

A Survey and Analysis of the Buildings of Early and Middle Anglo-Saxon England

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A DATA BASE containing all the information available to the authors on Anglo-Saxon structures has been devised and installed on a computer. A preliminary analysis of the data concentrating on the dimensions of the buildings has revealed some significant trends in their lengths, widths and proportions. These trends are interpreted within what is known of the social and economic context of the period. In addition, a method of comparing the complete set of buildings on a site has been developed. It can be used, for example, to find sites with similar sets of buildings which may, therefore, also share other characteristics.

One of the main problems in Anglo-Saxon archaeology has been to account for the apparent uniqueness of the English timber structures of the period. These structures seem to bear little resemblance either to earlier Romano-British or to continental models. In essence, the problem is that the hybrid Anglo-Saxon style seems to appear full-blown with no examples of development from the two potentially ancestral traditions. This problem has been considered in the past by Prof. P. A. Rahtz,² P. V. Addyman,³ P. Dixon,⁴ and S. James, *et al.*⁵ The last attempted to define the identifying features of Anglo-Saxon buildings from the 6th to 8th centuries in the light of the recent excavation at Cowdery's Down⁶ and suggested some affinities.

The consensus of the published work was that the Anglo-Saxon building style was predominantly home-grown. B. Hope-Taylor⁷ did suggest that the mature style at Yeavinger, as seen in buildings A2 and A4, might be an amalgam of Germanic and native British traditions but offered no evidence. Dixon discounted completely the Germanic elements of such sites. James *et al.*, however, were able to demonstrate that the origins of the building type owed features to both native British and Germanic traditions.

Given that the style is a hybrid, one would expect to find a few sites that are predominantly Germanic, since the settlers would surely have needed some time to absorb native British techniques. However, even at sites such as Mucking where it has been suggested that Germanic tribes were invited to settle,⁸ there is no evidence

of anything other than the mature hybrid style. In fact, no evidence whatever exists in England of any precursor to this style of building. Accepting that earlier sites may remain to be discovered, there is the further problem of how the hybrid came to be so widespread over the whole of England. This paper attempts to shed more light on these problems by considering the evidence from recent excavations and other sites that are known only from aerial photographs.

To carry out the work reported in this paper, all the available information on Anglo-Saxon structures from the 6th to the 9th century has been collected and entered into a computer (a Macintosh Plus) to form a data base. The volume of the collected information is such that the use of a computer is the most convenient and flexible means for rapidly searching and analysing it. Using a computer also facilitates the addition of further information as it is made available. It would have been preferable to use a conventional data base program to store the information, but none of them possess data-retrieval functions that are flexible enough to allow the manipulation and analysis of the material that we require. Consequently, we have written our own programs both for storing the information and for examining it. It is intended that these programs will be sufficiently general for use in a wider survey, which will eventually examine all rectilinear earthfast timber structures from Romano-British, sub-Roman, Celtic, Anglo-Saxon and continental Germanic sites to see if this can shed any further light on the evolutionary process.

THE SOCIAL AND ECONOMIC CONTEXT

A considerable number of sites have become known since Rahtz's survey of Anglo-Saxon settlements. Some, such as Cowdery's Down,⁹ have emerged through excavation, and others, including Malmesbury,¹⁰ by aerial photography. Although the structures on the sites are stylistically similar, sharing rectangular plans and earthfast foundations, the settlements themselves take a variety of forms. Some, as at Mucking,¹¹ possess a large number of structures: others, such as Chalton,¹² are small hamlets or, as at New Wintles,¹³ isolated farm units.

The paucity of finds on the sites provides little evidence relating to the economy of the settlements. The discovery of sheep and cattle bones has suggested a partially pastoral economy at, for example, Bishopstone¹⁴ but there has been a lack of evidence for arable farming on any site. The small amount of information concerning metal-working and weaving that has so far come to light would seem to indicate a degree of self-sufficiency rather than any industrial complex.

Given the problems of dating Anglo-Saxon settlements there does appear to be a general increase in the size of the structures with time. The use of individual post-holes seems to be the earliest form of construction. The structures at Mucking were all built in this way, and are small. By contrast, the later buildings at Cowdery's Down, constructed by the plank-in-trench method, are all comparatively large.

Some of the later settlements have a higher proportion of large buildings than others. These settlements also show clearer signs of planning in that they are focused on one large structure, the dimensions of which usually exceed 22 m by 7 m: they

include Cowdery's Down and Northampton.¹⁵ It has been suggested¹⁶ that these were high-status settlements, and Yeavinger has been equated with the Bernician royal compound, *ad Gefrin*.¹⁷ Even if it is not accepted that increased sizes of structures indicate settlements that have been attracted by some high-status personage, they would seem to indicate improved social organization, with a more co-ordinated community using the building for common activities or economic purposes, such as grain storage.

THE DATA, ITS REPRESENTATION AND THE METHODS OF ANALYSIS

PROBLEMS IN THE COLLECTION OF THE DATA

Over the past 25 years the number of Anglo-Saxon earthfast timber buildings excavated has increased dramatically. This is perhaps due to a higher level of interest in such buildings, although the ability of archaeologists to recognize their features may also have some bearing on the matter. The problem of recognition is not helped by the fact that features may have been destroyed, by deep ploughing in the countryside, and by the construction of deep cellars on town sites. What remains of the site may, therefore, not be a true representation of its original state.

Sites known only from aerial photographs have been included in this analysis but here there are problems of recognition of features and of dating. Where features stand out they have been included but many aspects of such sites have been excluded. They will be considered as and when excavation takes place in the future to clarify matters.

The absolute dating of sites and individual buildings on sites is difficult. This is particularly true of the early Saxon period when there are no coins and very little recognizable pottery. Carbon 14 dating can be used, but its innate errors give rise to dates that are too imprecise in the Anglo-Saxon period. Literary evidence would also suggest that timber was often re-used.¹⁸

Without absolute dates it is difficult to establish the chronology of a site. New buildings are often built in a different area, and although post-in-trench construction appears to be a later constructional method, post-built structures continue to be built right through the Saxon period.

Rahtz raised the possibility that the sites available for excavation were abandoned because they were failed settlements and therefore were not representative of Saxon sites in general.¹⁹ However, very few of the medieval deserted villages which have been excavated possess early Saxon or mid Saxon occupation levels. This suggests that the Saxon settlements may have been periodically relocated although, of course, some may have failed eventually.

It is clear that the evidence for Anglo-Saxon timber buildings is far from complete. The data therefore has to be used with care and any conclusions must be made in the knowledge that they may have to be amended in the light of further evidence. This adds point to the use of the computer as the means for storing the information. Once in the computer the information is amenable to amendment and open to alternative forms of analysis.

COMPOSITION OF THE DATA BASE

The information was structured in such a way that it could be stored as two sets of records. One set contains a record for each site with each record providing general information and any details that might be common to all the houses on that site. The other set contains a record for each structure, with each record providing the specific details, where they are known, of one structure. In this way, there is no need to repeat the general information that applies to all the structures on a site when entering the details of each structure on that site.

Sites

The form adopted for the record of a site is shown in Table 1. This is, in effect, the record card on which the details of a site are entered, and the table shows the details for the site at Bishopstone. The features recorded are those that can later be studied in order to throw more light on the nature of Anglo-Saxon settlements and to indicate the areas where sites have been discovered. It could also be used to reveal the nature of situations in which further sites might be found. The entry against 'number of buildings' simply indicates the number of known buildings on the site. It does not, however, imply that all these buildings will be recorded individually and be represented by a structure record. Some of the buildings survive only in part and others are only suggested by an aerial photograph. Only those buildings for which relatively reliable evidence can be obtained are dignified with a record. The date recorded is the one suggested by the excavator.

TABLE 1
THE RECORD FOR A SITE

Field name	Field entry
Name	Bishopstone
County	Sussex
Date (Century)	5
Number of buildings	13
Position (Valley or Ridge)	Ridge
Enclosed?	Yes
Earlier settlement?	Yes
Later settlement?	No

Structures

The form of the record for a structure is shown in Table 2. The record has been completed with the details of structure C7 from Cowdery's Down.

The features recorded are those that appear most frequently when such buildings have been excavated. It is only possible to record the plans of these structures as they do not survive above ground level, thus the length and width are recorded to allow later statistical analysis but the height is not. Various features have been suggested as typical of Anglo-Saxon structures. These include doors in the

middle of long sides, weak corners, annexes, and internal partitions. These features were therefore included. As an additional benefit, their inclusion will allow us to evaluate the correctness of these beliefs. The code for each structure is that given by the excavator. Where only one structure has been discovered on a site it is given the code '1'.

The type of construction was classified under one of three headings: individual post-holes; post-in-trench; and plank-in-trench. Evidence for planks has not always survived and, if it is necessary, it will be possible to amalgamate post-in-trench and plank-in-trench construction during analysis.

The record provides space to indicate other features that are found only occasionally, such as the flooring of structure C12 at Cowdery's Down,²⁰ and ridge or buttress posts that may throw light on the construction of the structure. If, as a result of further excavation, features that are not explicitly included in the record prove to appear frequently then the record can be amended.

TABLE 2
THE RECORD FOR A STRUCTURE

Field name	Field entry
Name	Cowdery's Down
Code	C7
Length (m)	14.4
Width (m)	7.3
Number of doors	2
Positions of doors	W, E
Number of partitions	0
Positions of small rooms	
Number of annexes	0
Type of construction	Plank-in-trench
Weak corners?	Yes
Orientation	North-South
Date	?
Remarks	Stakes between the planks

THE RESULTS OF THE ANALYSIS

The features of the buildings for which the data base contains the most complete information are the measurements of length and width. As such, they provide the most obvious starting point for investigations. Of the 267 structures in the data base the length and width are recorded for 247. Many of the measurements were given by the excavators in their reports, while others were taken from the plans presented in reports. Yet other measurements are for buildings known only from aerial photographs. The photographs were usually published to a very small scale, and in consequence measurements taken from them are of a lesser accuracy than the

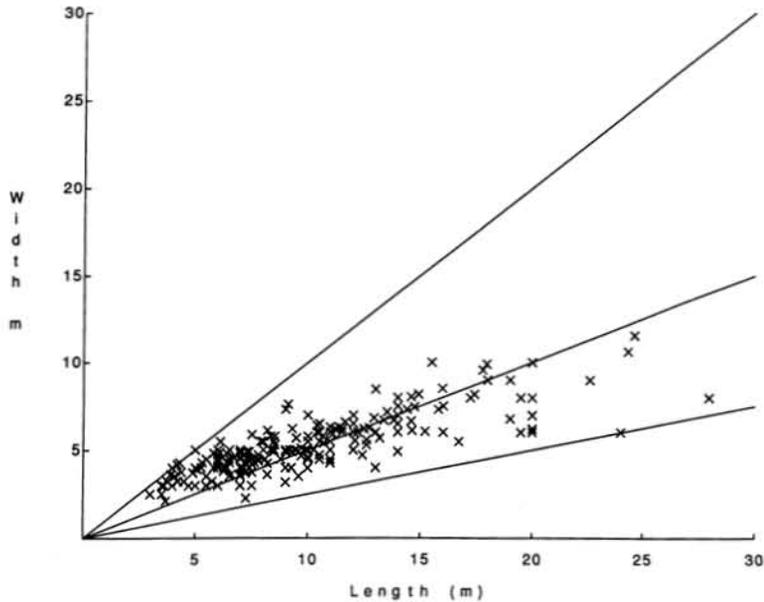


FIG. 1
Scatter diagram showing the sizes and proportions of all the structures. The lines mark the trajectories of the one-, two- and four-square shapes

remainder; nevertheless, the measurements are accurate to within half a metre at worst.

Fig. 1 shows all the lengths and widths plotted on a scatter diagram. This plot shows the general relationship between the lengths and the widths, and also the general pattern of the proportions of the structures. The lines on the graph are those along which the length is equal to the width, the length is twice the width and the length is four times the width, that is, the one-square, two-square and four-square lines. The graph illustrates in a general way that there is a certain clustering of the buildings on the basis of their lengths and widths, and that there are some structures that fall outside the normal range.

An attempt to summarize the data in Fig. 1 is shown in Fig. 2. The box in this figure is intended to represent, in a special sense, the average building. The centre of the box gives the average length and width of all the buildings. The length of the box is twice the standard deviation of the lengths, and so can be taken to represent the variation in the lengths. Similarly, the height of the box is twice the standard deviation of the widths, and it can be taken to represent the variation in the widths. In short, the box gives a graphic representation of the first and second order statistics of both the lengths and widths. The box of Fig. 2 shows that the average width of all the structures is close to 5 m while their average length is close to 10 m: in addition, the standard deviation of the widths is rather more than one metre while the standard deviation of the lengths is approximately 4.5 m. Even a glance at the box makes it clear that there is far less variation in the widths of the buildings than there is in the lengths. We shall use this 'box' method to characterize the buildings of individual sites so that we can encapsulate some essence of all the buildings on a site and use it as a means of comparing sites.

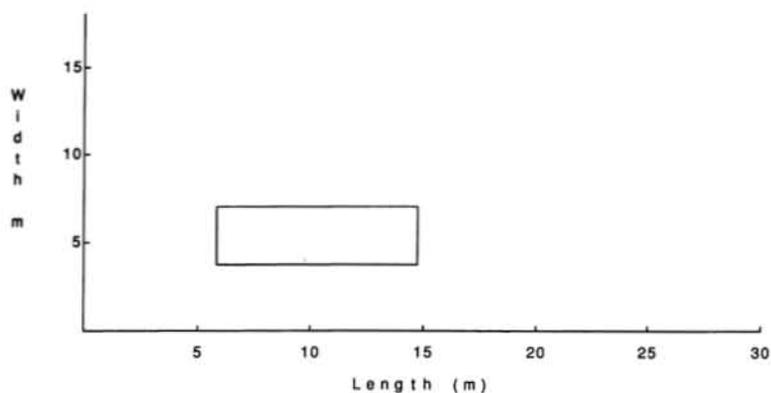


FIG. 2

The 'box' for all the structures. The centre of the 'box' gives their average length and width: the length and height of the 'box' are, respectively, twice the standard deviation of the lengths and widths of all the structures

Although the scatter diagram indicates the clustering of the measurements, it does not give an accurate indication of the number of buildings involved. Fig. 3 re-presents the data in the form of a histogram of the length/width ratios. This form of presentation indicates more clearly than the scatter diagram the way that the ratio categories aggregate: it also provides some quantitative information. In particular, it shows that there is a predominance of structures with a length/width ratio close to two.

These initial presentations of the data give some idea of its general nature and suggest some of the trends that lie within it. From them, we shall proceed to try and tease out some more detailed relationships.

THE WIDTHS OF THE STRUCTURES

An examination of Fig. 1 indicates that there is some clustering of the widths, most notably at approximately 4.5 and 6 m. The histogram of Fig. 4 clarifies this and shows that the widths cluster at 4.5 to 5.5 and at 6 to 6.5 m. Both the graph and the histogram show that most of the structures are less than 7 m wide, a fact that can be explained by the lengths of timber available for use as a single beam to span a building, and by the strength of timber when used for this purpose. The histogram also has spikes at widths of 7, 8 and 9 m. These spikes apart, the number of instances decreases steadily as the width increases from 7 to 12 m. It is tempting to see the histogram as showing a steady improvement in building technique with occasional sudden discoveries leading to the development of a number of buildings larger than those that had come before. Sadly, there is insufficient direct dating evidence available to refute or confirm this idea.

When separate scatter diagrams are plotted according to building type, a difference emerges between those with individual post-holes and those that are either post-in-trench or plank-in-trench (Fig. 5a, b). The buildings constructed with individual post-holes show a marked clustering at 5 m and, with a few exceptions, a cut off at slightly more than 7 m. The exceptionally wide buildings are B6 and B/C15 at Cowdery's Down, N at Cheddar and a structure at Sprouston known only from an aerial photograph. Their respective widths are 7.5, 8.2, 7.6 and approximately 8 m.

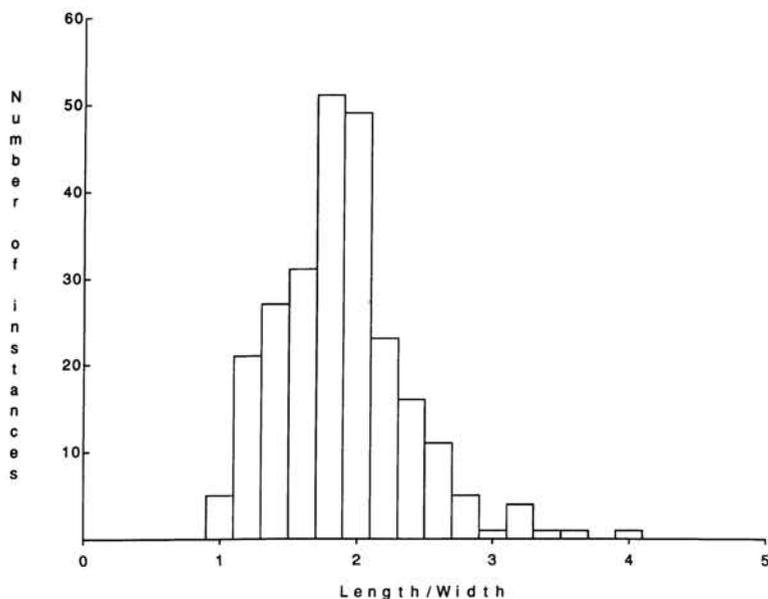


FIG. 3
Histogram to illustrate
the distribution of the
proportions of all the
structures

The post-in-trench and plank-in-trench structures show a greater variation of widths, having both smaller and larger ones than the post-hole structures. The post-in-trench and plank-in-trench types are believed to develop after the Anglo-Saxons had settled in England. The wider buildings having these methods of construction may result from the increased strength of the walls, which were able to resist the outward thrust of the larger roofs. Thus, the development of new methods for constructing walls and of more sophisticated roofing techniques may have proceeded in tandem. When the buildings with evidence for plank-in-trench construction are plotted separately (Fig. 5c) it can be seen that most of the widest structures are of this type. This factor gives weight to the theory that such buildings may be of higher status.

Only five excavated Anglo-Saxon sites have structures that are over 7 m wide: Yeavinger (A1a, A1b, A2, A3a, A3b, A4, C3, C4a, C4b, D5); Cowdery's Down (B6, C7, C12, C14, B/C15); Doon Hill (B); Thirlings (A, C) and Cheddar (N). In addition, four of the sites known only from aerial photographs appear to have structures with widths over 7 m. They are Atcham, Malmesbury, Milfield and Sprouston. J. T. Smith has stated that Doon Hill B and the buildings at Yeavinger which could be so interpreted cannot have had aisles. The exceptional preservation of features at Cowdery's Down makes the presence of aisles there unlikely, and there is no evidence of it at the two other excavated sites. Thus, while it is possible that some of the wider structures may have been aisled so that their internal walls could have been used as roof supports, there remain others that were certainly not aisled and for which more advanced roofing techniques would have been necessary.

THE LENGTHS OF THE STRUCTURES

When Fig. 1 is examined to ascertain information about the length of structures a number of large clusters can be seen. These occur at approximately 7, 10, 14 and, to a lesser extent, 20 m, as is confirmed by the histogram of Fig. 6. The shortest lengths are in the range 3 to 3.5 m. The longest building, at 28 m, is a post-built structure from the aerial photograph of Sprouston. There is a small cluster of buildings with lengths of 24 m (structures A2 and A4 at Yeavering and the long hall at Cheddar), but otherwise most of the structures are not more than 14 m long. Besides preferred lengths for the structures, the occurrence of preferred widths has already been noted. It may be observed that 3.5 m and multiples of it are a common feature of most, if not all, of these length and width measurements. The lengths and widths, however, form broad clusters at the preferred values, and display none of the precision of the rods of Huggins.²¹ There is a greater range of lengths than widths. The strength of the timbers imposes restrictions on the width of a building, but a structure can be lengthened indefinitely by adding sections of the same width. Thus, while there are no restrictions on the length of a building, certain lengths do predominate.

The separate scatter diagrams for post-hole structures and for the combined post-in-trench and plank-in-trench structures (Fig. 5a, b) show, in the same way as for the widths of buildings, differences that relate to the lengths. The post-hole structures fall mainly in the lower ranges with the majority below 11 m. The post-in-trench and plank-in-trench structures show a much greater variety of lengths, include more long buildings, and have a cut-off point at about 15 m, although a small number cluster round the 20 m length.

There are eleven excavated sites that have structures over 15 m long: they are Allington Hill, Catholme, Cheddar, Cowdery's Down, Kirkconnel, Maxey, Raunds,

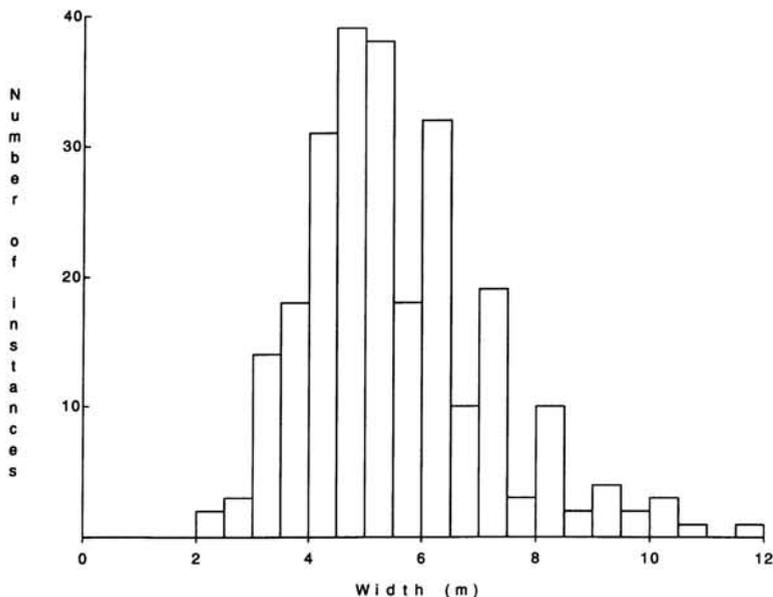


FIG. 4
Histogram to illustrate
the distribution of the
widths of all the
structures

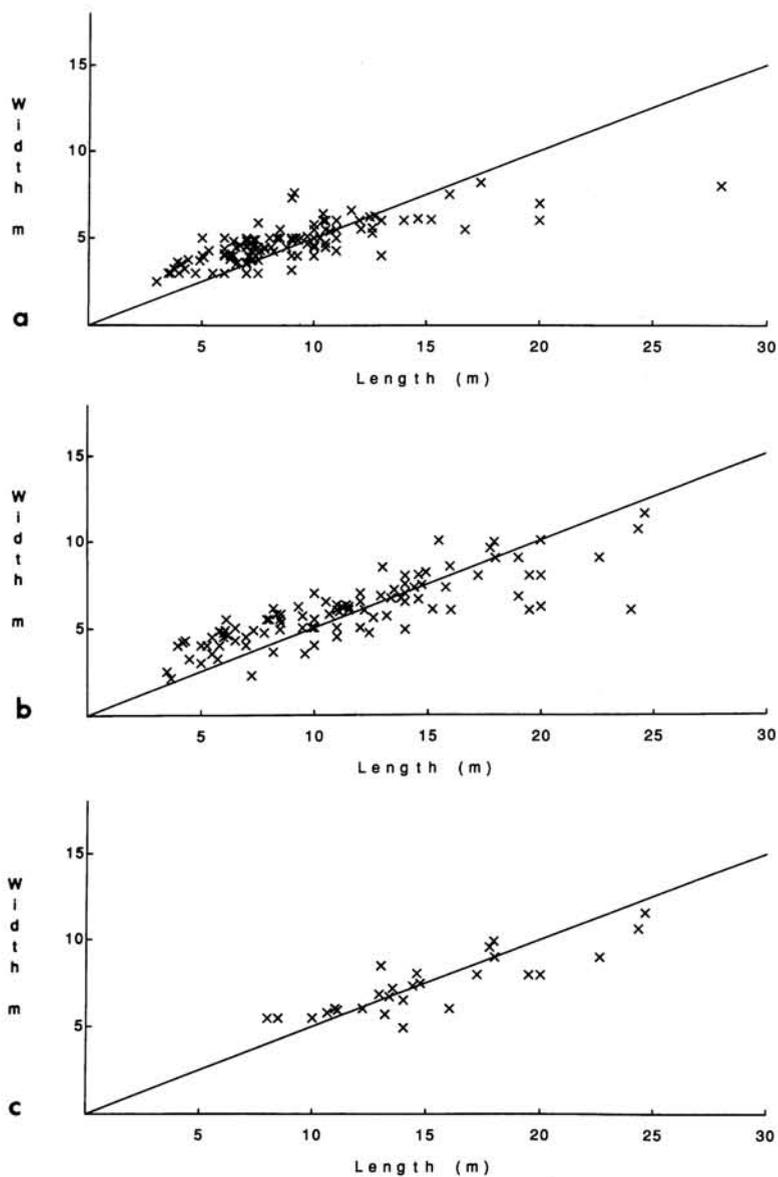


FIG. 5

a. Scatter diagram showing the sizes and proportions of all the post-built structures. The line marks the trajectory of the two-square shapes. *b.* Scatter diagram showing the sizes and proportions of all the post-in-trench and plank-in-trench-built structures. The line marks the trajectory of the two-square shapes. *c.* Scatter diagram showing the sizes and proportions of all the plank-in-trench-built structures. The line marks the trajectory of the two-square shapes

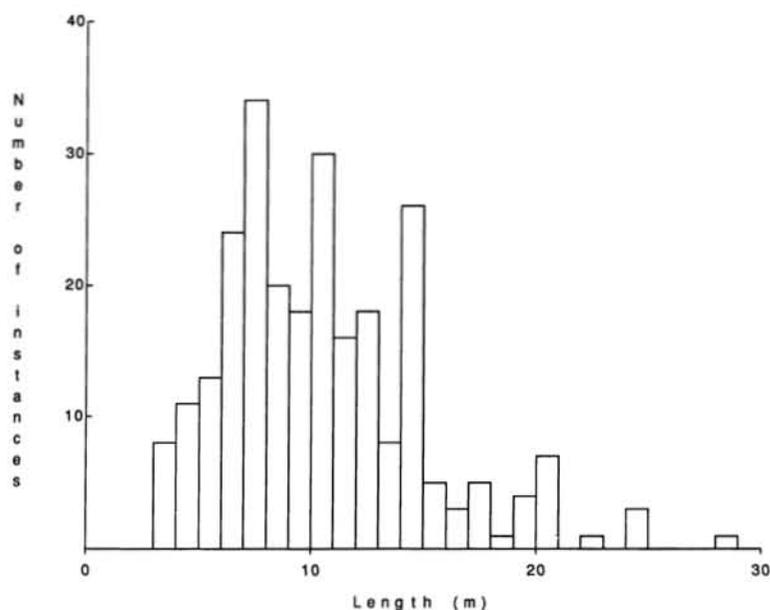


FIG. 6

Histogram to illustrate the distribution of the lengths of all the structures

Springfield, Thirlings, Wicken Bonhunt, and Yeavinger. Only Cowdery's Down and Yeavinger have more than one such building (B6, C12, C14, B/C15 at Cowdery's Down and A2, A3a, A3b, A4, C4a, C4b, D2b at Yeavinger). There are in addition three sites with such structures known only from aerial photographs (Malmesbury, Milfield and Sprouston). The majority of these structures are of post-in-trench or plank-in-trench construction.

The social status of sites with great halls over 18m long has been much discussed.²² The type of construction of these buildings and their apparent rarity may be of help in indicating status, both of individual buildings on sites and of sites themselves. Of these long buildings it has been suggested that Cheddar, which is apparently four-square, could be interpreted as a hall with two annexes,²³ and the fact that building 2 at Catholme went through four phases of construction which made the interpretation difficult²⁴ would allow structure 2c to be interpreted in the same way.

THE SHAPES OF THE STRUCTURES

The structures are all rectangular, so that each can be characterized by the ratio of its length and width. James *et al.*²⁵ have suggested the two-square model, and variations on it, as being characteristic of Anglo-Saxon buildings. In view of the existence of a number of preferred lengths and widths described in the previous sections, it might be expected that examination of the data base would reveal a corresponding number of preferred shapes.

The histogram of Fig. 3 displays the distribution of length/width ratios for all the buildings in the data base for which the length and width are both recorded. The outstanding feature of the diagram is the predominance of ratios at and close to 2. In

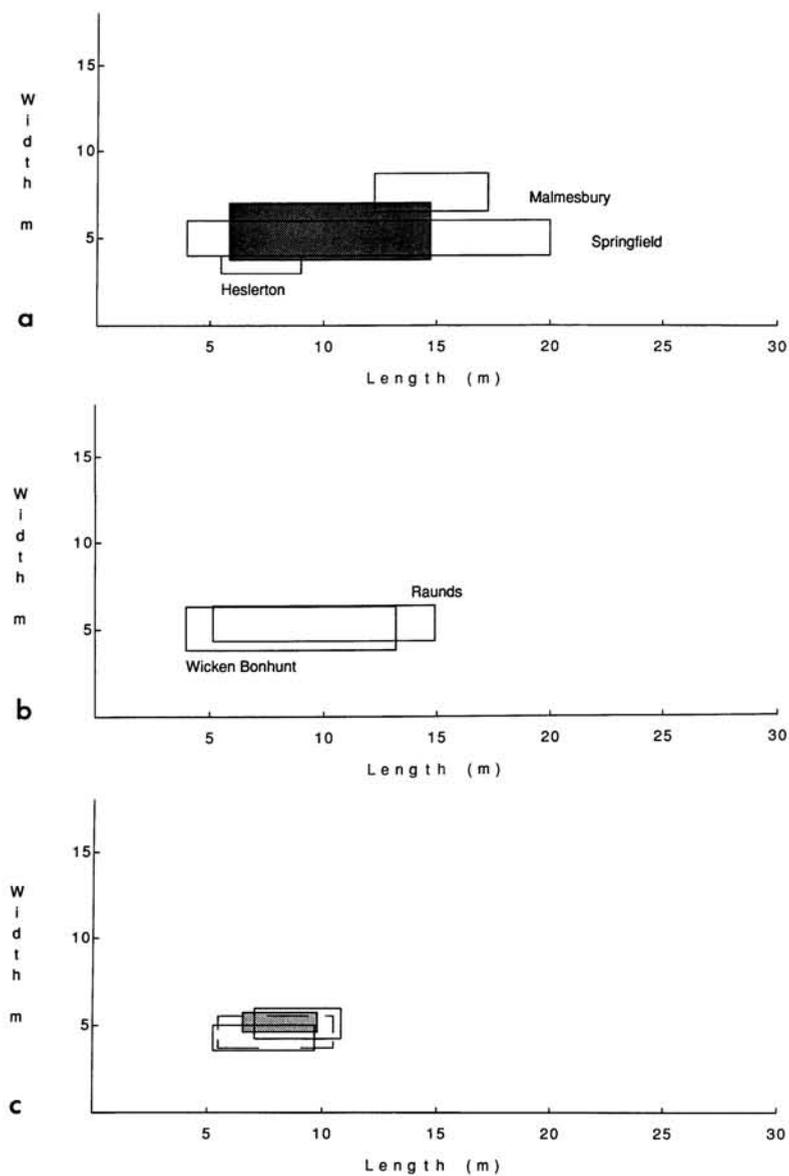


FIG. 7

a. The 'boxes' for the sites at Heslerton, Malmesbury and Springfield to show that sites with different characteristics can also have different 'boxes'. The shaded 'box' is that for all the structures. *b.* The similar 'boxes' of the sites at Raunds and Wicken Bonhunt. *c.* The cluster of similar 'boxes' for the sites at Bishopstone, Chalton, Mucking and Portchester

fact, the most frequently occurring ratios are slightly below 2, and may be taken to correspond to the overlapping squares variation of the two-square model.

The histogram also shows that there are buildings with length/width ratios in every interval from 1 to 3. The four buildings with a length/width ratio of unity (i.e. the square buildings) are all small. There is only one building with a length/width ratio close to 3 (i.e. a three-square building), which leaves a rather surprising gap in the distribution. There are buildings with a length/width ratio in excess of 3 but, as mentioned at the end of the previous section, some of these may be misinterpretations of two-square buildings with annexes.

In the light of this, Fig. 3 shows that the shapes of Anglo-Saxon buildings essentially occupy a spectrum of length/width ratios extending from 1 up to but not including 3, with a heavy predominance of buildings that conform to either the two-square model or its overlapping variant.

CHARACTERISTICS OF THE SITES

The box method introduced in Fig. 2 to represent in an easily assimilable fashion the first and second order statistics of the complete data set can also be applied to the set of buildings on a particular site to give us a means of characterizing all the buildings of that site. When used in this way, the method becomes a tool with which sites can be compared.

Fig. 7a shows the boxes for Heselton, Springfield and Malmesbury. The figure shows at once that the sites are quite different from each other: the average lengths and widths, and the variabilities of the lengths are all quite different. The only common factor is the variation in the widths. Since the characteristics of the buildings on these sites are so different, it would be reasonable to assume in the first instance that the sites differ in other aspects.

It is not difficult to discover sites the boxes for which are similar. Fig. 7b shows the boxes for Raunds and Wicken Bonhunt; and Fig. 7c those for Bishopstone, Chalton, Mucking, and Portchester. In the latter group there are pairs with an even higher degree of similarity. It is not unreasonable to assume some affinity between the sites that prove to have similar boxes, especially in their dating, but again the supporting evidence is scanty.

Some direct evidence can be found, however. Raunds and Wicken Bonhunt, the similar boxes for which are shown in Fig. 7b, both date from the middle Saxon period. Despite the fact that the sites with boxes in Fig. 7c are geographically scattered, their dates, or suggested dates, are all from the early Anglo-Saxon period. Further, the dominant building style on all these sites is post-hole construction. Although no exhaustive search of the data base for conflicting evidence has been carried out, none has come to light as yet. In the light of this, we feel that our box method is worthy of consideration as a means of identifying sites which may show further affinities.

DISCUSSION

A data base containing all the information that the authors have been able to glean on the Anglo-Saxon structures of England has been installed on a computer. A

preliminary examination and analysis of this data base has resulted in a number of findings, the development of methods for representing the data, and not a few questions.

The general belief that Anglo-Saxon structures increased in size through the period is supported by the results of our survey. The diagrams show that the post-built structures are generally smaller, while those built with the later post-in-trench and plank-in-trench techniques are among the larger. Small structures continued to be built throughout the period, however, so that the post-in-trench and plank-in-trench structures show a greater variation in size. Despite this variation, few of the structures stray far from the two-square module, and the predominant shapes are the two-square plan and its overlapping variant. The length/width ratios of the buildings almost all lie in a range extending from unity up to, but not including, three.

There are definite preferred widths for the structures. Most of them are less than 7 m wide, a value perhaps determined by the length of the available structural timber and the maximum distance that can be spanned by a single beam. Some of the buildings that are more than 7 m wide were almost certainly not aisled, and so signal the introduction of more advance construction techniques for roofing.

Despite the absence of constraints on the lengths of the structures, there are also certain preferred lengths. A measure of approximately 3.5 m is a common factor of most, if not all, of the most frequently occurring lengths. This measure has continued in use and may be found in the plans of vernacular buildings of all ages. Almost all the larger buildings are of post-in-trench or plank-in-trench construction. This may be for reasons of structural necessity or of status or even a combination of the two.

With little direct evidence for the socio/economic function of a site, a consideration of the changes in size may help to shed light on this matter. Reasons for the increase in size could include the desire for privacy, with larger buildings allowing for partitioning; a change in the economy, with a resulting need for increased storage space; and, as suggested by many,²⁶ a change in social organization, with the development of a social hierarchy in which larger buildings indicated higher status.

A site can be characterized by our 'box' method which encapsulates the first and second order statistics of the lengths and widths of all the buildings on a site. A comparison of the boxes for two sites is a suggestive way of finding sites which share similarities (or marked differences) in one characteristic and which therefore might (or might not) have other features in common. In fact, the boxes of two sites for which it has been suggested that large buildings are indications of high status, Cowdery's Down and Yeaveering, are similar. This fact lends weight to the value of our box method, which indicates that, at the very least, the two sites have similarities of some kind.

As further sites are excavated so further statistical work can be carried out, testing the validity of the techniques we have developed and leading to, it is hoped, a greater understanding of settlement in early and middle Anglo-Saxon England.

ACKNOWLEDGEMENTS

We would like to thank Dr M. Millett and Mr S. T. James for reading our work and suggesting improvements to it. We are also grateful to Mrs M. U. Jones and Mr G. Coles for providing us with unpublished information about their sites.

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- ¹⁸ Bede, *A History of the English Church and People* (trans. L. Shirley-Price) (Harmondsworth, 1968).
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- ²³ James *et al.*, *op. cit.* in note 5.
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