/0.7 x ?We/15/S/0.6		
	N	Wool	2/1 D twill (AM) type	?Wa/22/Z/0.7 x ?We/11/Z/0.7		
	N	Wool	2/1 D twill (AM) type	?Wa/26/Z/0.4/ closely packed x ?We/14/Z/0.5 well spaced		
	N	Wool	2/1 D twill (AM) type	?Wa/18/Z/0.4/ closely packed x ?We/11/Z/0.5/well spaced	Weaving error	
	N	Wool	2/1 D twill (AM) type	?Wa/22/Z/0.5 x ?We/14/Z/0.5		
	N	Wool	2/1 D twill (AM) type	?Wa/20/Z/0.7 x ?We/11/Z/0.7		

N	Wool	2/1 D twill (AM) type	?Wa/16/Z/0.6/ closely packed and hard spun x ?We/10/Z/0.7/well spaced and loose spun	
N	Veg.	2/2 D twill (IM) type	14/Z/0.75 x 14/S/0.75	
N	Veg.	2/2 D twill (IM) type	Wa/18/Z/0.8 x We/12/S/0.8	Non tablet woven side selvedge.
N	Wool	2/1 C twill (AM)	?Wa/20/Z/0.5 x ?We/14/S/0.5	Plaiting.
N	Wool	2/1 D twill (AM) type	?Wa/27/Z/0.3 x ?We/16/Z/0.5	Weaving error.
N	Wool	2/2 D twill (IM) type	?Wa/20/Z/0.6 x ?We/10/S/1.0	
N	Wool	2/2 D twill (IM) type	?Wa/14/Z/0.7 x ?We/9/Z+S/0.7	Spinning pattern.
N	Wool	2/2 D twill (IM) type	?Wa/8/Z/1.2/loosely spun & close packed x We/7/S/0.8/tightly spun	
N	Wool	2/2 D twill (IM) type	?Wa/12/Z/0.9 x ?We/7/S/1.2	Piling.
N	Wool	Plain	Wa/4/Z/2.5 x We/3/S/2.5	Non tablet woven side selvedge.
N	Wool	Plain	Wa/4/S/2.0 x We/2.5/S/4.0	Piling.
N	Wool	Plain	Wa/5/S/2.0/spaced x We/3.5/S/2.2/compacted.	Weaving errors.
N	Wool	Plain?	4/Z/1-4.0 x 3/Z/1.5-5.0	Variety of yarns used.
N	Wool	Plain	3.5/S/1.5-2.5 x 3.5/S/1.5-2.5	Dyeing
N	Wool	Plain	5/Z/1-2.5 x 5/S/1-2.5	
N	Wool		3.5/Z/2.5 x 3.5/S/2.5	
N	Wool	2/2 twill	6/Z/1.8 x 5/S+Z/1.5-2.0	
N	Wool	2/1 twill?	4.5/Z/1-2.2 x 5/S+Z/0.5-2.3	

	N	Wool	2/1 twill	4.5/S/1.2-1.7 x 4/S/1.2-1.7		
	N	Wool	Plain	4/S/2.5 x 3/S/3.0		
	N	Wool	Plain repp	?Wa/22/Z/0.5/closely packed x ?We/12/Z/ 0.2/well spaced		
	N	Wool	Plain repp	?Wa/19/Z/0.7/closely spaced x ?We/12/Z/ 0.4/well spaced		
	N	Silk?	Plain	Wa/70/Z/0.15/ compacted x We/12/ Z/0.2/well spaced	Non tablet woven side selvedge.	
	N	Wool	2/1 twill repp	?Wa/17/Z/0.8 x ?We/7/Z/0.8-1.5		
Viking (England)						
Heath Wood, Derbyshire (Barrow cemetery)		Silver			Embroidery	Crowfoot 1956, 45,52-3,fig. 6, pl III.
Northallerton, Yorkshire (Burial)	R					Henshall 1952, 16.
Thetford, Norfolk (Burial)	R		Plain	20/Z x 12/S?		Crowfoot E., Pers. comm.
Viking (Scotland)						
Ballinaby, Islay, Argyle (Burial)		Silver			Plait or Trichonopoly?	Anderson 1879, 67, fig.28.

Carn Nan Bharraich, Oronsay, Argyle (Burial)	R		Plain	14/Z x 10/S	Loops	Grieve 1914; Henshall 1952,16.
Castletown, Caithness (Burial)	R		Plain	8 x 8		Curle 1914,314 ; Henshall 1952,16
Clibberswick, Unst, Shetland (Burial)	R		Plain	20/Z x 18		Arch Ass. 1863,313
Croy, Inverness-shire (Hoard)		Silver			Trichinopoly	Ross 1885,91.
Gurness Broch, Orkney (Burial)	R					Robertson 1969, 289-90.
Kildonan, Eigg, (Burial)	N	Wool	2/2 twill	13/Z/fine and hard spun x 8/Z/thick and soft spun		Crowfoot 1949,26.
	N	Wool	Plain	8/Z/fine and hard spun x 4/S/thick and soft spun	Piled	
	R	Linen?	Plain	28/Z x 26/Z		
	R	Linen?	Plain	32/Z x 16/Z	Weaving error	
	R		2/2 twill	15/Z/fine and hard spun x 8/Z/thick and soft spun		
Kiloran Bay, Colonsay, Argyle (Burial)			Plain	10/Z x 8/Z		Anderson 1907,443, fig. 29 ; Henshall 1952,16.

Opisdale, Sutherland (Burial)	R					Henshall 1952,16.
Oronsay, Argyle (Boat burial)	R	Linen?	Plain	30/Z x 18/Z	Loop	M'Neil 1891,434; Henshall 1952,16-7.
Pierowall, Westray, Orkney (Burial)	R	Linen?	Plain	10 x 10		Anderson 1880,87 Henshall 1952,16.
Reay, Caithness (Burial)	R	Linen?				Curle 1914,297; Henshall 1952,16.
Skaill, Sandwick, Orkney (Hoard)		Silver			Trichinopoly	Anon 1859,247-9.
Sanday, Orkney	R	Veg	Twill	Z		Grieg 1960,88 Henshall 1952,16.
Tiree, Argyle (Burial)	R		Plain	20/Z x 12/Z		Anon 1872,532; Anderson 1874,554.
	R	Veg?	Plain	25/Z x 15		
Unst, Shetland	R		Plain	14 x 14		Anon 1894,5-6 Curle 1914, 310; Henshall 1952,16.
Westness, Rousay, Orkney (Burial)	R		Plain	8/Z x 6/Z		NMAS
	R		2/1 twill?	18		
	R		2/1 twill	17/Z x 12		
	R		Plain	20/Z x 12/Z		

Viking (Irish)						
Ballyholme, Co. Down (Burial)		Linen?				Cochrane 1906,74.
Donnybrook, (Burial)	R		Plain	20/Z x 20/Z		Hedges forth (C)
Viking (Isle of Man)						
Balladoole, Arbory, Isle of Man (Boat burial)	R? R?	 Veg.	Plain (repp) Plain	23/Z x 16/Z 31/Z x 28/Z	 Dyeing?	Crowfoot 1949,26-7; 1966,44.
Balladoyne Church, St. John's, Isle of Man (Burial)	R? R?	Linen?				Bjørn, 1940,26.
Cronk Keilleig, Jurby, Isle of Man (Burial)	R R	Wool?	 Plain			Crowfoot 1966,50-3.
Cronk Moar, Jurby, Isle of Man (Burial)	N?	Wool	Plain	Wa/4/Z/fine and hard spun x We/3/S/thick and soft spun.	Piled (three types)	Crowfoot 1949,27; 1966,80-3.
Knock Y Doonee, Ayre, Isle of Man (Burial)	R				Pile?	Kermode 1930, 31; Bjørn 1940, 23. Crowfoot 1949,27.

Dark Age (Scotland)						
Dun Cuier, Barra, Inverness-shire (Habitation)	R	Wool?	Plain (repp)	7/Z x 18/S		Henshall 1956,328
	R	Wool?	Plain (repp)	7/Z x light S		
Dark Age (Ireland)						
Ballinderry 2, Co. Offaly. (Habitation)	N	Animal	Plain	Wa/9 x We/9	Non tablet woven side selvedges	Hencken 1942,58.
	N	Animal	Plain	9 x 8		
Church Island, Co. Kerry (Burial)	N	Wool	2/1 twill	8/Z x 7/Z	Finishing?	Henshall 1958,112.
Lagore Crannog, Co. Meath (Habitation)	N	Wool	Plain	12 x 8		Start 1950,219-24.
	N	Wool	Plain	11 x 11		
	N	Wool	Plain	8 x 8	Weaving error	
	N	Wool	Plain	10 x 11		
	N	Wool	Plain	7 x 11		
	N	Wool	Plain	10 x 16		
	N	Wool	Plain	10 x 10		
	N	Wool	Plain (repp)	10 x 18		
	N	Wool	Plain	6 x 18		
	N	Wool	Plain	9 x 20		
	N	Wool	Plain	7 x 15		
	N	Wool	Plain (repp)	10 x 22		
	N	Wool	Plain (repp)	8 x 14		
	N		Plain (repp)	8 x 17		
	N	Wool	Plain	8 x 8		
	N	Wool	Plain	11 x 13		
	N	Wool	Plain	11 x 12		

	N	Wool	Plain	10 x 20		
	N	Wool	Plain	12 x 29	Dyeing	
	N	Wool	Plain	9 x 11		
	N	Wool	Plain	Wa/10 x We/16	Selvedge	
	N	Wool	Plain (repp)			
	N	Wool	Plain	10 x 12		
	N	Wool	Plain	Wa/8 x We/10	Selvedges and fringed warp	
	N	Wool	Plain			
	N	Wool + hair			Tablet braid	
	N	Wool			Tablet braid	
	N	Wool + hair	2/2 twill	Wa/12.4 x We/24	Finishing selvedge	
Undateable (England)						
York (S corner tower Roman fort)	N	Wool	Plain	11/Z x 7/S	Dark Age	Crowfoot 1956,525.
York, (Michelgate) (Burial)	N	Wool			Age unknown Sprang	Henshall 1951,22, pls I, II.
Undateable (Scotland)						
Greenigoe, Orphir, Orkney (Burial)	N	Wool?	2/2 twill	12/Z x 16/Z	Probably Viking	Anon 1889,123 ; Henshall 1952,17.
	N	Wool?	Plain (repp)	12/Z x 16/Z		
	N	Wool?	2/2 twill	9/Z/thin and hard spun x 6/Z?/thick and soft spun		
	N	Wool?	2/2 twill	12/Z/thin and hard spun x 12/Z/thick and soft spun		
	N	Wool?	2/2 D twill (IM) type A	18/Z/thin and hard spun x 12/Z/thick and soft spun		

St. Andrew's, Orkney (Burial)	N	Wool	2/2 Wa C (M)	Wa/9/Z x We/2x9/Z	Possibly Viking	Henshall 1952,9-14.
					Weaving errors	
	N	Wool			Tablet braid	
	N	Wool			Tablet braid	
Unstratified						
Unknown context	I				Gold braid	Crowfoot 1968, 209-10.
Unknown context	I				Gold braid	Crowfoot 1968, 209-10.

APPENDIX XI

CATALOGUE OF DARK AGE TABLET WOVEN TEXTILES FOUND IN THE BRITISH ISLES

N.B. Doubtful finds and those from which little information can be gained are not included in this catalogue but their existence is noted in Appendix X. (P.A.W.T. - Probably associated with textile).

Location	Pres.	Mat.	Count etc.	Further info.	Ref.
Early Saxon					
Barrington A, Cambridge (Cemetery)	R		Wa/ /4/XX/1.0 xWe/10/	P.A.W.T.	Crowfoot, E., Pers. comm.
	R		Wa/Z/ /S		
	R		Wa/Z/4/ZSZS/1.25 xWe/12/	P.A.W.T.	
	R		Wa/Z/ /ZS'/1.0 xWe/8/		
			Wa/ / /8X/0.5	P.A.W.T.	
Barrington B, Cambridge (Cemetery)	R		Wa/Z/ /S'/0.8 xWe/12/ /	P.A.W.T.	Crowfoot E., Pers. comm.
	R		Wa/ / /ZS/0.75	P.A.W.T.	
	R		Wa/Z/2/S'/	P.A.W.T.	
	R		Wa/ /4/ZSZSZS/1.0 xWe/18/	P.A.W.T.	

Location	Pres.	Mat.	Count etc.	Further info.	Ref.
Bekesbourne, Kent (Cemetery)	R	Wool?	Wa/ / /ZS(edge)6S(body) x We/18/	Brocaded with S ply wool thread.	Crowfoot, E., Pers. comm.
Bifrons, Kent (Cemetery)	P		Wa/ / /7X+/7 ÷ 6.0	Gold brocading for braid.	Crowfoot 1967,67-8, Fig. 13.
	P		Wa/ / /9X+/9 ÷ 7.0	Gold brocading for braid.	
	P		Wa/ / /7X+/7 ÷ 6.0	Gold brocading for braid.	
	P		Wa/ / /7X+/7 ÷ 6.0	Gold brocading for braid.	
	P		Wa/ / /5X+/5 ÷ 3.0	Gold brocading for braid.	
Black Patch, Wiltshire (Cemetery)	R		Wa/Z/4/SZSZS/1.2 xWe/ /Z	P.A.W.T. Selvedge?	Crowfoot, E., Pers. comm.
	R		Wa/ /4/X,D'/	P.A.W.T.	
Blewburton Hill, Berkshire (Burial)	R		Wa/ /4/ZSZ/ xWe/ /22	Starting selvedge	Henshall 1959,68-71, Fig. 8.

Location	Pres.	Mat.	Count etc.	Further info.	Ref.
Broomfield, Essex (Barrow burial)	R		Wa/ /4/4X/	Finishing selvedge	Crowfoot 1958,37; 1969,51.
Caistor on the Wolds, Lincolnshire (Cemetery)	R		Wa/S(1Z)/ /7S/ We/ /Z		Crowfoot, E., Pers. comm.
Chatham Lines, Kent (Barrow burial)	P		Wa/ / /5X+/5 ÷ 8.0	Gold brocading for braid.	Crowfoot 1967,68-9,Fig 13.
Chessell Down, I.o W., Hampshire (Cemetery)	P		Wa/ /13X+/13 ÷ 9.0	Gold brocading for braid.	Crowfoot 1967,71, Fig. 14.
Coombe, Kent (Barrow burial)	N	Wool	Wa/ /4/ZSZSZS/1.6 xWe/14/Z	Finishing selvedge	Crowfoot 1967,37-9 Fig 6.
Cambridge, (St. John's Cricket Field), Cambridgeshire (Cemetery)	R	Flax	Wa/S/4/ $^{Z}{}_{S}{}^{Z}{}_{S}{}^{Z}{}_{S}{}^{Z}{}_{S}{}^{Z}{}_{S}{}^{Z}{}_{S}{}^{Z}{}_{S}{}^{Z}{}_{S}{}^{Z}{}_{S}{}^{Z}$/11.0 ÷ 18	Colour-patterned braid	Crowfoot 1950,28-30,Pl. VI, Fig. 2.

Location	Pres.	Mat.	Count etc.	Further info.	Ref.
Faussett, Kent (Cemetery)	R		Wa/Z/4/10S/9.0 ÷ 10	Braid	Crowfoot, E., Pers. comm.
Faversham, Kent (Cemetery)	P		Wa/ / /7X÷/7 ÷ 8.0	Gold brocading for braid.	Crowfoot 1967,69, Fig. 13.
Finglesham, Kent (Cemetery)	R		Wa/Z/4/ZSSXX+D'/0.8 xWe/18/S	Sewn on border to garment.	Crowfoot, E., Pers. comm.
	R		Wa/Z/ /S'/0.8 xWe/ /2S		
		Linen	Wa/Z/4/ZSZSZS/0.8 xWe/17/	Selvedge	
Hadleigh Rd, Ipswich, Suffolk (Cemetery)	R		Wa/Z/4/15S/ xWe/7/ Wa/ /4/ZSZ'/0.5	P.A.W.T.	Crowfoot, E., Pers. comm.
Holywell Row, Suffolk (Cemetery)	P		Wa/ / /7X+/7 ÷ 7.0	Gold brocading for braid.	Crowfoot 1967, 72, Fig. 14.

Location	Pres.	Mat.	Count etc.	Further info.	Ref.
Howletts, Littlebourne, Kent (Cemetery)	P		Wa/ / /7X+/7 ÷ 5.0	Gold brocading for braid.	Crowfoot 1967, 69-70, Fig. 13.
	P		Wa/ / /8X+/8 ÷ 7.0	Gold brocading for braid.	
Laceby, Lincolnshire (Burial)	R	Linen	Wa/Z2S/4/SZ + $\frac{4}{2}$/24P + 4/SZ	Braid, width 1.1cm, colour patterned.	Crowfoot 1956.Fig. 3.
Little Eriswell, Suffolk (Cemetery)	R		Wa/ /2/5S/		Crowfoot 1966, 12, 32.
	R		Wa/Z/4/ZSZ'/0.9 xWe/11		
Mildenhall, Suffolk (Cemetery)	R	Wool	Wa/Z2Z/4/18ZS	Braid for wrist clasp 3 cm wide.	Crowfoot 1950,26-8, Pl V, Fig. 1.
Mitchell's Hill, Icklingham, Suffolk (Cemetery)	R	Wool	Wa/Z/4/2Z,24S/1.0	Braid for wrist clasp; originally c 30 twists.	Crowfoot 1952.

Location	Pres.	Mat.	Count etc.	Further info.	Ref.
Mucking, Essex (Cemetery)	R		Wa/Z/4/ZSSSSZZS/ xWe/Z2S/13	Possibly brocaded with coarse S ply thread.	Crowfoot, E. Pers. comm.
	R		Wa/Z/4/ZSZ'/0.6 xWe/Z/15	Part of belt with leather reinforced end.	
	R		Wa/Z/2x2/S		
	R		Wa/Z/2/XXX/1.3 xWe/12.	P.A.W.T.	
	R		Wa/ / /15Z/0.6 xWe/20/Sor2S		
	R		Wa/ / /ZSZZZZ		
	R	Wool	Wa/ /2/D'/1.0 xWe/10/		
	R		Wa/ /2/ /1.0 xWe/10/	Side selvedge?	
	R		Wa/ /4/ /1.0		
	R		Wa/Z/4/S'/0.8 xWe/10/Sor2S		
	R		Wa/ /4/ / xWe/13/2S	Braid.	
	R		Wa/Z/4/S'/ xWe/2S/8	Possibly brocaded with S ply thread.	
	R		Wa/Z/ /3S	Possibly brocaded with S ply thread.	
	R		Wa/Z/ /SZZZ/ xWe/10/		
	R		Wa/S/2/S'/0.8 xWe/ / pairs		
	R		Wa/S/4/Z'/1.0 xWe/13/	P.A.W.T.	

Location	Pres	Mat.	Count etc.	Further info.	Ref.
	R	Wool	Wa/Z/ /S'/	Colour patterned	
	R		Wa/Z/ /2S(border) + D' xWe/15/.	Braid at least 2 cm wide; colour patterned and brocaded.	
	R		Wa/Z/4/ZSZS(border) + D'/0.7 xWe/19/	Braid with colour patterned centre.	
	R		Wa/Z/4/Z'/1.0	P.A.W.T.	
	R		Wa/Z/2/8S/0.4		
	R		Wa/Z/4/ZSZZZ + SZSSS/0.4 xWe/16/	Selvedge.	
	R		Wa/Z/4/SZS + ZSZS/0.8	Colour - red or purple showing. Possibly bordering a twill pattern weave in gold and blue.	
	R		Wa/ /4/ZSSZZS(border)9D,SZZS(border) xWe/16/2S	Braid width 1.25 cm sewn to garment.	
Sarre, Kent (Cemetery)	P		Wa/ / /8X+/8 ÷ 0.5	Gold brocading for braid.	Crowfoot 1967,71, Fig. 14.
	P		Wa/ / /7X+/7 ÷ 0.5	Gold brocading for braid.	
	P		Wa/ / /5X+/5 ÷ 0.3	Gold brocading for braid.	
Stowting, Kent (Cemetery)	P		Wa/ / /5X+/5 ÷ 0.7	Gold brocading for braid.	Crowfoot 1967,71, Fig. 14.

Location	Pres.	Mat.	Count etc.	Further info.	Ref.
Swaffham, Norfolk (Cemetery)	R		Wa/ / /ZSZSZ/1.0		Crowfoot, E. Pers. comm.
Taplow, Buckinghamshire (Barrow burial)	N	Wool	Wa/Z2S/4/49S+/49 ÷ 3.3	Gold brocading.	Crowfoot 1967, 66,Fig. 12.
	P		Wa/ / /25X+/25 ÷ 1.4	Gold brocading for braid.	
	P		Wa/ / /c40X+/c40 ÷ 2.5	Gold brocading for triangular piece of braid.	
Wakerley, Northamptonshire (Cemetery)	R		Wa/Z/4/6S		Crowfoot, E., Pers. comm.
	R	Flax	Wa/Z/ /SSZSZ/1.0 xWe/Z2S/8	Braid frag for wrist clasp.	
	R		Wa/Z/ /S/ xWe/22/S		
	R		Wa/ /4/ZSZS		
	R	Flax	Wa/ /2/4Z,4S (turned every other shed to give twill with xWe/5/ inaccurate meetings)/0.8		

Middle Saxon

Location	Pres.	Mat.	Count etc.	Further info.	Ref.
Gloucester, (Westgate St) (Occupation deposits)	N	Wool	Wa/S2Z/4/ZS/1.5 xWe/6/Z	Selvedge	Hedges forth (J)

Location	Pres.	Mat.	Count etc.	Further info.	Ref.
Late Saxon					
Durham, (St. Cuthbert's vestments) (Burial)	N	Silk	Wa/ /4/Z,3S,Z,5S,Z,3S(border) 10S,10Z,10S,11Z-diagonally woven (centre) 3Z,6S,Z,3S,Z (border)/0.3	2 cms wide & 61 long Gold brocaded. Two coloured warp. Starting portion.	Crowfoot 1939, 57-80.
	N	Silk	Wa/ /4/Z,49S,Z/	Plaits sewn either side 2 cms wide & 20 cm long. Gold brocaded. Plaits sewn either side.	
	N	Silk	Wa/ /4/S,49Z,S-half turns	Gold brocading 2 cms wide & 20 cm long. Plaits sewn either side.	
	N	Silk	Wa/ /4/ZSSZSZSSZ/0.8	7mm wide, 3 cm remaining Gold brocading. Plaits sewn either side.	
	N	Silk	Wa/ /4/Z,5S,Z/	4mm wide, 2.5 cm remaining Gold brocading. Coloured.	
	N	Silk	Wa/ /4/ZSSZSZSSZ/	4mm wide, 9mm remaining Gold brocading, remains of plaits. Coloured.	
	N	Silk	Wa/ /4/S,5Z,9S,Z,4S,Z/	6mm wide, 2 cm remaining; originally 8mm wide. Gold brocading. Coloured.	

Location	Pres.	Mat.	Count etc.	Further info.	Ref.
	N	Silk	Wa/ /4/ZSZSSZ,9S,ZSSZSZ/0.4	8mm wide. Gold brocading. Coloured. Plait.	
	N	Silk	Wa/S/4/SZSZSZSZSZSZSZSZSZSZSZSZS/	6mm remaining. Silver gilt brocading.	
	N	Silk	Wa/S/46SZ/ xWe/S/	1.2 cm remaining. Silver gilt.	
Irish Dark Age					
Lagore, Co. Meath. (Crannog)	N	Wool	Wa/ /4/ZZZ/1.0	Fringe made by weft 2.5 cm long.	Start 1950,215-7, Pl XIX.
	N	Wool+ hair	Wa/ $\frac{4333}{4444}$/XXXX/	Natural colours used. Texture through part threading and different yarns.	

APPENDIX XII

THE GEREFA : A NEW TRANSLATION

In the Gerefa there is an inventory of implements used in spinning and weaving found on a west country manor. The author is probably the same as that for the 'Rectitudines Singularum Personum' which dates from the generation before the Conquest (Loyn 1962,113, 189). The passage in question is

'fela, towtola; flexlinan, spinle, reol, gearnwinden stodlan, lorgas, presse, pihten, timplean, wifte, wefle, wulcamb, cip, amb, crancstaef, sceadele, seamsticcan, scearra, paedle, slic.'

And the translation given is

'and many tools for spinning; linen flax, a spindle, a reel, a yarn winder, a slay (dialect studdles; M.E. telarium, glossed lame de tisserant), a weaver's beam, a press (glossed panniculae, possible a bobbin with threads for the warp attached), a wool comb, a weaver's stock, a 'reed' or 'slay', a reel for winding thread, a weavers rod, a seam stock, shears, a needle, a hammer.'

It is evident that the translator here not only had very little idea of how a loom worked and what kind of implements were involved but did not have an extremely good grasp on Old English. This is a very rare text and I am grateful to Mr. Swannell and Dr. Brooks of the Dept. English, Southampton University for the pains they have taken with contradictory and often incorrect lexicons in order to get the most out of the passage.

References used are noted as:-

BT = Bosworth & Toller (1898) Anglo-Saxon Dictionary.

BT (Supp) = Supplement to above (1921).

SW = Sweet's (1911) Students Dictionary of Anglo Saxon.

LB = Liebermann (1886) in Anglia IX, p 263. A translation into German.

OED = Oxford English Dictionary.

fela	many
towtola	spinning implements (plural of towtol)
flexlinan	flax-linens (plural of flexline) BT a cord for hanging flax on? SW flax-winder, reel LB flachswinde.
spinle	a spindle (accusative singular of spin(e)l) BT spindle LB spindel
reol	(variant of hreol) BT reel LB haspel (a reel, windlass).
gearnwinden	(accusative singular of gearnwinde) BT yarn-winder, reel LB garnwinde
Stodlan	(Could be singular or plural grammatically. Nominative singular stodle - a variant of stodl) BT lay, part of loom LB weberkamm (loom-reed). OED (studdle) one of the upright posts of a loom (quotes this passage as earliest use of the word in this sense. It can also mean a post in general).
lorgas	(plural of lorg or lorh. Must be plural) BT a pole, weavers beam. Gloss for liciatorium LB weberbaume (loom-beams)
presse	press (nominative singular) BT press. Glosses pannicipium & vestiplicium LB presse.

<u>pihten</u> (singular, presumably)
BT part of a loom. Presumably from Latin <u>picten</u> (a weaver's comb).
LB (weber) kamm (weaver's comb).

<u>timplean</u> (Could be singular or plural; nominative singular <u>timple</u>)
BT some implement used in weaving.
BT (supp) refers to OED temple.
OED temple. A contrivance for keeping cloth stretched to its proper width in the loom during the process of weaving. Usually plural. In the handloom, a pair of flat rods, having toothed ends which caught the selvedges on each side; in the power loom, various rotary devices are used).

<u>wifte</u> (accusative singular)
BT some implement used in weaving.
SW weft
LB einschlag (woof, weft).

<u>wefle</u> (accusative singular)
SW warp
BT weft, woof, thread which crossed the warp. But also gives the meaning 'a shuttle' and quotes this passage.
LB schiffchen (shuttle)

<u>wulcamb</u> (Must be singular)
BT woolcomb
LB wollcamb.

<u>cipp</u> (Must be singular)
BT (Supp) a beam, log, stock; share beam of plough; a weaver's beam (quotes this passage)
LB weberbaum (loom beam).

<u>amb</u> (singular)
BT reed or slay of a weaver's loom.
SW reed (of loom)
LB weberkamm (loom-reed)

<u>crancstaef</u>	(singular)
	BT a weaver's instrument
	BT (Supp) a crank
	OED crank. Quotes this passage under sense of 'In early times chiefly used as a handle or treadle to turn a revolving axis by hand or foot'.
	LB haspelstab (reel/windlass-staff/stick/rod)
<u>sceadele</u>	(seems to be singular)
	BT a shuttle
	LB schiffchen (shuttle)
<u>seamsticcan</u>	(probably plural)
	BT some part of a weaver's apparatus.
	LB saumstöcke (seam-sticks)
<u>scearra</u>	pairs of shears or scissors (plural)
<u>naedle</u>	(probably accusative singular) Needle.
<u>slic</u>	(singular)
	BT hammer. But adds, after quoting this passage: 'slic(?) an implement for smoothing what is woven, a sleek-stone.
	LB klöppel (clapper, bobbin)

Obviously the meaning of some of these words will always be at least obscure and several interpretations might be put on them from a philological viewpoint. It is the case however that what the writer of this passage was trying to do was give a list of equipment connected with the manufacture of textiles. We should expect therefore that it would be a) as complete as his knowledge permitted b) fairly logically presented, and c) non repetitive.

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