YEAVERING MEASUREMENTS: AN ALTERNATIVE VIEW

The publication of the 1952-62 excavations at Yeavering, Northumberland¹ allows us to compare the measuring system there postulated for building layout with that recognized elsewhere in Saxon England. Of the twenty or so timber buildings at Yeavering there are a few which suggest that they were carefully marked out on the ground. As a result of his study of the plans of these buildings and from measurement of timber sizes, Hope-Taylor postulates the use of a Yeavering unit of 11.05 modern inches. He also stresses the significance of the multiple of 8 such units, which he calls an x-measurement² and of 5 x-measurements, which he calls a y-measurement; this latter is thus 40 Yeavering units long. He states that 'an outstanding advantage of the 40-unit measure, y, is its flexibility: it is divisible by 2, 4, 5, 8, 10 and 20, and lends itself to such calculations in terms of both quarters and fifths as are here in evidence'. These x- and y-measurements are 7.37 and 36.8 modern feet respectively. This system contrasts with the 'Northern' system of measurement recently detected at Rivenhall³ and at Nazeingbury, Essex⁴ which is based on a 15-foot rod.

The overall size of the aisled building A2 was 88 by 40 Yeavering units; with a 4-unit wide doorway in the middle of the length, Hope-Taylor calls this a double square building but it is only such if the door jambs, which are 2 units wide, as well as the doorway, are *excluded* from the reckoning. This leaves side walls, as opposed to side walls with jambs, of length 40 units each side of the central doors (the door being 8 units wide, made up of the 4-unit doorway and two jambs each 2 units wide). If only the doorway is excluded each length of side timber work is 42 units in length and it is suggested here that this may have been a more significant measurement at Yeavering than that of 40 units.

Building A4 is of similar type and 'is left to carry the burden of demonstration' with regard to the 'precision' of setting out.⁵ The size of A4 was altered during construction from a width of 40 units to a width of 42 units. Thus A4, with the door jambs *included*, is truly formed of double squares, 42 by 42 Yeavering units, and with a central doorway of 6 units width the overall length is 90 units. In the dimensions so far considered the 42-unit measurement has occurred three times, in the width of A4 and in the lengths of timberwork of the sides of both A2 and A4. If the 40-unit measure is in some way basic then the 42-unit measurement is unlikely so to be. But the opposite may be true, particularly if the Yeavering unit has been wrongly construed.

It has been argued elsewhere⁶ that the Northern system of measurement, defined by Petric⁷ and discussed by Skinner⁸ was in use throughout much of Saxon England, the Northern system being:

3 barley corns = I N. inch (1.1 modern inches or 2.79 cm) 3 N. ins. = I N. palm (3.3 ins. or 8.38 cm) 4 N. palms = I N. foot (13.2 ins. or 33.53 cm) 15 N. ft. = I N. rod (16 ft. 6 ins. or 5.03 m)

This system was re-defined in modern terms by the early 13th century⁹ when:

1 foot	=	12 inches
1 elne (ulna)	_	3 feet (later 1 yard)
1 rod	=	$5\frac{1}{2}$ elnes or $16\frac{1}{2}$ feet (5.03 m)

It was reasoned that the Northern rod of 15 N. ft. was divided into thirds and sixths on the evidence of the plans of excavated buildings; this had been recognized just previously at Rivenhall. Thus the equivalent of a surveyor's ranging rod would have been $\frac{1}{3}$ N. rod or 5 N. ft. or $5\frac{1}{2}$ modern ft. long. The division into $\frac{1}{6}$ N. rod could have been achieved by the use of a hinge; it is interesting that the Latin word *pertica* has the dual meaning of measuring rod and flail, the latter of course being a hinged implement. The $\frac{1}{6}$ N. rod measure, although appearing to be an awkward dimension, is equal to 10 palms and as such is a

round number. The use of the Northern rod has been detected at West Stow, Suffolk, Chalton, Hants. and Cheddar, Somerset; and possibly at North Elmham, Norfolk, Maxey, Northants. and Thirlings, Northumberland. At Cheddar there are measurments of $6\frac{2}{3}$, $4\frac{2}{3}$, $3\frac{1}{3}$, $1\frac{2}{3}$,

The Ycavering unit of 11.05 modern inches is equivalent to 10 inches of the Northern system to within less than $\frac{1}{2}\frac{1}{0}$ which is well within the doubt in the figure derived. This in itself suggests that the introduction of the Ycavering unit was unnecessary and is likely to confuse the issue with regard to the larger dimensions. The 42 Yeavering unit dimension noted above is $2\frac{1}{3}$ N. rod or 35 N. ft., also to within less than $\frac{1}{2}\frac{1}{0}$. The total length of building A4, externally over the timbers, of 90 Yeavering units, is 5 N. rods to the same accuracy. As to the internal layout of A4, the aisle posts are set 12: 18: 12 in Yeavering units as aisle: nave: aisle or $\frac{2}{3}$: 1: $\frac{2}{3}$ in N. rods or 10: 15: 10 in N. ft. The original uncompleted A4 was to be divided 12: 16: 12 in Yeavering units which would not have fitted the Northern system; similarly the internal divisions of A2 at 10: 20: 10 would not fit. The pitch of the aisle posts seems to have been determined by functional rather than metrological consideration and their asymmetry may imply an *ad hoc* attitude to roof construction.

Thus the main dimensions from the plan of building A4 fit the Northern system whereas those of A2 and the uncompleted original A4 show less knowledge or application of the system. The alteration of the width of A4 may result from the decision to adhere more closely to a recently introduced system or to correct a mistake.

Measurements of most of the other buildings are not given, although 'it is most important that the excavators of ancient buildings should publish precise metrological data taken directly from the actual remains';¹⁰ in fact, accuracy, which, in this case, means closeness to the design size is more important than often unwarranted precision which can show in the quotation of a number to too many significant figures. However some other buildings can be discussed. The church B is clearly meant to be a 2: 1 building in terms of external length: external width and the length, extracted from the plan,¹¹ is 38.5 ft., which is exactly $2\frac{1}{3}$ N. rod. The width must have been intended to be $1\frac{1}{6}$ N. rod; in Yeavering units this building would measure 41.8 by 20.9 (roughly 42 by 21), so the 42-unit dimension which is awkward in the Yeavering-unit system occurs again. Other buildings may also fit the Northern system. Building BC is 2: 1 and is about 3 by $1\frac{1}{2}$ N. rod; C2 was possibly designed $2\frac{1}{6}$ by $1\frac{1}{6}$ N. rod; C3 is probably the same size as BC; C4 (a) measures about $3\frac{1}{6}$ by $1\frac{2}{3}$ N. rod overall; C4 (b), which replaced C4 (a), is about the same; D1 (a) is roughly $2\frac{1}{3}$ by $1\frac{1}{3}$ N. rod but is not close enough to be satisfactory; D2 (b) is roughly $2\frac{1}{3}$ by $1\frac{1}{3}$ N. rod; D₂ (a) is smaller at about $2\frac{1}{2}$ by $1\frac{1}{6}$ N. rod; D₃ is approximately 2: 1 but is rather larger than $2\frac{1}{3}$ by $1\frac{1}{6}$ N. rod; D4 (b) is a sure 2: 1 building and was probably designed $2\frac{2}{3}$ by $1\frac{1}{3}$ N. rod; D5 is another 2: 1 building at nearly 3 by I_2^1 N. rod. Two post-hole buildings, A6 and A7, at 30 by 18 Yeavering units reduce to $1\frac{2}{3}$ by 1 N. rod. The length of A8 is similarly $1\frac{2}{3}$ N. rod but the width is 2 Yeavering units or 20 Northern inches too wide to fit the basic thirds and sixths of a rod. The data for most of these buildings, obtained from Hope-Taylor's plans, are not satisfactory enough to allow certainty of their design size.

Building 3, in its two phases, is of particular value in the comparison of the measuring systems. The plans¹² are adequate for measurements to be extracted. Hope-Taylor himself does not attempt any metrological analysis because 'the irregularities of the individual plans. . . do not lend themselves to detailed extension of this metrological enquiry', and except for one measurement 'the dimensions of these buildings are unresponsive to analysis in terms of tens of units'.¹³ In other words, the two A3 buildings do not fit the Yeavering-unit system, although, as shown below, they fit the Northern system to a considerable

degree. A3 (a) was burnt down and A3 (b), less robust, was built on the same site. They both have a divided hall and annexes at each end. The length of the hall of A3 (a), using the scale provided, is 100 ft. or 6 N. rods (90 N. ft.) to within 1%. The maximum width at the central door is 33 ft. or 2 N. rods as close as can be measured. As to internal divisions, the smallest, measured inside the timbers, as one would in setting a partition relative to a pre-existing wall, is 16.5 ft. or 1 N. rod exactly; the rest of the hall was divided equally without achieving any special measurement. A3 (b) had been shortened to 93.2 ft., assuming the same scale to apply, and this is $5\frac{2}{3}$ N. rods or 85 N. ft. The width of A3 (b), being slightly less than that of A3 (a), does not fit the Northern system; it was possibly an *ad hoc* measurement so as to avoid soft spots from the destruction of A3 (a). The annexes of both the A3 buildings give further dimensions which probably fit the Northern system. So there is much in the A3 buildings to suggest that the Northern system was still in use in the later phases of the site.

Some substantial single posts were discovered. These 'perennially upstanding posts'¹⁴ were presumably used as markers. Checking of long distances for ancient measuring systems is not very satisfactory since practically any small unit can be made to fit to a whole number plus or minus a moderate percentage. However the distance between posts AX and BX, extracted from fig. 62, is not excessive and is just over 66 Yeavering units or about 61 ft. This could be claimed to be 8 x-measurements or an intended 64-unit dimension to within 3%. In the Northern system it is $3\frac{2}{3}$ N. rods to less than 1%.

Hope-Taylor proposes a setting-out plan for the group of buildings C1 to C4.¹⁵ He sees these buildings as set out at 80 Yeavering-unit intervals. The arrangement only fits three of the buildings and then only if three different corners are used. It seems more likely that the buildings suit the lie of the land, being spaced, presumably to avoid spread of fire, around the 234-foot contour.¹⁶

The carpenter, in preparation of the individual timbers, would have used measurements smaller than those here considered basic in the Northern system, viz. rods, thirds and sixths. The $\frac{1}{6}$ N. rod, 2 ft. 9 ins. in modern terms, may be akin to the carpenter's rule or the yardstick of today. Its length of 30 Northern inches may well have been divided into thirds, like the rod itself, to give 10 and 20 inch dimensions; further division into individual inches is to be expected. The door jambs of buildings A2 and A4 are given as 2 Yeavering units wide, which is 20 inches in the Northern system. With axe or adze preparation of the timbers the smaller timber sizes could hardly be adhered to in every case. However the timber size of $5\frac{1}{2}$ in.¹⁷ is exactly 5 Northern inches and that of $7\frac{1}{2}$ in. is 7 N. in. to within about $2\frac{120}{6}$.

In recapitulation only two important dimensions, of those which can reasonably be extracted from the publication, do not fit the basic Northern system; these are the width and length of building A2. However the width and length of A4, which succeeded A2 in time, were made a little larger, in fact 2 Yeavering units larger, and these slightly larger dimensions fit the Northern system. The very fact that the width of A4 was altered, during construction, to a Northern system dimension, is surely trying to tell us something which we do not fully comprehend.

There was certainly no need to define a specific Yeavering unit. This unit happens to be equal to 10 Northern inches and hence, by chance, some multiples of it, such as 3, 6, 12, 18, 36, 42 and 90, will coincide with basic dimensions of the Northern system, namely $\frac{1}{6}$, $\frac{1}{3}$, $\frac{2}{3}$, 1, 2, $2\frac{1}{3}$ and 5 N. rods respectively. However Hope-Taylor's x- and y-measurements of 8 and 40 Yeavering units do not coincide with the basic Northern sizes; these x- and y-measurements arose from consideration of building A2 which, to the present author, seems metrologically to be the odd man out of the major buildings. Hope-Taylor's statement of the importance of the division of his basic y-measurement into quarters and fifths appears unjustified; however, division of the Northern rod into thirds and sixths seems well authenticated. A trump card of the Northern system is that it is able to explain most of the design dimensions of the two A3 buildings. The Yeavering system was devised to suit building A2 in particular, the Northern system has been worked out independently but seems to be evident in the plans of many of the Yeavering buildings.

NOTES AND NEWS

Building A4, fitting the Northern system, was constructed¹⁸ in Phase IIIC which marked 'an impressive expansion of the township' and 'appears in all respects most convincingly to reflect the power and order of the Deiran Edwin's reign'. In the 11th century the church was 'to be responsible for just weights and measures',¹⁹ a responsibility, amongst others, taken over from the kings. If it was Edwin's responsibility to maintain standard measures it is, perhaps, not surprising that the power and order of his administration should be reflected in the major building work of his reign.

P. J. HUGGINS

NOTES

¹ B. Hope-Taylor, Yeavering: an Anglo-British centre of early Northumbria (London, 1977).

² Ibid., 147

^a K. A. and W. J. Rodwell, pers. comm. ⁴ P. J. Huggins, 'Excavation of a Belgic and Romano-British farm with Middle Saxon cemetery and churches at Nazeingbury, Essex', Essex Archaeol. Hist., 10 (1978), 64-65.

⁵ Hope-Taylor, op. cit. in note 1, 129.

⁶ Huggins, loc. cit. in note 4.

7 F. Petrie, Weights and Measures (London, 1934), 5-6.

⁸ F. G. Skinner, Weights and measures (Science Museum Survey, London, 1967), 91.

⁹ P. Grierson, English Linear measures (Reading, 1972), 14.

¹⁰ Hope-Taylor, op. cit. in note 1, n. 70.

¹¹ Ibid., fig. 33. ¹² Ibid., figs. 68, 69.

13 Ibid., 143

14 Ibid., 259.

¹⁵ Ibid., fig. 64. ¹⁶ Ibid., fig. 12. ¹⁷ Ibid., fig. 71.

¹⁸ Ibid., 277. ¹⁹ D. B. Loomis, 'Regnum and sacerdotium', in P. Clemocs and K. Hughes (eds), England before the Conquest (Cambridge, 1971), 143.

P. KIDSON writes: It should be noted that what has been designated the 'Northern foot' by modern writers is probably to be equated with the Pes Drusianus, a foot of eighteen Roman digits in use among the Tungri by the last century B.C., and which occurs frequently in the pre-metric systems of Italy. As with other measurement systems, the ultimate origin of what was to become the English rod or perch lay in the Roman rather than in the Germanic world.

SOME LATE SAXON FINDS FROM LILLA HOWE, N. YORKS. AND THEIR CONTEXT (Fig. 4; Pl. xiv)

The purpose of this note is to draw attention to two gold discs and four silver strap-ends said to be from the Bronze Age barrow known as Lilla Howe, N. Yorks. (SE88929868), and to consider the implications their date has for the frequent attribution of the barrow as the burial place of the Anglian noble Lilla, murdered in A.D. 626. The story concerning Lilla, as recorded by Bede, is as follows:

... there came to the kingdom an assassin whose name was Eomer, who had been sent by Cwichelm, King of the West Saxons, hoping to deprive King Edwin of his Kingdom and his life ... He came on Easter Day to the King's hall which then stood by the River Derwent. He entered the hall on the pretence of delivering a message from his lord, and while the cunning rascal was expounding his pretended mission, he suddenly leapt up, drew the sword from beneath his cloak, and made a rush at the King. Lilla, a most devoted thegn, saw this, but not having a shield in his hand to protect the King from death, he quickly interposed his own body to receive the blow. His foe thrust the weapon with such force that he killed the thegn and wounded the King as well through his dead body.¹

From their first mention in print in 1871 the discs and strap-ends were said to be 'probably' from Lilla's grave,² a likelihood converted to a certainty by Mr and Mrs