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Cover Illustration

Houghton House, Bedfordshire, from an eighteenth-century engraving.
Houghton House was one of the places visited by members who took part in the society's 1993 Spring Visit to Luton and Ampthill.

Editorial

This is necessarily a somewhat shorter issue of Information than many among the past ten issues.

Its contents rely on material available to the Editor at the end of his sojourn in Bristol without drawing heavily on the writings of a single author, himself. And, it should be pointed out, the editor has only a limited stock of his own work.

By the time this issue of Information reaches members of the British Brick Society, the address of the editor in Bristol will not be current.

Members with material for British Brick Society Information should use the address printed below.

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Letter to the Editor

The ancient Egyptians 'did' decimals whereas the Sumerians took twelve as the basis of their numerical system. It is appropriate to 'go' Sumerian and celebrate the sixtieth issue of British Brick Society Information.

The anniversary bears this old mind back to the days when I would devote a Sunday to compiling and another to typing the earliest issues on a stencil which, grace to the (then) Norfolk Technical College, it was was both reproduced and distributed without cost to the society. Then the Brick Development Association stepped in when I retired from the college. This was thanks to Terry Knight in the first place. It was cool cheek and brinkmanship all the way along!

Neither Laurence Harley nor I appreciated this. The same was true of then Secretary of the Society of Antiquaries of London, who, when I presented him with the first copy, murmured:

> Ah, yes, they generally run for ten or twelve numbers before they die out.

That, inter alia, was what determined me to perservere when there was much opposition and some contempt around.

All this makes me, if possible, even more grateful for that which the present officers have achieved and are achieving.

For this I thank you.

GEOFFRY HINES

The Colour of Brick in Historic Brickwork

R.J. Firmin

The colour of brick is, arguably, its most obvious and least understood property. However, though there has been little systematic research, empirical observations, allied to limited chemical and mineralogical studies, have established a number of factors which may affect the colour of bricks (1). These include:

a: the mineralogy and homogenity of the brick clay, or brickearth;

b: the quantity and nature of material which may have been added, such as sand, chalk, fuel ash, cinder coal, etc., or subtracted, during tempering of the clay;

c: the efficiency with which the material was weathered, mixed and ground;

d: materials, such as sand and straw etc., which might have been left adhering to the surface of the green brick after moulding and drying;

e: the position of the brick in the kiln or clamp;

f: the effect of sea sand, salt or fuel ashes which may have been thrown into the burning channels to induce 'flash glazing';

g: the length and character of the firing cycle, including the fuel used, the rate of heating, the maximum temperature obtained, and the length of time that that temperature was maintained;

h: oxidation and reduction conditions in the kiln or clamp, and within, or at the contact between the bricks, during firing;

i: colouring agents which may have been added before or after firing.

With such a multiplicity of factors influencing colour, it is hardly surprising that studies limited to just one or two aspects have found many exceptions to what, at first, were thought to be universally applicable correlations. Moreover, research has been and still is bedevilled by an inability to accurately identify, quantify, and chemically characterise the finer-grained fractions of both brickmaking sediments and the resulting bricks. Without this detailed knowledge it is impossible to proceed from empirical correlations to meaningful scientific explanations. Nevertheless broad generalisations can be made about the probable causes ofccolour in modern brick and these can, with reservations, be used, in conjunction with other evidence, to infer the probable source materials and methods of manufacture of historic bricks.

The principal chemical elements influencing colour in brick

Present research indicates that almost all the varied hues exhibited by historic bricks are due to iron in its ferric or ferrous state. Of the other transition elements, which might be expected to influence colour, only titanium and occasionally manganese, are present in sufficient quantity (c.1%) in brickmaking sediments. The former is mostly fixed in refractory minerals, such as rutile, which being themselves coloured may affect the final colour, despite remaining unreactive throughout the firing cycle. Manganese dioxide (pyrolusite) is said to have the effect of producing browns and blacks in an otherwise red brick and shades of grey on a buff body (2), but much more research is needed to define its role and amounts required to counteract the effects of iron. Unusual bluey and yellow-green vitrification colours are most likely to be due to the formation of lime-alkali rich glasses coloured by iron (3), rather than such transition elements as copper, cobalt, nickel, or chromium which occur in only minute amounts in brick clays and brickearths. Vanadium, though rare, has been reported to form yellow or green stains in modern brick made from some fireclays; however, there are no reports of this effect in older brick (4).

The key to understanding brick hues is, therefore, largely a matter of understanding how iron-bearing minerals in brickmaking clays react when heated. Hue (i.e. wavelength) is, however, only one aspect of colour and consideration should be given to the effect of the more abundant transparent and colourless minerals, such as quartz and feldspar, in modifying the intensity (value) of the perceived colour. The effect of the formation. under reducing conditions, of black minerals, such as magetite (Fe_3O_4) and graphite or carbon in darkening the brick may also sometimes be significant.

Iron-bearing minerals in brickmaking sediments

X-ray diffraction studies (5) have shown that the main iron-bearing minerals in brick clays and brickearths are ferric oxides such as hematite (Fe_2O_3) and 'limonite' (c. $Fe(OH)_3$); carbonates, especially siderite ($FeCO_3$); sulphides, usually pyrite (FeS_2) and silicates such as micas and chlorites (complex alumino-silicates containing small, variable amounts of iron). Rarely are all the above groups present in one sediment. Hematite, for example, requires highly oxidising conditionsfor its formation whereas pyrite forms in anoxic depositional environments. Moreover, because of its mode of formation, hematite tends to be associated with evaporitic minerals such as dolomite ($CaMg(CO_3)_2$) and gypsum ($CaSO_4.2H_2O$) whereas pyrite is usually found in rich organic, carbonaceous sediments. Not suprisingly, therefore, the chemical reactions engendered by firing hematite-rich sediemnts differ considerably from those containing pyrite, as do the resulting brick colours and other properties.

Although iron is the main element affecting the resultant hue, mineral fluxes, quartz and clay minerals containing no iron, are also important because they may react with the iron-bearing minerals to form other coloured compounds or glasses (6). It is therefore desireable to know not only what iron-bearing minerals are present, in what concentrations and how distributed, but also to know the total mineral assemblage in a particular brickmaking sediment. Given that A.C. Dunham (7) has identified no less than 46 different mineral assemblages in modern brickmaking clays and that the chemistry of individual phases in bricks is only sketchily known, the examples given below must represent only the better-known of the many processes which affect the colour of brick.

Probable explanations of specific colours and textures

A close or microscopic examination of even the most uniform of bricks reveals that the perceived colour is, like an impressionist painting, merely an amalgam of spots of different colours and tints reflecting the assemblage of coloured and uncloured components which comprise the brick. One or two colours usually predominate and it is these dominant colours which are discussed below; the subtle modification of these by the amalgam of coloured and uncloured components requires much more research.

a: Reds and orangy reds

These colours are due mainly to the presence of hematite, which may have been inherited if a red sediment was used (though not all red clays burn red) or may form from other iron-bearing minerals during firing. In oxidising conditions hematite forms as ferric hydroxides (300-350°C), pyrite (300-600°C) and siderite (375-830°C) dissociate (8). Hematite formation, however, depends on the maintenance of oxidising conditions around and within the brick itself and hematite will only be preserved provided that it does not react with fluxes, and other minerals, to form paler yellowish iron-bearing phases (9). In addition, especially where the matrix is coarse-grained, transparent minerals, mostly quartz, may substantially lighten the red colour. There is, therefore, no axiomatic relationship between the amount of iron in the brickmaking sediment and the 'redness' of the resulting brick. Nor does the red colour necessarily intensify as the temperature is raised; indeed where that raw material is rich in lime fluxes (e.g. London Stocks, Gault Clay etc.) it is often the underburnt bricks (semels) that are pale red and well burnt bricks that are yellow.(10).

Despite these exceptions, most brick clays and brickearths burn red and, moreover, maintain their redness throughout the firing cycle and its for this reason that most historic brickwork is red or orangy red.

b: Pale colours - yellows, creams and buffs

As indicated above paler colours may result from reactions between hematite, fluxes such as calcite ($CaCO_3$) and dolomite ($CaMg(CO_3)_2$); and alumino-silicates. Dolomite is rarely present in sufficient quantity to affect the colour, though some beds in the Midlands 'Keuper Marl' may burn yellow for this reason. Calcite flux may be a natural component, such as the finely dispersed calcite in parts of the Kimmeridge and Gault Clays (11) of Cambridgeshire or it may have been deliberately added (e.g. as chalk in the manufacture of London Stock Bricks).

Pale colours may also be due to an insufficiency of iron in the brickmaking sediment. This particularly applies to the white China Clay and ball clays of Devon and Cornwall and to the purer fireclays and pipe clays of parts of the Coal Measures. The Derbyshire Tertiary 'Pocket Deposits' also burn cream or yellow but are highly refractory and like the other examples quoted above were unlikely to have been used for brickmaking before the nineteenth century.

c: Mixed reds, orangy reds, yellows and dark spots

Mixed colours in oxidising conditions may be due to inhomogeneities in the raw material or to thermal gradients developing in the brick during firing. Boundaries between colours are usually sharp in the former case and gradational in the latter. The size and shape of the patches of different colour, arising from primary inhomogeneities, depend on the character of the brickmaking sediment and the efficiency with which it was subsequently mixed and ground. Most clays are bedded but the compositional differences between layers are often insufficient to result in different colours. Sometimes,however, alternating layers, perhaps one millimetre to several centimetres thick, burn alternately red and yellow or, more rarely, in a multiplicity of colours ranging from pale cream to deep purple (12). These differently coloured laminations range from structures preserved with little distortion, other than that resulting from pressing the clay into a mould, to highly convolute and often disconnected streaks (13). When brittle layers alternated with more plastic ones mixing in a pug mill or similar apparatus often resulted in a mixture of angular, usually pale burning fragments and rounded, darker, cognate clasts (14). Such variations in structure and colour seen in many pre-Reformation bricks may thus result from the tempering of otherwise uniform, laminated clays (15).

Some clays have, as it were, suffered from 'Mother Nature's pug mill', notably glacial tills (boulder clay), and where these, and other heterogeneous deposits such as head and clay-with-flints, have been used for brick manufacture, very varied structures, textures and colours result. Stony inclusions mainly of rounded quartzite and angular flint, ranging in colour from white to black and often with a rusty patina, add to the variety (16). Despite these coarse variations, obvious on close inspection, the overall impression viewed from a few feet is of uniform redness as the multiplicity of colours mingle into the more uniform 'brick red'. Thus the very considerable differences between say, the more homogeneous silt bricks of the Fens and Humberside, and the very hetrogeneous bricks made from decalcified boulder clay, are not very obvious to the casual observer.

More obvious is the mottling characteristic of some areas, such as Ely. Though sometimes in part attributable to compositional differences in the clay, diffusion of one colour into another, allied to a range of colours from one firing, usually indicates a clay in which either the vitrification range (i.e. the difference in temperature between the onset of melting and distortion) or the range of temperature of other reactions affecting colour is very small. Thus, unless temperatures can be controlled within very narrow limits, of say $\pm 25^{\circ}C$, multicoloured mottled bricks will result, as differential temperature gradients develop in the kiln or clamp and often in the bricks themselves (18).

Dark diffuse spots in bricks are also a common feature, owing their origin usually either to localised areas of reducing conditions, to localised melting, or both. The sporadic distribution of conbustable material and fluxes, such as fuel ashes, domestic waste and night soil, added to chalk and brickearth in making London Stocks, frequently caused such dark, sometimes cindery, spots up to 1 cm in diameter. Similarly the addition of a high calorific fuel such as the anthracite slack now sometimes added to Wealden Clay as the same effect. Though frequently due to added material, inhomogeneities in the brickmaking sediment may induce similar effects. Thus pyrite aggregates may cause local reducing micro-atomospheres. Easily fluxed carbonate ironstones in glacial deposits can cause local melting with the production of dark glass, as can particles of siderite, and also patchily distributed organic matter can cause local 'hot-spots' often surrounded by dark reduction haloes. Alternating reduction and oxidising conditions during the higher temperatures of firing, such as may occur when fuel is added irregularly in large amounts causes surges in temperature, can cause dark and light varigations known as brindling (19). This is not uncommon in clamp-fired historic bricks where rigorous temperature control would have been difficult to maintain. With such a plethora of possible explanations, dark spots, though frequently observed in historic brickwork, remain amongst the most enigmatic of coloured textures and structures.

d: Dark bricks and dark cores

Much the same is true of the so-called black cores which are so common in Roman and some early post-Conquest bricks. These, essentially, are due to the persistence of reducing conditions in the brick's interior, the thickness of the red oxidised 'skin' being governed by the penetration of oxygen into the bricks. Such black, brown or otherwise dark cores are most frequently seen when the bricks are weathered, but may be revealed, for example, in Roman bricks which have been broken prior to their reuse or, as at Little Coggeshall, Essex, (20), where the bricks have been chamfered. Most commonly the dark colour indicated an incomplete burn off of organic material in the original clay, though it can result from the break-down of pyrite or siderite creating a reducing atomosphere in the brick or even from the vigorous compaction and too short a firing period to allow oxygen to penetrate throughout the pores of the brick.

The dark headers used in Tudor diaper work were usually overburnt samples of the same clay as that used for the rest of the brickwork, though whether this overburning was deliberately indusced or accidental is debatable. In as much as these bricks are vitrified only at one end it is likely that fluxes, such as sea sand or fuel ash were added, either before, or more probably during firing (i.e. 'flash glazing') (21). Some doubt also exists about the reasons for the darker colours resulting from overburning: Carp (22) favouring a progressive atomic disordering of the hematite structure and Dunham (23) the formation of magnetite by partial reduction of hematite. Whatever the reason, red burning clays do often darken before they melt and this results in a range of progressively more saturated brownish and purplish reds typical of Tudor diaper brickwork. This contrasts sharply with the Victorian practice of using clays from different sources and with different firing characteristics to produce the same diaper effect. Clays which naturally burn dark blue or black (e.g. the 'Staffordshire Blues') do not appear to have been widely used before the late seventeenth century though this writer has reported mid-sixteenth-century examples, probably made from local oil shales (24) on the eastern edge of the Fens. Clays which would normally burn red can also be induced to burn dark by firing them in a reducing atomosphere, for example, by using a highly sulphurous fuel. More research is needed, but it appears that most historic dark bricks are due either to overburning or to the use of clays rich in manganese, organic matter or both.

e: Surface colours and textures

Finally it should be noted that colour and texture in bricks is often only skin deep. This may be because of sand sprinkled on the clay during and after moulding; to the burning of straw, or other material, adhering to the green bricks after drying, in the kiln or clamp; to less strongly oxidising conditions where bricks are in contact with each other. Also a white 'scum' of calcium suphate may form on the surface of bricks made from clays either rich in gypsum or a combination of pyrite and calcite. Owing to its low solubilities such scums may persist for a considerable time. Most of these surface effects were accidental but some, like the addition of crushed white calcinated (sic) flints noted by the St Albans Archaeology Group in buildings dating from the sixteenth century to c.1900 (25) were obviously contrived, as probably were most vitrified headers.

Conclusion

From the foregoing it may be concluded that the mineralogy and physical characteristics of the brickmaking sediment, though important, were by no means the only factors influencing the colour of brick in historic buildings. Unless the same sediment is used and the same techniques of tempering, moulding and firing, it is probably impossible to precisely replicate most historic bricks, particularly since most of the superficial clays and brickearths then widely exploited are no longer available. A close match of shape, size and colour, if not texture, is currently achieved by several specialist manufacturers by selecting and blending clays and by experimenting with various mixtures and methods of moulding, drying and firing. We are, however, some way from fully understanding the scientific basis of colour in bricks, though sophisticated techniques of in situ microprobe analysis and coordinated research programmes such as that directed by A.C. Dunham at Leicester (26) promise to shed more light on the many enigmas of brick colours and their other properties (27).

NOTES

1. As far as the writer is aware, there is no published comprehensive review of colour in brick. Grimshaw (1971) provides the fullest, though dated, text-book discussion or colour in ceramic materials, including brick. More recent reviews of brick mineralogy, such as Carp (1987) and Dunham (1992) discuss aspects of colour briefly en passant. Firmin and Firmin (1967) remains the only systematic attempt to measure colour (and many other features) of pre-Reformation brick, this article being an elaboration of the colour aspects of that pioneering work.

   Carp, A., 1987: 'The exploration and evaluation of raw materials for the heavy clay industry ', British Geologist, vol. 13, pp. 160-163.

   Dunham, A.C., 1992: 'Developments in Industrial mineralogy: I. The mineralogy of brick-making', Proceedings of the Yorkshire Geological Society, vol. 49, pt. 2, pp. 95-104.

   Firmin, R.J., and Firmin, P.E., 1967: 'A geological approach to the study of medieval brick', Mercian Geologist vol. 2, no. 3, pp. 299-318.

   Grimshaw, R.W., 1971: The chemistry and physics of clays and allied ceramic materials, London: Benn, 4th edition, pp. 905-908.

2. Carp, 1987.

3. Conditions governing the formation and colour of glass in bricks have not been adaequately studied but it may be anticipated that, as with the manufacture of historic glass, "furnace conditions were also critical in the production of coloured glasses as the same composition could give a completely different colour depending on whether the glass was produced in a reducing or oxidising atomosphere. Other relevant factors included the temperature at which the glass was originally melted, and also the duration of the melt" (Michael Heyworth, 1993; abstract entitled 'Colour in Ancient Glass' of a paper given to the 'Colour in Archaeology' day school at University College, London, 31 March 1993).

4. Carp, 1987.

5. Carp, 1987, and Dunham, 1992.

6. See note 3.

7. Dunham, 1992.

8. Based on data from Carp, 1987, and Dunham, 1992, but note that some of these reactions may be time dependent (i.e. occur at lower temperatures if heated for longer times) cf. other reactions investigated by Dunham and his co-workers.

9. A high proportion of lime available to react with iron-bearing materials often bleaches the red colour. Thus although two Caister Castle (c.1440) brick analyses quoted by Firmin and Firmin, 1967, contain virtually identical amounts of iron (viz. 7.25% and 7.94% total iron expressed as Fe_2O_3) the yellow brick with only slightly less iron has significantly more lime (viz. 7.00% and 4.53% respectively).

10. The writer's unpublished analyses of pre-1550 Norfolk bricks demonstrates that. despite exceptionally high lime/iron ratios, bricks when underburnt, may possess a reddish colour. Thus a brick from Drayton Lodge (c.1437) in spite of containing more lime (CaO = 28.5%) than any other, historic or modern unglazed brick, and a CaO/total iron ratio of 14:1, is nevertheless a moderate orange pink to light brown colour (i.e. Munsell 5YR 8/4 - 6/4). As indicated by a c21% CO_2 almost all the lime in this brick is present as $CaCO_3$ little if any of which has reacted with iron compounds. The large amount of $CaCO_3$ (probably mostly present as unreacted Chalk) has thus diluted, but not expunged, the red colour of the iron oxides formed during firing.

of $CaCO_3$ (probably mostly present as unreacted Chalk) has thus diluted, but not expunged, the red colour of the iron oxides formed during firing.

11. The term Gault Clay (upper case) here refers to the geological formation underlying the Chalk some, but not all of which, burns a creamy yellow. Other authors (e.g. Jane Wight, Brick Building in England from the Middle Ages to 1550, 1972) apply the term 'gault clay' (lower case) to any clay which fires a light colour, irrespective of the stratigraphical position or mineralogical composition.

12. By far the best example occurs in bricks of the ? early-sixteenth-century porch at Shadingfield Parish Church, Suffolk.

13. See illustrations in Firmin and Firmin, 1967, especially Plate 9D (Caister Castle, c.1440) and 10D (Surlingham St Saviour Church, Norfolk, sixteenth-century). A good example of convolute laiminations in brick resulting from tempering and moulding is exhibited by ? sixteenth-century bricks in Ashwicken Parish Church, Norfolk.

14. See, for example, Plates 10D (sixteenth-century) and 9C (modern) in Firmin and Firmin, 1967.

15. But note that unless the structure of the source clay is known it is impossible to eveluate the effect of tempering and moulding in distrorting primary structures, (see Firmin and Firmin, 1967, pp.303-304, for a fuller discussion).

16. See Firmin and Firmin, 1967, for examples and discussion.

17. Such as reactions involving the 'bleaching' of red colours by lime. In this connection it is interesting to note that the carbonates in Gault Clay apparently dissociate over a much narrower temperature range (800-850°C) than any other clay tested by the Buildings Research Station and it is in bricks made from Gault Clay that mottling is most frequently observed, (cf. Bonnell, G.G.R., and Butterworth, B., Clay building bricks of the United Kingdom, London: National Brick Advisory Council, Paper 5, 1950; London: H.M.S.O.).

18. Reduction to metallic iron which sometimes occurs in pottery has not been noted in any of the bricks examined by the writer.

19. Grimshaw, 1971.

20. Gardner, J.S., 'Coggeshall Abbey and its early Brickwork', Journal of the British Archaeological Association, 3rd ser. vol. 18, 1957, pp. 19-32; and Firmin and Firmin, 1967, Plates 9E and 9F.

21. A.R. Wittrick, pers.comm. 1992, following his discussions with Peter Minter.

22. Carp, 1987.

23. Dunham, 1992.

24. Firmin and Firmin, 1967; and subsequent unpublished research.

25. Miles, R., 'Calcinated flint facings', BBS Inf., 55, February 1992, p. 11.

26. Known as the LU-MIRO Brick Research Project (cf. Dunham, 1992).

27. Paper received December 1993.

This is an annotated and slightly amended version of a paper commissioned by SPAB to be published in their forthcoming volume on hand-made bricks and tiles.

Brick Exhibits in Museums: The Norfolk Rural Life Museum, Gressenhall, near East Dereham

David H. Kennett

Many rural life museums contain exhibits about local building crafts. These notes, made in 1988, report the items of interest to members of the British Brick Society in the Norfolk Rural Life Museum, Gressenhall, near East Dereham, Norfolk (grid ref. TF/974170).

The first exhibit of interest is the building itself. Built in 1777 as the workhouse for the Mitford and Launditch Union, this is a red brick building, originally E-shaped, with a central portion of seven bays, the three centre ones of which are set forward by a single brick's thickness and under a pediment containing a clock. These central three bays have fenestration indicating a mezzanine floor below the first floor rail. To both east and west are wings, projecting forward by a single bay and one very broad bay in width. There are twin doors to the central portion in the two extreme bays. The wings are six irregular bays from north to south; the west wing was orginallythe workhouse kitchens. To the eat of the east wing is a nine-bay wing running west-eat and connecting at its eastern end with a block orientated north-south. The last-named houses the offices of the Norfolk Archaeological Unit.

The building is in red brick throughout. However, the centre of the main block has been cleaned and thus it is unclear whether the brick was uniform in its original texture and colour. Variations in colour may be observed. In the museum wing to the east of the main block is a loggia, now blocked.

The room wherein building trades are exhibited is at the eastern end of the wing with the loggia, which if the visitor follows the order suggested for a visit to the museum is the last room to be viewed. Outside of the room is an exhibit concerning charms concealed in buildings to ward off bad luck. Opposite to this is an architect's wooden model of Quiddenham Hall. This Jacobean courtyard house was built of brick between 1606 and 1619 for Sir John Holland. Of this house only a little of the courtyard fenestration survives. It was totally remodelled after its sale to the third Earl of Albermarle in 1762, and then redone internally in about 1820. Now a Carmelite nunnery, the house has little remaining of its original or replacement furnishings. This was among the largest houses in Norfolk: in 1664, Sir John Holland, the third baronet, lived in a house assessed at 40 hearths. Given that most of the large houses built in Norfolk between 1550 and 1630 have been destroyed, including some which have been totally rebuilt, the model is a particularly valuable survival.

Even larger is the exhibit dominating the building trades' room. This is the architect's model of Melton Constable Hall. The model later became a dolls' house for the Astley children. Sir Jacob Astley demolished the former house in 1664, although part survives as a service range of sixteenth-century date to the east of the new house. The model, with minor variations, shows the house built between 1664 and 1670 on which decoration continued until 1686. The seventeenth-century house is nine bays by seven, of red brick, with stone quoins. The basement is faced with ashlar. It is the house used in the film of L.P. Hartley's novel, The Go-Between.

Both these models were recorded as elsewhere by Sir Nikolaus Pevsner in the two volumes of The Buildings of England: Norfolk in 1962.

There are exhibits about bricklaying, brickmaking and building materials in general. The last-named includes a mould for clay lump, a material much used in Breckland. These each have nine times the volume of a brick, being about one-and-a half times as long as a standard brick, as well as twice the width and three times the height. Brick moulds are also on show.

There are photographs of West Runton brickworks in the 1930s showing various processes. The artifacts include bricks of various dates, the moulds already mentioned, and brickmaker's tools. There is a barrow used to transport bricks when green which had been used at Swanton Novers brickyard. The museum has in store the pug mill from Great Melton brickyard.

One product of brickyards was the malt tile, a large square brick made with holes passing through the thickness. Different brickyards made their own patterns: three are on exhibition. When the malt floor was reduced to a continuous mass, children were employed to clear the holes with pins so that heat could once again pass through the holes to dry the barley. Children were also used to clean out the fires under the malting floor.

Tools on display include trowel, hod, dividers, float, bucket, and a set of jointers for laying putty between the joints of rubbed bricks in window arches.

On show also is the framed membership emblem of William J. Scott who joined the Operative Society of Bricklayers in 1895 as a member of the Cromer branch of the union.

Brick for a Day

1993 IN RETROSPECT

In 1993, the British Brick Society held a Spring Meeting in Luton and Ampthill and an Annual General Meeting in the Town Hall at Waltham Abbey with an afternoon coach excursion in west Essex and east Hertfordshire. There was no Autumn visit.

THE SPRING VISIT TO LUTON AND AMPTHILL

Members and guests assembled in Station Road, Luton, to begin a coach tour of brick buildings of the 1930s in Luton followed by an afternoon excursion to Houghton House and the town of Ampthill. Forty-seven had expressed an interest: only twenty-eight arrived on the day.

Four buildings were examined externally in the morning. The visit began with Midland Road Station, designed in 1937 and built between 1938 and 1940. The architect was William Hamlyn of the Midland Railway division of the Lodon, Midland Midland and Scottish Railway's architectural staff. At both churches, St Christopher, Round Green, and St Andrew, Blenheim Crescent, we were fortunate in being able to view the interiors also. St Christopher's of 1936 is by A.E. Richardshn; the earlier St Andrew's of 1931 by G.G. Scott. The final visit was to Luton Grammar School, where it was the privilege of both T.P. Smith and D.H. Kennett to receive the formative part of their respective extended educative experiences: it was clear from their comments that both had enjoyed their years at the school. The design was that of G.L. Torok, then a senior assistant architect with Marshall and Tweedy, of Newcastle-upon-Tyne and London; construction was supervised by J.L. Moore. The competion was held in 1936; the original building was opened in September 1938.

For this part of the day, a leaflet was prepared by T.P. Smith. I understand that D.H. Kennett has in preparation an extended account of these and other 1930s brick buildings in Luton for the October 1994 issue of British Brick Society Information.

After a most agreeable buffet lunch at 'The Old George', Silsoe, not a brick building, the party travelled to Ampthill. Here three visits took place: Houghton House, the town, and the site of Ampthill Castle.

Houghton House is a major Jacobean house, built in 1615 for Mary Sidney, Countess of Pembroke. In 1671 the house had 55 hearths, the third largest house in Bedfordshire and by this measure among the forty largest houses in England. Mainly of brick, with a service wing incorporating much local ironstone, the house has a double pile plan with corner turrets. Of seventeenth-century date is the south porch. Loggias were added to the west, possibly 1670-1700, and to the north, probably around 1764.

Ampthill is a timber-framed town, of four streets, with brick facades added to amny of the houses in the eighteenth century. Particular attention was paid to Church Street and Church Square. The latter has its west side of eighteenth-century brick houses. On the way to the site of Ampthill Castle, the group viewed timber-framed cottages with brick nogging built for the Ossory estate c.1790.

Ampthill Castle was a stone house which came into royal ornership in settlement of a gambling debt. Henry VIII liked the place and used it for a hunting lodge. He introduced brick repairs and alterations. The back of Ampthill Park, a brick house of 1694 designed for Lord Ashburnham, was seen from above.

Thanks are due to T.P. Smith and D.H. Kennett for their guidance on the day.

H.H. WILLOUGHBY

THE ANNUAL GENERAL MEETING
WALTHAM ABBEY AND DISTRICT

The 1993 Annual General Meeting was held in the Council Chamber of the Town Hall at Waltham Abbey, Essex. Afternoon visits followed to Hill Hall and St Michael's church, Theydon Mount; Rye House, Hertfordshire; and Nether Hall, Roydon, Essex.

The Town Hall at Waltham Abbey is an Art Nouveau public building c.1900: urban district councils were enacted in 1894 amd suitable civic buildings followed in the subsequent twenty years. No reference work known to this reviewer records the date of the structure at Waltham Abbey.

Sir Thomas Smith, diplomat and courtier of Elizabeth I's reign, erected the basic structure of the quadrangular Hill Hall between 1557 and his death in 1577. It is a brick house with a superimposed classical order on the inner faces of the great courtyard. There were eighteenth-century and later alterations. The building is undergoing restoration by English Heritage.

St Michael's church was built by Sir William Smith, nephew of Sir Thomas, in 1614 following a fire, caused by lightning, which destroyed the earlier church. This brick church - west tower, nave, south porch, chancel - contains tombs of various generations of the Smith family.

Rye House, Hertfordshire, was constructed by Sir Andrew Ogard. Work began in 1443 and was probably complete by Sir Andrew's death in 1454. The gatehouse is all that remains of a courtyard house of which a plan, elevation, and description were made in 1683. There is particularly elaborate corbelled brickwork under the oriel windows of the gatehouse. A full description of the building was published by T.P. Smith in his paper, 'Rye House, Hertfordshire, and Aspects of Early Brickwork in England', Archaeological Journal, 132, 1975, 111-150.

Nether Hall, Roydon, is the mutilated remains of a four-storey great gatehouse all thay survives from the forcible desctruction of the house in 1773. Thomas Colt was granted the estate in 1462 and died in August 1467 (not 1471 as is usually quoted). The house has not been studied in depth although brief accounts have appeared in the appropriate volumes of V.C.H. Essex and R.C.H.M. Essex. Being covered in scaffolding members were able to clamber over much of this usually inaccessible structure.

Helpful notes on these buildings were provided for members of the society by K.N. Brooks; the day's arrangements were undertaken by A. Corder-Birch. Our thanks are due to both.

DAVID H. KENNETT

THE BRITISH BRICK SOCIETY IN 1994

For 1994, the British Brick Society has arranged two Spring visits, an Annual General Meeting, and an Autumn excursion. Dates for members' diaries are:

23 April 1994	Marks Tey and Colchester, Essex Brickworks in the morning; town walkabout in the afternoon
21 May 1994	Bolton, Lancashire Town walkabout: morning and afternoon sessions
11 June 1994	Annual General Meeting Offices of Ibstock Brickworks, Almondsbury, near Bristol afternoon visits in Somerset
24 Sept 1994	Pershore, Worcestershire

Notice of the two Spring visits is included with this mailing of British Brick Society Information.

Plans for a coach tour visiting brick buildings in central Staffordshire are in hand for the Spring 1995 visit. The preliminary canvas of members suggested a response of around twenty to twenty-five people.

Future ideas for visits include town walkabouts in Wigan, Wolverhampton, and Bedford: not necessarily in that order.

Fig. 1 British Brick Society
Location of Annual General Meeting, Spring Visit, Autumn Visit 1984-1994

Under the present arrangements for decing the venue of the AGM, members have been asked to indicate a preference between Liverpool and Lincolnshire for the 1995 Annual General Meeting. Upon that choice will depend the the places or place for additional visits in 1995.

Suggestions for a venue for the 1996 AGM will be invited at the 1994 AGM in Bristol on 11 June 1994. If possible members might wish to make their suggestions in advance to the Hon. Secretary. The choice will then be made by members during 1994-95, for it to be announced at the 1995 AGM.

Members will see from the map that since 1984, the society has held meetings in Bedfordshire, Berkshire, Bristol (twice), Cambridge, Essex (three, plus 1982), Hampshire, Kent, Leicestershire, London, Middlesex, Oxfordshire, Shropshire, Staffordshire, Suffolk (twice), Worcestershire (twice), and Yorkshire (twice). It will be holding its first visit to Lancashire in 1994.

The Meetings Secretary Designate would welcome suggestions for visits, particularly for visits including interesting brickworks. Given the number of members in the county and adjacent ones, suggestions for visits in Surrey, Sussex, and Wiltshire would be particularly welcome.

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EARLY BRICK IN THE SOUTH-WEST

British Brick Society Information 55, March 1992, 25 has a query from Anthony J.T. Jaggard regarding Ince Castle, Cornwall, and early brick in the county. It includes a quotation from Sir Nikolaus Pevsner's volume, The Buildings of England: Cornwall, beginning:

> If the date of 1540 ... ... is correct, the building is of more than local interest (1).

Indeed so, but Prof. E.M. Jope questioned this dating over thirty years ago:

> It is repeatedly said, on the basis of the alleged Courtenay cartouche of arms (now obscured) over the entrance, that Ince was built by Peter Courtenay in the 1540s. Its symmetrical layout, with no hall, and its whole appearance, make this most improbable. Moreover, it is not mentioned by Carew in his Survey of Cornwall (1602); such a building could not possibly have escaped his notice, living as he did within sight of Ince. ... ... Further, he comments on the use of brick in Cornwall, saying it had been tried and given up (2).

For Ince Castle, Jope suggests a date in the early seventeenth century, and elsewhere ascribes the house to "about the 1620s" (3). His description is much fuller than Pevsner's, and includes a plan, a reproduction of Edward Prideaux's 1730s drawing, and two photographs.

Jope's discussion of early brick in the south-west is worth quoting in full, together with his footnotes:

> Brick was hardly used in the south-west before the late seventeenth century (4). Carew, discussing the "poore cottager", says it was tried and given up (5). He prpbably had in mind hearths and chimneys for which it had been used at Dartmouth in the 1430s (6). Leland (1539) records a "right fair house of bryke" at Stevenstone near Torrington (7). The earliest brickwork now traceable in Cornwall is at Ince which was entirely built of it about the 1620s. Similar bricks are used in a large dovecote of this period at Warleight, across the Tamar in Tamarton Foliot (3).

Jope's discussed examples also include Stowe in Kilkhampton, built of brick by John Greville, Earl of Bath, in 1680, and pulled down in 1739. There is a brief description based on Prideaux's drawing of c.1730, which is also reproduced (8).

The two references to the house near Torrington in Leland's Itinerary, read respectively:

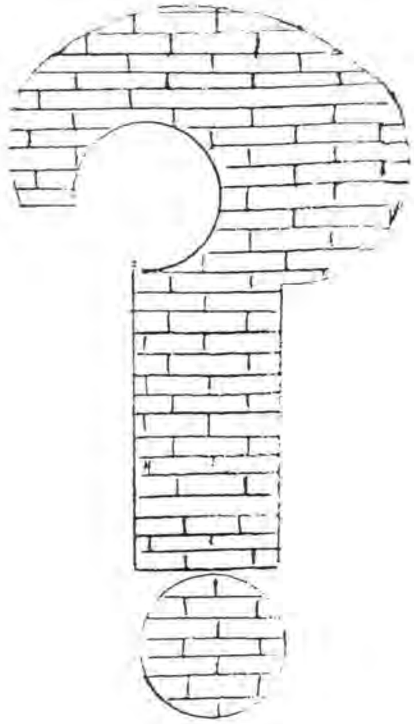
> There is an hamlet longging to Tarington toun not a mile est from Tarington caullid S. Gilys, wher George Rolles hath builded a right fair house of bryke.
>
> Mr. Rollys hath a very fair brik house at S. Giles half a mile by est out of Tarington (7).

Although I have some notes on Gray's Almshouses, Taunton, of 1635, the south-west is an area of which I have little personal knowledge - and of Devon and Cornwall none at all - but these references may be of value to those working in the area.

T,P, SMITH

Notes and References

1. The quotation from N. Pevsner, The Buildings of England: Cornwall, was included by the compiler.
2. E. M. Jope, 'Cornish Houses, 1400-1700', in E.M. Jope (ed.), Studies in Building History: Essays in Recognition of the Work of B.H.St.J. O'Neil, London, 1961, pp.192-220. this ref. pp.213-214.
3. Jope, 1961, p. 197.
4. (Jope's note 30) 'In 1692 bricks were being burnt at Heligan for Sir John Grenanne's house with coal brought from Fowey (accounts in County Record Office Truro).'
5. (Jope's note 31) 'R. Carew, Survey of Cornwall (1602; ed. F.E. Halliday, 1953).'
6. (Jope's note 32) 'H.K. Watkin, Hist. Dartmouth, I, 343/6; for 1596/7 see also B.H.St.J. O'Neil, in Archaeologia, 83 (1936), 144.'
7. (Jope's note 33) 'Leland, Itinerary, (ed. L.T. Smith, 1910(re-issued 1964)) I, 173, 300; W.G. Hoskins, Devon (1954), 276, 469; nothing of this date can now be traced there.'
8. Jope, 1961, p.215.



Brick Query Column

THE BRICK QUERY:
A SERVICE TO MEMBERS

From time to time the society receives queries about bricks, brickworks, and brick buildings.

To facilitate the dissemination of information these queries are printed in issues of British Brick Society Information. Some issues will be without a query list, either because none have been received or because the editor has only a single query to included.

Answers to queries are encouraged.

THE FERRO CERAMIC POTTERY COMPANY

There is an areas on the outskirts of Plymouth, within the boundary of Dartmoor National Park, which Ordnance Survey maps term as once the site of a ferro-ceramic mine. There is little recorded information on its activities. However, it is alleged that the quality of ore extracted was too poor for smelting and was consequently used in brick manufacture by The Ferro Ceramic Pottery Company.

The site is situated at the confluence of two rivers, the Meavy and the Plym. On the site is a ruin alleged to be a kiln ("M" on Fig.1)

I have a number of questions.

1: Would the ore have been suitable for brickmaking?

2: If so, would it have constituted the whole of the brick or simply been a colouring or facing element?

3: Is the building ruin likely to have been a kiln?

4: Would the building to be a kiln have required some substantial form of grate or furnace, with a chimney?

5: Was there such a company as The Ferro Ceramic Pottery Company?

There is evidence of a water wheel close by ("D" on Fig.1), capable of providing a source of mechanical energy for bellows/fan assistance.

There has been much speculation but little substantive fact about this site and its activities.

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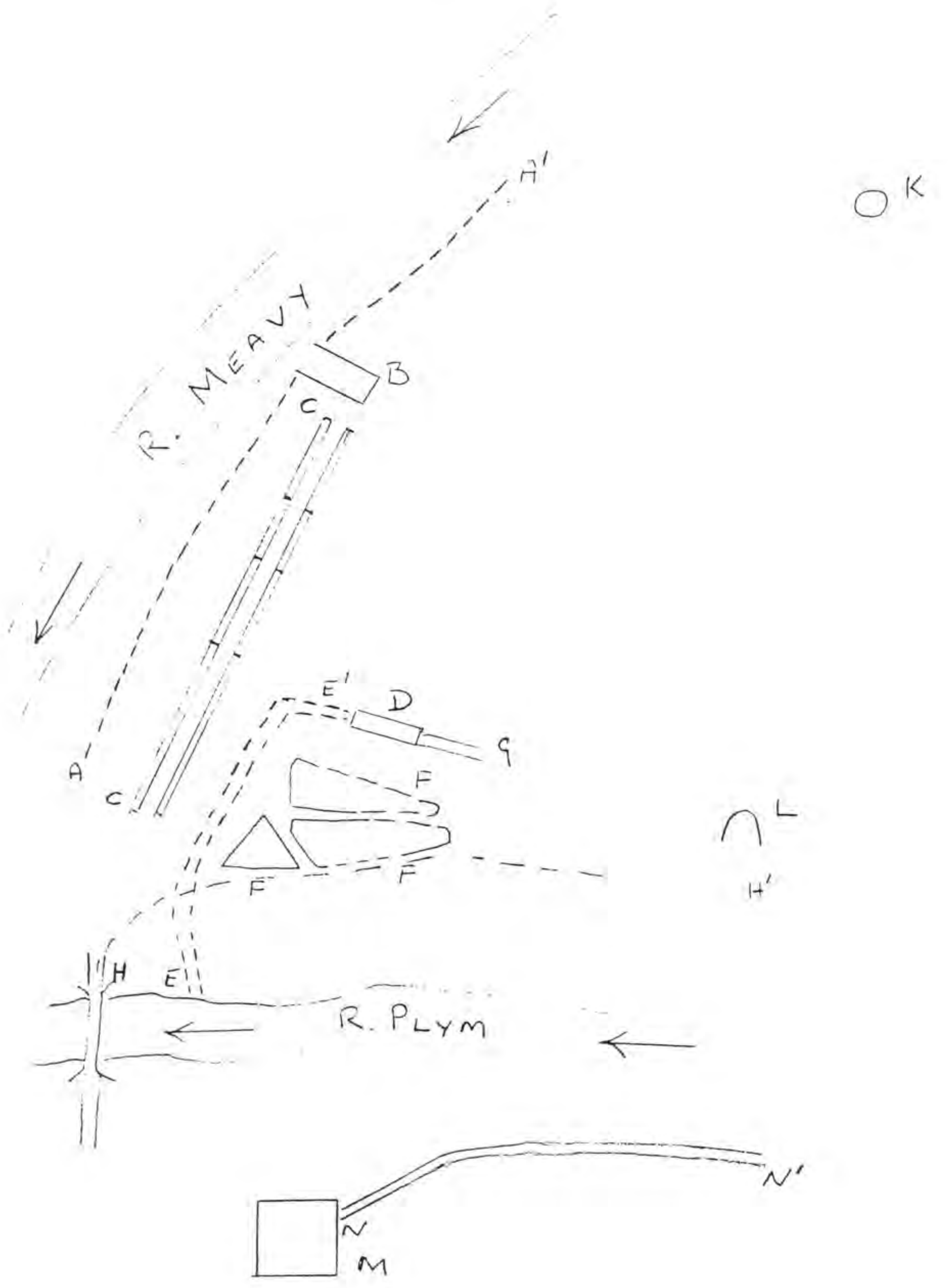

Fig. 1 The site of the Ferro Ceramic Pottery Company works near Plymouth
(Key overleaf)

Fig. 1 Key

Key

A.A' 8ft high granite retaining wall

B Stone-line depression, 9 ft wide, 27 ft long, 2 ft 6 in deep

C.C' 2 ft thick walls; 162 ft long, 5 ft high (reduced for safety ?); from C divided at 63 ft, 102 ft, 123 ft; vertical grooves 12 inches square inside the walls; horizontal grooves inside each wall, the full length 18 inches off the ground, 12 inches high, 6 inches deep (some form of flooring ?)

D Water wheel

E.E' Tail race

F Shallow pits (settling pits ?)

G Wooden launder supply

H.H' Path

K Shaft

L Mine adit

M Clay works, drying area

N.N' Slurry pipeline

A GAULT HANDMADE BRICK FROM NORFOLK

A gault handmade brick which in East Anglia could be variously described as a 'Suffolk White', a 'Costessey White', or a 'Holkham White' has in the frog:

CLAYTON & CO PATENT

This presumably refers to the maker. There is also:

W Hubbard E DEREHAM

who is thought to have been the builder who asked for the brick to be made.

Can any member supply any clues as to further information about this brick which has, presumably, some connection with the central Norfolk market town of East Dereham.

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