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BRITISH BRICK SOCIETY

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Cover Illustration:

The end of an era: the brick chimneys of Stewartby will not longer glow or steam as the last load of bricks has now been fired.

Editorial:
The Last Load of Bricks

Something highly significant happened on Thursday 27 February 2008: the last load of bricks was loaded into the kilns of what for most of its life was the Stewartby works of the London Brick Company. Self-combusting when heated to somewhat below the final firing temperature of 950°C, the Lower Oxford Clay contains seaweed and other plants from the boundary between the middle and the upper Jurassic periods, around 170-160 million years before the present day. The other great advantage is that the clay contains sufficient water to be malleable and requires no extra water to be added to the mix in the handling processes. Thus bricks made from the Lower Oxford Clay need no extra time spent in drying sheds and provided their own heat source. Once made, the green brick could go straight to the kiln.

If they possess these advantages, it may be asked why the largest brickworks in the world is closing. It is not a lack of raw material, although eventually that must diminish to the point where it is uneconomic to take the clay from the earth. It is not a lack of demand for bricks: until early in 2008, the volume of building work was actually increasing and brick is *still* the prime material for cladding a new building, be it house or office block, school or factory. It is not the inability of the workers to continue, although the age of the workforce at Stewartby was skewed in the direction of late middle age rather than younger men. Many of the remaining two hundred or so workers who lose their jobs when the last firing is emptied, the bricks packed into parcels ready to shipped out on trains and lorries to builders' merchants and building sites may well be taking some form of early retirement.

What has closed brick production in central Bedfordshire is the twenty-first century's aversion to risk, something which crept in by stealth during the last two decades of the last century. The present economic and social climate is risk-averse, not risk-taking. Regulators seize on any fault in the system and legislate the fault out of existence. This applies as much to children playing in the street or climbing trees as to noxious chemicals being pumped into the air by industrial processes. The chemicals generated by firing bricks at Stewartby include sulphur dioxide, both carbon monoxide and carbon dioxide, various hydrocarbons and sulphuric acid. None is pleasant; the fumes from each could be smelt up to ten miles away, if the wind was in the wrong direction; all are harmful to human life to a greater or lesser degree. But, we may ask, do these make the production of bricks at a site where the clay reserves are still extensive uneconomic.

The words above were written before the economic climate turned somewhat colder than it had been for the previous decade and a half. On 9 June 2008, it was announced that two brickworks were to be mothballed and their workers laid off, one hopes, temporarily. In a dramatic move, the world's largest brickmaker, Wienerberger, closed two of its plants in southern England: those at Steer Point, Devon, and Ewhurst, Surrey. The sharp decline in the housing market over the previous two months was to blame; something confirmed by the news that housing starts in 2008 would be the lowest since 1945, the last year of the Second World War, following an already low figure in 2007. Housing starts fell by over a fifth for the first quarter of 2008 compared with the last quarter of 2007, and by almost a quarter compared with January to March 2007. The eighty jobs lost at these two brickworks will probably not be the only jobs to go in the brick industry in Britain in the next fifteen to eighteen months.

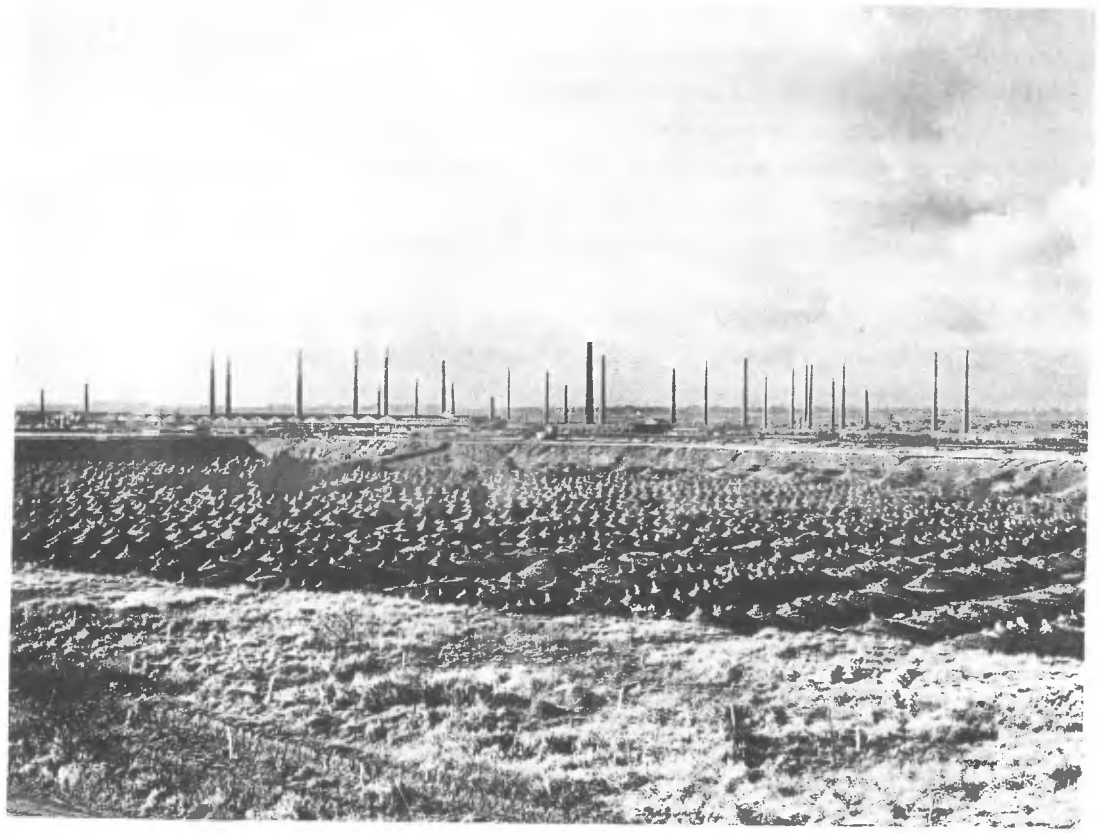

Fig. 1 The forest of brick chimneys which characterised the central Bedfordshire landscape for almost seventy years. The photograph shows Stewartby in its prime but it could equally be other Bedfordshire brickworks such as those at Lidlington or Marston Moretaine.

This issue of *British Brick Society Information* contains printed versions of two of the three papers given by members of the society at the session on 'Brick in the City' at the Leeds International Medieval Conference in July 2007, which was briefly noted at the end of the Editorial in *BBS Information,* **104,** Judy 2007. Sophie Blain's presentation forms the basis of her paper, 'Scientific Dating of Architectural Ceramics applied to Medieval Building Archaeology Application to the church Notre-Dame-sous-Terre, Mont-Saint-Michel, France'. Likewise, the paper by Tom Gurling on 'The Potential for Thermoluminescence Dating of Medieval and Tudor Essex Brick' represents an extended version of the presentation he gave. These two papers led to an extremely valuable discussion of the merits, costs and possibly applications of the technique.

A paper arising from the presentation by David H. Kennett on 'Brick in Great Yarmouth, Norfolk, before 1600: Town Walls, Friaries and Undercrofts', which has been held over pending further fieldwork. At the request of the conference organisers, this speaker included a short section on the use of other building materials such as clapperboarding, flint, stone, and wattle-and-daub within a timber frame; a piece of on-going research to be used as the basis of a future paper entitled 'Houses of the Rich, Houses of the Poor: Brick and other Building Materials in Great Yarmouth, 1500-1750'.

In July 2008, the British Brick Society is again sponsoring one session at the Leeds International Medieval Congress with papers to be given by Sophie Blain, Tom Gurling and Moses Jenkins.

Whilst Leeds 2007 was the first time that the society had sponsored a session at this or

any other academic conference, but not the first occasion on which it had been represented at an international conference or the meeting of a learned society.. Indeed, looking back through records of the lecture series of the British Archaeological Association, it is noticeable that different members of the society have contributed to this at various times, especially in those years in the 1980s and early 1990s when one of the lectures was given on a brick theme. Ann Los' paper on 'From Brickyard to Builders' Yard' in *British Brick Society Information,* **106,** February 2008, was originally given at a conference organised by the Construction History Society in 1990.

Again, whilst not organised by the society, the Cressing Temple Conference on Brick in Eastern England, held on Saturday 10 July 2004, was noteworthy for the prominence of members of the British Brick Society among the speakers and having as its chairman, the society's then Honorary Secretary, Michael Hammett, who is now the society's Enquiries Secretary. The conference was organised jointly by Essex County Council and the Essex Historic Buildings Group and is reported in *BBS Information,* **95,** November 2004.

Since May 2005, various members of the British Brick Society have attended the International Congress on Medieval Studies at Western Michigan University, Kalamazoo, Michigan, U.S.A. and have spoken at one or more of the many sessions: a total of 602 sessions were organised in 2007.

This issue of *British Brick Society Information* was prepared prior to the society's Annual general Meeting on 21 June 2008 at Amberley Chalk Pits Museum. The society has held one meeting on 2008, a visit to Coleford Brick in May. Two further meetings are planned, both within urban areas. First is a mid-week visit to Coventry, with sufficient time at the end for members to both view the Basil Spence Exhibition at the Herbert Museum and Art Gallery and to examine the interior of Coventry Cathedral, not a brick building, but one of great interest. The second on a Saturday in October is to visit the London Borough of Hillingdon and will feature the Hillingdon Civic Centre in Uxbridge, West Drayton Manor and the brick barn at Harmondsworth.

The editor holds sufficient material (excluding contributions written by himself) for just over one issue of *British Brick Society Information.* Number **108** is already in an advanced stage of planning. He would welcome indication of possible contributions forthcoming towards the end of 2008 or early in 2009, and particularly shorter pieces for a projected issue on the uses of brick in churches planned for late 2008/early 2009.

DAVID H. KENNETT
Editor, *British Brick Society Information,*
Shipston-on-Stour
7 March 2008 and 19 June 2008

SCIENTIFIC DATING OF ARCHITECTURAL CERAMICS APPLIED TO MEDIEVAL BUILDING ARCHAEOLOGY: Application to the church Notre-Dame-sous-Terre (Mont-Saint-Michel, France)

S.Blain[1,4], Ch.Sapin[2], P.Guibert[1], M.Bayle[3], I. Bailiff[4]

A paper given at the International Medieval Congress,
Leeds, July 2007

The early medieval period is not well known. In France particularly, there is a lack of visible evidence that identifies pre-Romanesque architecture. This is not only due to the lack of interest in this period for a long time (medieval archaeology in France only really became popular in the 1960s), but particularly because pre-Romanesque buildings were often subject to a continuity of use. Over time, evolution, transformation and adaptation to the subsequent periods has taken place. Indeed, the primitive pre-Romanesque buildings were often reused and incorporated into the Romanesque construction. Conversely, if the buildings were of no use, they were abandoned, lost and forgotten, or destroyed, appearing now only rarely and as incomplete ruins.

Across the Middle Ages social life revolved around religion, the main expression of which was the religious building. Along with castles, the church was the only building considered important enough to be made of strong, non-perishable material such as stone or brick.

One site that has seen this continuity of religious durable settlement from the early medieval period to the present day is Mont–Saint-Michel.

HISTORY

Mont-Saint-Michel is a small, rocky island that lies in a shallow tidal bay between Normandy and Brittany in North-western France.

We know from a twelfth-century cartulary, the *Introductio Monachrum*, that in 965AD, the duke of Normandy, Richard I allowed the settlement of Benedictine monks on the island with their first abbot, Maynard I (965-991), who is likely to have been responsible for the construction of a main abbey on the top of the island, as well as the churches surrounding it. One of these churches, positioned to the west of the island, is known as Notre-Dame-Sous-Terre, and forms the subject of our study.

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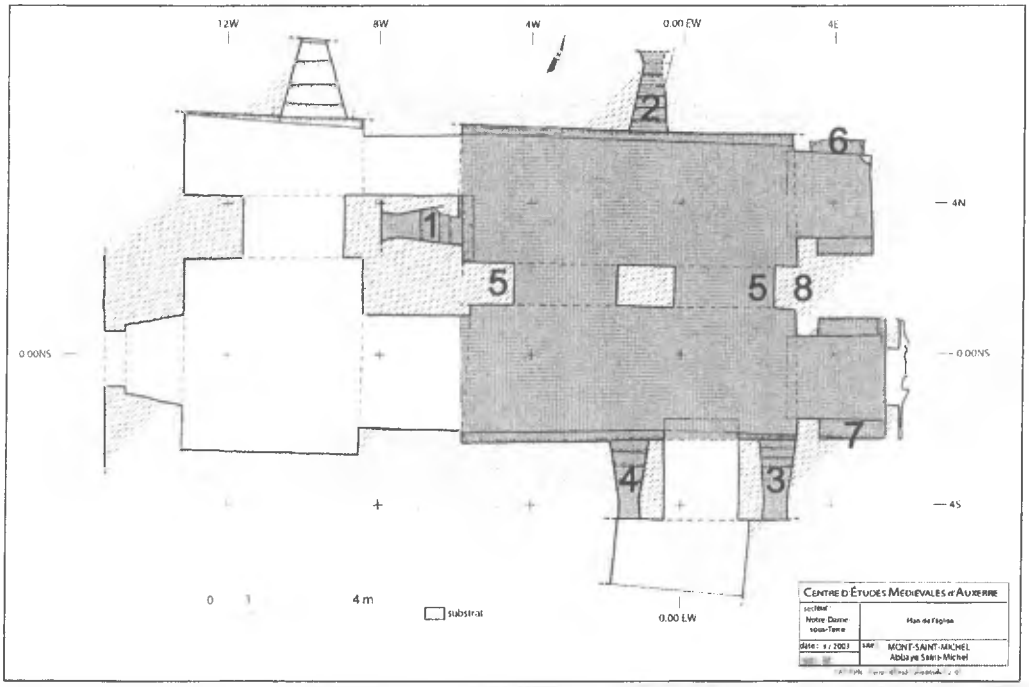

Figure 1 Plan of the current church of Notre-Dame-Sous-Terre, Mont-Saint-Michel, France. The primitive building (in grey) consists of two eastern nave with eastern sanctuaries and openings. The structures sampled are labelled 1-8.

Table 1 Location of the eight sampled areas

Reference on Plan	Masonry
1	Window West
2	Window North
3	Window South-East
4	Window South
5	Median Wall
6	Apse North
7	Apse South
8	Upper Gallery

The twelfth-century cartulary describes how fire ravaged the main abbey and its churches in around 992AD. The main abbey was repaired and enlarged, but the little church of Notre-Dame was preserved and used as a substructure for the new abbey. Thus, it came to exisit underground giving rise to the name by which it is known today. Being underground allowed it to be well preserved and this is the reason why, even though it was abandoned and forgotten, it was rediscovered, undamaged, at the beginning of the twentieth-century by archaeologist Paul Gout who was working in the upper main abbey.

This small, underground church, Notre-Dame-Sous-Terre, constitutes the only standing witness of the monastic origins of Mont-Saint-Michel.

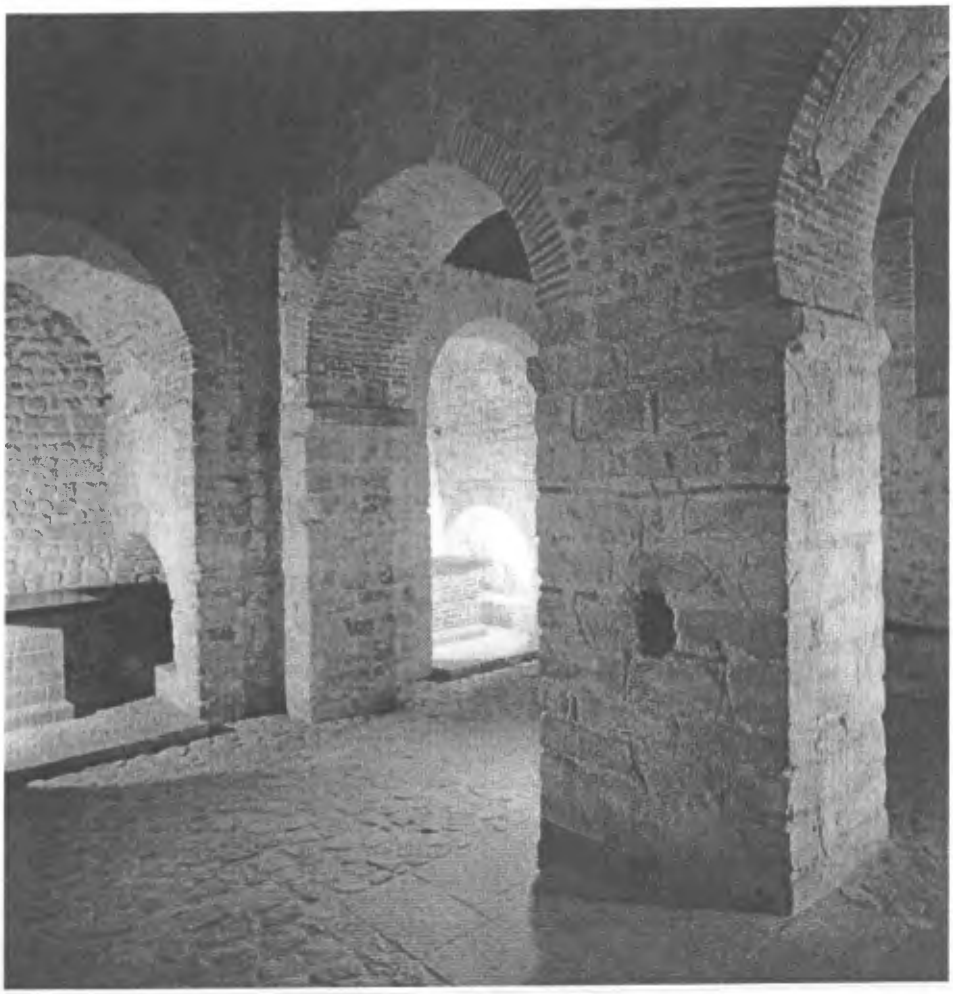

Figure 2 View from the North-West angle of the church: the two arches of the median wall and the two eastern sanctuaries.

DESCRIPTION and PRELIMINARY CHRONOLOGICAL HYPOTHESIS

The original, primitive church appears in grey on the plan (figure 1); the western part has been added later in the Romanesque period. The building is rectangular in shape (13x11m). The surrounding wall is punctuated by four windows. A median wall made of two arches splits the building into two naves, each with small sanctuaries at the eastern end (figure 2). Above them is a tribune level. The building as a whole can be typologically evaluated as belonging to the last third of the tenth century (Baylé, 1997; 2000) from comparisons with buildings in the region displaying similar architectural features. This specifically includes the masonry made up of granite rubble interrupted by bonding courses of brick, the brick round-headed arches, the square buttresses with simple imposts and the absence of an original vault (the vault we see today was added in the eleventh century to help support new building above).

Further interpretations of the building came from sources produced post-construction and as such, were observed with some caution. Common architectural forms and written documents placed the edification of the building in the second half of the tenth century.

When considering the detailed phasing, several hypotheses have been raised since the first archaeological study of the building in the 1960s. The *Monuments Historiques* architect responsible for the first restoration of the church, Yves-Marie Froidevaux, supposed that for

liturgical reasons, the building was originally made of two distinct naves in order to imitate the famous sanctuary of Monte Gargano in Italy, the first sanctuary dedicated to St Michael in Western Europe (Froidevaux, 1961). However, fellow archaeologist and historian, Michel de Bouärd, supposed that the primitive building was made of a unique rectangular room at the beginning of the tenth century, and that only later, at the beginning of the eleventh century, was it divided by the median wall (de Boüard, 1961). In 1998, new archaeological studies performed by the team of Christian Sapin from the Centre d'Etudes Médiévales of Auxerre, revealed particularly that the median wall rested against the western wall of the surrounding building. Moreover, the composition of the mortar appeared to be different in the surrounding wall to that of the median wall. It was supposed, therefore, that a first phase would have been the building of the surrounding walls and that the median wall was added in a posterior phase. This division allowed the adjunction of the two eastern sanctuaries. However, no definitive date was proposed for the separate phases.

FRAMEWORK

In order to investigate further the chronology of the building, the *Groupe de Recherche Européen* (GdRE), named "*Terres cuites architecturales et Datation*" and created in 2005 by archaeologist Ch.Sapin and physician P.Guibert, became involved in the study. The aim was to bring together a series of different experts to form a multidisciplinary team. The building archaeological team comprised the CEM led by Ch.Sapin (Sapin, 1997), a history of art contribution from Mrs Maylis Baylé of the Laboratoire de Médiévistique Occidentale de Paris (LAMOP) and the laboratories of absolute dating methods including Lyon for C14 dating applied on charcoal from mortars, Rennes using archaeomagnetism techniques and Bordeaux performing dating by thermoluminescence (TL).

This led to the first study in France that entirely combines and correlates archaeological and archaeometric data.

Presented here are the results obtained from the TL dating analysis.

METHOD

TL dating is a method that involves dating the last firing of the brick, specifically the minerals within, such as quartz (Aitken, 1985). Thus, it allows the manufacture of this material to be dated.

However, in the case of this historical building study, a preliminary examination is necessary to check if the dated event is actually relating to the brickmaking, and not the eleventh century fire mentioned by the cartularies. Since the mortar used to embed brick or stone also contains quartz minerals, we can study this material by TL to determine whether it has been affected by an historical firing or not.

Fortunately for us, the TL results gave a geological date of the mortar, which means that the mortar, and by extension the church, has never been affected by a fire strong enough to have altered the material. Consequently, we can be sure that we are dating the actual brickmaking. Moreover, we can project that dating the building materials corresponds to dating the building itself, presuming that the bricks were made specifically for this construction and that only a short gap separates the brickmaking and the bricklaying. Therefore, it may be possible to date the construction of the primitive building and also to evaluate its phasing.

The brick sampling strategy was designed in conjunction with archaeologists according to the historical and archaeological questions to be answered. Eight separate areas of masonry have been sampled (figure 1 and table 1), taking one to four bricks from each site. Taking

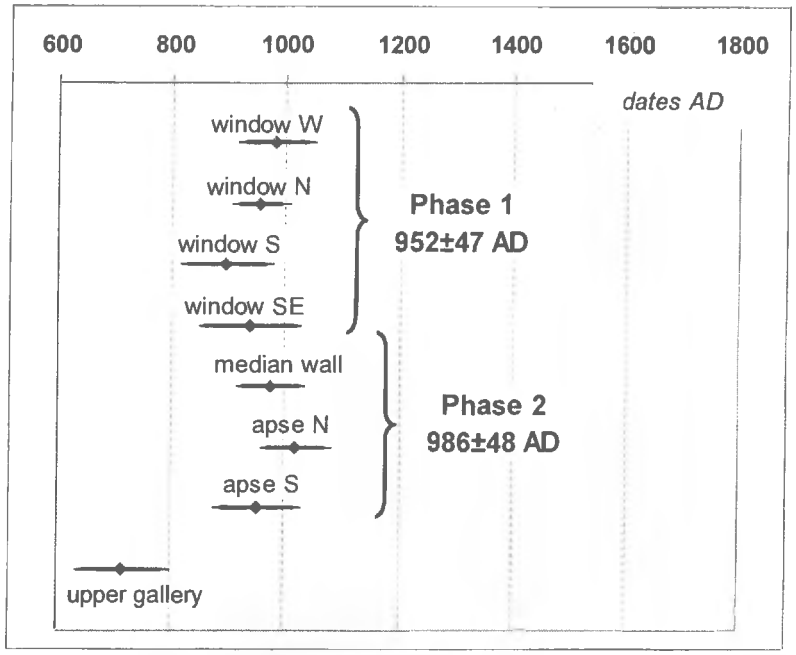

Figure 3 Averaged results for masonries and building phases from the church, Notre-Dame-Sous-Terre, Mont-Saint-Michel, France.

multiple samples from each of the selected areas of masonry helps to reduce the effect of anomalous results and, therefore, to achieve a more precise date.

RESULTS

The results for each masonry location sampled are presented in figure 3. An isolated sample, which is also the only one that has been sampled in the upper gallery, seems to give a much earlier date than the others by several centuries. It could be considered as a reused brick from a previous settlement (we know from a 9thC manuscript written by a monk of the site, the *Revelatio ecclesiae sancti Michaelis*, that a first Christian sanctuary, today disappeared, was in place by 708AD). However, because this is the only example, we cannot at this stage assert this theory.

For the other samples, which appear to be contemporaneous, by averaging the TL results from the individual dates by masonries, then taking into account to the two phases archaeologically defined, we can provide absolute dates for each of them. The results indicate that the primitive surrounding walls would have been made in 950±50AD and that some decades later, probably around 990±50AD, the median wall and the eastern apses would have been added.

CONCLUSION

The results seem to be consistent with historical data when we consider that Maynard I is known to have arrived on the island in 965AD. The TL study tends to follow the archaeological building studies in confirming the fact that two phases seem to be evident. Moreover, the TL dating has been able to establish that the two phases were probably chronologically closer together than the archaeologist Michel de Bouärd supposed when he separated the two phases by a century.

This study has been able to prove that the long supposed theory that in early medieval

buildings of north-western France, all bricks were reused ones from nearby abandoned Roman sites (de Boüard, 1975), is no longer viable for every site.

The next step of this work is to combine archaeomagnetism dating on bricks and C^{14} dates obtained from charcoal in the mortar. Along with archaeological evidence, the overall aim is to evaluate the precise chronology of phases in the construction of this building.

The study will then be developed on a number of medieval buildings (churches, castles) in North-western France and South-eastern England that present similar architectural features and/or unanswered questions.

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THE POTENTIAL FOR LUMINESCENCE DATING OF MEDIEVAL AND TUDOR ESSEX BRICK

Thomas Gurling

Adapted from a paper given at the International Medieval Congress, Leeds 2007

INTRODUCTION

The county of Essex is one of the richest in terms of the history of brick and its usage over the centuries. Naturally, many have studied the use of this building material in Essex over the years (Ryan, 1996; Ryan and Andrews, 1993; Harley, 1975; Harley, 1951) and brick chronologies have been compiled for the county by several different approaches, for example, documentary sources, such as wills, associated with specific buildings (Ryan, 1996, 63) or through the comparison of different brick features, such as dimensions, regularity of shape, colour and texture (Ryan and Andrews, 1993). However, whilst these approaches can be highly precise, there is the potential that inaccuracies or misleading results might be produced. This presents an opportunity to apply the scientific dating technique of luminescence dating to historic brick in Essex. This paper will first consider the strengths and limitations that exist for more established dating techniques before outlining the basic principles behind the luminescence dating technique. Finally, situations where luminescence dating could be applied to answer specific archaeological questions will be considered.

CURRENT APPROACHES TO DATING MEDIEVAL AND TUDOR BRICK

In Essex, there are several approaches that are currently employed to derive ages for Medieval and Tudor brick. Broadly speaking, they are divided into four categories:

Comparison to brick typologies

In Essex there is a brick typology system that has been established at Cressing Temple Barns which consists of a typical brick obtained either from archaeological excavations at different sites in Essex or from historic brick buildings where a spare brick could be removed. The approach relies on comparisons of specific features of the brick in question to those within the typology, for example, the dimensions, colour and fabric of the brick, the regularity of the arrises or any distinctive impressions on the surfaces. It has been proposed that this approach is reliable, straightforward, economic and operates to an accuracy of 50 to 100 years (Ryan and Andrews, 1993).

Whilst this is generally true of such an approach, one limitation is that bricks from certain periods are highly similar, for example bricks from the early fifteenth to the early seventeenth centuries are hard to distinguish between and further evidence is required to improve the accuracy of any date derived (Ryan and Andrews, 1993, 94). Another situation where uncertainty can potentially arise is in the early use of brick in Essex. Many Norman churches in Essex contain brick that is hard to distinguish as either Roman or medieval in nature (Potter, 2001) and there are now several churches where brick that was once thought to be re-used Roman material is now regarded as dating from the twelfth century. One example of this

Fig. 1 East Horndon Church. Documentary sources indicate that the main body of the church was built by *c.*1476 and that the south chapel was built *c.*1510. However, there is no record of when the south porch was added. A multi-phased brick structure such as this presents an opportunity to evaluate the ability of luminescence to date different brick parts, a task that can be challenging to current brick typologies.
Source: author

is St. Andrews church, Boreham, where the fabric of the building was originally thought to contain Roman bricks but is now regarded as consisting of a mixture of both Roman and Norman brickwork (Smith, 1988, 139; Rodwell, 1998, 104). However, there is still uncertainty surrounding the age of the brickwork in other churches, for example, Chipping Ongar is regarded by some as Roman (Potter, 2001, 133) but as Norman by others (Bettley and Pevsner, 2007, 233).

Whilst such typologies are great resources for archaeologists and historic building specialists, they do have limitations when applied to certain situations. This can be exacerbated when the brick in question has been recovered from an excavation and the building context is no longer available to offer further evidence as to the likely age of the brick.

Documentary evidence

Documentary evidence can be highly informative and revealing as to when a specific building was being constructed. Records exist as to when bricks were being ordered or manufactured, especially for high status buildings. Bequests were also left by individuals in wills towards the construction of specific projects, such as brick church towers, many of which were being added to existing churches in the late fifteenth and early sixteenth centuries. An example of this in Essex is Colne Engaine church where money was bequeathed in 1496 by John Draper for the production of 40,000 bricks for construction work in the church belfry (ERO T/A 338/1).

Whilst such documentary information is highly valuable and may seem to offer precise dating evidence, there are limitations associated with it. Firstly, it is a source of evidence rarely found for Medieval or Tudor buildings unless they were high status projects, for example, Kirby

Muxloe Castle in Leicestershire (Emery, 2007, 8; Brunskill, 1992, 124). Secondly, documentary sources are not always reliable. In Essex an example of this can be seen in Billericay church where the fifteenth century tower had originally been dated by a record of a grant to the church in 1496 but the recent discovery of decorated Spanish tiles dated to c.1450-1475 in the brickwork has called this date into question (Andrews, 2005, 167-168). Finally, even if contemporary records do exist for when construction work was undertaken, there is no guarantee that any later alterations to the building will be accounted for in the documentary record. An example of this can be seen in Essex at East Horndon church (fig. 1) where, based on evidence in wills, the bulk of the church seems to have been built by *circa* 1476, with a south chapel being added circa 1510. However, there is no documentary evidence for when the south porch was added to the church and consequently it has been ascribed a date of the first half of the sixteenth century (Starr, 1988, 2-3).

Architectural analysis

Whilst the chronological phasing of buildings proceeds on the basis of recognising continuities and breaks in wall fabric, diagnostic fittings or features of the building, such as window tracery, doorways or fireplaces, the designs of which varied during the course of time, may also indicate a date if consistent with the walling phases. Often such features are compared with buildings for which the date of construction is known with a high degree of confidence (Hall, 2005). This can potentially allow for a precise date range for a building to be obtained but is dependant on several factors, such as how quickly architectural fashions changed and also on such diagnostic features being present and observable on the building under consideration (Brunskill, 1992, 124-127). As with documentary evidence, this is an approach that is often more effective for high status buildings, a fact that illustrates another potential limitation to this dating approach. Later alterations to buildings or the re-use of material from older structures can also offer the potential for misleading results to be derived. Other features that are true to the structure can also be misleading and must be treated with caution when considering a possible date, for example date plates or dated features, such as rainwater hoppers and coats of arms, could refer to when a non-architecturally significant event took place in the building's history, for example, a change in ownership (Emery, 2007, 17; Brunskill, 1992, 128). Architectural features can provide valuable information but there are potential limitations to using this approach which relies on diagnostic features being present. Equally, the assumption that certain aspects of one building relate to another structure where similar diagnostic features are also present could prove just as misleading.

Scientific dating methods

In Essex, a programme of dendrochronology dating has been underway for several years now in an effort to allocate absolute dates to the timbers of historic buildings across the county. Dendrochronology is a valuable approach to dating buildings and can potentially offer very precise dates for the felling of trees. However, this requires that a dendrochronology sample has both its hardwood-sapwood and sapwood-outer bark boundaries intact, something that is often not the case (Aitken, 1990, 47). If only the hardwood-softwood boundary is intact, then a date range can be suggested. Irrespective of whether a dendrochronology date can be derived from the timbers of a building, there are other potential problems that can arise with dendrochronological dates, for example, an insufficient number of growth rings in a sample or the question of timbers being re-used (Kuniholm, 2001, 36). In Essex, the problem of timber reuse was encountered at the church at Woodham Walter (fig. 2) where late-fourteenth-century

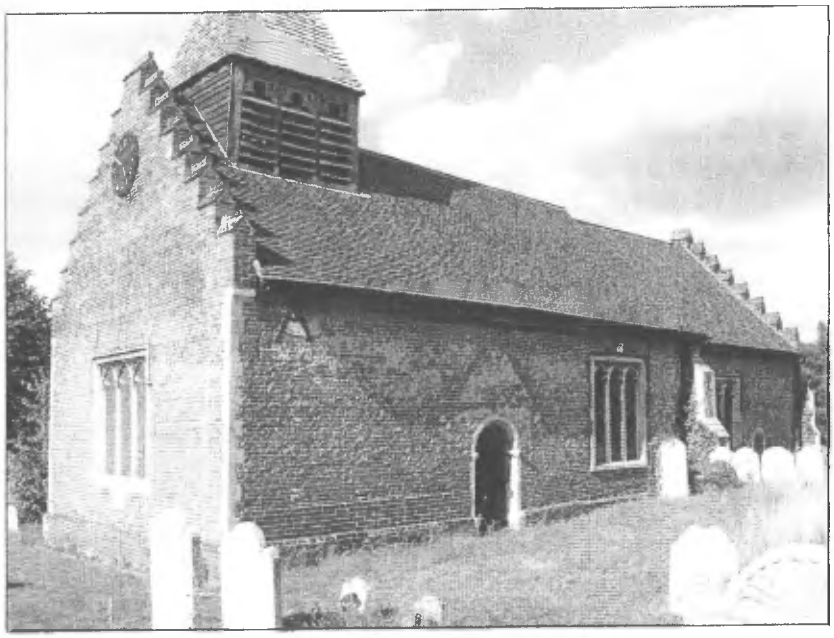

Fig. 2. Woodham Walter Church. This church has conventionally been dated to 1562-1564 based on documentary evidence and a date plate within the church. However, dendrochronology undertaken on the timbers in the belfry produced a late-fourteenth-century date, suggesting a re-cycling of materials had taken place and highlighting a potential limitation to dendrochronology.
Source: author

dendrochronology dates were derived for a brick building that had previously been dated to 1562-1564 (Ryan, 1989, 23). Equally, it should be noted that this technique does not directly date the brick itself and there is therefore the possibility that the timbers do not relate to any brick elements of a building, for example, brick façades could be built around older timber buildings (Laws, 2003, 69).

LUMINESCENCE DATING

It should be noted that the following account only offers a brief outline of the process involved in deriving a luminescence date from an historic brick sample. More detailed accounts are provided in Aitken (1998) and Aitken (1990).

The key element of a brick that is required for a luminescence date are quartz grains which naturally occur in geological clays and are therefore present in bricks when they are first manufactured. These grains emit a weak light when they are stimulated by either heat (*thermo*luminescence or TL) or specific wavelengths of lights (*optically stimulated* luminescence or OSL). This luminescent energy is initially formed in the quartz grains due to the action of naturally occurring background radiation from both radioactive inclusions within the surrounding clay and low level cosmic sources. In their natural environment, the luminescent signal within the quartz grains steadily increases over the course of time until a brick is manufactured and fired to a sufficiently high temperature in excess of 300°C (Aitken, 1990, 145). Once fired, the stored luminescent energy is released and it is from this point of firing that the technique dates the brick from. The brick is then inserted into a building and naturally

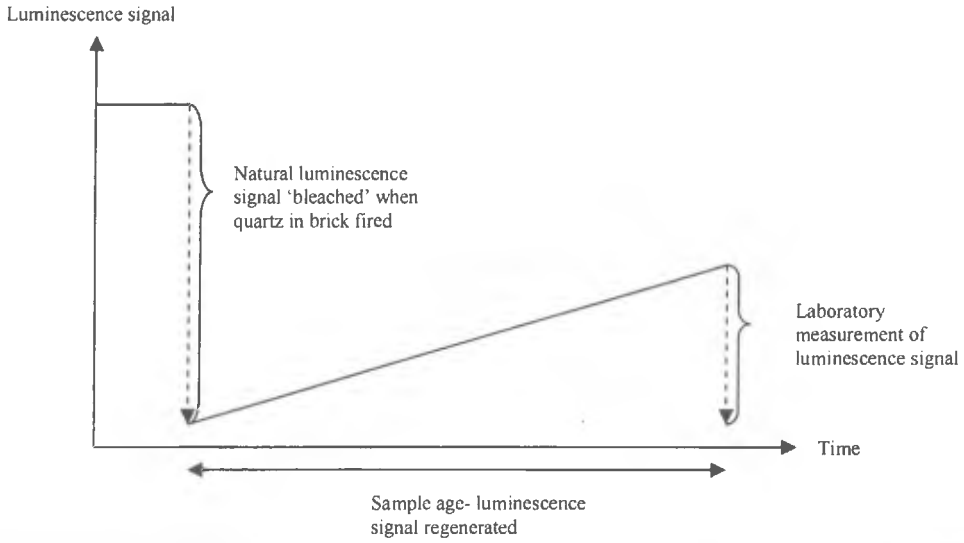

Fig. 3: Diagram showing the 'bleaching', regeneration and measurement of a luminescence signal (based on Grün, 2001, 49).

occurring background radiation from both radioactive inclusions within the brick and surrounding parts of the building, such as walls, begin the process of regenerating the luminescence signal (see fig. 3)

In order to date a given brick, two key pieces of information are required. Firstly, the amount of radiation that has acted on the brick to produce a luminescence signal of a certain scale (this term is generally referred to as the *paleodose*). Secondly, the annual radiation dose, or *dose rate*, acting on the brick. With this information, it is possible to determine how many years of a certain annual radiation dose acting on the brick are required to produce a luminescence signal of a specific magnitude. This is expressed in the equation below:

$$\text{Age} = \frac{\text{Paleodose}}{\text{Annual Dose}}$$

The paleodose is determined by extracting quartz from a core drilled out of a specific brick and then optically stimulating it with light from Light Emitting Diodes (LED's). The luminescence signal is released and its magnitude is measured. The same quartz is then exposed to known doses of radiation and the resultant luminescence signals are compared to the original signal allowing the magnitude of the paleodose to be derived. The annual radiation dose is determined by a combination of laboratory experiments on the brick fabric and *in situ* measurements close to the point of sampling with capsules containing a powder that develops a luminescence signal as a result of the surrounding background radiation. Such capsule measurements are normally made over an extended period of several months.

It should be noted from the above discussion that a luminescence value dates to the time of a brick being fired which could differ from the date when that brick was actually used to construct a building. Equally, if the background radiation value is altered during the lifetime of the brick, for example, if the brick is re-used in a different context or the building is structurally altered, then discrepancies can arise between the true age of the brick and the luminescence date derived. Consequently, an understanding of the archaeological and historic development of any building that is sampled is needed to provide the optimum chance of determining a luminescence

age that is appropriate for the building. Modern repair and conservation work can add another potential pitfall to obtaining a true date if a modern replica brick is sampled by accident. Despite these potential limitations, the luminescence dating approach is one that has been successfully used in dating Medieval and Post-Medieval brickwork from several sites along eastern England, including the city of Newcastle (Bailiff and Holland, 2000), Lincolnshire (Bailiff, 2007) and Suffolk (Antrobus, 2004).

POTENTIAL FOR LUMINESCENCE

Given the above discussions about different techniques that exist for dating historic brickwork, what potential is there for the luminescence approach in terms of the archaeological or architectural historic questions that can be addressed?

Throughout Essex, there are many situations where the absolute dating of historic brickwork would provide valuable information. Firstly, it could be used to identify the true location of the earliest medieval brickwork in the county and possibly in the country. Traditionally, Coggeshall Abbey has been regarded as containing the oldest post-Roman brickwork in England, dating to the latter half of the twelfth century (Fergusson, 1984, 120; Drury, 1981, 126). However, recent research has begun to call this claim into question. Two sites which are now thought to contain brickwork that might be earlier than Coggeshall Abbey are Polstead Church, Suffolk, which is thought to date to the 1160s and the Norman church at Bradwell-juxta-Coggeshall which is thought to date to the second quarter of the twelfth century (Rodwell, 1998, 100-105; Kennett, 1990). Equally, as mentioned above, some churches have brickwork in their fabric for which there is still uncertainty, such as Chipping Ongar church.

Another opportunity that exists is allocating absolute dates to bricks from the same buildings that the Cressing brick typology is composed of. By adding an absolute chronology to the different types of brick, this would help to improve the precision of the typology for future use. Even if the same buildings from which the Cressing bricks were originally collected could not be sampled, sampling buildings which contain bricks with specific characteristic, such as the medieval 'great' brick or the 'Tudor' brick, would still improve future typological analysis.

Previous studies of luminescence dates have suggested that age ranges of ~80 to ~35 years are possible for bricks produced between 1300-1700 (Bailiff, 2007; Antrobus, 2004, 30). Given the similarity of brickwork during the fifteenth, sixteenth and early seventeenth centuries, dating a building that contains brickwork from these periods would provide an opportunity to evaluate how effective the luminescence approach is at phasing such a building. In Essex, there is an opportunity for such a study at East Horndon church (fig. 2) which is almost entirely built of brick and has had different aspects dated by architectural and documentary means to the fifteenth and sixteenth centuries (Ryan, 1996, 51-52; RCHM, 1923, 36-37) thereby offering an opportunity to evaluate the phasing potential of the luminescence dating approach.

Finally, there is the possibility of dating the early appearance of specific architectural features in brick, for which there are several opportunities in Essex. One site is the Moot Hall in Maldon (fig. 4), a building thought to have been built in the early fifteenth century before 1439 when it was granted to the town by Sir Robert D'Arcy, the member of parliament for the borough (Clarke, 1936, 212). The building contains both an early example of a newel staircase constructed entirely out of brick and carved brickwork forming trefoil corbelling (Andrews, 2007). Another early brick structure that has a disputed age of construction is the brick bridge at Pleshey Castle. Some have suggested that the structure dates to the early fifteenth century (Neville, 2003, 35) whilst others believe it might date to the late fourteenth century (Bettley and

Fig. 4. The Moot Hall, Maldon. Built in the early fifteenth century, the structure incorporates a number of rare and unusually early brick features, including a brick newel staircase and trefoil corbelling made from carved bricks.
Source: author, 2007

Pevsner, 2007, 627). Certainly, it is an unusually early example of brick being used in a skilled manner to build a major bridge structure and a date for such a feature would be interesting.

CONCLUSION

This article has illustrated that luminescence is an effective approach to dating historic brickwork that has been successfully applied to other Medieval and Post Medieval situation. Whilst other approaches to dating historic brickwork can be precise and frequently provide meaningful results, there are occasions where they are limited in the information they can provide. Consequently, the opportunity exists to evaluate the effectiveness of luminescence at phasing a multi-period brick building, improving existing approaches of using brick typologies and addressing specific archaeological questions relating to how brick was employed during the medieval and Tudor periods.

ACKNOWLEDGEMENTS:

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TALL BRICK CHIMNEYS

Gerard C. J. Lynch

In respect of the letter in Brick Query from Mr P. A. Earwaker, concerning 'Tall Chimneys' in *British Brick Society Information,* **104,** July 2007, several questions were asked, to some of which I am able to offer a response. I knew two men very well who worked on the chimneys for the Hoffmann Kilns as used by the Fletton brick makers, and though I never worked on them myself, I have always been interested in, and undertaken some study of, this specialist branch of the bricklayer's craft.

DESIGN

The design of the kilns and their tall brick chimney shafts was traditionally undertaken by the various Fletton companies - later the London Brick Company and now Hanson Building Products – own in-house drawing offices and structural engineers. This would be to suit individual position and production requirements, but following original Hoffmann kiln design.

The design and ultimate height of the tall chimney shafts are essentially dictated to by the need to disperse the smoke and vapours more completely, and that the higher the chimney and wider the diameter of its shaft the greater the 'draw', or suck,; which also controls the drying travel of the continuous kiln (Pratt, 2007). The engineers undertake structural calculations to determine the overall stability of a tall chimney by taking into account its proposed size, shape, height, form of construction and expected wind pressure.

The tallest ever built by the former London Brick Company was at the 'Kings Dyke' (Whittlesey) extension in 1970, when the then new kiln had a chimney shaft height of 300 feet. Its concrete base, which was poured in one day, is *"55 feet square by 4 feet 6 inches deep and took 555 cubic yards of concrete and more than 700 reinforcing iron bars, each 40 feet long and 1 in, in diameter"* (LBC Review, 1971, 5). The present chimneys standing at the Stewartby brickyard are between 59 and 70 metres (193 ft to 229 ft 6 in) tall and at Peterborough, from 84 to 120 metres (275 ft 5 in to 393 ft 5 in) high (Pratt, 2007). The biggest chimneys are frequently circular on plan as internally it reduces friction of the gases, speeding their exit, and externally the curved surface offers less wind resistance.

CONSTRUCTION

At the Fletton in-house bricklayers and labourers working to company designs undertook works a great deal of the kiln building. Some local companies were also used for the projects such as Messrs Bettles, Sturgeons, and SDC etc, who might just provide the specialist craftsmen for the erection of the chimneys. Such bricklayers would need to be exceptionally fit and hardy characters to endure the exceptional elements and working conditions unique to this class of work. In essence they were steeplejacks, blessed with strong nerves to cope successfully with the great heights involved.

The bricks used would be of good quality throughout and uniform gauge, capable of successfully accepting the various types of stresses placed on them. These stresses would involve the chimney's size, height and weight, and ability to withstand the massive compressive forces, the nature of the industrial use - coping with rapid temperature changes, and the geographical locality - and being able to resist the worst expected weather. The Fletton producers used their own best grade commons, which were produced with radial stretcher and header faces

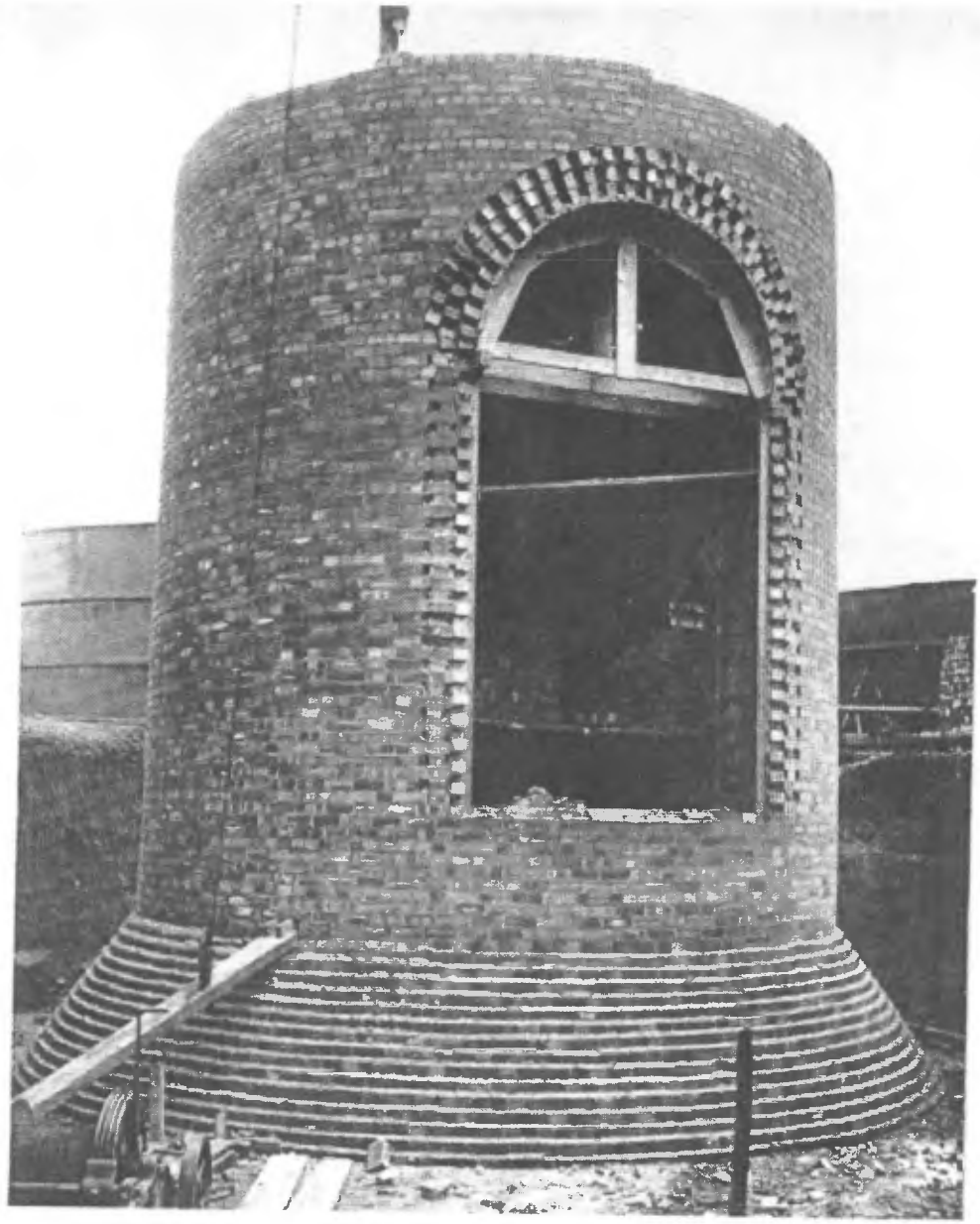

Fig. 1 Footings of a circular chimney shaft.

to enable the bricklayers to gracefully build their face brickwork, or 'neat-work', to the designed circumference of the chimney.

The mortar for bedding the external masonry of any tall chimney has to perform to meet certain unique criteria. A cement binder, although capable of setting quickly and to very high strengths is not sufficiently flexible and is too dense. Therefore the binder has to be of an appropriate class and quality of hydraulic lime mortar, possessing a degree of elasticity and porosity, yet capable of setting to meet the designed strength. Such a material is Blue Lias lime, used to a specified ratio with washed pit sand and never weaker than 1:3. A relatively porous mortar tends to greater equilibrium between the internal and external temperatures; which would vary enormously with a cement-based mortar (Frost, 1931, 51). Also all chimneys are subject to movement, typically a 250 feet tall chimney will sway about 10 inches at the top.

The lower level, perhaps first 40 feet of the shaft, is constructed with an inner lining of 'firebricks', made from a special refractory clay that can withstand high temperatures and

Fig. 2 A chimney shaft in the course of construction.

chemical attack. The best sources of this material were the prolific deposits in the 'Black Country' - particularly Staffordshire (Cooksey, 2003, 11) - and Yorkshire, and there was also production of renowned firebricks in parts of Scotland too (Douglas and Ogletheorpe, 1993,19-21). These firebricks are dampened and dip-laid with fine joints of a 'fireclay' mortar that, once the kiln is lit, sets as hard and as one with the bricks. This half-brick-thick lining is built independently of the outer masonry, separated with a 50mm (2 inches) cavity. Where the particular industrial process would subject the chimney to exceptionally high temperatures, such as an open-hearth furnace, then this firebrick lining will be built the full height of the chimney.

SETTING OUT AND BUILDING A TALL CIRCULAR CHIMNEY

The usual bricklaying practice is to build the 'footing' courses off of the square concrete foundation. These footings are built entirely of header bond, frog-up, in a series of courses that

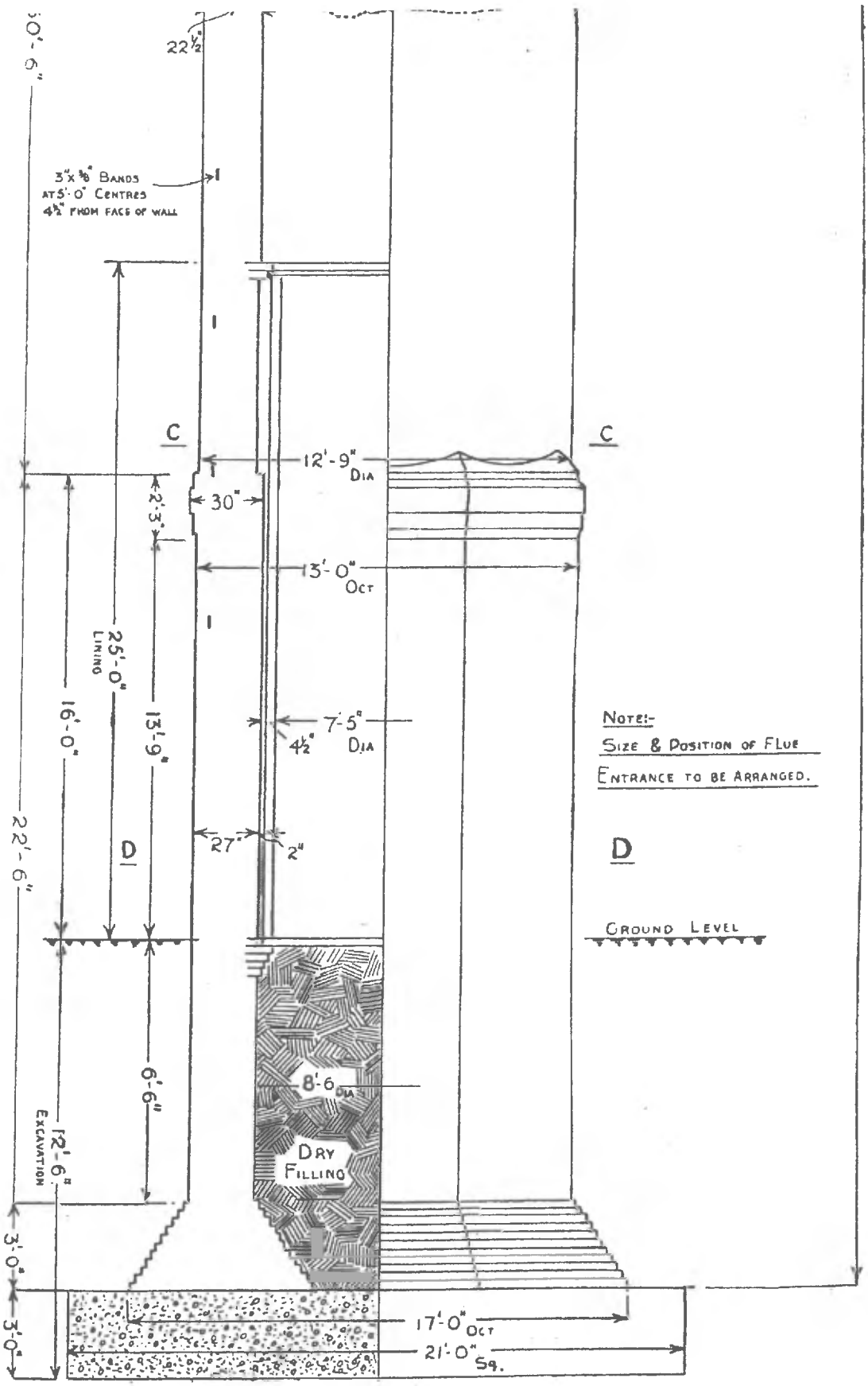

Fig. 3. The lower part of a brick chimney shaft, section and exterior.

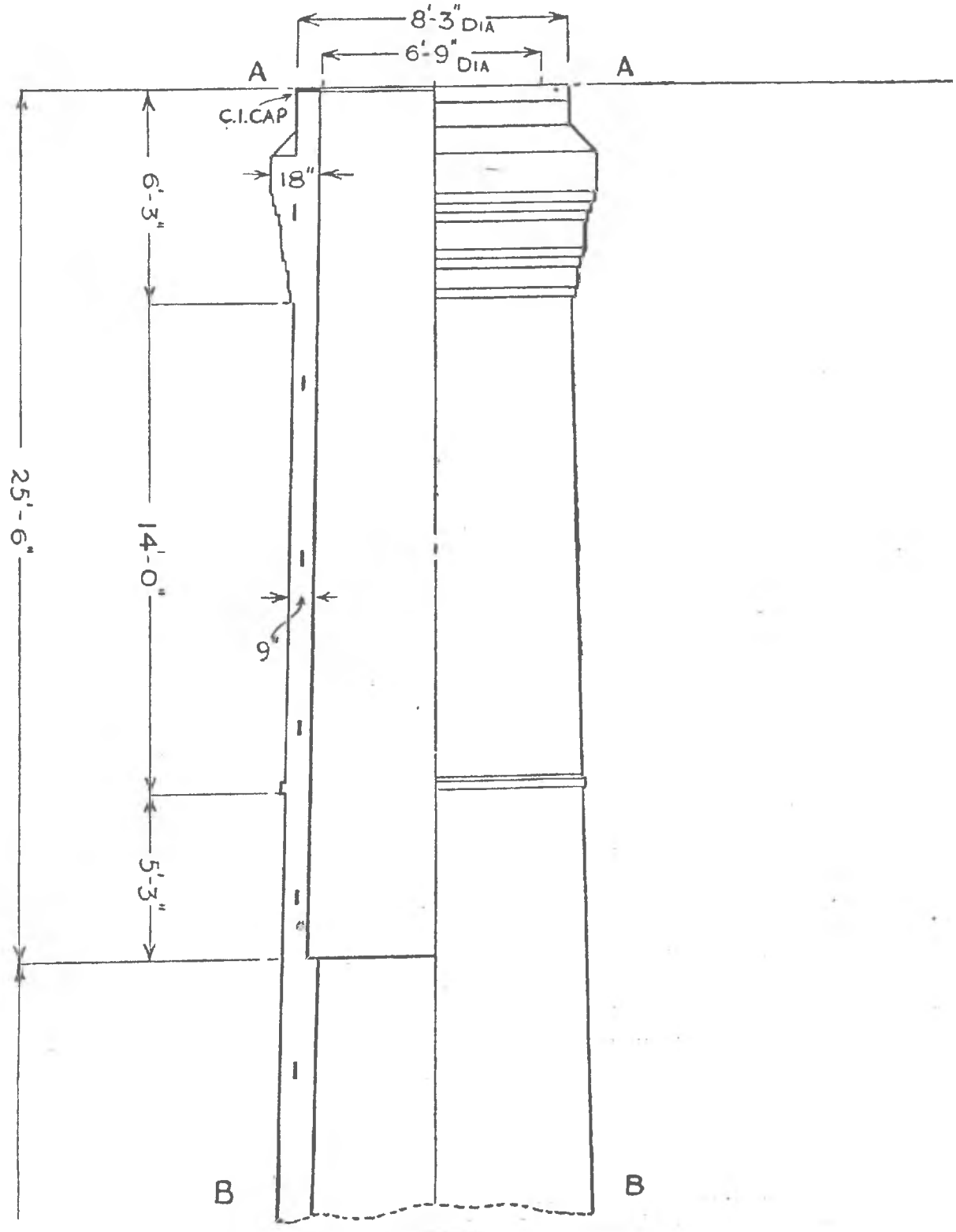

Fig. 4 The upper part of a brick chimney shaft: section and exterior.

recedes, or is set-back, one quarter brick from the preceding course up to the start of the neat-work at the base of the chimney shaft; this would typically be 3 feet high – 12 courses – for a 130 feet high chimney. The courses are checked for accuracy of plan by the use of a rotating trammel rod, the point of which describes the curve, or line of the brickwork face, that is attached to a round metal bar accurately placed and plumbed at the geometrical centre, or 'striking point', of the shaft. As the courses recedes so the trammel is suitably adjusted at the striking point to the new required distance.

Alternatively the bricklayers can use a large circular timber plan template to set out the entire first course; the outer edge scribing the external face line of the first course. Successive courses, however, are then built and checked using a short timber template (typically 2 metres long), cut to answer a section of the curve of each course, and used in combination with the laying of 'lead bricks', placed to bond, level and gauge, at selected points around the circumference. Obviously the curve of this template is altered to suit the changing circumference of each successive course. Once the lead bricks are correctly positioned, the gaps between any pair are built-in to bond and the whole checked for accuracy of level and curve with the spirit level and appropriate template.

It is the latter method of lead bricks and template that is employed to guide the overall chimney construction once the neat-work of the main shaft is reached. The lead bricks, however, are plumbed using a spirit level onto which a length of timber is fixed that has been planed to the inclination, or 'batter', of the face of the chimney. The angle of batter being determined by how much the chimney shaft reduces in circumference from its base to the top, or 'head', in its overall height. So effectively when these lead bricks are plumbed into their bond position they are set to this batter. The infill bricks are then laid and checked between, as described above, using English Garden Wall bond, to the ratio of three courses of half-bonded radial stretchers to one course of radial headers. The thickness of the walls changes from three-bricks-thick at the base down to one-brick-thick, for the last 25 feet (approximately), being reduced at pre-determined heights by a series of half-brick internal offsets.

Generally the bricklayers lay 'overhand', or by standing on the inside of the shaft, to build the tall chimneys, working off of telescopic scaffold platforms that are provided with a central open area through which all the materials are hoisted up. These materials are brought inside the base of the shaft through 'temporary openings' in the brick walls deliberately left unfilled by the bricklayers, corbelled-over' at the head to a strong triangular shape; and propped with inclined timbers, called 'gallopers', provided for additional support.

As they raise the brickwork of the shaft the bricklayers' build-in 'Step-Irons' every six to eight courses so they can use them to access their work. Also, at pre-determined vertical intervals, the bricklayers build-in iron bands, set back a half-brick from the external face. These bands are designed to help terminate possible air cracks that could occur in the brickwork due to the sudden temperature differentials in the flue gases. All tall chimneys are also provided with lightning conductors (Frost, 1954, 50).

Also at designed vertical positions, as the brickwork rises, the bricklayers build out a series of projecting, or 'oversailing', courses from the face of the shaft by using a timber gauge set to the desired distance. These string courses, designed to shed rainwater clear of the brickwork below, never project in total distance beyond one-brick-thick and are sloped, or 'weathered', on the topmost course. The head of the shaft is likewise projected, but gradually over several consecutive courses, terminating with a large sloped weathering five or six courses down from the one-brick-thick top; that is sometimes provided with a cast-iron cap to help protect it from the elements (Frost, 1954, 50).

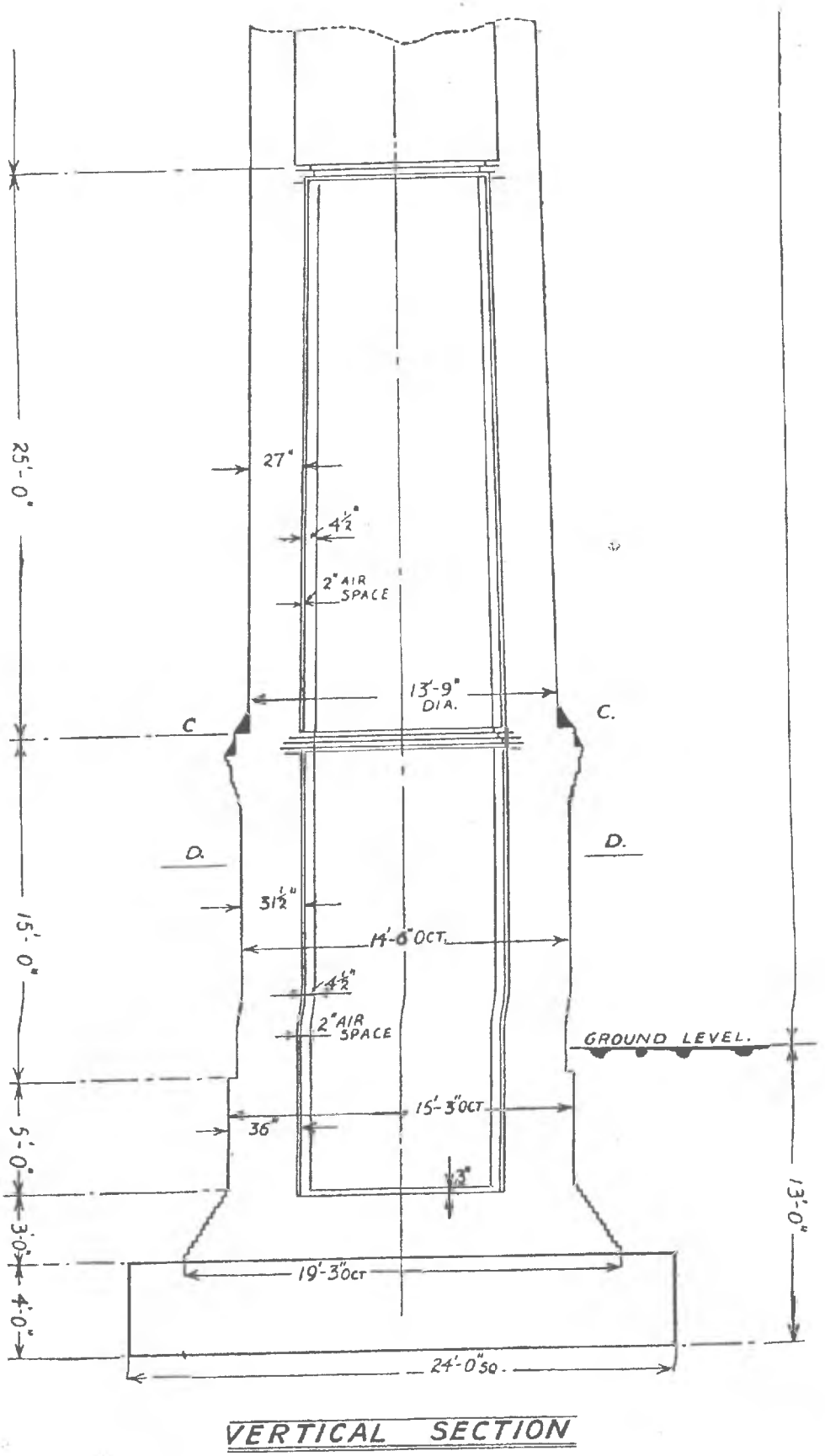

Fig. 5 Vertical section of a brick chimney shaft.

REPAIR OF TALL CHIMNEYS

Although some chimneys, due to regular inspection and maintenance such as replacing defective bricks, re-pointing and crack repairs, could go a lifetime without re-building, some would eventually need to have their upper section re-built. This would be deemed necessary for a variety of reasons, such as structural decay, weather erosion, lightening strike or structural heave or lean etc. As Joe Pratt (2007) states, *"They have even been known to crack during light-up procedures if they have not been warmed slowly!"*

The height of a re-built top section is always subject to the fully surveyed condition, but normally it is the topmost 25 feet that becomes a problem area over the years; a point at which the chimney brickwork reduces in overall thickness from one-and-a-half to one-brick-thick. Whatever, it is important that they must always be re-instated to the design height if they are still in use (Pratt, 2007).

Specialist steeplejack bricklayers usually carry out repair works. If it is only the basic repairs, as mentioned above, then this will be undertaken either off of a 'cradle', suspended from the top, or by 'scaling ladders' secured on iron hooks, or 'dogs', that the bricklayers position and manually hammer tightly into the bed joint mortar (Frost, 1954, 52). The work of re-building a top section, however, is a different matter for which full access scaffolding is required. The erection of this is a work of great skill, being built out and off of a series of outward spreading vertical poles, or 'standards', around the appropriate level on the face of the shaft. These are carefully positioned and supported at regular intervals, connected and secured by horizontal 'ledgers' and diagonal braces to create a stable base. Upon this base the upright standards are connected and the ledgers vertically spaced upon them to create the required number of boarded working platforms, or 'lifts', made rigid by diagonal bracing, necessary to safely execute both the demolition and re-building works.

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Pratt, J. 2007: Private correspondence. Mr Joe Pratt worked in the Fletton industry for the London Brick Company, holding various positions such as Works Manager, from 1975 until 1991. In 2000 he rejoined and is now Area Sales Manager, Hanson Building Products. The Pratt family have had a long and influential history in brickmaking that dates back to the very earliest days of Fletton brick production.

TERMS FOR BRICK: A COMMENT

Joan Schneider

May I add a note to Terence Smith's interesting article '*Tile Stone*: a Medieval Term for *Brick* in the 'Wycliffe' Bible' included in *British Brick Society Information*, **105,** October 2007.

Modern German still uses the equivalent term. *Collins German Dictionary,* 1980, gives 'Ziegelstein' or 'Backstein' as the translation for 'brick'.

To follow up this comment we can note that the very useful German language guide to the brick museums of Europe by Christine Doege is has the short title, *Zielgeleimuseen,* and the subtitle *Ein Führer zu den deutschen und einigen eropäischen Ziegeleimuseen.* Of the twenty-five museums covered in depth, sixteen have 'Ziigel' or 'Zeigelei' in their name; this includes one museum in Austria and another in Switzerland. Only two, one in the Netherlands with 'Steenfabriek' and the other in Belgium with 'Backsteen' use the alternative word.

DHK

A BRICK WITH NUMERAL GRAFFITI
From Wheeler's Farm Barn, Thursley, Surrey

Terence Paul Smith

INTRODUCTION

Graffiti in fired bricks within walls have occasionally been considered within these pages and elsewhere.[1] Graffiti formed in bricks *before* firing are well-known from the Roman period,[2] but are far less familiar from post-Roman times. The present contribution is concerned with one such brick, found during archaeological work by Compass Archaeology at Wheeler's Farm, Thursley, Surrey (site code: WFB02; NGR: SU902396) in 2002. Various building materials, mostly bricks but with some peg tile fragments – all, almost certainly, of nineteenth-century date – were recovered. They were recorded for Compass Archaeology by Museum of London Specialist Services (MoLSS).[3]

THE BRICK AND ITS NUMERAL GRAFFITI

The brick, of which only about half survives, comes from the internal wall (context [5]) which separated off the root store at one end of the threshing barn at the farm. It is in a dark red, fairly fine fabric, with sharp arrises, and is slightly distorted; its one surviving header face is semi-vitrified, probably accidentally; there is no frog. The brick measures ? × 4¼ × 2¾ in (? × 109 × 70 mm), and is almost certainly of nineteenth-century date. The header face shows faint fingerprints from where the brick was handled whilst still soft.[4] Of even greater interest, and an extremely rare feature, is a series of numeral graffiti in each bedface (fig. 1). They were made with a stick or similar implement whilst the brick was still soft - that is, shortly after moulding – across the breadth of the brick. The graffiti read, in the upper bedface (as in the mould and thus indicated by strike marks):

667
8
? 6

and in the lower bedface:

5194
6050
564

A small curve at the beginning of the third line in the upper bedface *appears* to be the start of a further numeral, mostly missing because of breakage. The horizontal line beneath the 8 suggests a calculation, possibly 667 × 8 = [533]6; this, however, can be no more than speculation, the more so since the incomplete curve at the start of the third line looks more like part of an 8 than of a 5 and the two 3s are certainly not present. Possibly the calculation was never completed and the curve at the start of the third line is merely accidental. The small curve beneath the 6 and 4 of the third line in the lower bedface is probably the upper part of a further curved numeral: 0, 2, 3, 8, or 9.

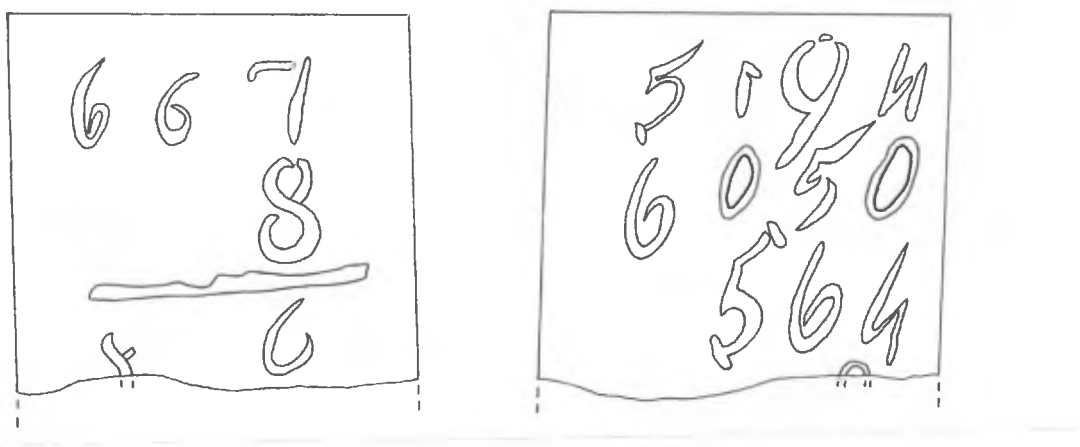

Fig. 1 The brick from the threshing barn at Wheeler's Farm, Thursley, Surrey:
left: upper bedface;
right: lower bedface

THE PURPOSE OF THE NUMERALS

The purpose of the numerals is not clear. One possibility is that they represent some sort of batch counting at the brickyard. If the brick dates from before 1850 then this may have been in connexion with the Brick Tax, in force between 1784 and 1850 and levied on the number of green bricks (with an allowance for misfired products).[5] It seems much more likely, however, that any such counting – whether connected with the Brick Tax or simply for the brickyard owner's or manager's own use – would have been done using a slate and/or paper. The graffiti, in fact, suggest something more casual or irregular: possibly the brick was used as a convenient 'scoreboard'

for a gambling or other game at the brickyard, or perhaps the numerals represent a child's or adult's attempt at learning to form figures or are even the result of an arithmetic lesson. The three different ways in which the 5s are formed (fig. 1, right) does rather suggest an unpractised hand. There is clearly a human story behind these graffiti, and it is a pity that we shall never be able to recover it.

ACKNOWLEDGEMENT

I am grateful to Geoff Potter of Compass Archaeology for permission to publish this brick.

NOTES AND REFERENCES

1. For example: D.H. Kennett, 'Schoolboy Graffiti', *BBS Information*, **91**, July 2003, p.35; P. Guillery, Survey of London, 'Police Graffiti, New River Head, Finsbury', *Trans. London & Middx Archaeol. Soc.*, **55**, 2004, pp.85–7; T.P. Smith with A. Westman and R. Cowie, 'A Demolished Edwardian School Building at Dame Alice Owen's School, Clerkenwell, London: its Bricks and Brickwork and its Schoolboy Graffiti', *BBS Information*, **101**, July 2006, pp.8–11.

2. G. Brodribb, *Roman Brick and Tile*, Gloucester: Alan Sutton, 1987, pp.127–31.

3. T.P. Smith, 'Building Materials Assessment for Wheeler's Farm Barn, Thursley, Surrey (WFB02)', unpublished archive report,MoLSS for Compass Archaeology, June 2003. The more precise NGR, provided by Compass Archaeology, is SU 90178 39589. Wheeler's Farm itself is a sixteenth-century timber-framed building. Archaeological work in 2002 was directed by Robin Densem and Geoff Potter.

4. Such fingerprints in bricks are occasionally encountered: see, e.g., T.P. Smith, 'Fabric-Marks, Finger-Prints, and Other Features: Bricks in High Town Methodist Chapel, Luton', *BBS Information*, 77, *Brick in Churches Issue*, June 1999, pp.12–16.

5. For the Brick Tax: N. Nail, 'Brick and Tile Taxes Revisited', *BBS Information*, **67**, March 1996, pp.3–14.

MORE INFORMATION ON BRICKS FROM SOUTH WALES

John Wells

My contribution to *British Brick Society Information*, **104,** July 2007, pages 8-10, has stimulated some interest and in addtion to the editor's comments which followed my reporting of these bricks, I received three letters offering further information and also asking some questions. I wish to express my thanks to Mr Robin Sheldrake, Mr Alan Cox, Mr Philip Rothery, and Mr Karl Gurke for their helpful comments which form the basis of this note.

The bricks were found in builders' rubble in the garden of a cottage in the village of Rhydlewis, Ceredigion/Cardiganshire; the cottage is the home of a relative of mine. The various comments relate to individual bricks. They can be identified by the marks in their frogs.

EMLYN

This is not from Newcastle Emlyn as supposed by the editor,. Mr Robin Sheldrake of Haverfordwest, Pembrokeshire, informs me that it would have come from Castle Brick, Emlyn Works, Waterloo Road, Penygroes, Llanelli, Carmarthemshire. The word EMLYN appears in the frog of their bricks.

Mr Sheldrake also enclosed a photograph of a wire-cut, perforated brick (fig. 1) and informs me that this was produced at a brickworks in Cardigan, in a part of the town known as Mwldan. The works no longer exists, having been destroyed by flooding when a dam burst upstream.

Mr Sheldrake also provided the names of two other brickworks in south Wales: namely, Consolidated Brick, Brindley Road, Cardiff; and Powell Duffryn Bricks Ltd., Priory Works, Ewenny, Bridgend. These and Castle Brick appeared in *Yellow Pages* in recent times and so presumably are still in business or ceased trading only within the last few years.

STAR BRICK CO. NEWPORT, MON

As stated by the editor, this brick would have come from the Star Brick Company at Newport, Monmouthshire (now Gwent). Mr Philip Rothery of Otley, West Yorkshire, sent me a photograph of a brick with NATIONAL STAR NEWPORT between two stars in the frog (fig. 2). It was produced by the National Star Group of Brick Manufacturing Companies, whose head office was at Pnthir, Newport, Monmouthshire, from 1964 to the 1970s. This was obviously a development from the original Star Brick Company.

I also heard from Mr Karl Gurke of Slagway, Alaska. He is researching information on British firebricks, some of which were exported to Canada, the USA, and Mexico. He mentions two Welsh companies making firebricks. The first, in north Wales was William Hancock of Hawarden, Flintshire, whose head office was in Liverpool between 1907 and 1955. The second,

Fig. 1 (opposite) A perforated brick produced by a brickworks in Cardigan.
Photo: Robin Sheldrake

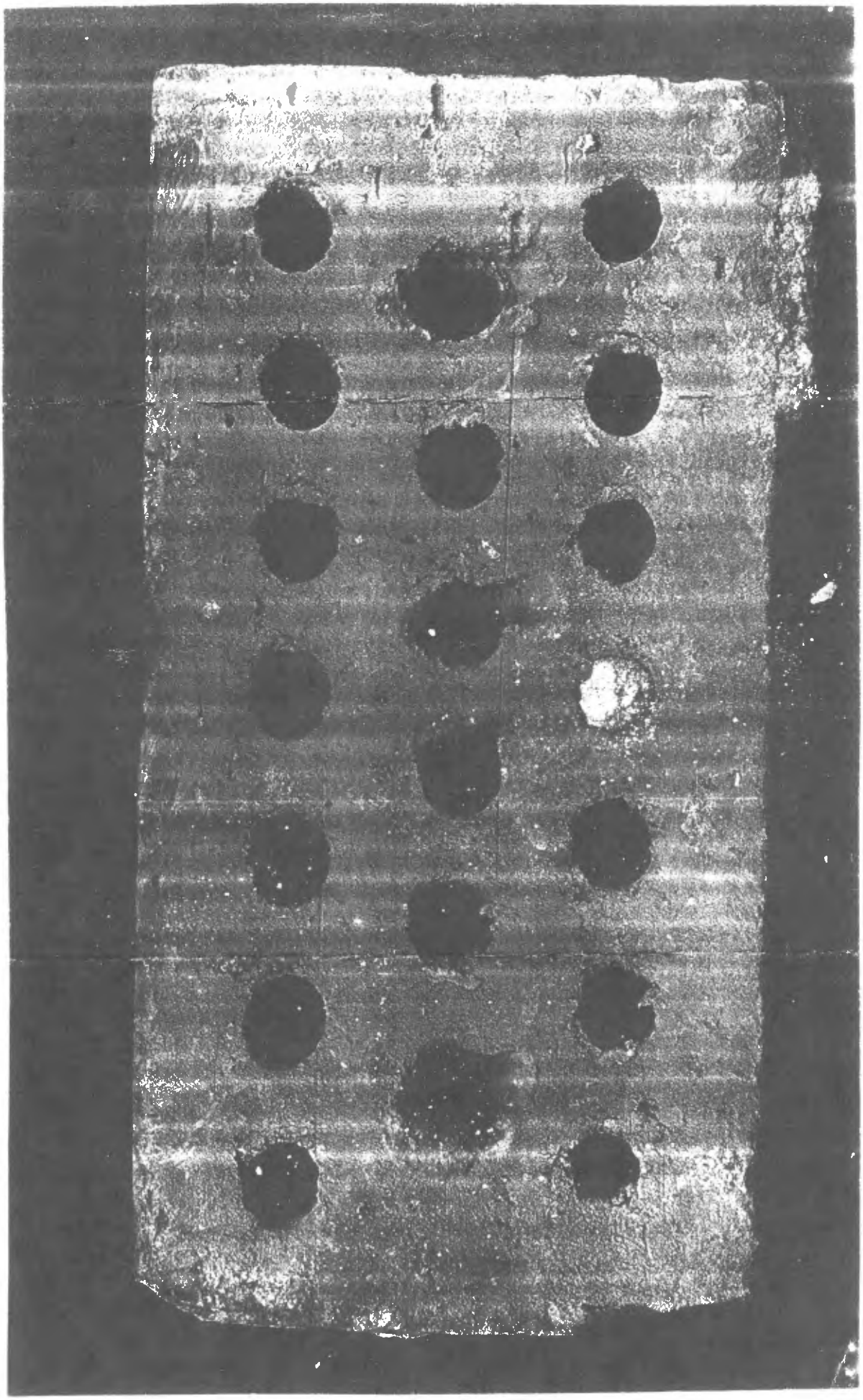

Fig. 2 Brick produced by the National Star Brick Company, Newport, with the company name and two stars in the frog.

more relevant to the bricks being discussed, was the Jones Duran Firebrick Works at Risca, Welshpool, Montgomershire, which operated between 1901 and 1935. It became a branch of Star Brick & Tile Co. Ltd., and Newport, Mon., in 1920.

TONDU

Detailed information was provided by Mr Alan Cox in *BBS Information,* **105,** page 17, concluding that this brick came from Tondu Brickworks Company Limited, Tondu Brickworks, Aberkenfig, Glamorgan, operating from 1922 to the mid 1930s. Aberkenfig is immediately south of Tondu, 3 miles north of Bridgend.

AMMANFORD COLLIERY

There is nothing to add to the editor's information that this came from the brickworks at Ammanford Colliery in Betws, on the south side of the Afon Amman, Ammanford, Carmarthenshire.

In conclusion, could I say that I am not particularly knowledgeable about, nor am I researching, Welsh bricks, so unfortunately, I am unable to offer expert advice.

Brick for a Day

In the latter part of 2007, the British Brick Society held two meetings: its Annual General Meeting in June at Sudbury, Derbyshire, and a London Autumn Meeting in late October in the City of Westminster. Reports of these meetings appear here.

DHK

Sudbury Hall, Derbyshire

The 2007 AGM of the British Brick Society was held on Saturday 16 June 2007 in the Parish Room at Sudbury, Derbyshire. This is a small red brick building, apparently incorporating reused bricks. The whole village – essentially a single street – is most attractive, virtually all its buildings of warm red brick with no jarring intrusions. The centrepiece, almost literally, is the 'Vernon Arms', where some members took lunch. Built in 1671, it is of red brick with a central segmental-headed carriage entrance, slightly projecting outer bays, and straight gables. The mullioned windows are Tudor in form, decidedly old-fashioned for their date. Several of the nearby cottages are contemporary with the inn. Others are later, but in keeping with its style.

The highlight of the day was the afternoon visit to Sudbury Hall, at the western end of the village, and now in the care of the National Trust. From its forecourt one is able to glimpse in the distance, the large dovecote belonging to the extensive park surrounding the house. The building is again of red brick. It is known to have been in existence by 1751 and traditionally dates from 1723. It is parallelogram-shaped with turrets, which once had ogee caps. In the early nineteenth century a sham gatehouse, also with turrets, was added.

Sudbury Hall, itself (fig. 1) dates from *c.* 1665-1702, replacing a more modest house further to the east. It was built for George Vernon (1635-1702). No architect is named in the well-preserved building accounts, and it has been suggested that Vernon himself designed it. Sir Nikolaus Pevsner was dismissive of this suggestion, but it is not wholly implausible. Vernon's younger contemporary, Roger North (?1653-1734), of aristocratic lineage (he was the sixth and youngest son of Dudley, the fourth Lord North) and a lawyer by training, practised as an amateur architect: his Great Gateway to the Middle Temple, London (1683-84), is an attractive building of sufficient accomplishment to have been ascribed to no less a professional than Sir Christopher Wren (1632-1723). North declared that he preferred his own designs since 'a profest [= professional] architect is proud, opinionated and troublesome, seldome at hand, and a head workman pretending to ye designing part, is full of paultry vulgar contrivances; therefore be your owne architect, or sitt still'. George Vernon was not the man to 'sitt still' and he, like North, may well have been his 'owne architect'.

The house is of red brick on a low stone plinth and with stone dressings, including a wholly stone double-storey porch to the principal (north) front, carved by Sir William Wilson (1641-1710). This front, and the garden (south) front, are arranged on an E-plan, with projecting ends bays and central porch. The east and west walls are in English Bond, but on the north and south fronts this has had to be modified to accommodate the all-over diaper pattern in black bricks. Close inspection of the latter shows that they are certainly overfired products, not, as is sometimes the case, specifically manufactured for the purpose. (The point is worth stressing since there are some who insist that *all* such bricks were deliberately produced.) On the south front, above the first ten courses, the bricks change in shade. This has sometimes been taken to indicate a break in construction; but it may equally reflect no more than the use of bricks from different suppliers, as detailed in the building accounts.

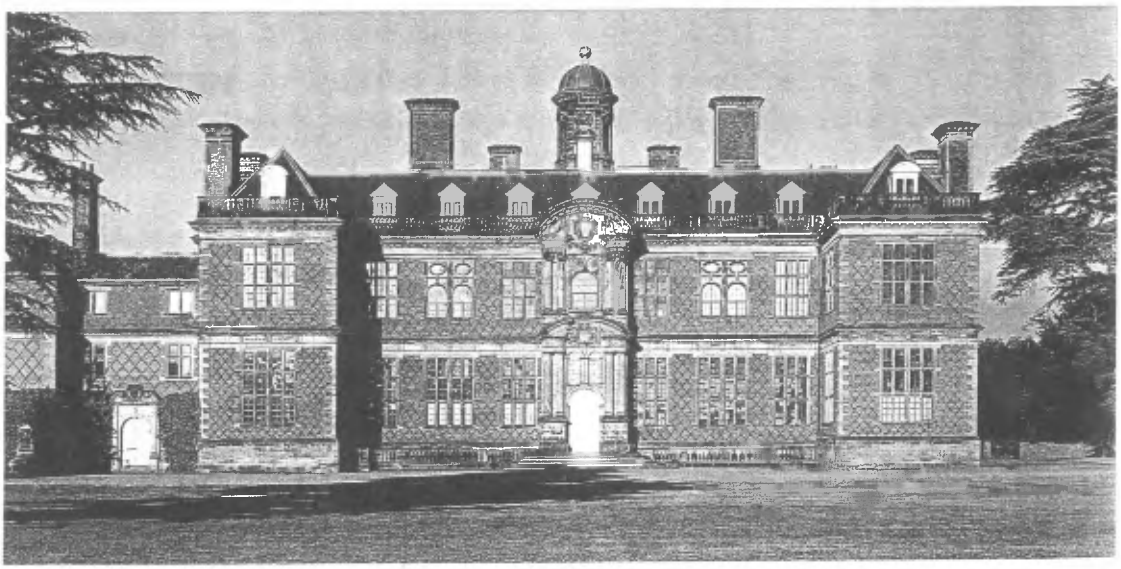

Fig. 1 Sudbury Hall: the north or entrance front.

The all-over diaper, the mullioned and transomed windows, the E-plan, and the provision of a long gallery were old-fashioned at the time of building, although other features of the design were not. Writing in *Country Life,* 17 June 2004, (see the notice in *BBS Information,* **98,** November 2005, p.26), the late Giles Worsley suggests that the house was consciously designed as anachronistic, a means of proclaiming lineage. On the other hand, there seems to have been a tradition of such *retardataire* building in provincial Derbyshire – seen for example in what is now County Hall, Derby (1659). (And one may recall those Tudor-type windows in the 'Vernon Arms' noted above). And, if Vernon was his own architect, drawing on local models and on book illustrations, then this outmoded style is just what one might expect – its *démodé* character unintended rather than the result of deliberate contrivance. It may be significant in this regard that the more up-to-date features – notably the hipped roof and the cupola – were constructed late in the building campaign, after Vernon's visit to London, where he may have become acquainted with the latest metropolitan fashions in architecture.

Members of the British Brick Society obviously have a particular interest in the brickwork. But the interior of the house is equally impressive, not least for the carving by Grinling Gibbon (1648-1721), the Great Staircase by Edward Pierce (*c.*1635-1695), and the elaborate plasterwork, by various craftsmen, in several of the rooms, including work by Robert Bradbury (*fl.* 1675-76) and James Pettifer (*fl.* 1675-1702), the latter of whom went on to work for Wren in London.

In the 1870s, a new East Wing was added to designs by George Devey (1820-1886). It, and the adjoining stable block, are in red brick, without diaper patterns. The East Wing now houses the National Trust Museum of Childhood: most of this was closed for refurbishment at the times of our visit, although the Victorian schoolroom was open. The stable block houses a shop, tea rooms and toilets. The small lodge dates from 1787 and was designed by Thomas Gardner (*c.*1737-1804) of Uttoxeter.

Our thanks go to our Honorary Secretary, Mick Oliver, for efficiently organising what was a most enjoyable visit. The weather was not kind to us and prevented full exploration of the gardens. But though it may have dampened members' clothing, the rain did not succeed in dampening their spirits!

TERENCE PAUL SMITH

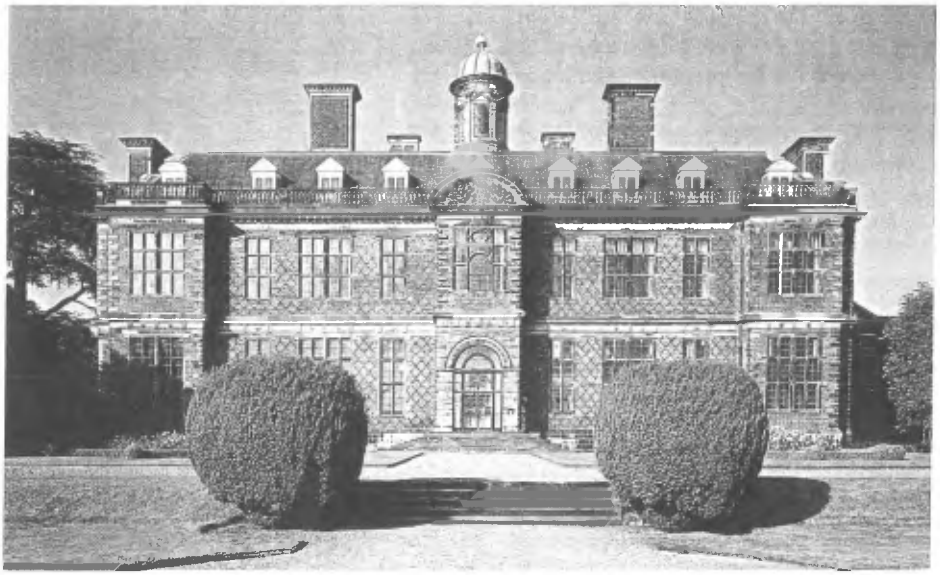

Fig. 2 Sudbury Hall, the south or garden front.

London: the City of Westminster

The London Autumn Meeting was held on Saturday 20 October 2007. Beginning at the Sainsbury Wing of the National Gallery, at the north-west corner of Trafalgar Square, in the morning, members examined its west and north walls of brick (Venturi, Rauch & Scott-Brown, 1987-91) together with buildings on Orange Street, including the new research facilities for the National Portrait Gallery (Grimley J.R. Eve, 1990-92) and office buildings on the south side at the east end of the street constructed in the 1990s to designs by various architects.

The primary purpose of the morning was to see the brick houses and their replacement by later brick buildings on Pall Mall and on St James's Square, the former including the Alliance Insurance Building (R. Norman Shaw, 1882-83) on the corner of Pall Mall and St James's Street. Viewing of the exterior of St James's Palace and the Queen's Chapel was somewhat held up by the arrival and subsequent dispersal of the marching band of one of the guards regiments, who surprisingly were whisked back to barracks in a motor coach. Given modern security considerations, viewing of the palace, whose buildings were constructed at various dates in the sixteenth to nineteenth centuries, is in any case restricted to what can be seen from the public highway, and the same is true of both Inigo Jones' Queen's Chapel (1623-25) and Marlborough House (Sir Christopher Wren and Christopher Wren jun., 1709-11), both of which were built of brick: the former has always been covered in stucco.

No such considerations affected the last building of the morning, nor that viewed in the afternoon. At the end of morning members saw St James' church, Piccadilly (Sir Christopher Wren, 1676-84) and what was built as a small branch of the Midland Bank by Sir Edwin Lutyens adjacent to the churchyard on Piccadilly itself (1922-24). In the afternoon, members visited Westminster Cathedral, the principal Roman Catholic church in England. Designed by J.F. Bentley between 1895 and 1902, building finished in 1903, the year after his death. The sources of the bricks of the cathedral is to be the subject of an article in a future issue of *British Brick Society Information.* Here the "competition" was a choir festival with some very colourfully dressed choristers, both male and female.

DHK

BRICK IN PRINT

Between June 2007 and April 2008, the British Brick Society received notice of various publications of interest to members of the society. This is a now regular feature of *BBS Information*, with surveys usually twice in a year. Members involved in publication or who come across books and articles of interest are invited to submit notice of them to the editor of *BBS Information*. Web sites are also included. Unsigned contributions in this section are by the editor.

DHK

1. David Adshead, 'King of Theatres',
Country Life, 14 February 2008, pages 60-63.

The last surviving Regency period theatre in England is the Theatre Royal in Bury St Edmunds, built to designs by William Wilkins in 1819. Wilkins' father was a theatre entrepreneur in East Anglia and an architect. William Wilkins the elder rebuilt theatres in Norwich and Colchester in 1800 and 1811-12 respectively. Father and son had rebuilt the Barnwell Theatre in Cambridge.

When built, the new theatre in Bury could seat 780, divided 300 in the Pit, 360 in the boxes, who also had exclusive use of the Saloon, and 120 in the Gallery; The auditorium had *three* separate entrances. Competition from London and the advent of the railways limited the peak use of the theatre to barely two decades. The Bury and East Suffolk Railway opened in 1847. The Theatre Royal closed for the first time in 1903, reopened in 1906 but closed again in 1925, due to the competition of two cinemas in the town. Greene King, the Bury brewer and owner of the building, then used it for a barrel store for forty years. In 1975, after a ten-year campaign, the theatre reopened with excellent acoustics. The late Alec Clifton Taylor, in *Another Six English Towns*, mentions giving a lecture there when all 350 people present heard perfectly. In September 2007, a further refurbishment was completed.

The theatre was built in Woolpit whites: an excellent photograph (fig. 2 on page 62) shows the façade with the stucco on the portion visible from the street but the more prosaic structure rising behind.

Bury St Edmunds has a wealth of brick buildings of various periods and is well worth an extended visit The Visits Coordinator of the British Brick Society is hoping to investigate this possibility for 2009.

2. Ian K. Bailiff, 'Methodological developments in the luminescence dating of brick from English late-medieval and post-medieval buildings',
Archaeometry, **49**, 2007, pp.827-851.

Fired clay brick samples, obtained from a group of seven high status late medieval and post-medieval buildings in England, mainly in Lincolnshire, ranging in date from *c.*1390 to 1740, were dated by the luminescence method using an optically stimulated luminescence technique. The results obtained indicate that, when applied to quartz extracted from brick, the technique is capable of producing dates that are in consistently good agreement with independent dating evidence for the buildings. This can be more specific evidence of the documentary record, dendrochronological analysis of a building's timbers, a datestone, or date-marked ironwork, as well as the less specific indications of building analysis and architectural style.

Three late medieval buildings are in Lincolnshire. In date order they are St Mary's Guildhall, Boston, built 1390-1395; Tattershall Castle, from which the sample can be assigned

to 1445-1450; and Aysgoughfee Hall, Spalding, constructed 1450-1455. Also in Lincolnshire, Doddington Hall, built 1593 to 1600, is the single late Elizabethan house sampled, while Alford Manor House of 1611-1615 represented the Jacobean period. Fydell House, Boston had two construction phases, 1705-?1710 and 1725-1726. Two periods are also known for the single building outside Lincolnshire: Clarendon House, Wiltshire, which has building periods of 1650-?1675 and 1727-1737.

For six samples taken from a group of four 'control' buildings the mean difference between the central values of luminescence and assigned ages was 5±10 years (s..d., n = 6). The methodology used is appropriate for application to other standing buildings in other temporal and geographic regions, and may be used with confidence where conventional dating methods are less certain.

The study also examines the luminescence characteristics of quartz and characteristics of lithogenic radionuclides in brick samples and identifies various aspects related to the assessment of experimental uncertainty in testing the reliability of the method.

There is a long bibliography, mostly covering technical matters but also drawing attention to recent work by a team from the University of York on Alford Manor House, Ayscoughfee Hall and St Mary's Guildhall in Boston.

IAN K. BAILIFF (Author's Abstract, adapted and extended)

3. Oliver Bradbury, 'Clifton Campville Hall, Staffordshire'.
Country Life, 10 January 2008, pages 62-65.

Clifton Campville Hall is one of those houses begun but never finished. in 1798, Stebbing Shaw wrote in *The History and Antiquities of Staffordshire* that 'Sir Charles Pye built at Clifton the two wings of a house, which was intended on so large a plan that he never began the centers: and one of those wings has since served his family as their mansion'. Sir Charles began to build in 1708, but died in 1720, the year of the South Sea Bubble. Lack of funds or the death of the project's instigator could have been the reason why the central block was never completed; indeed, it is not certain that it was ever begun.

The Pye family used the kitchen-office wing, like its fellow, in a mellow, red brick with stone quoins, as its home and in this they have been followed by subsequent owners, including the present ones, Mr and Mrs Richard Blunt. since 1996. They rescued the house and the other wing from dereliction and misuse as a dump to store scrap. The centres of each wing were built as open courtyards but now each centre has a glass roof, the kitchen-office wing since before 1905, the other more recently in its conversion into several homes.

As an uncompleted project, Clifton Campville Hall joins several earlier brick houses Only a brick gatehouse of 1616 was built for a great house at Leighton Bromswold, Hunts., commissioned by Sir Gervase Clifton from John Thorpe before 1608. In the early sixteenth century, Layer Marney Tower, Essex, was left as the great gatehouse and an adjacent wing following the death of the second Lord Marney in 1525: the great hall was never built. Similarly Baroness Scales built one and a half wings to the gatehouse at Middleton Towers, Norfolk, following her father's death in 1460 but never got round to constructing a great hall.

4. David R. Coffin, edited by Vanessaa Bezemer Sellers,
Magnificent Buildings, Splendid Gardens,
Princeton NJ: Princeton University Press, 2008
xix + 300 pages, 174 figures.
ISBN 978-0-691-13664-6 (hbk); 978-0-691-13677-6 (pbk)

This magnificent volume reprints the most significant articles by the landscape and architectural historian, David Robbins Coffin (1918-2003) who spent most of his professional and academic career at Princeton University. It concludes with appreciations of two of his teachers. By way of appreciation, a number of the professor's pupils offer brief comment on the origin of the pieces and on subsequent work on the topics.

Coffin's work discovered aspects of the landscape and architecture of both Italy and England. Members of the British Brick Society will find most illuminating two particular articles. The first, 'Some Architectural Drawings of Giovan Battista Aleotti' (pp. 118-137), concerns buildings in Ferrara, including the splendid brick façade of the ellipitcal church dedicated to San Carlo Borromeo on the Giovecca, erected between 1613 and 1623. Turning to England, we have lerngthy contributions on 'Repton's "Red Book" for Beaudesert' (pp.200-217). The Red Book includes views of the Elizabethan brick house of the Pagets, the largest dwelling in Staffordshire. By way of comparison the illustrations also include Repton's drawing of Oxnead Hall, Norfolk, a house of comparable size.

5. Claudia Lazzaro and Roger J. Crum (editors), *Donatello among the Blackshirts,* Ithaca and London: Cornell University Press, 2005, viii + 293 pages, 102 figures. ISBN 978-0-8014-8921-0 (paperback); price $24-95

A group of fourteen essays with an introduction and epilogue covering artistic matters in Fascist Italy. Of particular interest to members of the British Brick Society is Part III, Middle Ages and Renaissance, with essays by Diane Ghirardo on 'Inventing the Palazzo del Corte in Ferrara' (pages 97-112), and by D. Medina Lasansky on 'Towers and Tourists: the Cinematic City of San Gimignano' (pages 113-131).

Built in the late thirteenth century and subsequently enlarged, the Palazzo del Corte was originally the palace of the d'Este family, the local ruling family in Ferrara. Restoration followed an architectural competition in 1923, and the proposed reconstructions of the principal façade illustrate Prof. Ghirardo's article. In Ferrara, local interests fitted well with Mussolini's desire for grandeur but it was local interests which had control of the rebuilding. In San Gimignano, the use of the 1941 film *San Gimignano dalle bella torri* (San Gimignano of the beautiful towers) to bolster the image of the town and to attract day tourists is documented. The making of the film required the reconstruction of various monuments, not least the Palazzo del Podestà, where a new loggia was added by Egisto Bellini in 1936.

There is much else of interest in these essays, particularly those in the first two parts. Part I deals with Italy's Past as Mussolini's Present, and Part II with Antiquity. From the many attempts to recreate antiquity in a modern guise, particularly striking is the projected arch designed by Adalberto Libera for the abandoned Esposizione Universale due to have been held in Rome in 1942. It evokes strong comparisons with Eero Saarinen's Gateway Arch in St Louis, Missouri, of 1966, two structures which. Roger Griffin also deals with in *Modernism and Fascism The Sense of a Beginning under Mussolini and Hitler,* (Basingstoke and New York: Palgrave Macmillan, 2007, 235-237).

6. David Littlefield and Saskia Lewis, *Architectural Voices Listening to Old Buildings,* Chichester: Wiley-Academy, 2007,
240 pages, numerous (unnumbered) colour photographs; also plans and elevations. ISBN 978-0-470-01673-2, price £23-95.

Littlefield and Lewis are the principal authors of the essays and interviews in this book which ranges across the last two hundred years, although most of the buildings are in London. Brick

buildings included cover a wide spectrum from the Ditherington Flax Mill in Shrewsbury and the Round Factory at Leeds via the grain mills of Buffalo, USA, to the remaking of buildings in London, such as The Factory, 10-22 Shepherdess Walk, Shoreditch, a former warehouse being turned into Manhattan-style lofts, the premises of Talkback Television in Newman Street, Westminster, or the Young Vic Theatre in Southwark, London, and its recent refurbishment. Both of Giles Gilbert Scott's power stations find a place, although in the case of Battersea, the work of Theo Halliday is not acknowledged. The tale of Hoxton Cinema gains an extensive airing as does that of the Royal Military Asylum in Chelsea, a school whose emphases would be anathema to the present writer. This building, vacant in 2007, is clearly brick-built; it is to become the new home of the Saatchi Gallery.

London Churches featured include the current restoration by Eric Parry of James Gibbs' St Martin-in-the Fields and one of the few built works by the architectural teacher and arbiter of taste in the 1930s, C.H. Reilly: St Barnabas, Hackney, of 1909-10.

Clearly a book to dip into on a winter's evening, rather than one to read from cover to cover, *Architectural Voices* provides interesting perspectives on the range of architects' concerns in the early twenty first century.

7. Charles Lynne, 'Higham Hall, Suffolk',
Country Life, 21 June 2007, pages 126-129.

Higham Hall was completed in 1811 for James and Elizabeth Stutter, one of the principal landowners of the parish: in Higham, as in so many Suffolk parishes there had always been several major landholdings, although, like elsewhere in the county, there is no one big house. Between 1851 and 1904, Higham Hall was held by Edward Cooper and then by his widow and her two unmarried middle-aged daughters. Mr Cooper had farmed 180 acres to some time before 1871 when he was described as a "retired farmer". Since 1980, it has been the home of Quinlan Terry, the architect, and his artistic family. Mr Terry was the pupil and then the partner of Raymond Erith, who lived at Dalebook House, Dedham, across the River Stour in Essex. Mr Terry now practices with his son, Francis.

Higham Hall presents itself to the world as a white brick house: Dalebook House does the same. But both houses have a more complex history than their well-documented early-nineteenth-century façades suggest. At Higham Hall, this is evident both in the exterior and in the plan. The north (entrance) front has five-bay two-storey arcade, with the arches in segmental gauged brick. There are broad pilasters supporting the arches, but the pilaster to the left of the door is broader than the rest. North and east fronts are in Suffolk whites; west and south fronts, facing St Mary's church and the garden respectively, are in red brick in English bond.

The original house was entered from the surviving door in the west room. Internally, there is a broad corridor running west-to-east, with the drawing room and the bedroom above in the south part of the house are at a lower level than the other rooms. In the rebuilding, a double-height bow window enhanced the external appearance of these rooms, marking out their high status. Recent repairs to a sash window suggest that the respected firm of Wheeler's of East Bergholt were the builders of Higham Hall: the name 'Wheeler' was found written in pencil on the window. The architect of Higham Hall is unknown. Possibilities include Sir John Soane and Francis Sandys of Bury St Edmunds. Both designed houses with full-height bow windows: Soane at Tendring Hall, Stoke-by-Nayland in 1784-86 and Sandys at Finborough Hall in 1795.

8. Simon Thurley, 'Newmarket Palace, Suffolk,
Country Life, 24 April 2008, pages 100-103.

On a side street in Newmarket stands a modest-looking, three-stroey building of three bays in red brick with a stone string course between the ground and first floors. Apart from the stone doorcase with its small plaque above, there appears nothing remarkable about the building.

Yet this is the king's pavilion, the only part of a major royal palace of the 1670s which surviives. Designed by William Samwell, a local man. Samwell had designed Euston Hall, Suffolk, for Henry Bennet, Earl of Arlington, most of which is now lost, and went on to built a surviving range at Felbrigg Hall in north Norfolk. For Charles II, Samwell built a two-storey palace with attics, in brick, but incorporating parts of an older palace, built for his grandfatehr James VI and I. The latter was stone-built. The new, brick palace had another innovation: sash windows. Samwell also used corner fireplaces, then a great rarity in England, allowing great blocks of chimneys. Simon Thurley's reconstruction of the whole palace a single stack with eight chimneys in the queen's pavilion as well as blocks of four in both the king;'s pavilion and the king's lodgings, the last-named a more private space.

At Newmarket, Samwell designed a subtantial structure, in total 124 rooms: the king had twenty-three of them, including the surviving state bedroom: a formal room in which state business was conducted. Pleasure was combined with ceremonial but the very success of the project was its undoing. as members of the court bought or erected houses in the small Suffolk town.. On 22 March 1683, a fire destroyed 66 houses in the town causing Charles II to abandon both palace and town. His last two years were taken up with a project to building a new royal palace in Winchester.

Brick Query

I recently found a blue engineering brick with a shallow frog with 'diamond jubilee' stamped in it. The bricks are used to construct a farm access bridge over the north west mainline railway, approximately 2 miles north of Penrith station in Cumbria. There are no other brick structures in the area; all buildings and bridges are made from the local sandstone.

Has any member any ideas as to the source of these bricks and thoughts on the possibility that they were manufactured in the area of Queen Victoria's Diamond Jubilee (1897).

The date of the bridge is unknown but efforts are in hand to determined when the bridge was constructed.

GRAHAM BROOKS
Coomara, Carlton Carlisle, Cumbria CA4 0BU
e-mail: gbrooksvet@tiscali.co.uk

The suspicion of Queen Victoria's Diamond Jubilee in 1897 is probably correct. But an alternative explanation for 'diamond jubilee' might be 60 years of the unknown firm which made them. Suggested origins for such bricks could be Staffordshire or perhaps, as it is nearer, the brickworks attached to various mines in the Lancashire coalfield. In the mid 1990s, the former Mining Museum in Salford had a large brick collection. This included blue engineering bricks made a more than one of the colliery brickworks as well as the more common red bricks associated with the brickworks of the Lancashire collieries.

DHK

BRITISH BRICK SOCIETY
MEETINGS IN 2008

Meetings planned for 2008 include

Saturday 21 June 2008
Annual General Meeting
Amberley Chalk Pits Museum, Sussex

Thursday 14 August 2008
Summer Meeting
Coventry, a town walk with brick buildings of various dates including the award-winning library for Coventry University. At the end of the visit there will be an opportunity to view the centenary exhibition at the Herbert Museum and Art Gallery on the work of Sir Basil Spence (1907-1976).

Saturday 4 October 2008
London Autumn Meeting
West London: Hillingdon Civic Centre, West Drayton manor, Harmondsworth Church and Barn

Preliminary thoughts for visits in 2009 include Bury St Edmunds, Suffolk, and the Tilbury forts.

Full details of meetings in the Summer Meeting and the Autumn Meeting are in this mailing

The British Brick Society is always looking for new ideas for future meetings.
Suggestions of brickworks to visit are particularly welcome.
Offers to organise a meeting are equally welcome.
Suggestions please to James Campbell, Michael Oliver or David Kennett.

Changes of Address

If you move house, please inform the society through its Membership Secretary, Dr Anthony A. Preston at 11 Harcourt Way, Selsey, West Sussex PO20 0PF.

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