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Contents

Editorial: Patching and Replacement - change in the house	2
An Early-Eighteenth-Century Dutch Tile Painting of a Pug Mill				
by Terence Paul Smith	....	....	....	5
The Pug Mill Reconsidered				
by Alan Cox	....	....	....	9
The Pug Mill: some shorter contributions				
by Molly Beswick, Frank Kelsall and Terence Paul Smith	....	....	....	15
More on the Pug Mill				
by James W. P. Campbell	....	....	....	17
Goodbye Yellow Brick Road				
by Martin Hammond	....	....	....	18
Brick Queries	....	....	....	19
Brick for a Day 2002	....	....	....	23
Brick in Print	....	....	....	28
Cover Illustration:				

The brick tower of St Mary's church, Gestingthorpe, Essex, visited by members of the society during the Spring Meeting on 13 April 2002. Money to continue the building of the tower was among the bequests given by William Carter in his will of 1498.

Editorial:

Patching and Replacement - change in the house

When Dr Williams moves into his new abode, Lambeth Palace, he will inhabit a building much altered from that to which John Morton added the well-known brick gatehouse. The flat in which the Archbishop of Canterbury and his family live is in that portion of the palace almost totally rebuilt by Edmund Blore in the early nineteenth century.

The society's visit to Ely in July 2002, reported elsewhere in this issue of *British Brick Society Information*, reminded the writer of two facts: how the temporal position of church prelates changed the hundred and seventy years after John Alcock held the see of Ely and how much patching and replacement in their residences took place in that time.

The Bishopric of Ely was one of the richest sees in medieval England but the bishop did not become much poorer in the course of the sixteenth century. His nominal income in 1535 was £2,300, and that of the see was only one hundred pounds less in 1596. What did happen was that the ten houses enjoyed the unmarried bishop at the beginning of Henry VIII's reign had been reduced to three for a married bishop with a family by the time Henry's daughter died, almost one hundred years later.

It is well-known that Alcock built the Bishop's Palace at Ely in brick between 1486 and 1501 but from the work of a successor, Thomas Goodrich between 1533 and 1554, it is clear that Alcock did not live to complete the palace. Goodrich completed the west wing on the base courses erected by Alcock's workmen but the mid-sixteenth-century workmen did their building without the diaper work put in place for Alcock on the façades of the east wing. At some point, the private gallery from the palace to the cathedral was demolished: a blocked doorway and the scar of the jambs can be seen in the south wall of the galilee porch of the cathedral. To repair the east side of the east wing of the palace a large area of patching in a slightly different red brick was used. This remains as a large patch of plain red brick, covering, in fact, one and a half storeys. The brickwork here looks different to that used by Goodrich on the west wing: perhaps it was a different year or a different group of workmen.

Goodrich also extended the palace westwards by building a long gallery on the side of the west wing, with very similar brickwork to his work on the west tower.

However, it is curious that no bishop between Alcock and Goodrich, for example, neither Redman nor West, bothered to complete the palace, even though West built a chantry chapel for himself in the south chancel aisle of the cathedral.

In the second half of the sixteenth century Thomas Goodrich, who died in 1554 had only two immediate successors, Bishop Thirlby in Queen Mary's reign and Bishop Cox who died in 1581. Elizabeth I as a matter of policy often kept sees vacant so that the crown could enjoy the income: she left Ely as a vacant bishopric for twenty years until 1601. Almost at the end of these two decades, the great manor house at Somersham, Hunts., was transferred from the bishopric to become crown property. Even in 1588, it had been estimated that between £400 and £500 would be needed to repair this lost brick house. Two other episcopal houses were lost to Sir Christopher Hatton: Ely Place, Holborn, the London town house of the bishops, and the small house at Long Stanton, Cambs. Members of the Hatton family were buried in All Saints' church at Long Stanton in 1658 and 1812. Elizabeth had been entertained at the house by Bishop Cox in 1564.

A later Bishop of Ely was Matthew Wren, the uncle of the more celebrated Christopher. Matthew Wren was a man of his own time, a devout Anglican, open to changing currents in theological discourse, someone whom the older generation in 1629 would include among

some prelates, near the King, having gotten the chief administration of ecclesiastical affairs under his Majesty, have discountenanced and hindered the preferment of those that are orthodox [*i.e.* Calvinist], and favoured such as are contrary.

Matthew Wren was Arminian in his theology, denying the Calvinist concept of predestination: the idea that a person's place in heaven was pre-determined even before birth. Despite the lingering use of Holy Communion, the majority of the clergy of Church of England had been Calvinist-minded since the middle of the reign of Elizabeth. To be Puritan was to be modern in those days. As she sought "not to make a window on men's souls", such religious difference was of small consequence in the late sixteenth century; new Cambridge colleges - and Emmanuel in 1584 and Sidney Sussex in 1594, both with brick buildings - were founded to train clergy in the new religious orthodoxy of Calvinism.

Matthew Wren, a younger man than many of his later detractors, became Bishop of Ely in 1632. It was to be an eventful episcopate. In the turbulent times in which he lived, Ely, a solid beacon standing proud above the bleak, uncompromising Fens, became a small island of the doctrinal validity of Cranmer's *Book of Common Prayer* in the eastern sea of dissent. In the English Civil War, Matthew Wren, like Charles I, was on the losing side.

The other houses of the bishopric are known to have suffered dilapidations in the destruction of property which ensued as a consequence of the civil conflict. Downham, Cambs., had been rebuilt by John Alcock as a two-storeyed house, like the Ely palace in red brick with blue brick diaper: the site has been ruinous since 1316. The house became ruinous again in the sixteenth century. An early-seventeenth-century bishop, Lancelot Andrews, between 1609 and 1618, spent considerable sums on its repair. As an episcopal residence, the house at Downham lasted barely a century and a half. Bishop Wren was living there before his arrest in 1642. Part survives as Tower Farm, Downham.

Lancelot Andrews also restored the castle at Wisbech. It had been used as a prison for recusants but the £2,000 spent by Andrews and the money spent by his successor were to little avail. The house was sequestered and replaced by that designed for the Secretary of State, John Thurloe, perhaps between 1655 and 1657 or possibly *c.* 1658 and attributed to Peter Mills. This house was demolished in 1816 although its garden walls and stone gatepiers remain.

By the time the Restoration came, Matthew Wren was an old man: he had been born in 1585 and was aged seventy-five in 1660. he was one of only nine bishops to survive from before the Civil War. He had spent eighteen years in captivity; he was released from this enforced inactivity in 1659. In the early years of his imprisonment, he had heard tales of the use of the lady chapel at the cathedral as a stables. He had £5,000 to spend and he gave it to his old college; Christopher Wren, the old man's nephew, then better known as a mathematician, designed that little gem of a building, the Chapel of Pembroke College, Cambridge.

Matthew Wren in the last eight years of his life clearly had no energy to repair the domestic buildings of his see. He was content to live in a small space. Extensive repairs to the one surviving house of the Bishop of Ely, the palace beside the cathedral, could wait for his successor, Bishop Laney, who used his eight years as bishop to rebuild much of John Alcock's house. Because Alcock's east tower and Goodrich's west tower and long gallery all survive, it looks as if Laney, too, ran out of time to complete the rebuilding, and no one in subsequent years had the energy or the finances to demolish the remainder of Alcock's work and replace it by something more modern. We are used to admiring the late medieval and mid-sixteenth century work, but Bishop Laney's buildings in deep purple-red brick using a classical style deserve greater recognition than they have had.

The society's visit, in July 2002, to Kentwell Hall, Suffolk, also inspired similar thoughts about brick houses, their survival, re-furbishment and ultimate demise, with total or partial

replacement. Partly as a means of updating the notes on Suffolk houses in *BBS Information*, 37, November 1985, the present writer is preparing a case study of how long the larger and medium-sized brick houses constructed between c.1430 and c.1640 actually remain in use before being replaced.

A number of members were kind enough to write to me following the publication of 'Brick and its uses in the Twentieth Century: an overview 3 Britain, 1919-1939: Brick and Economic Regeneration' with suggestions about buildings which had not been mentioned. Issues of *British Brick Society Information* due to be published in the next two years will include articles on other aspects of brick and its uses in Britain in the two interwar decades. These three articles will include consideration of the use of brick in buildings for power and transport; the use of brick in the rebuilding of town centres; and brick as the material for buildings which uplift the human spirit, including buildings for recreation, religion and the education of children. Brick as a material for university building is considered in the article which discusses brick and its uses in the rebuilding of town centres, although not all contemporary university buildings are town centre ones.

The second of the articles on brick and its uses in Britain between 1919 and 1939, that on brick for power and transport buildings, was scheduled to have been included in this issue of *BBS Information*. However, pressure on publication space meant that it has been delayed until *BBS Information*, 91, June 2003. Publication of the third and fourth articles in the series will follow in 2003 but probably not in succeeding issues so as to allow space for contributions by those other than the editor..

In the issue of *BBS Information* following publication of the last of these articles, comments on brick buildings of the 1920s and 1930s which members have submitted will be collected together as a separate article. The editor would welcome comments following publication of any of these further articles.

During the past two or three years a number of members have submitted articles concerning the uses of brick as a building material in churches. An issue of *British Brick Society Information* to be published in the latter part of 2003 will include these and any further contributions on the subject which may have been received. If members have articles or notes, however short, concerning the use of brick in churches, it would help the editor in the preparation of *BBS Information*, 92, if they could be received by 31 May 2003.

DAVID H. KENNETT

Editor, *British Brick Society Information*

6 November 2002

AN EARLY-EIGHTEENTH-CENTURY DUTCH TILE PAINTING OF A PUG MILL

Terence Paul Smith

In a recent contribution to these pages, James Campbell questions what he calls "the myth of the seventeenth-century pug mill", suggesting that, contrary to what has often been stated, this device was *not* in use in the seventeenth century:

it may have been used in the late eighteenth century, but it is highly unlikely that it was in use before that.¹

The evidence presented is entirely negative: seventeenth- and eighteenth-century accounts of brickmaking mention trampling clay by foot and cutting it with spades but they make no mention of pug mills; nor do the latter appear in those brickmakers' inventories that Campbell has examined. Of course, arguments *e silentio* often require caution, but in this instance the case is a strong one: in particular, the descriptions cited by Campbell are in other respects very detailed and include the (alternative) method of preparing the clay: it is extremely unlikely that the pug mill would have been omitted from such accounts if it was in fact in use.

There is, however, irrefutable evidence that the pug mill was in use in the Netherlands in the *early* eighteenth century. A tableau of 11 x 14 tiles in portrait format shows, in blue on white, a sectional view of three floors of a tile and pottery manufactory in Friesland.² In its inscription, at the top of the tableau, it bears the date 1737. At the bottom right of the picture (fig. 1) is the pug mill operated by a horse. This early-eighteenth-century depiction of a pug mill confirms what has been written on this issue by a Dutch scholar, G.B. Janssen.³ Janssen is concerned with the period 1850-1920, but he briefly discusses the 'prehistory' of his chosen period, citing works which are for the most part not easily available in Britain. As early as 1609, it appears, a patent was awarded in England to John Etherington for a horse-driven device for crushing clay, and in the Netherlands a similar patent was granted to Sicke Wierdts, a tilemaker of Leeuwarden in Friesland. He was given a five-year monopoly on his invention, which he had developed "with great worry, trouble, and costs".⁴ This, however, was not a pug mill, as is clear from Janssen's subsequent discussion of the development of the latter. Almost certainly it was an application of a device familiar from antiquity for crushing olives in Mediterranean countries and used later in Britain and elsewhere for crushing cider apples, dyestuffs, and other materials. It consisted of two heavy rollers, something like millstones on edge, running round a circular track, and turned by a horse. Such a device was still in use at a terracotta works at Broxbourne, Herts., in the early twentieth century.⁵ As Janssen emphasises, however,

the use of such mills remained very limited [in the seventeenth century], principally to pottery manufacture, for which less clay but of better quality was used.⁶

It was in the early eighteenth century, according to Janssen and his sources, that the pug mill proper was developed in the Netherlands, and this was used in other countries too. It

consisted of a circular barrel (a cylinder with a diameter of 0.5-0.8 metres and a height of 1.2-1.5 metres) which was open at both top and bottom In the middle of the barrel

an iron axle, provided with arms fitted with wrought iron knives (twenty or thirty of them) revolved, and by the turning of the axle these cut the clay as efficiently as possible whilst water was added at regular intervals. The knives refined the clay, and at the same time roots, herb, and the like were caught on them. They therefore had to be cleaned from time to time. A beam of about 3.5 metres in length, which was turned by a horse walking round and round, worked the axle and the spokes and knives fitted to it. The pugged clay fell under its own weight from the bottom [of the barrel] ... where it was scooped up and carried on a cart to the moulding place. The downward movement of the clay could be increased by fixing the knives at a particular angle, whereby they worked as a screw and pushed the clay to the bottom.⁷

The drawing accompanying Janssen's text is the now familiar one taken from Edward Dobson's *Rudimentary Treatise* of 1850.⁸ This is a later version, and as the Dutch tile painting makes clear, the original pug mills consisted of a *real* barrel adapted to the purpose. The picture shows the horse, blindfold, as was normal, to stop it from becoming giddy, walking round a circular track, seemingly contracted for the purpose of fitting into the limited space available for its depiction. The man to the right is filling the barrel with clay, whilst the pugged clay emerging from the bottom of the barrel can be seen in front of the man's feet. At the bottom, just left of centre, is a wheelbarrow, presumably used both for bringing fresh clay to the pug mill and for taking the pugged clay to the moulders. The wooden bucket in the right foreground may be for the water which had to be added to the clay from time to time. The larger tub next to it may also have held water or was perhaps for holding clay. On the wall at the back beneath a shelf, hangs a sieve.

According to Janssen, during the second half of the eighteenth century a pug mill "was invented in Sweden by Triewald which in principle was the same as the Dutch type," but with refinements so that "it could be square as well as round": this was achieved by fixing knives to the wall of the barrel as well as to the axles.⁹ Later in the century Triewald developed a different, also horse-driven, apparatus for cutting and mixing clay. It involved a circular pit into which the clay was placed.¹⁰ It must have been an adaptation of the earlier glaze-grinding machine, part of one of which may be seen at the extreme left of figure 1. But this takes us away from the pug mill proper.

The pug mill was, then, available from the early eighteenth century. A note of caution is required, however: the tile painting shows a works which manufactured pottery and tin-glazed ('Delftware') tiles, both of which require much finer raw materials than do bricks. Tin-glazed wall tiles, for example, are only between 7 and 15 mm in thickness,¹¹ whilst they also need a smooth surface for the application of the glaze and the painted design. Bricks do not require such fineness. It may well be, therefore, that Campbell is correct in supposing that pug mills were not seen in *brickyards*, as opposed to potteries and tileworks, before the late eighteenth century - a judgement which agrees with data gathered in Sussex by Molly Beswick.¹²

In conclusion, it is perhaps worth remarking that the tile tableau which has been considered here includes at its head the names and armorial shields of the four men responsible for it: IOH. TICHELAAR, IAN STEENSMA, HERO De IAGER and WYBE STEENSMA.¹³ The first of these surnames means 'Tiler', presumably, in this case, a tile *maker* rather than a *user* of tiles, whilst the second and fourth (*Steensman* in full) mean 'Brickman'. The latter were closely related since they bear the same (*dimidiated*) arms, which include *in sinister base* a brick or roof tile mould; Tichelaar was also related since his arms are essentially similar but *differenced* by having the mould *in sinister chief*. The third member of the quartet has a goose as his arms; his name, *Jager*, means 'Hunter', and the bird is presumably a *canting* reference to this.

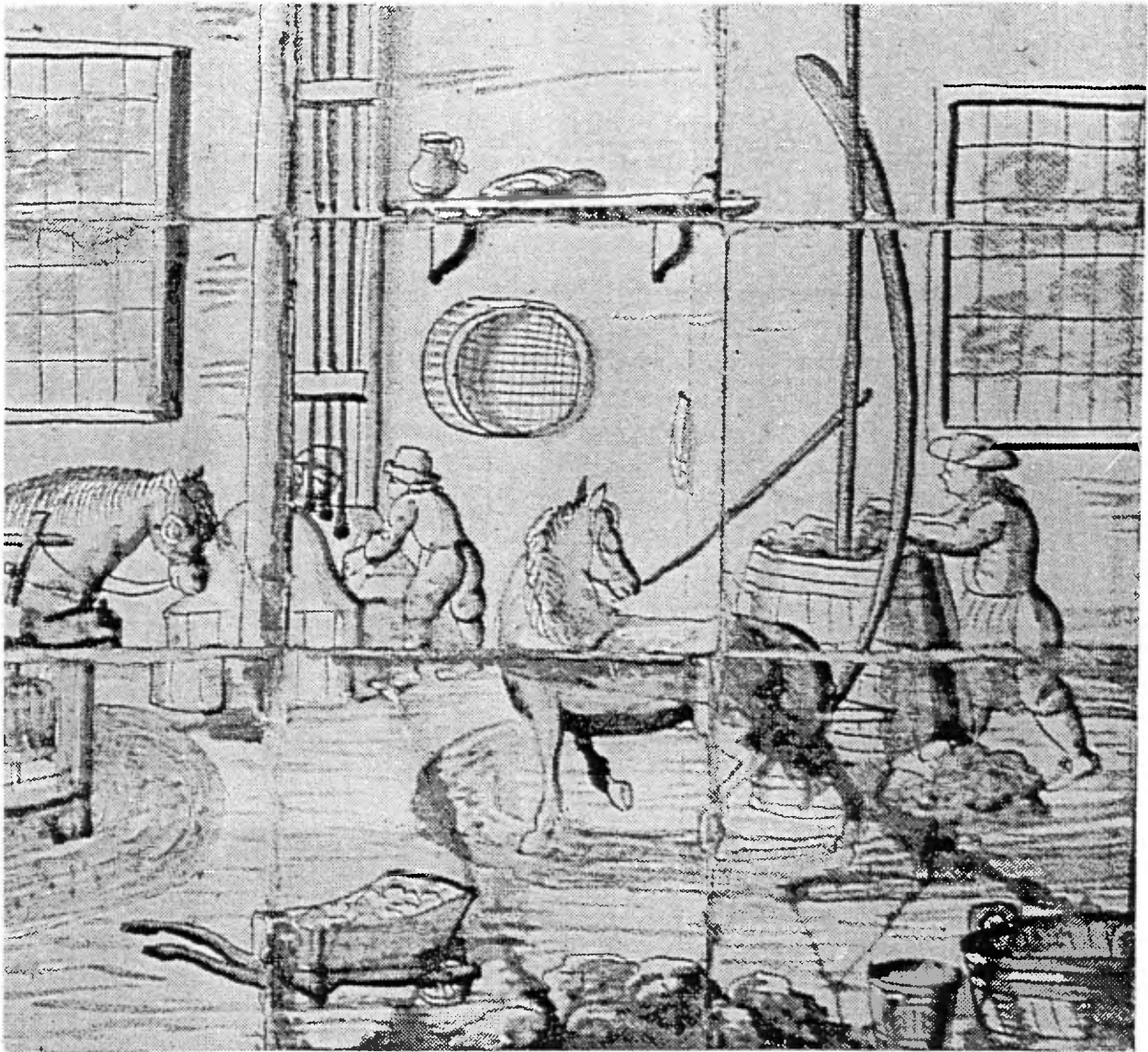


Fig. 1 Dutch tile painting of 1737 depicting a pottery and tile works: detail showing the horse-driven pug mill.

Notes and References

1. J.W.P. Campbell, 'The Myth of the Seventeenth-Century Pug Mill', *BBS Information*, 86, December 2001, 7-8.
2. I have used a large poster available from The Netherlands Tile Museum, Otterlo, Netherlands; there is also a version, obviously made using the same *spons* (transfer) in the Rijksmuseum, Amsterdam, reproduced in part in N. Riley, *Tile Art: A History of Decorative Ceramic Tiles*, Baldock: The Apple Press, 1987, re-issued as *A History of Decorative Tiles*. London: Grange Books, 1997, pp.14-15.
3. G.B. Janssen, *Baksteenfabricage in Nederland van nijverheid to industrie 1850-1920*. Zutphen: De Walburg Pers, 1987, pp.85-87; all translations from this work are my own.

4. Janssen, 1987, p.85 with references.
5. W. Branch Johnson, *The Industrial Archaeology of Hertfordshire*, Newton Abbot: David & Charles, 1970, p.80 and pl. on p.70.
6. Janssen, 1987, p.85.
7. Janssen, 1987, p.87 with references.
8. Janssen, 1987, p. 86, fig.9; E. Dobson, *A Rudimentary Treatise on the Manufacture of Bricks and Tiles*, London: John Weale, 1850, reprinted in slightly reduced facsimile, ed. F. Celoria, as *Journal of Ceramic History*, **5**, vol. 2, pp.14-15, figs. 11-12.
9. Janssen, 1987, p.87 with references.
10. Janssen, 1987, p.87 with references; for such a clay mill: Dobson, 1850, vol. 2, pp.5-7, figs. 2-10.
- [11. A modern Delft tile (purchased in the city, April 1970) in the collection of D.H. Kennett has a thickness of 8 millimetres. DHK]
12. M. Beswick, *Brickmaking in Sussex: a History and Gazetteer*, new edn., Midhurst: Middleton Press, 2001, p.65. [See also this issue of *BBS Information*, page 00. DHK]
13. This top portion of the tile picture is not included in the reproduction in Riley 1987/1997.

THE PUG MILL RECONSIDERED

Alan Cox

I was very pleased to see in *British Brick Society Information*, 86, December 2001, James Campbell's article questioning whether the use of the pug mill for brickmaking originated in the seventeenth century. As one of those cited by him as spreading this belief, I can say that I have become equally sceptical about its validity. I have therefore been accumulating material about the use of the pug mill, and am happy to have the opportunity of sharing this evidence.

Modern writers have given anything between the late seventeenth century and the first half of the nineteenth century as the date when pug mills were first employed in brickmaking, Alec Clifton Taylor in *The Pattern of English Building* is none too explicit but implies that the pug mill was introduced into brickmaking in the very late seventeenth or very early eighteenth century.¹ Elsewhere he talks of the pug mill being used for brickmaking in the eighteenth century.² Richard N. Price, on the other hand, suggested that the pug mill "was probably developed in the 1820s-1830s".³ Very sensibly, Ron Brunskill hedges his bets:

From the late seventeenth century onwards, but especially in the late eighteenth and nineteenth centuries, the introduction of the pug mill speeded up the tempering process.⁴

And for some time now I have, in my own talks, adopted a similar equivocal formula:

the pug mill, which may have been introduced in the late seventeenth century, although it didn't come into general use until the nineteenth century.

Turning to the historical evidence, the earliest illustration I know of a pug mill in connection with brickmaking is included in Plate V of W.H. Pyne's, *Microcosm; or a picturesque delineation of the arts, agriculture, manufactures, etc., of Great Britain*, first published in 1803.⁵ Pyne's drawings of brickmaking have been much used by modern authors, but the accompanying text by C. Gray, introduced in the second edition of the *Microcosm*, published in 1806, has tended to be overlooked, but may offer a vital clue to the origins of the pug mill. Part of the explanation of Plate V reads:

In the back-ground the mill for grinding the clay. This, we believe, has been but lately adopted by the brick-makers, but potters have long used such mills.⁶

So, then, it is to the pottery industry that we need to turn in order to discover where pug mills were first introduced. According to R.G. Haggard's account of the Staffordshire pottery industry:

Although a potter's mill existed at Bucknall in 1621, the clay was normally prepared in the 17th century by the primitive [manual] method described by [Sir Robert] Plot. By 1678, however, a horse-gin was sometimes used; Thomas Wedgwood's will of that year mentions his "horse mill with the buildings wherein it now stands".⁷

From the early eighteenth century, water-powered mills were used to prepare raw

BRICK KILNS.

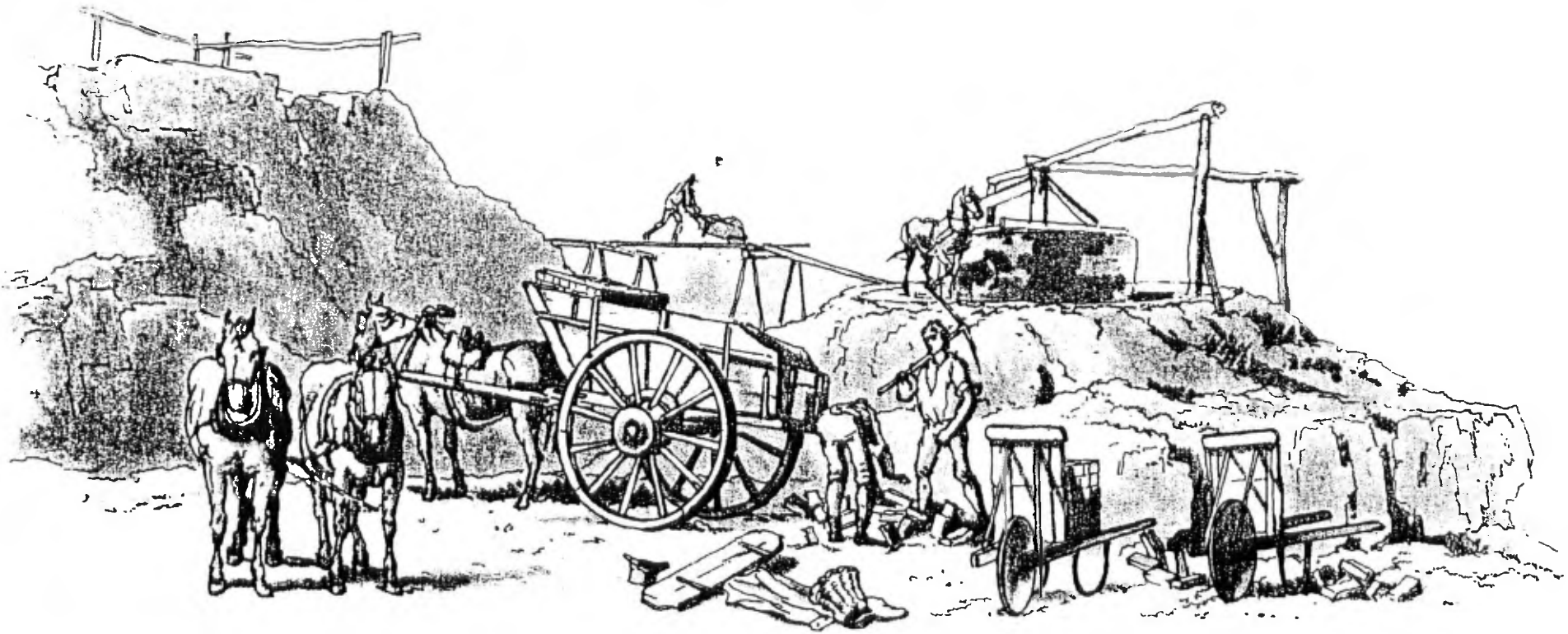


Fig. 1 An early-nineteenth-century brick kiln, with a horse-mill in the background. First published in 1803 and republished in 1806, the illustration is taken from William Pyne, *Microcosm, or a picturesque delineation of the arts, agriculture manufactures,*

etc., of great Britain. The text accompanying the 1806 edition of Pyne's *Microcosm* suggests that the pug mill had only recently been adopted by brickmakers despite its long use by potters and tilemakers.

materials in the pottery trade, especially clay and flint, and by the mid eighteenth century windmills had also been adapted for the same purposes. In late 1767 or early 1768 Erasmus Darwin was designing a horizontal windmill for Josiah Wedgwood, to mix either clay or flint with water. While Enoch Wood erected a windmill at his Fountain Place Works, Burslem, in the 1780s for 'raising water, mixing clay and grinding glazes and colours', Newcomen type steam engines were introduced in the Potteries in about the mid-1770s, and a fully steam-powered mill first appeared in 1784, at Wedgwood's Etruria.⁸

Pug mills of a sort, therefore, existed in this country from the seventeenth century and could have been used for brickmaking. But were they? I agree with James Campbell that there is a complete absence of any evidence of their use before the last decade of the eighteenth century. The various contemporary published works and manuals on architecture and building make no mention of pug mills, nor are they included in brickmakers' inventories or insurance policies of the time. And none of the surviving building accounts of the period mentions payments for such equipment.

Only in the 1790s does one begin to get references to pug mills for brickmaking, and even then they are often rather ambiguous or inconclusive.⁹ Molly Beswick states that the earliest record for the introduction of a pug mill in Sussex occurs on the Goodwood Estate at Westhampnett, when Thomas Horton was paid £12 4s for work done during 1791 'with the Mill Horse'.¹⁰ Two years later, Arthur Young described how in north Norfolk, Holkham bricks were made of a mixture of two-thirds clay to one-third white marl, 'the whole ground together between two iron cylinders turned by a horse mill'.¹¹ This is not, of course, the bucket-like pug mill with knives which became characteristic of the brick trade in the nineteenth century.

In 1794 the glasshouse at Donnington Wood, Shropshire, was being supplied with Stourbridge clay for its crucibles which was ground in the Coalbrookdale Company's clay mill at Horsehay. Shortly afterwards, fireclay from the same clay mill and firebricks from the adjacent brickworks were delivered to the site of the new porcelain works at Coleport.¹² In 1798 there was apparently a small water-operated pug mill at the Hardy estate brick kiln, at Letheringsett, Norfolk.¹³

Moving into the nineteenth century, the Swedish metallurgist, Eric Svedenstierna found in the Hull area in 1802-03 that 'For the manufacture of roofing tiles more extensive and expansive plant has been installed', including 'a machine for working the clay'. In contrast, in Birmingham

a kind of clay is found, especially at the end of town, which is already mixed by nature with the proportion of sand necessary for good bricks, and no further effort is needed beyond digging out the clay and running on to it either rainwater or the water which trickles from a small hill. When the clay has thereby become so soft it can easily be worked, it is stirred up with a spade, and is then ready for moulding.¹⁴

A contract of 7 September 1812 for the construction of brickwork for the new gaol at Maidstone, Kent, specified that the clay to make the two and a half million stock bricks was 'to be ground in a Pug Mill'.¹⁵ The fact that this had to be included in the contract suggests that the use of pug mills could by no means be taken for granted.

In 1834 S.R. Bakewell stated:

I have visited within a short period the principal brickyards in about twenty counties of England, and also those in eighteen of the States of North America, and I verily believe that I have seen more than a dozen different machines for, and modes of tempering clay.¹⁶

While this suggests that pug mills were becoming more widespread, it also implies that they were still something of a novelty, and that a standard model had yet to be evolved. Indeed, as late as 1839, Laxton's *Price Book* advised, when selecting bricks, 'generally prefer hand tempering to pugging in the clay'.¹⁷

And two years later, *The Civil Engineer and Architect's Journal*, (October 1841, pages 340-341) said that traditional tempering of clay by being trodden by horses or men, had been usual in Britain 'till lately'. Nevertheless the editor of the journal, in a footnote, gives a recognisable description of the characteristic bucket-like pug mill as

an iron cylinder set upright, in the axis of which an arbor or shaft revolves, having several knives, with their edges somewhat depressed, projecting from it and arranged in a spiral manner round the arbor. By the revolution of the arbor the clay is brought within the action of the knives, by which it is cut and kneaded, and finally forced through a hole in the bottom of the cylinder.

This is, of course, nine years before the publication of Edward Dobson's *A Rudimentary Treatise on the Manufacture of Bricks and Tiles* in 1850, which gives a fuller description as well as drawings, of the pug mill. Yet according to him, 'the old fashioned way of tempering' by turning over the clay with shovels and treading it over by men and horses, 'is still practised in many country yards' where output was small.¹⁸ This is borne out by two brickyards in southern England: at Guestling, near Hastings, in Sussex, where in 1846 there was still no machinery, and tempering was evidently still done in the traditional manner;¹⁹ and at Bailey's Hard, on the Beaulieu River in Hampshire, where clay was tempered by hand until 1854.²⁰

Dobson does, however, also say that

where demand for bricks is extensive machinery is usually employed, the clay being ground between rollers or pugged in a pug mill.

He found that

the pug mill is very extensively used near London, and in most places where the brick-earth is of mild quality, so as not to require crushing.²¹

However, pug mills were not employed at the time in Nottingham, although they were in the surrounding neighbourhood.²² Dobson's assertion that use of the pug mill was often determined by the level of demand is borne out at the Bailey's Hard brickyard, where a pug mill was acquired in 1854 'to keep pace with production demands and escalating orders from builders'.²³ In a small estate brickyard like that at Ashburnham, Sussex, clay for the bricks was tempered and pugged by hand right up until the yard closed in 1968. A pug mill was only used there to work the heavier Wadhurst Clay to manufacture tiles, pipes and flower pots.²⁴

Pug mills were normally operated by a horse, but steam engines might sometimes be used. The use of wind and watermills to power pug and other mills in the pottery industry has been noted, and both forms of power were also used very occasionally in brickmaking. At the Duke of Bedford's estate brick kiln at Husborne Crawley, near Woburn in Bedfordshire, in the 1820s a horizontal windmill was used to power the pug mill. By 1830 it was beyond repair, so the possibilities of installing a watermill were considered, but the cost was too much, and it was replaced by a conventional windmill in 1831.²⁵ The pug mill driven by a watermill at Letheringsett, Norfolk, has already been mentioned, and a brickyard at Brightling in Sussex had a water-powered pug mill which was surveyed and recorded in situ in 1969.²⁶

So, perhaps, none of us who have written about the origins of the pug mill have got it completely wrong, but neither have we managed to be wholly right. We can now, however, at least posit a working hypothesis: there were pug mills in use from the seventeenth century onwards, but for sometime only in the pottery industry. If there was any use of pug mills in brickmaking before the late eighteenth century it must have been so rare as to be almost non-existent. Even then the adoption of pug mills for the manufacture of bricks seems to have been slow, and apart from certain areas, such as London, or particularly large brickyards, they may not have become common until about the middle of the nineteenth century.

I hope that others may be able to offer further evidence that will confirm, augment or disprove all or part of this hypothesis.

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2. A. Clifton-Taylor, *Six English Towns*, London: British Broadcasting Corporation, rev. pbk. edn., 1986, p.30
3. R.N. Price, 'The Other Face of Respectability: Violence in the Manchester Brickmaking Trade 1859-1870', *Past and Present*, 66, Feb 1975, p.112, fn.8.
4. R.W. Brunskill, *Brick Building in Britain*, London: Victor Gollancz, 1990, p.22.
5. This, as James Campbell points out, is reproduced as illustration 53 on page 103 of James Ayres, *Building the Georgian City*, New Haven and London: Yale University Press, 1998. Another relatively early depiction of a pug mill is included in a drawing by Denis Dighton, dated 1821, which appears as illustration 92, facing page 176, of J. Woodforde, *Bricks to Build a House*, London: Routledge, Kegan Paul, 1976.
6. Contemporary terminology can sometimes make it difficult to be sure that a pug mill rather than some other type of clay-processing machine is being described. Edward Dobson notes that although clay might actually be ground between rollers; the pugging of clay in a pug mill 'is also called grinding, and therefore in making inquiries respecting the practice of particular localities, the reader should be careful that he is not misled by the same name being applied to processes which are essentially different', (*A Rudimentary Treatise on the Manufacture of Bricks and Tiles*, 1850, Part I, pp.24-25.) Similarly, the term 'clay mill' might apply to a washing mill, used for washing or mixing clay and other substances, especially chalk, before being poured into settling pits. Washing mills were employed in the manufacture of London stocks, and sometimes in brickyards elsewhere in the country - for example, in Norfolk.
7. *Victoria County History of ... Stafford*, vol. II, Oxford: Oxford University Press, 1967, p.9
8. *Ibid.* p.9; Diane Baker, *Potworks: The Industrial Architecture of the Staffordshire Potteries*, London: Royal Commission on the Historical Monuments of England, 1991, pp.13-14, 26-27.
9. Again one is not helped by the fact that the first reference to a clay washing mill also occurs in the 1790s. (Patent Office: 1797, No.2154).
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18. Dobson, 1850, Part I, pp. 24, 26.
19. Beswick, 1993, p.65.
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24. K. Leslie and J. Harmer, *Brick and Tile-making at Ashburnham, Sussex*, Singleton: Weald and Downland Open Air Museum, 1991, p. 10.
25. A. Cox, *Brickmaking: A History and Gazetteer*. (Survey of Bedfordshire), Bedford: Bedfordshire County Council and Royal Commission on the Historical Monuments (England), 1979, illustration no. 10 on p.20 and p.23.
26. Beswick, 1993, pp.64-65, 127.

THE PUG MILL: SOME SHORTER CONTRIBUTIONS

Molly Beswick, Frank Kelsall and Terence Paul Smith

INTRODUCTION

In response to the contribution on 'The Myth of the Seventeenth-Century Pug Mill' by James Campbell in *British Brick Society Information*, 86, December 2001, pages 7-8, in the two months following publication, the editor received no fewer than four short items, three of which are a single paragraph. These are collected herein together.

These shorter notes are in addition to the two longer contributions to the debate on the pug mill, printed elsewhere in this issue of *BBS Information*. Some further comments from James Campbell who initiated the debate follow as a short separate piece.

THE PUG MILL IN SUSSEX

James Campbell states that he has found 'no mention in any of the normal sources of the use of the pug mill in the eighteenth century'. In the course of my research, the only eighteenth-century reference I found, albeit a late one, was in the accounts of the Goodwood estate brickyard at Westhampnett where, in 1791, a man was paid for work done during the year 'with the Mill Horse'.¹ The first actual use of the word 'pugmill' I came across was in the inventory of a brickyard on the Brighton/Hove boundary taken in 1811.² After this references become much more frequent.

MOLLY BESWICK

PUGMILL IN THE OXFORD ENGLISH DICTIONARY

Like many, I share James Campbell's reservations about when the pug mill was introduced. The *Oxford English Dictionary* has two very helpful quotations under "pug mill" The first is from 1824 in the *Mechanics Magazine* No 33 on page 78:

the introduction of machines called pugmills, into which the prepared earth is wheeled.

In the following year, 1825, John Nicholson in *The Operative Mechanic and British Machinist*, on page 533, writes;

[the tread of men and oxen] .. has of late been superseded by the clay or pug mill, which is a very eligible, through simple, machine.

These are the first two references provided. The *Oxford English Dictionary* is about to be revised and reissued and I am unaware whether there are other earlier references which the compilers have found.

FRANK KELSALL

THE AUSTRALIAN PUG MILL

According to the Australian architectural historian Robert Irving,³ it was only in the early nineteenth century that the pug mill was first used in Australian brickmaking:

The texture of bricks improved and their density increased with the introduction in New South Wales of pug-mills in the 1820s.

A brief description of these pug mills is given, and an accompanying illustration shows a barrel-like drum in the form of a truncated cone with the horse turning the iron mechanism by means of a long beam. A plank slopes up to just over halfway up the barrel and at the top of the plank a man is emptying clay from a wheelbarrow through a square aperture in the side of the barrel. At the foot of the barrel another worker - apparently a woman - is removing the pugged clay. Irving's description continues:

Later pug-mills were steam-operated, and ground the pug by means of rollers before kneading it. In the 1850s there were both American and English machines in Australia which did even more than this; they could grind, mix, knead and extrude the plastic clay into a continuous band that was then cut into separate bricks of appropriate size, the whole process being almost automatic.

TERENCE PAUL SMITH

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MORE ON PUG MILLS

James W. P. Campbell

In my note in *BBS Information*, 86, on 'The Myth of the Seventeenth-Century Pug Mill', I stated that the earliest description of a pug mill I had come across was in E. Dobson's *Rudimentary Treatise on the Manufacture of Bricks and Tiles*, dated 1850. Lawrance Hurst kindly notified me of an earlier instance, which he had found in his library, in Thomas Martin's *Circle of Mechanical Arts* (1820). This prompted me to do some further checking. A slightly earlier edition (1813) of Martin's work exists in the British Library in which the description also appears (on page 101):

..... some brick makers , in order to mix the soil and ashes more regularly, perform it with a machine called a clay mill, which a horse turns round. The machine consists of a tub or tun which is fixed to the ground, in which is placed perpendicularly an instrument resembling a worm or screw; the soil being put in at the top, is worked down by the rotary motion of the worm, and is forced out at a hole made on the side near the bottom of the tub.

It is worth noting three points about this description: firstly, it describes a screw thread machine which is not the same as the pug mill described in Dobson's *Treatise*; secondly, it is being used specifically as a mixing device; and thirdly, it is called a "clay mill" not a "pug mill".

Martin was quoting from an earlier work, James Malcolm's *Compendium of Modern Husbandry*, three volumes (London: C. and R. Baldwin, 1805), volume one pp.85-86. The clay entry in Malcolm's work is more or less the same. This confirms that the "clay mill" was known in 1805 and presumably had been used for some time before that date.

The first use of the term "pug mill" I have yet found in a book on brickmaking is in William Wilder's *Elementary and Practical Instruction on the Art of Building Cottages and Houses to which are added Practical Treatises on the Manufacture of Bricks and Lime*, (London: John Weale, 1835), page 48:

the clay mill or *pug mill* as it is called is made in the manner of a cask with staves and hoops, and rather wider at bottom than top - about five feet long and three feet wide at the bottom - an iron spindle runs down the middle, working in a socket at the bottom, and passing through an eye at the top, where it has a beam attached to it for hanging the horse to, by which it is turned. Out of the sides of this spindle strike five or six iron arms in different directions, which, by repeated division, thoroughly intermix the earth, which is put in at the top, by the time it reaches the bottom, where it is taken out at a hole in the side.

If any members have any other early examples of the use of the term "pug mill" or an earlier description of the device, I would be very pleased to hear from them.

GOODBYE YELLOW BRICK ROAD

Martin Hammond

I had two brickworks in southern England to record between November 2001 and January 2002 on behalf of the Bursledon Brickworks Trust. At the same time, these notes take the opportunity to record items of interest about brickworks in Ibiza and connected with the Great Wall of China.

BEACON HILL, CORFE MULLEN, DORSET

Beacon Hill Brickworks at Corfe Mullen, Poole, Dorset, established in 1937, ceased production of facings in September 2001 and commons on 30 November 2001. It has been visited by the British Brick Society for the Annual General Meeting in February 1978 and again in September 1998 as part of a visit to the Poole area. An account of the latter visit appears in *BBS Information*, 76, February 1999. It was one of only three remaining calcium silicate works in Britain. In 1985 it supplied 4000 yellow bricks for the Yellow Brick Road in the film *Return to Oz*, a sequel to *The Wizard of Oz*.

DOWNTON, WILTSHIRE

The other was Charles Mitchell and Sons' works at Downton near Salisbury, Wilts. Founded in 1936, it produced first calcium silicate bricks, then concrete bricks until the early 1960s. The shell of the building containing the boiler, autoclave, steam engine, and brick press, by Herbert Alexander of Leeds, remained. In 1952 two rectangular downdraught kilns each fired with three automatic coal stokers were built by Wilfrid Iball of Stoke-on-Trent. At 30,000 bricks capacity they were identical to the now demolished pair at Smith Brook Kilns near Cranleigh, Surrey. In 1962, Terry Callaghan built two further kilns of the same size but oil-fired, with ten fireholes each. Such is the local geology that suitable sands and clays for brickmaking are found in close proximity. Brick production was by a Wootton Brothers (from Coalville, Leics.) wet-pan mill feeding a three-mould Berry machine with automatic mould sander, and a Keller transfer-car system feeding a 21-chamber corridor dryer. This was supplied with hot air from the cooling kilns supplemented by an oil-fired air heater. The machinery was mostly secondhand. The pan mill is said to have come from Leebotwood Brickworks, Church Stretton, Shropshire; the Keller system from the North Devon Clay Co., Peters Marland, Torrington, Devon.

Items from Downton destined to go to Bursledon for preservation are the pan mill, the Keller system and the Berry machine. Bursledon has also acquired a quantity of firebricks, mostly Hall's, made by John Hall Refractories Ltd., Congreaves Trading Estate, Overend Road, Cradley Heath, West Midlands. Likewise, an Emperor rotary table press, a fly-press used for specials, and the front end of an autoclave from Beacon Hill are to go to Bursledon.

Downton closed in 1991 after almost thirty years working as a clay brickworks but reopened in 1998 as the New Forest Brick Company, directed by Tom Dulake of Bloxworth House, Dorset. Tom Dulake had at one time owned Swanage Brickworks, now Dorset's only brickworks, owned by Ibstock, the brickworks at Hastings, East Sussex, and the Pluckley works at Ashford, Kent.

Downton closed suddenly in March 2000 when the firm was declared bankrupt. The

dryers were full of bricks, and there was a kiln load of bricks ready for firing. Kiln setting and drawing was done by hand, aided by fork lift trucks, for which the wickets had to be widened. A second newer Berry which provided pug for the hand-moulding department went to H.G. Matthews at Chesham, Bucks., along with unfired bricks.

IBIZA

During another visit to the second smallest of the Balearic Islands in 2001, I had a chance to re-visit the two brickworks on which I wrote in *BBS Information*, 36, May 1985.

The brickworks at Ca'n Clavos between Eivissa and Santa Eulalia is still in production and has apparently replaced the Hoffmann kiln with a tunnel kiln but retained the chimney. At Ca'n Creu works the sides of the shellroof structure which sheltered the zigzag kiln have been walled in and bear a huge sign reading 'Forn Can Sans'. It appears that brickmaking has ceased on this site. 'Forn' is Catalan for kiln or oven.

CHINESE HORSESHOE KILNS

Sometime in 2001, I was watching a television programme on Channel 4 about the construction of the Great Wall of China. It showed the firing of a type of kiln used from the seventeenth century onwards. This worked rather like a cross between a beehive downdraught kiln and a scotch kiln. It was open-topped, with a thick outer wall with a single wicket in it. When the kiln is set a conical vent, closed at the top is formed in the middle (see fig. 6). In this the coal fire burns, stoked through the wicket. The kiln top is covered with beaten clay, leaving a ring of vents around the wall, covered with slabs to control the draught. At the end of the firing water is thrown over the clay covering, creating a reducing atmosphere. The resulting bricks are best described as 'brown brindles'. Did any other members see this programme?

Brick Queries

From time to time, the British Brick Society receives enquiries about bricks, brickmaking, other ceramic building materials, and brick buildings. These are printed when space is available in *British Brick Society Information*. Responses are also included when these are forthcoming.

DHK

A STAMPED BRICK FROM EASTLEIGH, HAMPSHIRE

On a house in Valley Park, near Eastleigh, Hampshire, two examples of a distinctive brick have been observed. The bricks have the letter M, or the letter W, impressed in them. The letter can be clearly see on the left-hand side of one brick, that inside the garage of the house.

It is a brick of regular size, of a rough surfaced type as are those in the rest of the house. The house was erected in 1988, one of a series put up by the Perbury Group on a housing estate called Valley Park, near Eastleigh in what was part of Chandlers Ford but is now part of the Test Valley. There are only two that the owner, who is one of the members of the Eastleigh and District Local History Society, has found like this in the whole house. One is inside the garage and the other high up outside. The initial is definitely on the side of the brick and not in the frog.

Could any member please help?

Would the letter M or the letter W be a counting device to mark off 1000 bricks? If so, does every firm do this, or something similar? Or is it peculiar to a specific firm?

KATHLEEN CLARKE

31 Chestnut Avenue, Eastleigh, Hants., SO50 5AN

BRICKS FROM A MINERAL RAILWAY NEAR CHIRK, DENBIGHSHIRE

Alison Walton, a friend of mine has purchased a small woodland near Chirk, Denbighshire, Wales. There is a disused mineral railway line running through part of the wood, and along one edge this has been lined with some unusual bricks. They are of all different shapes and sizes. Some have holes in them and some have writing on them. The variety of sizes and shapes are shown in a series of photographs (fig. 1 and fig. 2).

Does any member have any information which may shed light on the origins of this type of bricks and their date.

ELIZABETH LAYCOCK

School of Construction, Sheffield Hallam University,
City Campus, Pond Street, Sheffield S1 1WB

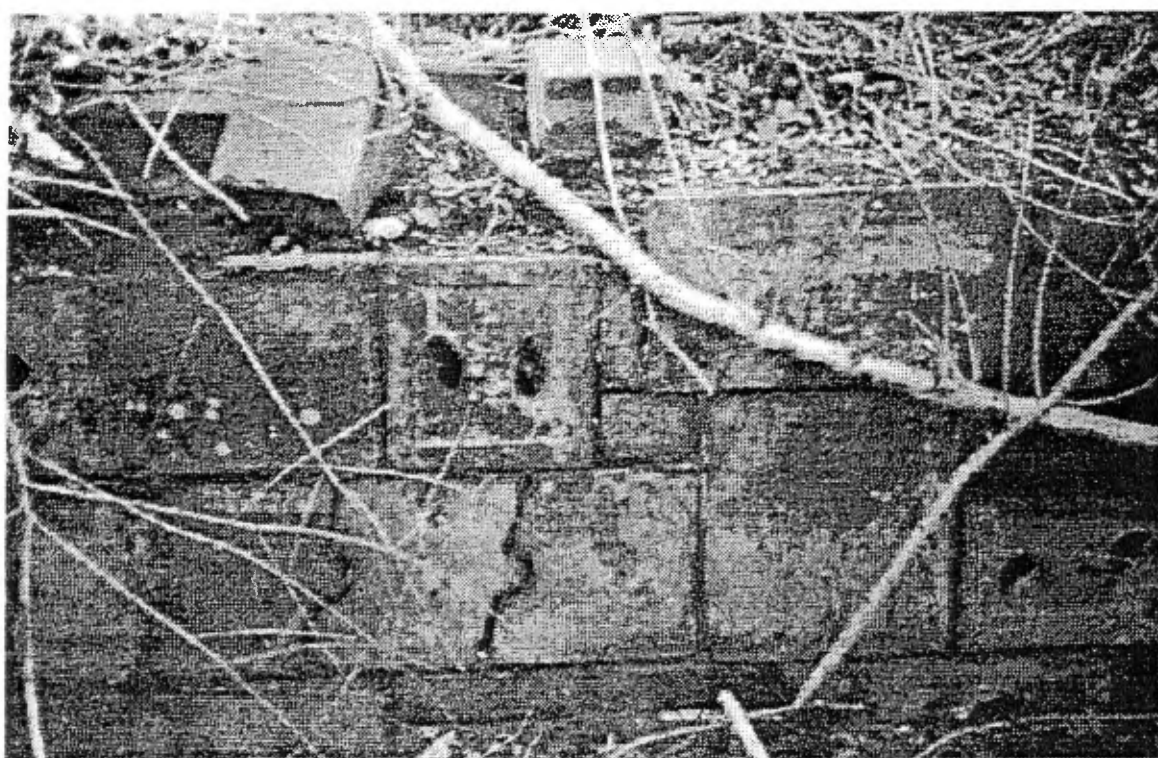


Fig. 1 Bricks *in situ* from a mineral railway at Chirk, Denbighshire..

S. & E. COLLIER, GROVELANDS, READING

I would like to hear from any member who has detailed or original information about the brickmaking industry in the town of Reading, and in particular about the activities of the firm

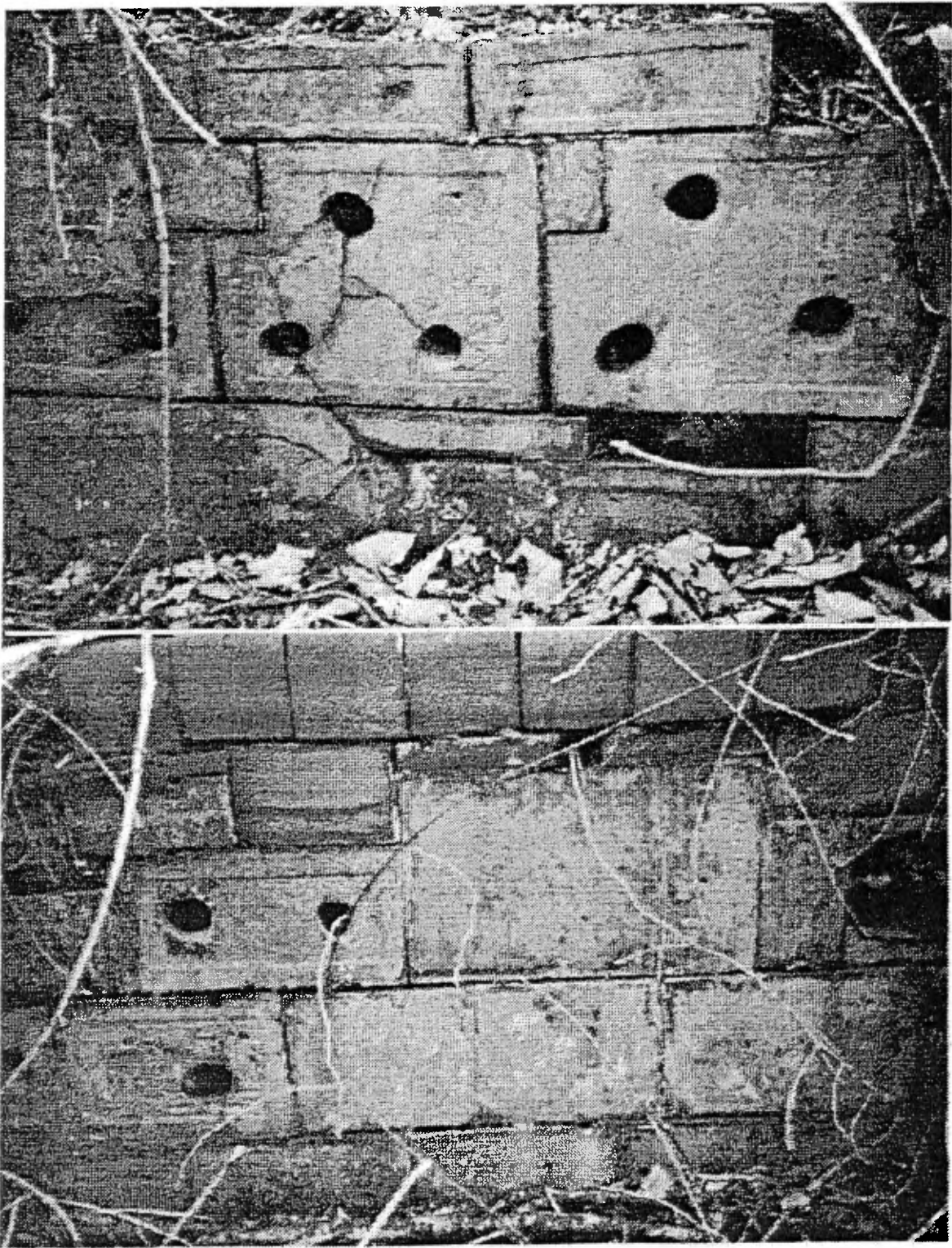


Fig. 2 Two photographs of bricks *in situ* from the mineral railway near Chirk

of S. & E. Collier in the nineteenth and twentieth centuries.

Reading Museum has some items from Collier's on display and many more in store. The have five original sales catalogues, but no other documents relating to the firm. Searches of Reading Library and Berkshire Record Office have proved unrewarding.

Collier's were active members of the Institute of Clayworkers and exhibited at the Building Trades Exhibition in the period between 1895 and 1913, which is reported in *The British Clayworker* but with little detail. I have found a copy of the 1936 exhibition guide in the RIBA library but nothing earlier. Does any member have knowledge of guides or brochures for earlier Building Trades Exhibitions which may include more details of the display stands?

DON MACGREGOR

26 Avington Close, Tilehurst, Reading, Berkshire RG31 5LW

BRICKS IN DEVON

Ian Linn lives in a seventeenth-century cottage in Exminster, now a suburb of Exeter; the cottage is built of cob and the local sandstone known as Heavitree stone. Various building materials have been unearthed in the large garden. Mr linn asks if we can identify the maker of old clay bricks with an impressed monogram mark 'THL' (fig. 3a). He has about a hundred. They are in a dark sandstone colour, not frosted, nominal dimensions 235 x 110 x 70 mm.

MICHAEL HAMMETT

9 Bailey Close, High Wycombe, Buckinghamshire HP13 6QA

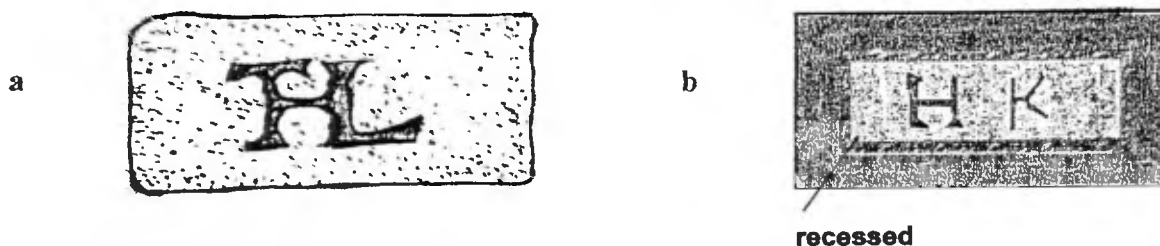


Fig. 3 a. Brick from Exminster, near Exeter, with impressed monogram brickmark.
b Brick from the Hardwicke Settlement, Auckland Islands, New Zealand

BRICKS IN THE AUCKLAND ISLANDS

Madelene Allen is doing a survey of the Hardwicke Settlement between 1849 and 1852 on the Auckland Islands, south of New Zealand, and is preparing a report for the National Historic Places Trust and the Department of Conservation, New Zealand.

The Hardwicke settlers left Plymouth, in August 1849 on the *Brisk*, the *Samuel Enderby* and the *Fancy*. It is understood that bricks were carried as "working ballast" and it is just possible that they may have picked up more in Australia. Bricks with the brickmark illustrated in figure 3b have been found and she asks if we can identify the maker.

They are described as "regular-sized" building bricks, pinkish in colour, rough textured and porous.

MICHAEL HAMMETT

9 Bailey Close, High Wycombe, Buckinghamshire HP13 6QA

Brick for a Day, 2002

INTRODUCTION

During the Summer months of 2002, the British Brick Society has held two meetings: its Annual General Meeting in Portsmouth on Saturday 29 June 2002 and a July Meeting in East Cambridgeshire on Saturday 20 July 2002. Both were organised by Michael Hammett, the society's secretary, and thanks are due to him for making the excellent arrangements. The society must also thank Mike Chapman who acted as organiser for the East Cambridgeshire day when Michael Hammett was unable to attend. The Autumn Meeting was a visit to Lord's Cricket Ground on Saturday 19 October 2002. Reports of all of these meetings follow; unless otherwise indicated, they are the sole work of the visits co-ordinator.

DAVID H. KENNETT

BRICK CHURCHES IN PORTSMOUTH

The Annual General Meeting was held in the hall of St George's church, St George's Square, Portsea. The church was built in 1754 to the design of an unknown person, probably the Dockyard Surveyor. The plan is a Greek cross within a square, thus allowing the three-sided gallery to stretch round the equivalent of transepts, aisles and (liturgical) west end in a neat fashion, supported on big Tuscan columns. Internally it was damaged by a wartime bomb so the fittings of a church designed for worship as laid down in *The Book of Common Prayer* of 1662 have been lost and the focus is now on an east dais with the altar. A big Venetian window lights the east end while the other walls have a double row of lights, segmental above and round-headed below. They are set in well-laid red and grey brick.

Set back from its square, the church presents an attractive sight even though many of the eighteenth-century buildings which once surrounded it are no longer there: apart from war damage, the nearby viaduct of the railway dispersed earlier inhabitants.

Setting out from St George's church, one espied other brick churches in Portsmouth, which derived their inspiration from other traditions of Christian worship.

St Agatha's belonged to those churches designed to impress by ritual and internal decoration. Thus J.H. Ball, a local man who had trained with Alfred Waterhouse, produced a plain stock brick basilica of four bays with red brick used for the round arches. Impressive externally is the apse of the sanctuary; a similar apse to the lady chapel was truncated for road widening. The client was Father Dorling, a vigorous Anglo-Catholic priest who set out to bring religion to the dockyard slums. His choice of Heywood Sumner as mosaicist and figurative artist was an inspired one as the interior ranks among the finest liturgical statements in the Anglo-Catholic tradition. Due to housing loss, the church was deconsecrated in 1955.

Portsmouth has two cathedrals: one for the Church of England, originally the parish church of St Thomas in Portsea Island, created a cathedral in 1927, and the other for the Roman Catholic Church built from scratch at various dates in the last quarter of the nineteenth century. We did not see the former but the route out to Fort Nelson took us past the cathedral of St John the Evangelist. Big, tall and impressive on its site on the corner of Edinburgh Road, this is red brick at its most daring.

From the train going into Portsmouth, one also saw St Philip, Cosham, of 1936-38 by

Ninian Comper. There is very neat buff brick here with cusplless three-light windows: it is an impressive sight. There are other brick churches in Portsmouth which the literature suggests would repay inspection by the British Brick Society: a possibility to be born in mind when planning the programme of visits for 2004 and later years.

FORT NELSON, PORTSDOWN HILL

Fort Nelson is a brick tour-de-force: it took ten years to build and never needed to be used. Like *H.M.S. Warrior*, its contemporary whose guns were never fired in anger, it was there to deter. After the Crimean War (1854-56), the diplomatic relationship between Britain and France deteriorated to the point where invasion was feared. Portsmouth, one of the great naval bases of England, was vulnerable to a land-based attack from the hills to the north. To prevent any invader who might have landed from being able to achieve the objective of bombarding Portsmouth from a vantage point high above the town, a series of red brick forts were constructed along the Portsdown Hills.

Fort Nelson is named after the nearby column of 1807 to the boy from Norfolk who wanted a skiff to command when idle in the 1780s; it is the most complete of the five built between 1858 and the late 1860s. The other forts take their names from nearby villages.

Built in Fareham red brick, the same as used in another mid Victorian building, the Royal Albert Hall, London, Fort Nelson was constructed in English bond and used ten million bricks in its impressive walls, underground structures, barracks, redoubts and firing platforms.

Many of the actual bricklayers and other building workers who did the construction had had experience of working as building workers on the railways. The use of relieving arches in the brick and flint wall lining the north ditch, almost 100 feet high, and brick-lined tunnels allowing ammunition to be conveyed underground to any point in the defences are testimony to the workers' skills and their prior knowledge.

Costing £84,000 to build, with another £100,000 being spent on buying the land to the north, east and west to allow for clear lines of sight if called upon to be fired over, Fort Nelson and its fellows in acting as a deterrence to invasion might be said to be cheap at the price. The guide who lead the tour which BBS members joined told an interesting story of how French officers were taught about Fort Nelson and its fellows and how much these graduates of the Ecole Militaire were in awe of it.

EAST CAMBRIDGESHIRE

The visit to east Cambridgeshire on Saturday 20 July 2002 was in two parts. The morning was spent at the works of the Cambridgeshire Brick and Tile Company at Goose Hall Farm, Burwell, and the afternoon in the city of Ely where some of its products were seen. This made an excellent link for the day.

THE CAMBRIDGESHIRE BRICK AND TILE COMPANY, BURWELL

In the late 1980s, problems with re-roofing historic buildings in Ely led to the formation of what has now become the Cambridgeshire Historic Buildings Preservation Trust who own the Cambridgeshire Brick and Tile Company Limited, based at Goose Hall Farm, on the outskirts of Burwell, and one field away from the brick pit of the former Burwell Brick Company, which

closed down in 1970 leaving a seam of Cambridgeshire gault clay sufficient for sixty years. The company is exceptional in that it uses this clay, traditional for brick and tilemaking in the county. No other company is thought to be making tiles or bricks from the gault clay at the moment.

Our guide at the tileworks was Paul Hawes, who until his 'retirement' two years ago was the works manager and for some years the only person there. Paul showed how the load of 300 tons of clay, now exhausted after eleven months and due for renewal in the week after our visit, was used at the rate of one and a half tons a day, broken down in the mix and churned through the pug mill twice to give the right consistency for moulding. At the moulding bench after a demonstration from Paul, one of our members tried his hand with a slab and the bow knife to produce a Cambridgeshire peg tile.

The drying process includes the use of de-humidifiers in what amounts to the space a garage would occupy. By trial and error the company have evolved systems to utilise bread trays for drying racks for coping tiles, valleys and specials. We saw many of these waiting to be fired.

The kiln is a second-hand pottery kiln, unloaded and loaded on a Monday for firing on a Tuesday. The weekly cycle allows cooling to take place over the weekend. In an average burn is 85% tiles, 5% wall copings and bricks and 10% floor tiles. As well as buildings in Ely and Burwell, roofs of these tiles include the art gallery and café on South Quay, King's Lynn, where several members ate lunch after the society's AGM in June 2001. A current project is the re-roofing of the wendy house at Hinchingsbrooke, Huntingdon, which involves shield-shaped peg tiles and twenty-six ridge tiles, a special made with the small upper pieces luted in with slip.

Cambridgeshire floor tiles have been used in the church dedicated to St Mary the Virgin, Tilty, near Great Dunmow, Essex. The photographs show the quality of the product and the care with which they have been laid.

The need for a product that matched the local townscape led to the formation of the company and it is pleasing to find that roofing contractors and conservation officers will specify the use of these tiles in restoration schemes. The local grapevine also helps spread knowledge of the products. From being a solitary worker, Paul has been joined by four other employees of the company and there are plans for a move from Goose Hall Farm and limited expansion to cope with the demand.

The society thanks Paul Hawes for his excellent tour round the works, his successor Nigel Taylor for providing tea and coffee for members on arrival and for providing the interesting display of products and photographs of buildings using the products.

BRICK IN THE CITY OF ELY

Ely is a small city, in the English not the Franco-American sense of the term. Like Wells in Somerset, it fits the English image of a cathedral city: mother church of the diocese with a great green in front of its west end and a bishop's palace to the south side.

At Ely, the great Norman abbey church raised to the status of a cathedral in 1109, with Cambridgeshire as the area of the diocese, one of only two such creations in England between William the Conqueror's restoration of cathedrals to urban centres and Henry VIII's making of six new dioceses in the 1540s.

At Ely, Henry's bishop from 1533 was Thomas Goodrich (died 1554) who extended and completed the brick palace of a predecessor, John Alcock, bishop from 1486 to his death in 1501. The east tower range is Alcock's red brick with black brick as diaper and the base of the west tower is also his work; the west tower was completed in plain red brickwork by Goodrich who built a long gallery to the west of this. Both towers have a polygonal stair turret on the inner, courtyard face. The range between these two towers built by Alcock has been demolished.

Bishop Laney, who held the see from 1667 to 1675, built a new brick range faced with brick pilasters capped by Ionic capitals of stone. The interior of this was remodelled in 1771.

Alcock's was not the first to build in brick in Ely. At the south end of the monastic complex, much of the Ely Porta of 1397 is brick; the bricks were transported down the river Great Ouse from the Wiggenhalls in west Norfolk. The Porta now leads into the buildings occupied by the King's School. To the south is the monastic great barn, now a dining room. It is a building whose roof was originally of Ely peg tiles, just the type to be replaced by the products of the Cambridgeshire Tiles and Brick Company. Ely peg tiles were likewise of gault clay. Production of Ely peg tiles ceased at the end of the nineteenth century and the unsuitable replacements, like the French slip covered tile, do stand out like glinting sores. The French light-coloured tiles are not gault, but are dipped in a slip and glazed: elsewhere and particularly as ridge tiles on the Almonry range they do look intrusive.

Another Cambridgeshire clay produces red bricks and reddish tiles. This comes from Haddenham, a village with a remarkable house of 1657, the Porch House. These pink clay tiles look effective in the lowish sun of a summer evening, as do those in the more deeply red of the Cambridgeshire mix of Keymer Brick and Tile Company from Sussex, but the latter are out of place in Cambridgeshire, a county on the fenland and eastern side which has a balance between mellow fruitfulness and the rawness of East Anglia.

Brick in Ely can be red or white. The former Three Cups Inn, on Fore Hill, now three shops, is the narrow Ely red brick but across the Market Place there is a contrast between the local and the imported. A purpose-built jeweller's shop of 1910 with workshop above, having large window on the north side, is in the fierce red of Accrington or Ruabon.

White has been selected for a new development on the north side of the Market Place using Turka Old Ely cream and rusticated brickwork on the ground floor. A large conservation area surrounds the cathedral. One aim is to regenerate through conservation, using quality materials.

And unfortunately, Ely has more than one instance of intrusive blocks, relics of 1960s schemes designed to modernize which ultimately led to business-flight. A replacement for the Corn Exchange of 1847 on the west side of the Market Place is in a harsh, machine-cut purplish brick; the offices for the water authority at the foot of Fore Hill on the corner with Broad Street use a pleasanter purple-coloured brick but look out of place in their angularity.

Across the road on Broad Street we walked through a new housing development, mostly three-storeyed, set in short terraces and designed as streetscape not just individual houses. The brick was both red and white. The white brick was Old Ely cream, using Flemish bond: snap headers makes laying labour intensive. Above the windows of these houses is set a pre-fabricated unit imitating gauged work: apparently modern bricklayers do not have the skills to create the angled, rubbed work to simulate the older tradition. The red brick came from Bovingdon and some corners on the white brick houses used a brick akin to Luton Greys: opinions differed as to their origins.

A tradition in Ely brickwork was tumbling and this has been revived here and in another housing development on the riverside. We saw older examples in various buildings in the town: what is now a restaurant on Riverside was particularly impressive with the tumbling indicating that the building had been heightened from one and a half storeys to three storeys.

The society's guide in Ely was John Selby, who is the Conservation Officer for East Cambridgeshire District Council. Our thanks are due to him for his excellent tour which enabled members to see tiles from the Burwell works on a variety of buildings: a small outbuilding in the Cathedral precinct and public conveniences in the Ship Street car park were the earliest ones. More recently these tiles have been used on buildings in the Market Place and in the two new housing developments.

LORD'S CRICKET GROUND

The scorecard did not read "Rain stopped play" when the British Brick Society visited Lord's Cricket Ground, the home of the Marylebone Cricket Club in St John's Wood, London, on Saturday 19 October 2002. Indeed we had a very full innings.

Members, their spouses and guests viewed the interiors of both the Pavilion of 1889-90 and the NatWest Media Centre of 1995-98. The respect in which these are held was instantly apparent: the former spotless despite its years, the latter already grubby within less than half a decade. The contrast in cladding materials of these two buildings could not be more stark. Thomas Verity choose London Stock bricks for the exterior of the pavilion where it faced away from the ground and a red brick and buff terracotta for the side which overlooks the Pavilion End. For the outside of the media centre Future Systems used aluminium.

London Stocks were also used for the Mound Stand by Frank Verity, son of Thomas, in 1898-99, and for the Real Tennis Court by the same architect in the same years. At the end of circumnavigating the ground members walked through the former and our visit included the interior of the latter: a match was in progress, between Marylebone and Manchester. The Manchester and Salford Real Tennis Club is a building of 1889 on Blackfriars Road, Salford: the exterior bricks are a dull purple colour. Only forty real tennis courts are to be found in the world, of which half are in Britain. Most noteworthy, of course, is that at Hampton Court Palace; Henry VIII, it should not be forgotten was an accomplished player.

Early in the course of the guided tour we were able to see the Long Room, the place through which all players must walk on their way to the wicket, and perhaps return, crestfallen, having been dismissed for a duck! When the members of the Marylebone Cricket Club are there in a great throng, as on the opening day of the Lord's Test, it must be a daunting prospect, especially for a young man on his debut for his country to pick his way through so many of the eighteen thousand members of the club.

The two dressing rooms are on the first floor, with players' balconies independent of the members' balcony. Access to all three balconies gave BBS members an opportunity to examine the terracotta corbels in detail. Built as it was in the close season of 1889-90, more than a decade before he retired, these writers would assert that the second corbel from the south on the members' balcony is a representation of W.G. Grace, complete with cap and beard. As with the stone corbels on one of the extensions to the Bodleian Library, Oxford, at Lord's no two corbels are identical.

An interesting piece of terracotta is the moulding above the Dioceltian window of the England dressing room with 'MCC' intertwined; the initials of the club indicating ownership of the ground and its pavilion. Thomas Lord had originally rented a field in what is now Dorset Square in 1787. In 1811, his lease ran out and the land was let for building leases; the houses here and on streets to the north, immediately east of Marylebone Station are modest brick houses of the second and third grades of the 1810s and 1820s. On the south side of Dorset Square, the broken mass of Dorset House, by T.P. Bennett and Son, is a replacement of 1935. For three seasons the Marylebone Cricket Club played on a field commandeered in 1814 for the Regent's Canal from east London to Paddington Basin; part of the field, to the north of the canal is the site of the St John's Wood Electricity Works of 1902 by Stanley Petch and C.H. Reilly. The site now serves as a switching station but since 1972 the lone brick chimney, formerly so prominent in views of Lord's Cricket Ground when looking south, is no more.

Instead the tall building is that to the immediate east of the ground, the NatWest Media Centre. For this Future Systems had to find a shipbuilding company to prefabricate the hull: the monocoque resembles a shell or ship's hull placed on its side. Pendennis Shipyard of Falmouth created the structure which weighs 130 tons and sits on two concrete columns. Within the centre,

pride of place goes to Test Match Special studio, from which the ball-by-ball commentary is broadcast, directly behind the bowler's arm at the Nursery End.

For the paying public, Lord's provided greatly increased seating capacity in the ten years before the building of the media centre. On the south side extra tiers were added to the Mound Stand in 1985-87 by Michael Hopkins and Partners, using as the base the existing brick structure with its external arcade. This was one of the first buildings to have a catenary curved tented roof, here designed to reflect the origins of cricket as an essential part of Englishness:

cricket on the village green, old ladies bicycling to early Communion as one member of the Marylebone Cricket Club so eloquently affirmed. It also reflects the English class system: club members on the promenade deck beneath the tents, supping tea and eating sandwiches, corporate clients in the hermetically sealed boxes beneath and the ordinary spectators on the open terraces below. Opposite, on the north side is the Grandstand, of 1996-98, by Nicholas Grimshaw. Both upper tier and terraces are for the paying public, again with private boxes sandwiched between them. The east side has two slightly earlier stands, both unroofed; the Compton Stand to the north-east, the Edrich Stand to the south-east, with the gap between them serving to admit mowers and rollers to the pitch. On test match days, the sight screen is in front of the entrance. The two concrete towers with stairs to the media centre now frame this, the only entry other than the wicket gate from the pavilion to the pitch.

The outfield at the time of our visit was not there, the "hallowed turf" having been auctioned in September; it is being relaid for the first time for a century. East of the ground is the nursery, part of which was dug up for the cut and cover brick tunnels which take the trains from Birmingham Snow Hill via Banbury into London St Marylebone. On their way home the writers saw photographs of these operations on the walls of the station, a fitting end to a very interesting meeting.

SUSAN HOLLAND and DAVID H. KENNETT

Brick and Tile in Print

From time to time the British Brick Society receives notice of short publications, either as booklets or as articles in periodicals, which are worthy of notice in *British Brick Society Information*. Similarly, there are publications not solely concerned with bricks which nevertheless may be of interest. Members involved in publication or who come across items of interest are invited to submit notice of them to the editor of *BBS Information*.

DAVID H. KENNETT

1. Margaret Bailey, *My Ancestors were Moulders of Clay*
Graft Publications, 'Greenlea', Mayfield Road, Fordingbridge, Hants., 2002;
142 pp. ISBN 0-9542701-0-X, price £9-95.

Moulders of Clay is essentially a family history of the Reeds and their ancestors who were brickmakers and potters in Alderholt and Sandleheath, near Fordingbridge, on the Hampshire-Dorset border, about ten miles south of Salisbury.

Each chapter is a short biography of each of the 'moulders of clay' from the author's great-great-grandfather William Reed (1772-1837) to the time of S. Reed & Sons' brickyard in Sandleheath, which closed in 1963. Her early-nineteenth-century ancestors on her mother's side were also brickmakers and potters. The second half of the book is taken up with descriptions of

brickmaking processes, delivery of the bricks, and the author's childhood memories. It is well illustrated with family photographs, copies of paperwork, and sketch maps of the early sites; together with colour photographs of bricks, moulds and tools.

Your reviewer has known the family for over thirty years, and it was Sidney Robert ('Bob') Reed (1898-1991) who taught him much of the theory of handmade brickmaking and kiln firing. This was written up in *Brick Kilns: an illustrated survey* (1977), and also by the late Donald Young in 'Brickmaking at Sandleheath', *Industrial Archaeology Magazine*, 1970. Because of these articles, the book does not dwell too long on technical detail. One of Bob Reed's favourite sayings was that 'you had to be strong below the neck and weak above it to work in a brickyard'.

MARTIN HAMMOND

2. Ian M. Betts with Tony Wilmott, *Medieval 'Westminster' Tiles*, MoLAS Monograph 11, London: Museum of London Archaeology Service, 2002; xii + 78 pp., 46 illustrations in black and white and colour; ISBN 1-901992-24-1; price £11-95, paperback.

'Westminster' floor tiles are 'probably the worst medieval tiles ever to be commercially successful' (p.5, quoting Elizabeth Eames). The inverted commas around the name serve, first, to signal the fact that Westminster (Abbey) is where they were first recognised as a distinct group, *not* their place of manufacture, and, secondly, to distinguish them from a group of far superior tiles also found in the Abbey and known as Westminster tiles (*without* the inverted commas). The 'Westminster' tiles occur from Canterbury, Kent, to Croxden Abbey, Staffordshire, with an outlying group in north Norfolk, although the vast majority are found in London and its immediate environs. In this publication, the result of many years of study, BBS member Ian Betts ably discusses the huge number of decorated and plain tiles of 'Westminster' type: their manufacture, production centres, distribution, size, date, designs, and arrangements in floors. He argues persuasively for a date in the second half of the thirteenth century, although with the mosaic tiles from Merton Priory, Surrey, Stratford Langthorne Abbey, Essex, and elsewhere occurring just *before* the mid-thirteenth century. The heraldic tiles are discussed separately (pp.27-29) by Tony Wilmott although this misses *some* points: for example, the use of heraldic *vair* and *counter-vair* (fur) patterns on designs W55, W56, W57 and possible W123; nor are the various *fleur-de-lis*, *lion*, *gryphon*, and *Paschal Lamb* (*Agnus Dei*) designs discussed by Willmott as heraldic devices - which they certainly are. All the currently known decorated tiles are catalogued and illustrated, itself a most valuable service to archaeologists and historians. The designs are given unique reference numbers, preceded by W (for 'Westminster') or by KL (for King's Lynn) in the case of the Norfolk tiles. Not least commendable is the high quality of the illustrations, especially of Ian Betts' own colour photographs.

T.P. SMITH

3. Mary Miers, 'Wassund Hall, East Yorkshire', *Country Life*, 29 August 2002, pp.42-47.

Thomas Cundy (1765-1825) did a watercolour elevation of the house he designed for the Rev Charles Constable in 1813. An elegant Regency villa, Wassund Hall was built in pale brick and originally entered from the three-bay west side. There was an addition to the service wing by the York architects Watson & Pritchett in 1821-23 and further extensions in the 1870s. The latter were removed by the Bridlington-based architect Francis Johnson in 1947-48 when the north front, inspired by Palladio's church of Il Rendentore on the Guidecca, Venice, was remodelled

to become the main entrance. While the house is in white brick, the walled garden, opened up by the present owner, Mrs Russell, has external walls in red brick.

DAVID H. KENNETT

4. Thomas J. Noel, *Buildings of Colorado*, New York and Oxford: Oxford University Press (for the Society of Architectural Historians), 2002, xviii + 669 pp., many black and white photographs. ISBN 0-19-509076-4, price £18-99, paperback.

Buildings of Colorado is the fifth volume to be published in the series, *Buildings of the United States*, issued under the auspices of the Society of Architectural Historians: the others available in paperback are Michigan, Iowa, the District of Columbia, and Alaska. More recently, Nevada, North Carolina, and Virginia have each been published in the hardback edition and a paperback may be expected within a few years; work on other states is in progress.

Modelled on *The Buildings of England* the American volumes differ from these; towns have plans, often with small sections of larger cities given individual street maps; illustrations are integrated with the text and referenced by the code given to each building described. The coverage of buildings is selective but the choice of building types is wide: industrial buildings, offices, even gasoline stations are given descriptions. An earlier book which provided a model is *A Guide to the Architecture of Minnesota*, by David Gebhard and Tom Martinson, published in 1977; the late David Gebhard with Gerald Mansheim was the author of *The Buildings of Iowa*, published in hardback in 1993 and in paperback in 1997.

Denver has some remarkable buildings. From the inter-war decades, the terracotta ornament of the Mayan Theater is comparatively well-known, possibly on account of the similar cinema in Los Angeles, but much else is a revelation. At the Bryant Webster Elementary School, 1930, by G. Meredith Musick, purple-brown brick is used to display motifs from Navajo textiles, Pima baskets and Pueblo pottery including buffalo and kachinas (deified ancestral spirits in Pueblo mythology); the specials which required intricate mouldings and firing were made by the Denver Clay Pipe and Brick Company. The same architect used red brick and Indiana limestone trim at the First Baptist Church of 1938 in a neo-Georgian design. With a magnificent terracotta façade, worthy of mercantile Manchester two decades earlier, is the Gart Brothers' Sports Castle, but originally an automobile showroom for Chrysler designed in 1926. Broadway also had a 1923 Studebaker showroom also with a fine ornamental, terracotta frontage; this, with a russet-coloured brick extension of 1982 is now a department store.

The city has lost the Tabor Grand Opera House and Vendome Hotel of 1879 by Frank E. & Willoughby J. Edbrooke, rather grand in red brick with much stone, but still has the 1908 Denver Municipal Auditorium: Robert Willison's building was built for the Democratic National Convention of that year and is in beige brick with terracotta trim. Standing also is the imitation in pale brick of the campanile of St Mark's, the Daniels and Fisher tower, of 1911, originally part of a department store.

Elsewhere in the state, the Public Library of 1931 in Akron, a square, neo-Georgian building, but with the entrance pushed out at one corner and with an unusual parapet, constructed in red brick, caught my eye, as did the Old Van Briggie Art Pottery Factory on the campus of the Colorado College in Colorado Springs. An interesting building is Chaffee County Courthouse in Salida, built of yellow brick in 1932.

As will be seen from the examples quoted, in this volume (like the others), detail is given about the building materials used in each building described: revisers of *The Buildings of England* please take note.

DAVID H. KENNETT

5. David A. O'Connor, *The Hole in the Ground - The Story of the Battledown Brickworks*, Charlton Kings Local History Society, 2002; 92 pp., 91 maps and illustrations. ISBN 0-9519451, price £8-50 (inclusive of post and packing) from the author at The Headlands, Stanley Road, Battledown, Cheltenham GL52 6QD.

The Hole in the Ground is the story of the development and eventual demise of the Battledown Brickworks at Charlton Kings. In the late eighteenth and early nineteenth centuries there were many local brickfields producing hand-made bricks from surface clay. Under the guidance of four generations of the enterprising Webb family, Battledown mechanised its production and outstripped its competitors to achieve a monopoly position in the Cheltenham area.. Not all was smooth going: the First World War brought cold kilns and a flooded pit, and a slump followed. However, by the early 1920s the business recovered; its heavy bricks, and particularly its hand-made tiles, were in demand throughout the country until the 1950s when Battledown was unable to compete with the country-wide marketing of the London Brick Company's Fletton brick. the winning of the clay stopped in 1955 and the Hole in the Ground was purchased by the council as a landfill site for Cheltenham's rubbish. In 1978 a new sports field was opened but subsequent subsidence rendered it untenable and the area is now an informal green space.

The book, which is lavishly illustrated, covers not only the personalities and the history but also the geological problems which had to be overcome, the production machinery and processes, the products, and the marketing methods of Webb Brothers Ltd. of Battledown. The author is David O'Connor, who is Vice-Chairman of the Charlton Kings Local History Society and lives in Battledown. Copies can be obtained from him (address above) or from Maltby Books, Regent Street, Cheltenham, Glos. GL50 1HA.

MICHAEL HAMMETT

6. Matthew Slocombe, 'How to look after your house: Brick Repair', *Country Life*, 29 August 2002, pp.64-65.

Matthew Slocombe makes the point, eloquently, that many (*not* I hasten to add the members of the British Brick Society) think of brick as commonplace whereas, historically, its use signified high status in a building.

The article gives contacts for the repair of brickwork and sources for specialist materials. Illustrations include the Master's Lodge at Peterhouse, Cambridge, and a detail of the brickwork of the columns of the 'Barn à la Paestum' at Malvern Hall, Warwickshire.

DAVID H. KENNETT

7. John Thomas, *Albi Cathedral and British Church Architecture*, London: The Ecclesiological Society, 2002; x + 68 pp; 37 black and white illustrations. ISBN 0-9466823-13-8. no price stated.

This study, subtitled "The influence of thirteenth-century church building in southern France and northern Spain upon ecclesiastical design in modern Britain", is a longer version of a paper first published in *The Journal of Architecture*, 3, Summer 1998. Chapter 1 considers the design and purpose of the dramatic brick-built Cathedral of St Cecilia at Albi and of related churches, whilst chapter 2 discusses nineteenth-century publications which made knowledge of these buildings widely available in Britain. Chapters 3 and 4, which form the kernel of the book, seek to demonstrate the influence of Albi and the others on a number of parish churches and cathedrals in nineteenth- and twentieth-century Britain. Only in one case, that of Sir Basil Spence's Coventry Cathedral (1950-51), is there direct evidence from the architect himself for influence on the design process (pp.37-38), although Sir Edward Maufe acknowledged it on the choice of

material - brick - for Guildford Cathedral (1932-66; p.33). In other instances, the case has to be based on alleged affinities, sometimes against the architect's own pronouncements or silences, as with J.F. Bentley's Westminster Cathedral (1894-1903). Chapter 5 discusses the diaphragm arch in modern British church design, and again derivation from southern France and northern Spain is proposed. An Appendix considers some enigmatic drawings by Sir Giles Gilbert Scott, an intriguing issue on which (quite properly, so I believe) the author comes to no firm conclusions. No such reticence is shown elsewhere in the book, but to this reader the arguments seem tenuous. On pages 57 and 58 alone one comes across the phrases "It may well be that", "it is surely not impossible that", and "It may be that". Similar *peradventures* occur throughout, resulting in a series of conjectures based on such similarities as exist but underplaying any differences.

The book refers to a number of nineteenth- and twentieth-century brick (and non-brick) churches in Britain, and there is a useful array of references, though no index. At p.48 the text correctly attributes St Luke's Mission Church and Hall, Watford (1938) to Welch & Lander, but the caption to fig. 33 wrongly ascribes it to Leslie T. Moore. Those interested in the topic will need to read the book and ponder its proposals. Perhaps they will be more persuaded than was this reader.

T.P. SMITH

Changes of Address

If you move house, please inform the society through its Membership Secretary, Keith Sanders, at 24, Woodside Road, Tonbridge, Kent, TN9 2PD.

The society has recently been embarrassed by material being returned to various officers from the house of someone who has moved but has not told the society of his/her new address.

BRITISH BRICK SOCIETY

MEETINGS IN 2003

The British Brick Society is in the course of arranging meetings for 2003. The provisional programme is as follows:

A Saturday in either March or May *Spring Meeting*
Stratford-upon-Avon, Warwickshire

To include tour of the Royal Shakespeare Theatre (1928-32), by Elizabeth Whitworth Scott, and a walk round Old Town to view the variety of eighteenth- and nineteenth-century brick buildings in the town. The tour will end to allow sufficient time for members to visit Shakespeare's Birthplace.

Saturday 5 April 2003 *Northern Spring Meeting*
Nostell and Temple Newsam, Yorkshire

The brickworks at Nostell is part of a complex which includes an opencast coal and clay site. A guided tour has been arranged of the buildings of the Temple Newsam Estate, where the house is Tudor and Jacobean, and is now owned by Leeds City Council.

Members wishing to make a weekend in West Yorkshire will have the opportunity to visit Clarke Hall, near Wakefield, on the Sunday when this brick E-plan house of 1542 with a wing of 1629 will be having an open day.

Saturday 14 June 2003 *Annual General Meeting*
Jackfield, Salop

A Saturday in July *July Meeting*
North Yorkshire

The society hopes to organise a July Meeting in North Yorkshire to include a visit to the mausoleum at Castle Howard.

A Saturday in late September or October *Autumn Meeting*
Details to be announced.

Full details of the two Spring Meetings will be included in the February mailing.

The officers of the British Brick Society welcome suggestions and ideas for future meetings. Notice of brickworks who would be willing to host a visit would be particularly invited. Please contact Michael Hammett, David H. Kennett or Terence Paul Smith. Thank you.