

A new vaulting technique for early baths in Sussex: the anatomy of a Romano-British invention

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Roman Britain is not the first place that springs to mind when thinking of innovative vaulting methods, yet it was the birthplace of a new type of heated vaulting system for bath-buildings using hollow terracotta voussoirs. The system underwent modifications but it was used for over two centuries and rarely left the province of *Britannia*. Its invention can be pinpointed to a particular place and group of builders — a rarity for antiquity — which provides a context that can enhance our understanding of the influences that prompted the invention. In this case, the voussoirs were invented at a tiler believed to have been located on the coast of W Sussex, probably around Chichester. The context is enlightening because, unlike Italy, S Gaul or even N Africa where the bathing habit was firmly established, Britain did not have a tradition of building baths or of brick and tile production before the Roman conquest in A.D. 43.¹ The invention of a new terracotta vaulting element for baths in a ‘virgin’ territory is all the more intriguing as it was introduced not by the Roman army but by a civilian group of builders working in Rome-friendly territory of the local Regni tribe.

The context of the invention within the history of the development of baths

The hollow voussoirs in Britain were clearly inspired by wall-heating systems developed in Italy that used box-tiles, which had begun to replace *tegulae mammatae* in the first half of the 1st c. A.D.² The first steps towards heating vaults were taken by applying *tegulae mammatae* to the concrete vaults with iron nails; examples are preserved at the women’s *caldarium* of the Stabian Baths at Pompeii³ and the *caldarium* of the Suburban Baths at Herculaneum.⁴ Allowing the heated air from the walls to enter the space created by the *tegulae mammatae* on the vault would have helped prevent condensation, but, given the narrow space (c.5-6 cm),⁵ the overall heating capacity would not have been greatly enhanced. Moreover, the surviving stucco with its corrugated grooves at the Vesuvian towns was probably

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- 1 McWhirr and Viner 1978, 360. Some fragments of crude Belgic bricks have been found at Verulamium (Wheeler and Wheeler 1936, 178 and pl. LVI), Colchester (Hawkes and Hull 1947, 347), and Silchester (Fulford and Timby 2000, 120), but there is no evidence for their use structurally.
 - 2 Seneca (*Ep.* 90.25), writing in the A.D. 60s, notes that the invention of wall tubes for heating baths (*impressos parietibus tubos*) was within living memory. His comment accords well with M. E. Blake’s (1959, 67, 163) reference to an early example at the Terme della Via dei Vigili at Ostia (2.3-4) dated to the Claudian period.
 - 3 Schween (1936, 23) describes the wall tiles as *tegulae mammatae* and those on the vault as tiles of 20 x 50 cm with corner projections. Eschebach (1979, 14) notes that the vault is covered by *tegulae mammatae* measuring 20 x 51 x 2.5 cm, whereas Jorio (1978-79, 179) notes that the walls are covered by *tegulae mammatae* but that the vaults are covered by flat bricks supplied with “peduncoli”.
 - 4 Maiuri (1958, 150, 162-63 and 165) notes that the walls of the *caldarium* are covered by “mattoni tubolari” and the vaults by “tegole mammate”, but Jacobelli (1987, 152-54) notes that box-tiles are used only in the *laconicum* whereas *tegulae mammatae* with cone-shaped *mammae* are used on the walls in the *caldarium* and *tepidarium*. In fact, both types occur in the *caldarium*: *tegulae mammatae* on the NW wall and box-tiles on the SW wall.
 - 5 The *tegulae mammatae* at the Forum Baths at Pompeii have *mammae* 6.0 cm long, while those at the House of Julia Felix are 5.0 cm (Brodrigg 1987, 64).