Analytical techniques for the investigation of non-artefactual wood from prehistoric and medieval sites

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INTRODUCTION

The rather cumbersome term 'non-artefactual wood' is used here to exclude deliberately fashioned-objects such as bowls, oars etc, but it encompasses structural timbers, whether in situ or not, and the general wooden detritus of water-logged sites of all periods.

The study of non-artefactual wood from prehistoric and medieval sites has long been confined to an analysis of the species range and, where timbers of suitable size and species are located, to dendrochronology (Morgan 1975). The listing of identified species is, of itself, rarely of any value to the understanding of the sites. It only gains relevance if it forms part of a greater study which includes, for example, palynological and macro-botanical analyses. The particular assemblage of species found on the site may then be examined against the backdrop of species available in the locality and the abnormal abundance or absence of individual species interpreted as evidence of deliberate selection, the underlying reasons for which may be deducible from other site information. For instance, the use of particular species for fodder (Troels-Smith 1960) was a well-known practice which survived into this century in NW Europe (Kelly 1976, 110): species-identification can be used to examine the possibility that masses of twigs and branches came to be deposited on site as a result of such activity (Sweingruber 1975, 6: Barber 1981a).

However, apart from smaller twigs and branches, many sites produce large numbers of timbers in various stages of preparation and, although many or all of them are structural timbers, very few indeed may survive in their original positions within the structures. This paper is mainly concerned with the unambiguous description of timbers of this type.

METHODOLOGY

The process by which timbers are derived from trees is called 'conversion' and in the periods under discussion the primary means of conversion was by radial splitting. The resulting forms are illustrated and codified in fig 1. Example A on fig 1 could be either trunk or branch, with little shaping other than the stripping of bark and branches. Examples B and C are consecutive conversions from A, and D is a segment of any size smaller than a quarter. Depending on their intended function, the pieces may then be squared-off to produce the secondary forms A1 to D1. The waste from this process (E) can also be squared (B1) and utilised. As shown on fig 1 there is no way of distinguishing D1 from some quarter-sawn timbers and E1 from some rift-sawn timbers. Quarter and rift sawing are the main modern conversion techniques but

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Primary

Secondary timber may have one or more Waney Edges indicated by a subscript in the code, e.g., $B_{iw}, C_{iw}$.

Secondary

Irregular cross-sections

Fig 1 Conversion by radial splitting
although on medieval sites radially split timbers predominate, occasional sawn timbers do occur and the medieval trade with Scandinavia in sawn pine planking is well-documented. Timbers of irregular cross-section are subscripted ‘2’ on fig 1 to the primary form to which they most closely approximate.

The description of prepared timbers is fraught with ambiguity. The difficulties caused by regional variations in terminology are increased by a general confusion of size and function in the terms used. ‘Stake’ clearly denotes a function and ‘board’ a size (a wide thin timber), but ‘joist’ is descriptive both of a function and a size. One of the major aims in the analysis of wood from archaeological sites is to suggest possible functions or to define the limits of a range of functions of a particular assemblage. It is therefore important that descriptive terms are free of functional implications. The system of classification offered here is based solely on the dimensions of the cross section of timbers.

The terms used below follow, as closely as possible, those defined in British Standard 565 (1972). However, the definitions used there are not mutually exclusive and in several cases different dimensions are used for softwoods and hardwoods (see eg) Planks, BS 565 (1972), 21). Furthermore, the terms used in BS 565 have been designed to apply specifically to modern machine-cut timbers produced for a widely dispersed market where conformity to a standard is required: there is consequently little variability. This is not the case with ancient woodworking where primary conversion was mainly by radial splitting and subsequent fashioning was governed by immediate requirement. Therefore the British Standard definitions have been adapted to encompass such variability. Fig 2 shows the range of dimensions for each category. If the width and thickness of each piece of wood are plotted onto this graph then the area within which each piece falls determines its classification. Three of the categories, Baulk, Half-timber and Plank define specific ratios of width to thickness (1:1, 2:1 and 5 or more:1, respectively) and so are represented as radiating bands which allow for approximately 10% deviation from the defined ‘ideal’ ratio. The properties of square Scantling and Strip differ somewhat from those of rectangular cross-section and therefore a radiating line defining a width to thickness ratio of 1:1 divides these categories.

This process does not allow for the inclusion of the first three primary conversions, A, B and C since these do not have simple width and thickness dimensions. To overcome this, full stems (A) are graphed as baulks whose cross-sectional area is equal to the area of the circle of the stem’s cross-section. Thus the side length of the baulk (1) is defined as

\[ l = 0.89d \]

where d is the diameter of the stem. Similarly for B conversions the half-timber of equal cross-sectional area is chosen as representative. The length, l, of its long side is defined as above, its short side being \( \frac{1}{2} l \). The C conversions seem again best represented by timbers of square cross-section with side length 1 defined thus

\[ l = 0.44d \]

DISCUSSION

Although this set of definitions is restricted solely to sizes of timbers, it must be noted that size, specifically the cross-sectional area, is directly related to load-bearing capacity and thus related to the functions of a particular timber. We have tried in fig 3 to overlay a range of functional areas on the dimensional ranges defined in fig 2, and to examine a range of material from published
Nomenclature of timbers on the basis of cross-sectional dimensions

sites. Waterfront timbers from Chapel Lane, Staith (Ayers 1978, 30) and Trig Lane (Milne & Milne 1978, 89, 95) seem to generate a characteristic pattern of heavy baulks and half timbers which were used in the main framework, together with heavy planks used in the shuttering. There are in both cases concentrated groups clustered near the origin. These represent myriad pegs and stakes used to pin and revet the main frame.

The rather simple wattle and daub houses common on medieval sites (e.g. Durham 1977; Carver 1979) consist of heavy baulks functioning as sillbeams, angleposts and other roof supports, with large numbers of small (c. 50 mm diameter) sails from the wattle screens, and masses of wattles. This suggests the pattern illustrated in fig 3, bottom right (based on work now in progress from the Kirk Close excavations, Perth).

The confusion of size and function can still occur where pointed timbers are in question. Current practice, certainly in prehistory, is to term all pointed timbers 'stakes', or rather to term the soil structures which their decay produces 'stake-holes'. Pedantic adherence to the classification outlined above would place a great majority of pointed timbers (mainly code A) on the 'baulk' line where their functional significance would be lost. This is readily overcome by using a suitable symbol to distinguish them from the other timbers. Furthermore, the blanket term 'stake' covers timbers from less than 10 mm in diameter to as much as 1 m or more. The range of functions covered by 'stake' varies from tethering small animals to supporting very large structures. One of us (Barber 1981b, 122) has already commented on this problem and suggested an arbitrary division into stakes (cross-sectional area greater than 25 sq mm) and
Size - function: possible relationships

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**Trig Lane structure G11**

- fig. 9

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**Trig Lane structure G3**

- fig. 5

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**Chapel Lane Staith**

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**Kirk Close, Perth**

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**FIG 3**
pegs (cross-sectional area less than 25 sq mm). It is proposed to retain these terms here, redefining stake as a pointed timber falling in the Baulk size range, peg as a pointed timber falling within the Scantling range, and adding pin for a pointed timber falling within the strip range (fig 3).

This technique was designed in the hope that, by overcoming problems of nomenclature and by defining the relationship between function and size, it might prove to be of some assistance in dealing with the large volume of non-artefactual wood returned, mainly from medieval, but also from earlier, sites. An attempt to use it in this way has been undertaken in the report on the wood from an early Vallum ditch at Iona dating to the first few decades of the 7th century AD (see elsewhere in this volume p 328). The exercise (fig 3) which used timbers of known function from Trig Lane and Chapel Lane, Staith acts as a control, demonstrating the correlation between inferred function and real function. This technique may prove useful for interpretation on sites recovering 'floating' (ie not in situ) wood assemblages.

REFERENCES

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