Proc Soc Antiq Scot, 111, 1981, 510–515

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

Anne Crone and John Barber*

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 A_I to D_I. The waste from this process (E) can also be squared (B_I) and utilised. As shown on fig 1 there is no way of distinguishing D_1 from some quarter-sawn timbers and E_1 from some rift-sawn timbers. Quarter and rift sawing are the main modern conversion techniques but

* Central Excavation Unit, (SDD Ancient Monuments), 3–11 Melville Street, Edinburgh

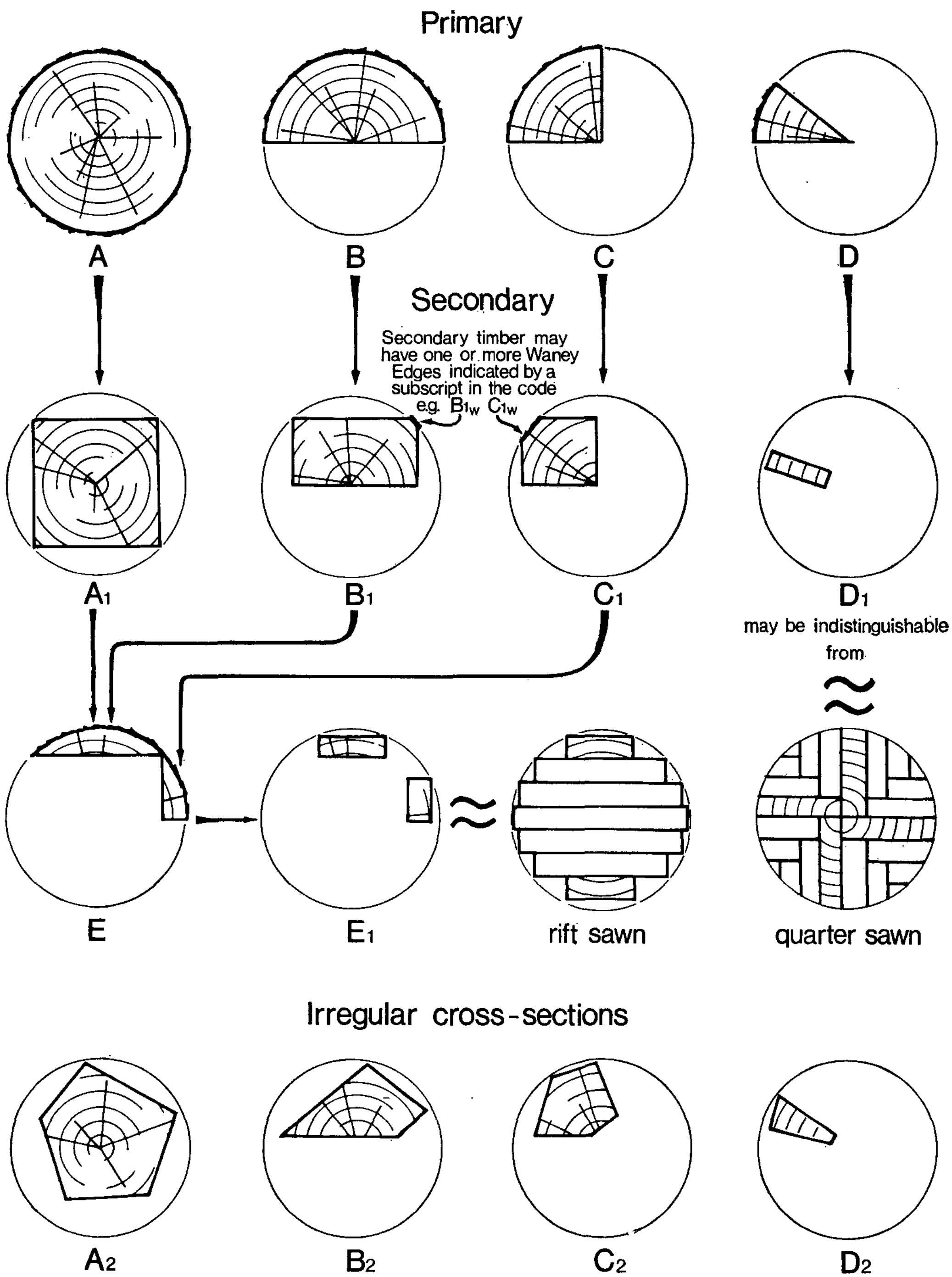

FIG 1 Conversion by radial splitting

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 rect-angular 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

$$[l = 0{\cdot}89d]$$

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

$$[l = 0{\cdot}44d]$$

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

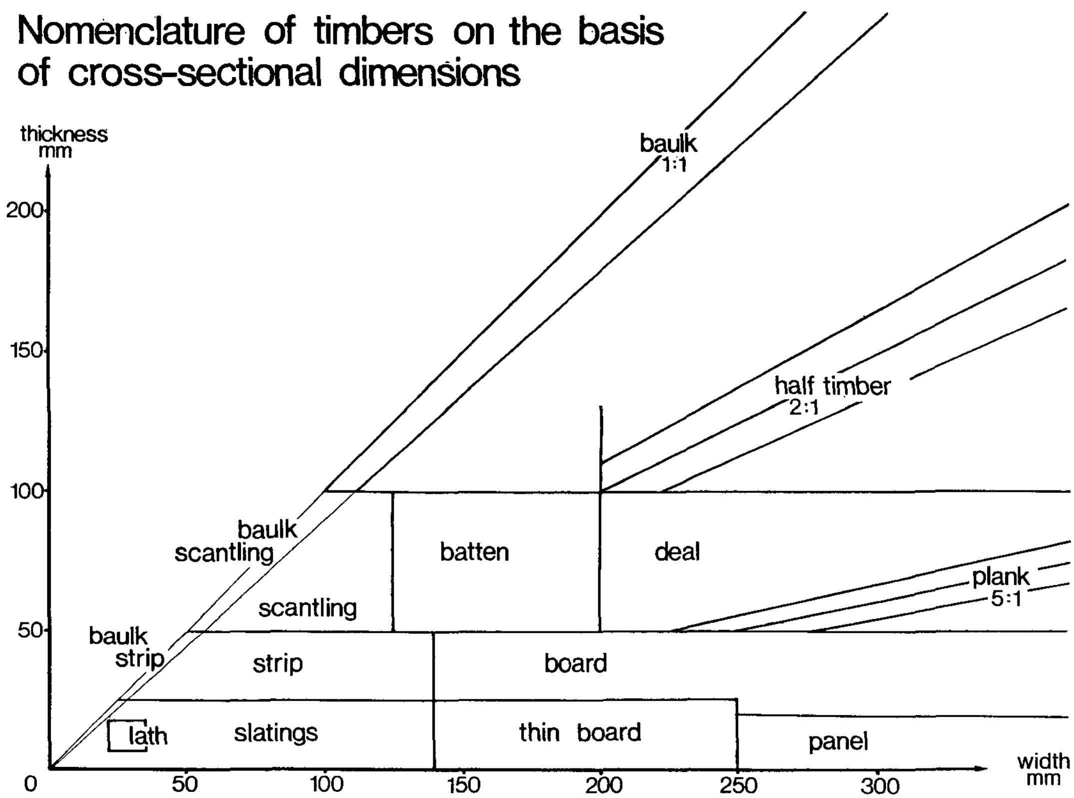

FIG 2

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 (eg 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

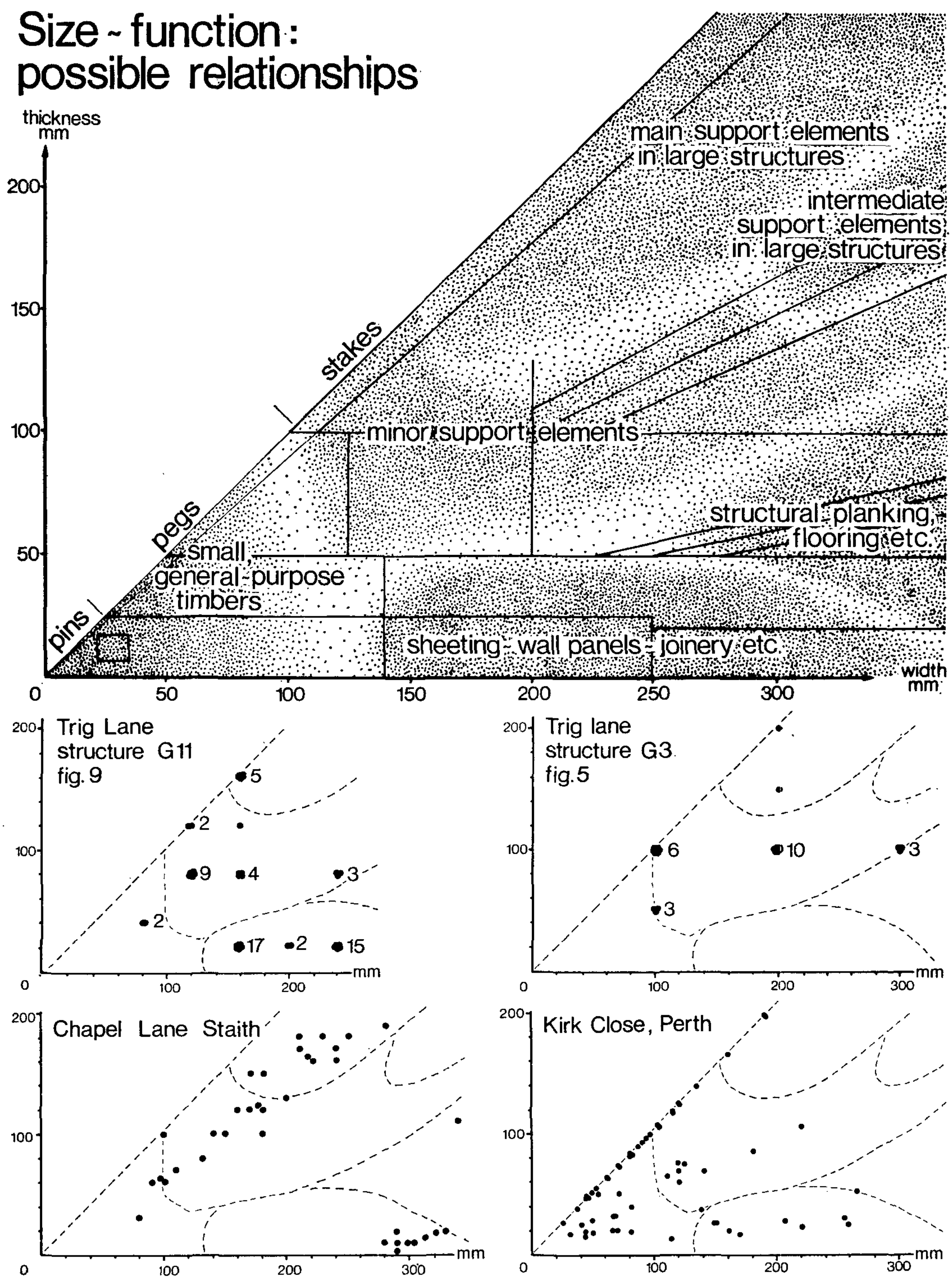
Size ~ function : possible relationships
thickness mm
width mm
stakes
pegs
pins
main support elements in large structures
intermediate support elements in large structures
minor support elements
small, general-purpose timbers
structural planking, flooring etc.
sheeting - wall panels - joinery etc.
Trig Lane structure G11 fig. 9
Trig lane structure G3 fig. 5
Chapel Lane Staith
Kirk Close, Perth
mm

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

Ayers, B 1978 'Excavations at Chapel Lane, Staith 1978', *E Riding Archaeol*, 5 (1979), 1–97.
Barber, J W 1981a 'Report upon the wood', *in* Mercer, R J 'Excavations at Longknowe, Eskdale, Dumfriesshire, 1976', *Trans Dumfriesshire Galloway Natur Hist Antiq Soc*, 3 ser, 56 (1981), 63–67.
Barber, J W 1981b 'Wooden objects', *in* Good, G L & Tabraham, C J 'Excavations at Threave Castle, Galloway, 1974–78', *Medieval Archaeol*, 25 (1981), 117–23.
British Standard 565 1972 *Glossary of Terms relating to timber and woodwork*, London.
Carver, M O H 1979 'Three Saxo-Norman tenements in Durham City', *Medieval Archaeol* 23 (1979), 1–80.
Durham, B 1977 'Archaeological investigations at St Aldate's, Oxford', *Oxoniensia*, 42 (1977), 80–203.
Kelly, F 'The Old Irish Tree-List', *Celtica* 11 (1976), 107–24.
Milne, G & Milne, C, 1978 'Excavations on the Thames waterfront at Trig Lane, London, 1974–75', *Medieval Archaeol*, 22 (1978), 84–104.
Morgan R 1975 'The selection and sampling of timber from archaeological sites for identification and treeing analysis', *J Archaeol Sci*, 2 (1975), 221–30.
Schweingruber, F H 1975 'Das Holz als Rohstoff in der Urgeschichte', *Helvetica Archaeologica*, 6 (1975), 2–14.
Tabraham, C 1982 'Threave Castle', *Medieval Archaeol*, forthcoming.
Troels-Smith, J 1960 'Ivy, Mistletoe and Elm: Climate Indicators — Fodder plants', *Danmarks Geologiske Undersøgelse*, 4 ser, 4, 4 (1960), 4–32.

The Society is indebted to the Scottish Development Department (Ancient Monuments) for a grant towards the cost of publishing this paper.