

A Bibliography of Works on Brick published in England before 1750

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Background

Thirty years ago Francis Celoria wrote a bibliography of brickmaking in Britain to accompany the facsimile of Dobson's *A Rudimentary Treatise on the Manufacture of Bricks and Tiles* that appeared in the *Journal of Ceramic History*.¹ Before then the generally accepted source for bibliographical data on the subject had been Nathaniel Lloyd's *English Brickwork* of 1925 (reprinted in 1983).² Lloyd's work remains invaluable and quotes many sources at length. In 1990 Eileen Harris assisted by Nicholas Savage produced *British Architectural Books and Writers 1556-1785*,³ providing for the first time a comprehensive overview of British publishing relating to most types of building between these dates, including lists of books on measuring. More recently the computerisation of many of the world's major library catalogues has made searching for books by title and subject considerably easier.

Scope

The bibliography presented here goes beyond that in Lloyd and Celoria in including not just brickmaking, but also bricklaying, the design of brickwork and the setting out of arches. Where possible all the works in *British Architectural Books and Writers* have been checked in at least one edition, and many other books have been added which were not included in that work because they were not strictly architectural.

We have chosen to omit unpublished manuscript sources which may have been transcribed and appeared in print more recently, works like the notebooks of Roger Pratt⁴ and Roger North⁵ and the diaries of Robert Hooke.⁶ As useful as these undoubtedly are to the historian of today looking at brick, such works were not readily available to the reader in the seventeenth and eighteenth centuries and if they were to be included it would be difficult to justify not listing other published and unpublished manuscript records and sources relating to brickwork which would run to many hundreds if not thousands of items.

Likewise, as the focus of this study is on sources that can throw some light on construction history, we have ignored references to bricks in biblical commentaries and the numerous reports of discoveries of ancient bricks that abounded at the time. Although these may be of interest to the antiquarian, they tell us little or nothing about the construction industry of the period.

We have also excluded from the current survey all legal instruments: statutes, proclamations, proceeds of committees, bye-laws and other acts of parliament and local government legislation. This is not to suggest that they are irrelevant or have been adequately covered elsewhere, but rather that they are worthy of a longer study in their own right. There was considerable complexity in building regulation at this time and its study is made more difficult by the haphazard reporting in the seventeenth century in the Journal of the Commons and the Statutes of the Realm. Some inkling of the complexity involved can be found in Patrick Youngblood's unpublished MPhil dissertation on London building regulations in the reigns of James I and Charles I.⁷ A cross-section of the few published acts and journals are reprinted in the rare limited edition volumes of Joseph A. Foster's *Contributions to a Study of Brickmaking in America*.⁸ A complete study still needs to be written.

Here we have confined ourselves to non-governmental works printed in England which help to understand the building trade at the time. Books, news-sheets and pamphlets have been included, although the list of pamphlets is likely to be far from complete as their survival rate is understandably poor. Our dates (approximately 1589 to 1750) are determined partly by the works themselves and partly by convenience; 1589 is the date of publication of Paul Ive's *The Practice of Fortification*[1], a book on military architecture which appears to be the first work in English to touch on the use of brick, while 1750 is the middle of the eighteenth century, and comes neatly just after the publication in 1747 of the first substantial book devoted entirely to brick, Langley's *Exaction Detected* [68]. Our complete bibliography listed in chronological order can be found at the end of this article. Numbers in square brackets used in the text refer to the position of the works in this list.

The material presented here shows how scattered and fragmentary earlier references were. This, of course, creates problems for the researcher. Despite our efforts no doubt there are omissions, but we hope this bibliography will provide a useful starting point on which future research can be based.

A Brief Survey of Early Writing on Brick

As we have already observed, the earliest work on our list was published in 1589. It may seem surprising that the first references to brick appear in England over a century after the invention of printing, but this is also true of architectural books generally and it is in the context of categories of architectural writing that brick will be discussed here. Early books were expensive and their subjects were thus aimed at the interests of the patrons who could afford them rather than craftsmen. Until the late seventeenth century the English patron seems to have cared little about building construction, whilst his interest in architectural theory was met mainly through the import of foreign treatises or purchase of translations of them.

It is also easy to forget from our modern perspective that architecture itself was perceived differently in the sixteenth century from today. Architectural books in this period were normally found under mathematics at the booksellers or in the library and the subject was thought of as a branch of applied geometry. It was common to further divide architecture into two parts: military and civil. Civil architecture was, as its name implied, concerned with the production of buildings for civilian life: houses, churches, and public buildings, while the term military architecture covered fortifications, barracks, harbours, gun-emplacements, ship yards and the like. The closeness of these disciplines to each other and to mathematics was reflected in the fact that Christopher Wren, a renowned mathematician, was offered first the Surveyorship of the fortifications in Tangier as a military architect, and then the Surveyorship of the King's Works as a civil one.

In view of this, it might seem surprising that military architecture is so rarely talked about in books on the architecture of the period. Military architects are, for instance, largely excluded from Colvin's *Biographical Dictionary of British Architects*⁹ and books on fortification are omitted from Eileen Harris's *British Architectural Books and Writers*. This is no doubt partly to do with modern definition. Today much of the work that they would have carried out is seen as engineering rather than architecture, a distinction that was to emerge only in the eighteenth century. Nevertheless in terms of building construction it is clear that there was no difference between them: military barracks were built from the same bricks and mortar as the country houses of distinguished courtiers. In theory, at least, books on fortification should be just as relevant to the study of the history of building construction and the use of brick as those on more conventional civilian buildings.

Military Architecture

Disappointingly, despite their own frequent statements that the military architect must be practical, books on fortification such as those by Samuel Marolais,¹⁰ Robert Norwood,¹¹ David Papillon,¹²

Balthazar Gerbier,¹³ Andrew Tacquett,¹⁴ John Steed,¹⁵ Jonas Moore,¹⁶ Abel Small,¹⁷ Joseph Moxon,¹⁸ Abel Boyer,¹⁹ J.T. Desaguliers,²⁰ and pseudonymous works on the subject like the *Enchiridion of Fortification*²¹ tended to treat fortification entirely as an abstract exercise in pattern-making, containing little or no information on building techniques and materials. Indeed, Paul Ive's *The Practice of Fortification*[1] only refers to bricks in passing, stating :

"The fittest stuffe to make the face of a fort, is bricke, and such other like soft stones, but the next to hand and cheapest must always be taken."²²

Building materials were not given serious consideration in works on fortification in English until Thomas Savery translated Coehoorn's Dutch treatise *Nieuwe Vestingbouw* in 1705 [36], but even then the recommendation of the use of brick in this work was completely concealed by a mistranslation of stones for bricks (the Dutch for a brick is "baksteen" which means literally a "baked stone").

For a real discussion of the merits of brick we have to wait for John Barker's *Treasury of Fortification* [37] of 1707 which is an altogether more practical work, fully in keeping with the spirit of the eighteenth century. It contains detailed instructions on the methods of building foundations on various types of ground and a section on choosing materials, concluding that

"The Best bricks, are made of White Clay, not too much Burnt; their length is eight or nine inches, their height is two inches, and their breadth four inches."²³

In general, though, despite Barker, it is safe to say that before 1750 most English works on fortification could teach you the theory, but would have been of little use in the field. That was to change, but not in our period. Before the middle of the eighteenth century, fortification was still a subject for the military tactician and gentleman scholar who were quite often one and the same.

Civil Architecture: works for the Patron

Civil Architecture was also a pursuit of gentlemen and by the mid-1620s, largely thanks to Inigo Jones, the man at court was expected to be at least aware of the latest trends in Italian architecture, if not willing to adapt his house accordingly.

Armed with his copy of Serlio or Palladio, Shute or Vignola he was well placed to understand the orders, but the question of how to go about actually building in accordance with them was more complicated. To fulfil this need a new type of literature arose aimed at the architectural patron. It assumed that the reader was a gentleman of means and set out to show him how to choose a plot, plan his house and deal with contractors, avoiding all the various pitfalls along the way.

The first of these works for the architectural patron was Henry Wotton's *The Elements of Architecture* [2] published in 1624. The shortcomings of the genre are immediately apparent. Wotton was well versed in Italian architecture, having been the ambassador to Venice under James I, and his mastery of the scholarly background to the subject is amply demonstrated by his frequent quotations from authorities as diverse as Aristotle, Alberti, Bernardino Baldi, Dürer, Philibert De L'Orme, Pliny, Vasari, and Palladio, as well as the commentaries on Vitruvius by Philander (French), Barbaro (Italian/Latin), and Rivius (High German). Indeed he was writing the book very much as an intellectual exercise in an attempt to secure the Provostship of Eton College, an aim in which he was eventually successful. His grasp of English building practice was, however, rather patchy. Much of the material on bricks is little more than a commentary on Vitruvius with some brief asides on the proper forms of arches.

Wotton's book was extraordinarily successful, regularly appearing throughout the seventeenth and eighteenth century as part of other works. It was not until after the Restoration that another book was written from the same point of view, by another author seeking a position. Balthazar Gerbier was prompted to write his two books on architecture by a desire to secure himself the post of Surveyor

of the King's Works. As an architect he was more experienced than Wotton. His first work, *A Brief Discourse concerning the three chief principles of Magnificent Building* [5] is relatively short and contains only a few scattered comments about the choice of bricks, mortar and the design of walls and foundations, but this was always seen as an introduction and was followed up a year later by *Counsel and Advise to all Builders: for the choice of their Surveyours, Clarks of their works, Bricklayers, Masons, Carpenters and other Work-men therein concerned* [6] (builders here of course referred to the patron, not the craftsmen).

Counsel and Advise [6] contains a wealth of information on brickwork and brickmaking from the patron's point of view, detailing prices, methods of employment and how to select the best materials and workmen and avoid being cheated. It also represents the last of this type of work. Henry Aldrich's work on architecture published at the beginning of the eighteenth century [39] was also aimed at the gentleman, but was much more academic in approach. Its references to brick were again derived wholly from Vitruvius and the text was entirely in Latin. Only ten copies seem to have been produced and the circulation appears to have been confined to his friends. Gerbier's title reveals the reason for the decline in this type of writing. By the 1660s the patron's chief problem was the selection of his Surveyor and the existence of such a profession meant that the necessity of being oneself acquainted with the practicalities of building was fast disappearing.

Works on Measuring

Surveyors, of course, predated the seventeenth century, the measuring of land being an important part of the system of freehold. In building work, they could for simplicity be divided into two groups: measurers and architects, although no such distinction was drawn in the seventeenth-century and individuals frequently carried out both roles. The measurer was employed on contracts to measure the amount of work that had been carried out and certify payment very much in the same way a quantity surveyor might operate today. Like his modern counterpart, the seventeenth-century measurer required considerable mathematical ability (mathematics teachers often found extra employment this way) and a whole range of books grew up to help them. These were very popular (the earliest, Thomas Digges's *A Boke Named Technicon* first published in 1556; went to no fewer than thirteen editions in the following century) and there were many of them (Eileen Harris lists over thirty titles for the period 1556-1750).

Brickwork was measured in three ways: by the rod, by the *foot (superficial)* and by the *foot (running)*. The standard rod mentioned in measuring books was 16 1/2 feet long. For simplicity in conversions a square rod was rounded down to 272 sq feet. Measuring by the rod referred to an area equal to one square rod of bricks in a wall 1 1/2 brick-lengths thick. Thicker or thinner walls had to be 'reduced' to the equivalent wall 1 1/2 bricks thick and much of the space on brickwork in measuring books was devoted to explaining how to do this by differing methods. Special decorative face-work was measured either in square feet ('foot superficial' measure) or in length of the courses ('foot running' measure). As such work was more expensive, the thickness of wall in which the decorative work was set was not considered significant and was typically ignored. 'Solid measure' (the cubic volume of brickwork) was not normally used for brickwork except occasionally for chimneys which often had a separate section in measuring books devoted to them, but even these were more often measured by the rod or foot with an extra charge to account for the increased intricacy of the work.

It is perhaps telling that the earliest book to contain details of measuring brickwork, Thomas Willford's *Architectonice* [3], was not published until 1659, a full century after the first measuring books appeared. From 1660 it became increasingly common in such works to supply instructions for reducing brickwork to rods and by the middle of the eighteenth century no book on measuring was considered complete without a section devoted to the subject. The first writer to provide tables for the purpose was Edward Roman, whose *The Gentleman's and Builder's Director* [35] was probably written in 1705 (all fifteen pages of this short work were devoted to tables). Both Salmon's *Builder's Guide*

[58] of 1736 and his *London and Country Builder's Vade Mecum* [64] of 1741 follow Roman's example in supplying tables to ease conversions. Tables made the books useful even to a barely literate readership and their appearance at this stage indicated both the increasingly widespread use of brickwork in the period and the fact that even the humblest craftsmen needed to find a way to estimate their costs.

Price Books

While most books on measuring were limited purely to mathematical problems and often started with simple textbook descriptions of basic geometry, others in the late seventeenth century like Willford's *Architectonice* [3] began to include detailed information on prices as well. These works, like Wotton's [2] before them, also touched on questions of quality and distinctions between various types of brick and their methods of manufacture. Books such as Primatt's *City and Country Purchaser* [7] and Leybourn's *Platform for Purchasers* [10] thus provided more information than just bare costs of bricks, talking about rates of pay and how many bricks bricklayers and brickmakers could use or make. Primatt [7] even included advice on making money by renting out land for brickmaking. The figures themselves are more open to dispute. Most authors were content to copy earlier books and there is little evidence of any of them making great efforts to check the accuracy of their sources.

Although measuring books could provide the reader with a clear idea of how much it would cost to build a house in the seventeenth and eighteenth century, they contained little or no information to explain how one might actually perform the various operations involved. One group of men were interested in precisely this problem. They were prominent among the founding members of the Royal Society and the books that they published which set out to reveal how crafts operated were called 'histories of trades'.

Scientific Enquiry and the History of Trades

The full story of the history of trades project in the early Royal Society is complex and too long to go into here. A longer summary, if one is required, can be found in James Campbell's unpublished PhD thesis, 'Sir Christopher Wren, The Royal Society, and the Development of Structural Carpentry 1660-1710'.²⁴ Suffice it to say that the Society was founded to follow the writings of Francis Bacon and one of Bacon's ideas was that science could be moved forward by collecting information on all the arts and crafts. At the formation of the Royal Society, a committee was duly organised to oversee this project and lists were compiled so that volunteers could choose individual trades to study without overlap or omission. In the early years the project went well, but gradually interest waned and only a few histories of trades were eventually published.

Sir William Petty, clothier, political economist and professor of anatomy, who had become famous for his survey of Ireland and was a founding member of the Society, was a keen supporter of the project. An essay on "Stones and Bricks" is listed amongst his papers, but it is missing and it is generally presumed that he never got around to writing it.²⁵ Not so Joseph Moxon, whose industriousness supplied the histories of not just one trade but many. Moxon began his career as a weaver, before becoming a prominent instrument and globe-maker. He was also a printer and Hydrographer to the King. His *Mechanick Exercises or Doctrine of Handy-works* [32] which looked specifically at the building trades, was the first book to be published in fascicules (small sections designed to be purchased monthly and bound into a book). It was an idea before its time and Moxon's project almost died through lack of sales, but luckily he persevered and was rewarded with a Fellowship of the Royal Society. Bricklaying was not in Moxon's original book, but was added to the 1700 edition. By this time Moxon himself had died and his son James had taken over his printing business. Whether the younger or elder Moxon wrote the tract on bricklaying remains a matter for speculation, but it seems likely that Joseph had set down notes and done the research, leaving only the compilation to James. The resulting book, which is profusely illustrated, is an invaluable historical source. Moxon begins by describing its contents:

“Bricklayers-Work is an Art Manual, which joins several bodies together, that they adhere like one entire body [...] The method that I shall use in Treating of this Art shall be this.

First, I will shew what Materials they use and their Composition.

Secondly, I will treat of their Tools, and describe their Names and Uses.

Thirdly, I will declare their Method of Working, both in Bricks, Tiles, &c.”

While Moxon described bricklaying, it was another FRS who provided the earliest full account of brickmaking. John Houghton was an apothecary who dealt in tea, coffee and chocolate. He became a Fellow in 1680 and was from the first one of the keenest adherents to the history of trades projects, remaining so long after the rest of the Society seemed to have lost interest. His *Collection of Letters for the Improvement of Trades* [21], published in parts between 1681 and 1683, contained a detailed description of brickmaking at Ebbisham in Surrey from the experiences of a workman there. It is quoted at length in Nathaniel Lloyd’s *A History of English Brickwork* and remains the best description of brickmaking in the period. In 1692 Houghton started publishing a weekly newsletter giving stock prices, confusingly entitled *A Collection for Improvement of Husbandry and Trades* [24-29]. Each issue carried a short article on a different aspect of trade and between November 1693 and January 1694 these again concentrated on brick, adding some new material and repeating much of the content of the previous *Letters* [21].

The problems that Houghton and Moxon must have encountered in carrying out their researches in getting craftsmen to reveal their secrets are amply illustrated in Issue No. 4, Volume 2 of Houghton’s *Collection of Letters*, published on 11 December 1683. This contained a request from Robert Plot for information to help in the compilation of his *Natural Histories* of the various counties, including the various crafts practised therein. He stated:

“Where by the way let it be noted, that the Undertaker of this design [Plot], desires not to dive into the Mystery of any Trade, but only to represent Matter of Fact, and so many of the Circumstances as may be communicated without discovery of the Mystery.”

Unfortunately for us Plot was true to his word and neither of his *Natural Histories* give away any trade secrets, although he does mention types of clay and bricks in passing in his natural histories of Oxfordshire [19] and Staffordshire [22]. His example in topographical approach was closely followed by John Morton FRS who published his *Natural History of Northamptonshire* [43] in 1712. This too provided little on brickmaking, but did contain useful definitions of types of soil and their various early eighteenth-century uses including brick earths and pottery clays.

Eighteenth-century Building Dictionaries

The encyclopaedias that started to circulate in the eighteenth century were the obvious successors to the aims of Plot, Moxon, Houghton and the Royal Society.²⁷ The first was *The Universal, Historical, Geographical, Chronological and Classical Dictionary*²⁸ published in 1703. It was closely followed by John Harris’s *Lexicon Technicum*²⁹ of the same year. They may have both claimed universality but it was not until Ephraim Chambers’ *Cyclopaedia* [49] of 1728 that a general encyclopaedia appeared containing an entry on bricks. This work provided the direct inspiration for Diderot and D’Alembert’s French *Encyclopédie* which appeared between 1751 and 1772, but sadly it had very little in common with the accomplishment of the latter in terms of either research or illustration.

The specialist dictionaries of the period are slightly more informative. A number were produced at this time focusing specifically on building. Neve’s *Apopiroscopy* [33] predated Harris’s *Lexicon*, first appearing in 1702, and he followed it up with *The City and Country Purchaser and Builder’s Dictionary* [34] a year later. Until the appearance of the anonymously produced *The Builders Dictionary* [55] in 1734, Neve had no serious rivals in the field.

Apopiroscopy and other building dictionaries like it were arranged like encyclopaedias in alphabetical order. For the most part, the compilers of these early dictionaries and encyclopaedias do not seem to have researched their subjects in the field and were content instead to use existing written sources, rarely adding anything to what had already been published. Unlike other books on building of the period, however, they usually listed their sources. Some are quite unusual. In discussing brick, for instance, Neve cites Woolridge, a writer on brick who might easily be otherwise overlooked.

John Worlidge or Woolridge was an agricultural writer who lived in Petersfield, Hampshire. He corresponded with John Houghton and wrote a number of best selling works on gardening. His *Systema Agriculturae; the mystery of husbandry discovered* [13] went to no fewer than seven editions before 1700. Brickwork is included in his works in instructions for building garden walls.

Books on Drawing

The nature of architectural publishing changed during the eighteenth century. Books were becoming cheaper and illustrated works increasingly common. Exploiting the new possibilities of the illustration which made the explanation of certain technical procedures more accessible, books on drawing began to appear aimed at the builder and architectural draughtsman.

One of the subjects frequently dealt with was the setting out of brick arches. Circular arches caused no problem being simply delineated with compasses, the sides of bricks of the arch radiating from the centre. Elliptical arches were another matter. The true ellipse with two foci and a continually changing curve can be set out with relative ease using a piece of string attached to the two foci (as Isaac Gadsdon explained in his book dedicated to the subject [60] in 1739) but this method seems to have been unknown to early writers who like Venterus Mandey [20] and Moxon [32] advocated the use of circular arcs of different radii. The so-called ‘elliptical arch’ thus created never looked entirely convincing. The problem found a solution in the invention of the *trammel*, a drawing instrument specifically devised to draw ellipses. It appeared with reference to setting out arches in Halfpenny’s *Builder’s Pocket Companion* [50] in 1728 and in another context in Francis Price’s *Treatise on Carpentry* in 1733.³⁰ It was this instrument that became the standard tool for the setting out of elliptical brick arches in the eighteenth century.

Books for the Speculative Builder

Two other important types of work appeared in the eighteenth century: the building manual and the pattern book. The two were closely related and often indistinguishable. The building manual was aimed squarely at the craftsman and speculative builder and set out all the various trades in detail, together with information on the building regulations. The pattern book too contained house plans but consisted almost entirely of plates including a large number of decorative schemes, all designed for the purchaser to copy. From the point of view of the history of brickwork, builders’ manuals are more interesting, although, like the eighteenth-century dictionaries on building, they tend to repeat material from earlier works. Works by Langley [51], Rowland [53] and Salmon [56] are thus of only slight interest. Where they do add something it is in detailed interpretation of the early Georgian building regulations, which like their seventeenth-century predecessors contained instructions for the thickness of walls in various types of building. Moxon [32] had provided similar interpretations of the post-fire regulations of 1670.

Works by the Craftsman

So far we have heard little from bricklayers themselves. It is true that both Venterus Mandey and Thomas Hammond were bricklayers (Mandey was apprenticed to Hammond and claimed to have

written the latter's *The Compleat Measurer* [12]), but they were exceptions and their works were on measuring, not on life as building craftsmen.

Evidence on literacy among master bricklayers of the period suggests that only about fifty per cent of them could write. Although the skills of reading and writing were taught separately in the seventeenth century it is unlikely that many more could read. It is thus of no great surprise that we have so little written by craftsmen themselves about their situation. With sufficient motivation, however, a voice did make itself heard, as when the threat of taxation and the ban on use of *spanish* (ash added to brick-earth in brickmaking) caused a flurry of pamphlets on the pros and cons of the new regulations in the early eighteenth century. These tell us nothing about daily life but they do shed some light on brickmaking techniques and numbers of bricks made at the time. To find out about working conditions, however, we mostly have to look at the books on the various trades produced by non-bricklayers.

R.Campbell, for instance, notes in *The London Tradesman* [67] that the mid-eighteenth century bricklayer worked from 6am until 6pm and needed between £100 and £1,000 to set up as a master-bricklayer.³² His book set out to advise parents on prospective careers for their children and he had a pretty low opinion of bricklayers:

"It is no new Thing in London, for those Master-Builders to build themselves out of their own houses and fix themselves in Jail with their own materials. A Journeyman Bricklayer has commonly Half a Crown a Day and the Foreman of the Work may have Three Shillings or perhaps a Guinea a Week: But they are out of Business for five, if not Six Months in the Year; and, in and about London, drink more than one Third of the other Six."³³

And an even lower one of brickmakers:

"The Brick-Makers Business is by some not reckoned a very reputable Employment; especially to be Journeymen, if they can properly be called so."³⁴

Since Campbell was advising on prospective ways to earn a living, he was undoubtedly justified in pointing out that bricklaying was not the easiest way to do so, but it hardly made him a unbiased observer. A more balanced source for working conditions are the poems of Robert Tatershal published in two volumes in 1734 and 1735 [57]. Tatershal was a bricklayer and in three of his poems he sets out to describe his way of life. The quality of the writing as poetry is not our concern. What matters is that he knew first hand about the grim working conditions and daily grind. Sadly there is not room to quote him at length here, but it is perhaps fitting as we draw to a close this short description of brick in early English publishing, to quote the epitaph he wrote for himself that shows how the craft was not without its happier moments:

"Here lies secure, full six Foot deep
A jolly Bricklayer, fast asleep;
Disturb him not, but let him rest,
Close with his Trowel in his Chest;
Who so many Winter has gone thro',
With many a Storm of Wind and Snow:
Eat many a Pound of Cheese and Bread,
And many a Sprat, both Tail and Head;
Drank many a Glass of Gin and Beer,
And yet he could not tarry here;
For chalk'd so much behind the Door,
The meagre Host would draw no more,
So took him hence, to pay the Score."

Robert Tatershal, "Epitaph", 1734

Conclusion

The publication of Batty Langley's *Exaction* [68] marked a turning point. As we have seen it would be incorrect to say that there was nothing published on brickwork before this date, but Langley's work is the first book of any length to be devoted entirely to the subject.

In *Exaction* Langley set out to warn the architectural patron against the various "frauds" and "exactions" which he saw bricklayers as commonly inflicting upon the unsuspecting public. By "frauds" he meant the use of poor workmanship and materials, while "exactions" were the tendencies of eighteenth-century builders and suppliers to overcharge for labour and materials. Langley saw "exactions" as having arisen from the long credit that many clients had habitually asked for. This, he argued, had led to a general increase in prices even where credit was not being requested. His book set out provide readers with the true costs which they should be charged, to which he suggested a "fair profit" should then be added. In the process he provided detailed descriptions of types and costs of brickwork, mortar and various other aspects of the bricklayers' and brickmakers' crafts.

The century that followed Langley's publication was to see an increasing number of works both on brick in particular and building construction in general. The total was increased by the growing interest in the second half of the century in the possibilities of determining structural sizes by calculation.

This survey demonstrates how the history of the publication of information on brick and brickwork from 1550-1750 parallels the development of the building industry of the period. The end of the sixteenth century was still largely a time of craft skills handed down through apprenticeship, of guilds and closely guarded trade secrets, of patrons and master craftsmen. It is true that none of these had completely disappeared by the mid-eighteenth century, but it is fair to say that the building trade in general was much more commercial and open. The rise of the architect meant that technical innovations were being made faster and that the balance of power in design in building had shifted. The more humble craftsmen were having trouble keeping up to date with the latest fashions, something that the conservative apprenticeship system could not help with. As this study has shown, books and printed articles were as much as agent of these changes as they are a reflection of them. It is thus only by understanding these texts that we can begin to comprehend not only how the brickmaking and bricklaying trades operated in what was undoubtedly one of the most important periods in the development of English brickwork, but also how influential the books of that time were in changing building practice.

Publishing on Brick in England before 1750

Works listed in Chronological Order

Unless otherwise noted page numbers refer to the first edition. Titles in Harris's *Architectural Books* are marked with an asterisk.

Sixteenth century (1501-1600)

- [1] **Ive**, Paul, *The Practice of Fortification* (London: 1589), treatise on fortification. Bricks mentioned on p. 21.

Seventeenth century (1601-1700)

- [2] **Wotton**, Henry, *The Elements of Architecture* (London: printed by John Bill, 1624),* treatise on architecture, reprinted as part of other works in 1649 (in Latin), 1651, 1654, 1671 (abridged), 1672, 1676 (abridged), 1685, 1687 (abridged), 1693 (abridged), 1698 (Spanish), 1700 (abridged),

- 1708 (abridged), 1721 (abridged), 1723, 1730, 1731, 1733, 1734 (abridged), 1752 (abridged) 1809, 1825 (in Latin), 1903, 1968 (facsimile). Bricks are dealt with on pp. 14-5, 27-8, 43-4 and 51 (facsimile edition).
- [3] **Willsford**, Thomas, *Architectonice* (London: printed for Nathaniel Brook, 1659),* book on measuring, facsimile by Gregg in 1969. Starts with a discussion of bricks on pp. 1-5.
- [4] **Brown**, John, *The Description and Use of a Joynt Rule*, (London: printed by T.J., 1661),* book on measuring, second edition under a slightly different title in 1684. Bricks on pp. 106-7.
- [5] **Gerbier**, Sir Balthazar, *A Brief Discourse Concerning the Three Chief Principles of Magnificent Building* (London : printed by A.M., 1662),* treatise on architecture, reprinted in 1664 and 1665. Bricks on p. 24, mortar on pp. 19-21 and foundations and vaults pp. 21, 28-30 & 36.
- [6] **Gerbier**, Sir Balthazar, *Counsel and Advise to all Builders: for the choice of their Surveyours, Clarks of their works* (London: printed by Thomas Mabb, 1663),* treatise on architecture and building. Bricks on pp. 27-8, 50-4 and 57.
- [7] **Primatt**, Stephen, *The City and Country Purchaser* (London: printed for S.Speed, 1667),* book on measuring/prices, reprinted in 1668. Bricks on page 51-9.
- [8] **Leybourn**, William, *The Line of Proportion* (London: printed for J.S., 1667),* book on measuring reprinted in 1668, 1673, 1675, 1678, 1684, 1698, 1702, 1715 and 1726. Bricks on p. 141.
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