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Published in:
Common Ground

2006

Document Version:
Publisher's PDF, also known as Version of record

The Early Use of Fired Brick in Hellenistic and Roman Architecture

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Although many important treatises have been written about various aspects of Roman brick production, very little has been done regarding the introduction and early use of this building material in the Graeco-Roman world.[1] The present paper will not resolve any questions concerning the early development of brick architecture, but may contribute some observations and general ideas. These observations are based on the combination of a preliminary survey of reported early appearances of fired brick and a study of an early example of brick-faced concrete in Rome, the tomb of Caecilia Metella.[2] Although covered on the outside by travertine blocks, on the inside, this sepulchral monument displays brick walls of excellent workmanship. In fact, the tomb of Caecilia Metella may represent the earliest known example of fired brick in Rome, and a discussion concerning the use and function of the bricks in this particular building may cast some light on the process of adopting new building materials in antiquity.

It took a long time for burnt brick to become a commonly used building material in the Graeco-Roman world. Sun-dried bricks were frequently utilized from prehistoric times onward, but the earliest examples of kiln-baked brick did not appear until the fourth century B.C.[3] The singular find of a fired brick at Olynthos may actually be the oldest one known to us.[4] However, it was not until the end of the first century A.D. that the Romans brought the art of making burnt brick to perfection and introduced it wherever they went.[5] This rather slow development is all the more surprising considering that terracotta roof tiles had been produced continuously at least from the middle of the seventh century B.C.[6] The necessary technical and organizational prerequisites had thus existed long before burnt brick first appeared.

A well-fired brick has some advantages compared to its sun-dried counterpart. It has greater strength and is resistant to intense heat. More important, though, it is durable and, unlike a mud-brick wall, it does not disintegrate when exposed to moisture. However, it must be emphasized that in spite of these valuable properties, fired brick still could not compete with sun-dried brick as a cheap and efficient building material. The high cost of production may initially have been the most important obstacle to the rapid spread of the material, although later on rationalization set in and changed the balance. Of course, the degree of economy in using this material also depended on the local availability of good clay and workable stone. But do the economic factors suffice to explain the development?

By collecting primary and secondary reports on early appearances of fired brick, it is possible to get an impression of the spread of this material, as illustrated by the distribution maps in Figure 1. The survey is far from complete. There are several reports of Hellenistic fired bricks that cannot be attributed to a specific century. Many reports have not yet received due attention, and still more finds have probably not even been reported. Nonetheless, it is my belief that this preliminary study can give us some useful hints.[7] When theorizing about early brick-making in general, it is tempting to envisage the spread of the new technique as the slow but continuous diffusion from one area to the next, the knowledge and skill being passed from one artisan to another. It also seems natural to view the development as a process of continuous evolution in which the production and use of the material in each area become more and more refined, complex, and specialized. The preliminary survey indicates that this preconception is wrong. The spread and development of fired brick proceeded in leaps. Many times, the earliest reported appearances in each region represent the most advanced and complex product. It appears that fired brick was often introduced as the customized solution to a particular architectural problem. With the exception of the odd Olynthian specimen, the earliest securely dated appearance of fired brick is found in Seuthopolis, a Hellenized city in Thrace (Fig. 2). What is interesting is that all the bricks in this locality can be attributed to a single category of buildings: tumulus tombs with beehive-shaped burial chambers. The curved, trapezoidal bricks were employed to form the circle

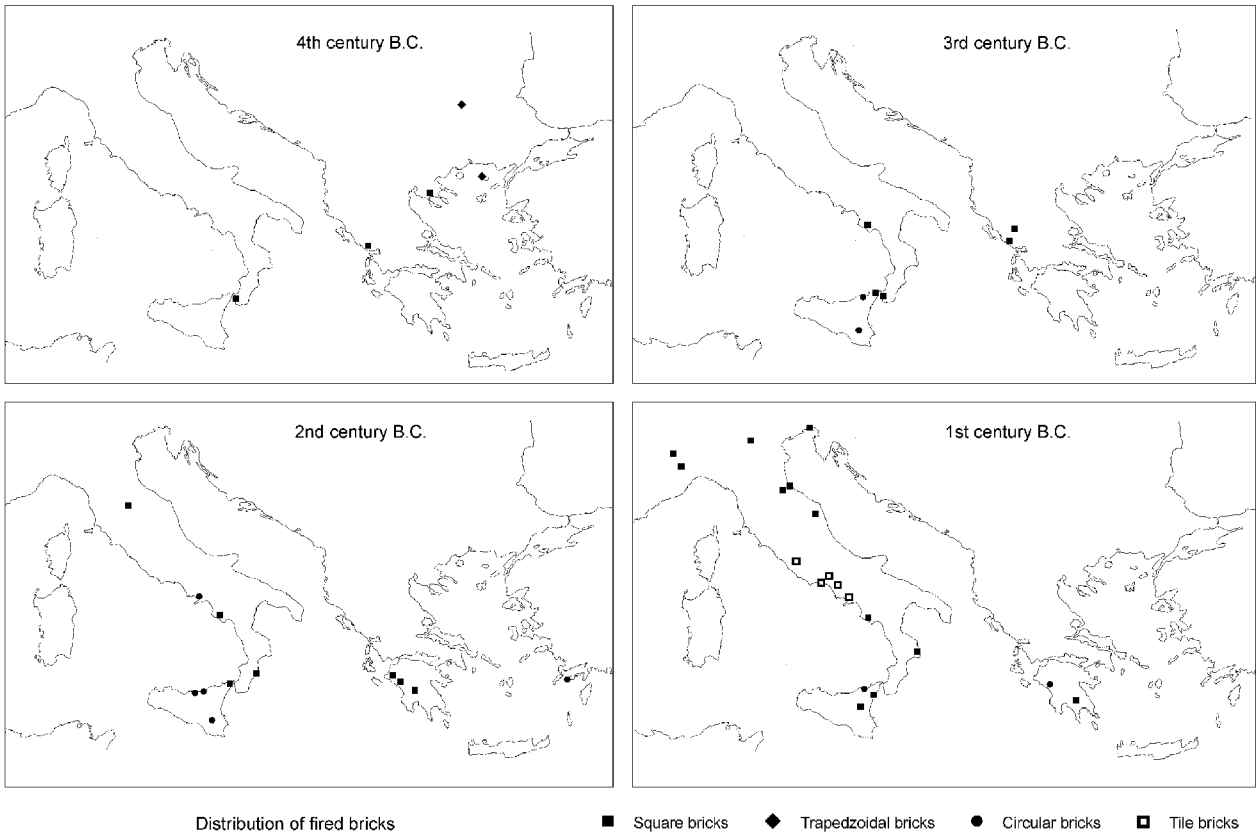

Fig. 1. Preliminary survey of reported early occurrences of fired brick. A revised catalogue with full details is forthcoming (maps by Henrik Gerding)

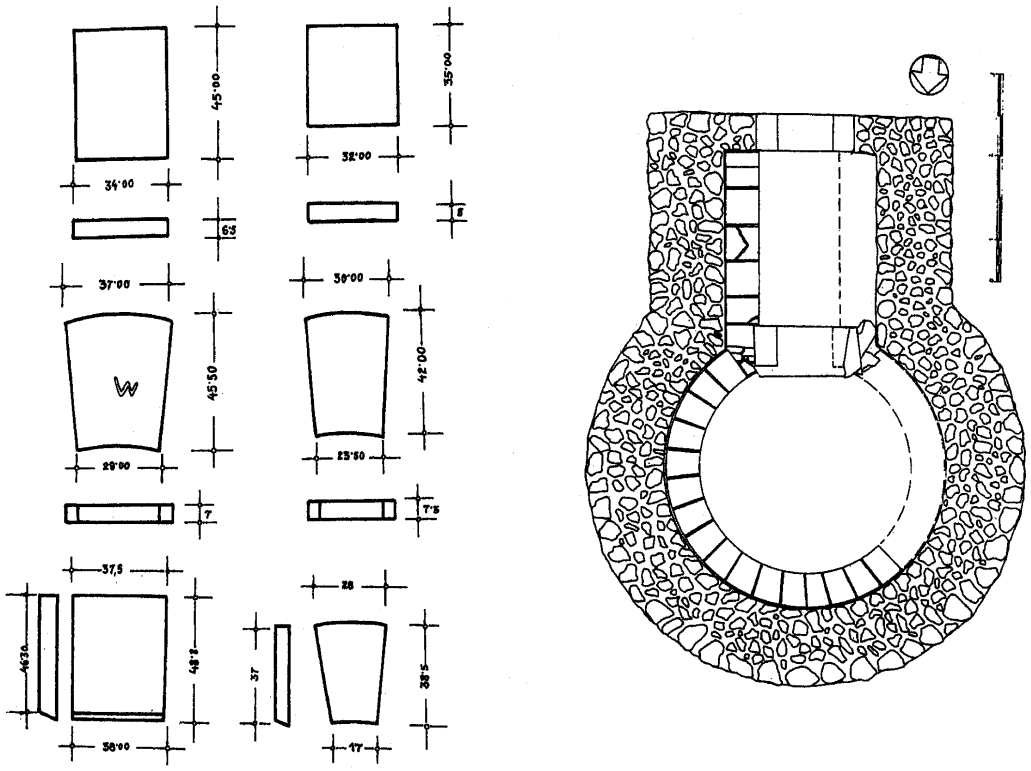

Fig. 2. Fired bricks and tumulus tomb at Seuthopolis, Thrace (after Dimitrov and Čičikova 1978, figs. 52, 95)

of the internal wall. The narrow side facing inwards was molded with a slant so that the tapering walls would have a perfectly smooth surface. These tombs belong to the last quarter of the fourth century B.C.[8]

Now, it is easy to assume that the lack of a local stonecutting tradition accounts for the exceptional use of fired brick in this area. However, chisels and other tools show that stonecutting was well developed, and well-hewn ashlar blocks on the outside of the tombs amply demonstrate that there was some other reason for employing a new building material. The tomb at Kazanluk, a short distance from Seuthopolis, may provide the answer. It is constructed in the same way as the others but remains completely intact and displays some of the best-preserved wall-paintings from the ancient Greek world. What we see is the combination of a distinctly domestic sepulchral trait, the circular beehive-shaped tomb, with an imported Hellenistic feature, funerary wall-paintings. This presented a quite new problem for the builders, which called for a new solution. The covering earth mound made the interior walls constantly susceptible to moisture, and the high level of humidity could easily be detrimental to the wall-paintings. However, tests carried out at the Lund Institute of Technology have clearly demonstrated that the great absorption capacity of fired bricks doubles the adhesive strength of plaster as well as its longevity. Furthermore, the molding technique allowed a smooth interior surface and a perfect fit despite the doubly curved wall.

The intricately shaped bricks that were used for these tombs represent what I have termed "special-purpose brick," as they were made for a particular category of buildings where they served a very specific purpose. Similar examples of special-purpose brick occur in Sicily and Southern Italy, for example at Velia. The concept could be said to conflict with the very idea of bricks, generally perceived as an exceptionally standardized and versatile building unit. An important comparison can be made with the introduction of roof tiles in Archaic Greece. The earliest known terracotta roof of the historic period, although constituting the extremely complicated Isthmian system, probably represents an innovative architectural idea without precedents or prototypes.[9] This indicates that we need not presuppose a long series of primitive fired bricks in northern Greece leading up to the customized finds at Seuthopolis.

Let us now turn to the introduction of fired brick in Rome. It has long been recognized that it was the combination of "thin" Roman bricks and concrete that led to the ultimate supremacy of brick construction. However, there are also noticeable similarities between the introduction of this technique and the early occurrences of "thick" Hellenistic bricks. There may be no direct link between them, but they represent a similar process. Just as in the case of the tombs at Seuthopolis, we may conjecture that fired bricks were introduced in Rome as the solution to a particular architectural problem.

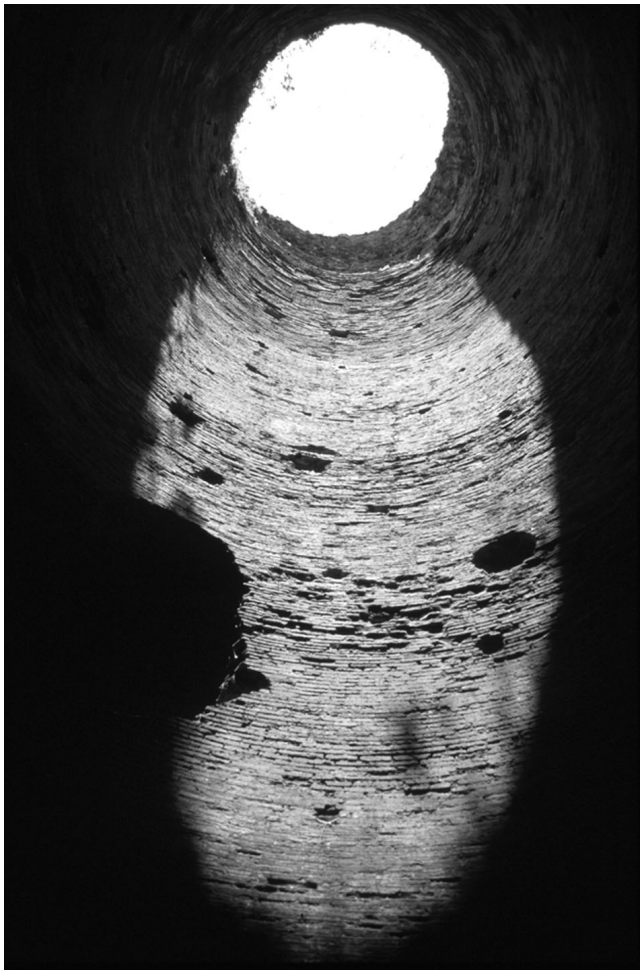

Fig. 3. The interior walls of the tomb of Caecilia Metella are lined with bricks made of roof tiles (photo Niklas Hillbom)

The tomb of Caecilia Metella was probably built in the beginning of the 20s B.C., and is one of the earliest known examples of brick-lined construction in Rome (Fig. 3). The bricks were made from roof tiles that had had their flanges cut off and were broken into several pieces. However, these tile bricks were used not only as a superficial coating on the internal walls, but also as *caementa*, that is, as aggregate in the concrete structure. In most parts of the building the aggregate consists of *selce*, but for a distance of almost three feet behind the interior facing we find pieces of brick instead. The transition between concrete with *selce* and concrete with brick is nearly seamless, and the casting procedure must have been carried out with the two different materials simultaneously.

One way of understanding this building technique is as a protective measure against moisture within the walls. Most Roman sepulchral monuments did not have proper roofing. Large parts of the construction contained masses of earth fill

Fig. 4. One of the chambers in the tomb of Sempronius Atratinus at Gaeta, showing double interior walls with an intermediate space (photo Henrik Gerding)

extending all the way to the top of the building where it formed an earth cap or even a conical mound. This applied in particular to the circular tombs of the Augustan era. Although great pains were taken to drain away as much of the rainwater as possible, the earth fill easily became saturated, thus increasing the humidity in the concrete walls. As the water tried to escape through the surface of the interior walls, plaster, wall-paintings, and stucco relief crumbled. In one circular tomb belonging the early Augustan period, the tomb of Sempronius Atratinus at Gaeta, the architect tried to prevent such damage by using double walls (Fig. 4). Moisture was ventilated away through the intermediate space before it could reach the interior surface. In the tomb of Caecilia Metella, the same effect was attained by another method. The use of fired brick as *caementa* and wall-facing reduced the permeability of the wall and increased the adhesive strength of the plaster. The brick walls of the tomb are bare today, but residual traces and nineteenth-century eyewitnesses testify to the presence of interior wall decoration.

The suggested chronological precedence of special-purpose brick implies that there existed a close relationship between the commissioner of the building on the one side and the producer on the other – a commissioner, that is, with the power to redirect the existing terracotta production or set up a completely new production apparatus. The tumuli at Seuthopolis are generally considered to be royal tombs, and brick stamps indicate that their production was in the hands of the king. Most early fired bricks have been found in public buildings, and it is surmisable that the brickyards delivering the new building material were state-owned. As a possible next step, these brickyards began exporting fired bricks to other nearby cities to be used in public works. Third-century bricks with official Messanian stamps have been found across the strait in Rhegium, and public bricks from Velia have turned up in Paestum. This trade may have had a political side apart from the economic. Once production was regularized, public and private brickyards could attend to the budding demand from private customers. In the case of the tomb of Caecilia Metella, the tiles used as bricks were probably discards or surplus from kilns owned by the commissioner, Marcus Licinius Crassus. These yards may have been supplying his private estates.

According to the proposed model, which remains to be verified, it was not the movement of particularly skillful and innovative brickmakers that accounted for the initial spread of fired brick, nor economic necessity, but rather the fortuitous combination of certain technical problems with commissioners involved in the terracotta industry.

Notes

I would like to express my gratitude to Prof. Örjan Wikander, who read an early draft of this paper and gave me many valuable comments.

1. Among the notable exceptions is R.J.A. Wilson, "Brick and Tiles in Roman Sicily," in A. McWhirr (ed.), *Roman Brick and Tile. Studies in Manufacture, Distribution and Use in the Western Empire,* BAR-*IS* 68, Oxford 1979, 11–43.
2. H. Gerding, *The Tomb of Caecilia Metella: Tumulus, Tropaeum and Thymele*, Lund 2002.
3. Cf. W.B. Dinsmoor, *The Architecture of Ancient Greece*, rev. ed., London 1950, 388.
4. D.M. Robinson, *Excavations at Olynthus* XII. *Domestic and Public Architecture*, Baltimore 1946, 156, pl. 130.
5. G. Brodribb, *Roman Brick and Tile*, Gloucester 1987, 2.
6. Ö. Wikander, "Archaic Roof Tiles. The First Generations," *Hesperia* 59, 1990, 285–290.
7. During the congress I was informed of further finds in Thrace, but I have not been able to incorporate them in this paper.
8. M. Čičikova, "Auftreten und Verwendung des Backsteins als Baumaterial bei den Thrakern von Ende des 4. bis Ende des 3. Jahrhunderts v. u. Z.," *Bulletin de l'Institut Archéologique* 21, 1957, 151–152; D.P. Dimitrov and M. Čičikova, *The Thracian City of Seuthopolis,* BAR Suppl. Series 38, London 1978, 23, 55.
9. Wikander 1990 (supra n. 6).

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