A dated typology for Roman roof-tiles (*tegulae*)

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Fragments of roof-tile are one of the most common finds in excavations, yet they normally contribute little to the interpretation of sites. If *tegulae* could be dated, this would not only add to the overall understanding of sites but provide direct information on the development of the buildings which they roofed.

Previous attempts to establish a *tegula* typology have focussed mainly on the profile of the flange.[1] Different sites often produce quite different flange profiles — a reflection of the idiosyncrasies of individual tilemakers and the way they ran their hands down the flanges during the smoothing process. However, whilst the profiles of flanges may yield good differentiation within and between sites (because they are the result of the habits of individual tile-makers), they are most unlikely to form the basis of any generally applicable typology. The only exception would be flanges with a square profile resulting from the use of an inverted box mould.

This paper considers an alternative approach, one that uses tile stamps and *tegula* dimensions, to establish a typology based upon the evolution of the lower cutaway form (fig. 1). *Tegula* dimensions vary significantly throughout the empire.[2] In a survey of 104 Romano-British sites,[3] I recorded some 500 *tegulae* having a complete length: the longest was 590 mm, the shortest 305 mm; the greatest flange height at the lower end was 82 mm, the smallest was 28 mm. The most significant variations arise in comparisons made between one site and another, but there are also important variations within sites.

Differential shrinkage

All *tegulae* have straight parallel sides, indicating that they were made in moulds. Thus size variations should be caused either by the use of different-sized moulds or as a result of differential shrinkage, by which two tiles that were identical when manufactured shrunk by different amounts during the drying and firing processes. A figure of 10% for tile shrinkage has been widely cited, but sometimes it is used in relation to the *absolute* shrinkage of the tile, from wet clay to finished product, while at other times it refers to the *differential* shrinkage between tiles that were originally the same size in the mould.[4]

Given the difficulty of demonstrating that two *tegulae* derive from the same mould, the best way of assessing differential shrinkage is from an examination of tile stamps. If the dimensions of the same tile stamp present on different tiles are measured, the difference in size between the two stamp impressions should be due to the relative difference in shrinkage of the two tiles.[5] Measurements were made from the 10 commonest dies on Romano-British *tegulae*.[6] In all, 105 stamps were recorded. The distribution of their variation in size from the mean of their respective dies is shown in fig. 2.[7] One statistical standard deviation yields a range of less than ±3% for the effect of differential shrinkage. Thus differential shrinkage can be responsible only for a very small proportion of the size variations observed.

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1 E.g., Chauffin 1956, 81-88.

2 E.g., Adam 2005, 213 for some *tegulae* sizes from Italy.

3 They are listed in fig. 21 below. Warry 2005 provides a detailed analysis of the survey.

4 Brodribb (1987, 4) states that his experimental *tegulae* shrank by 10%, which is clearly an absolute rather than a differential figure. Betts, Black and Gower 1997, 13, give a figure of 10-12% for variations in size of box flue tiles, implying that this is differential shrinkage, but they do not give evidence to support the statement.

5 This method was adopted by Boon (1984, 20).

6 It comprised 2 dies each from *Legio II*, *Legio VI* and *Legio XX*, 1 die from *Legio IX*, 2 dies from the *Classis Britannica*, and 1 from *Cohors IIII Breucorum*.

7 The methodology is more fully described in Warry 2005, 65-71.