

# Modes of Production among Medieval Tilers

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*THREE ALTERNATIVE MODELS for the production of floor tiles in the 13th–15th centuries are discussed. Evidence is produced to support all three modes of production; itinerant, intermittent and settled. The significance of such variation is discussed.*

How effectively the medieval economy linked demand with goods and services, and which sectors of society were most actively involved in the market, are major questions for archaeologists dealing with the centuries before documentation becomes plentiful. It can be argued that in the 12th and 13th centuries most people still produced most of what they used themselves, and that access to markets was mainly limited to the wealthy members of society who used money to buy luxury goods. Alternatively, it has been suggested that by the 13th century the economy was relatively sophisticated, with most people's requirements being satisfied through the market. The second of these views has received support in recent years. Christopher Dyer, for example, has argued that peasants were dependent on a market system by the 13th century.<sup>1</sup> Using documentary evidence he suggests that professional carpenters were building peasants' houses from the second half of the 14th century and that these specialist services and the necessary materials were being paid for by the peasantry. Using the archaeological evidence for high standards of carpentry continuing through the 13th and 14th centuries, he suggests that this system was already established in the 13th century.

Dyer's approach raises the possibility that different modes of working, identifiable in the archaeological record, can be indicative of the nature of economic activity. Another useful idea has been proposed by Fernand Braudel, who distinguishes between the value of material things outside the market economy, which have what he calls 'use value', and that of articles within a market economy which acquire 'exchange value' and generate capital.<sup>2</sup> Archaeologists are very familiar with the idea of goods with prestige value being exchanged outside a market system. However Braudel, discussing the period 1400–1800, is concerned with small quantities of mundane goods. This paper considers the various modes of working adopted by medieval tilers, and the 'value' of the goods they made, as possible indicators of the nature of economic activity in this industry.

The modes of working usually attributed to medieval tilers are either itinerancy or settled production.<sup>3</sup> At one extreme itinerant working implies that craftsmen continually moved from one site to the next fulfilling a series of contracts. This type of working is most likely to involve a kiln being set up at a building site to make tiles for that building. In these circumstances the provision of materials and any substantial equipment would be the responsibility of the employer. The tilers would travel to the site, where fuel and other raw materials were also assembled. Capital expenditure was, therefore, made by the customer. A tiler working in this way could be paid in kind (in terms of food and accommodation) or in money, or perhaps both. Some entrepreneurial spirit would be required to organize successive contracts.

Tilers might alternatively work from settled tileries. Settled tileries had to arrange for the transport of their products to customers. They also needed good supplies of raw materials to enable long-term production. They depended on well-developed markets for an adequate demand, and needed capital or credit to pay for land, raw materials and equipment.

Many tilers probably worked on a part-time basis. Manufacturing tiles would have been difficult in winter. Those involved in experimental work have noted several problems including controlling kiln temperatures, accumulating sufficient dry fuel, drying ceramics before firing and protecting them from frost.<sup>4</sup> Certainly both brickmakers and layers are known to have stopped working in winter,<sup>5</sup> and there is extensive documentary evidence for masons ceasing building work in bad conditions.<sup>6</sup> Seasonal working is eloquently demonstrated at the 13th-century kiln site of Laverstock in Wiltshire where flooding would have prevented production in wet weather.<sup>7</sup>

The length of the working year may have varied according to levels of investment in different industries. Blanchard argues that lead miners only worked in this occupation for short periods of the year. He suggests that the one to two tons of ore mined annually per man was equivalent to only one or two months' work, and that most miners would also have been fully involved in agricultural life.<sup>8</sup> However, Hatcher argues that tin mining was a very different operation which was run on a large scale and highly capitalistic basis, with a marked distinction between capital and labour.<sup>9</sup> He suggests that these miners would have worked on a much more full-time basis, holding little in the way of land, particularly when the demand for land was high.

The length of the working year among tile makers is not known although some idea is given by an Act of Parliament of 1477 which laid down that clay to be used for tile making was to be dug by 1 November, turned before the beginning of February, and not made into tiles before March.<sup>10</sup> It is possible that tilers and other ceramic producers spent the winter attending to other aspects of their trade. However, the difficulties of transporting goods in winter may have made this impractical. Floor tilers are sometimes argued to have spent the summer making tiles and the winter laying them, but may have had problems getting mortar to dry in winter months. Employment for part of the year in other occupations, particularly agriculture, is likely among tilers, and is documented at Penn in Buckinghamshire.<sup>11</sup> Animal husbandry, in which the bulk of the work involves feeding and falls in the winter

months, might have been particularly appropriate for those involved in seasonal industries. Tilers with one or more other occupations are likely to have worked within a fairly limited geographical area.

The implications of these various modes of production are far-reaching. Itinerant tilers travelling long distances suggest that supply was limited, with markets and transport insufficiently developed to distribute goods. Where tilers worked from settled sites, on the other hand, the markets must have been stronger and more sophisticated and either access to the resources necessary to set up in production were more widely available, or those who had raw materials and capital wished to make use of them. Part-time involvement in tile production or other crafts could have been an advantageous mode of working. Having some interest in a craft outside agriculture could alleviate the effects of bad harvests, as well as providing a means of obtaining cash with which to pay for other goods, services and taxes. As far as the consumer was concerned, however, this mode of working would be localized and might severely limit the supply of goods.

How far can these different modes of working be recognized in the archaeological record? The manufacturing techniques used in the production of decorated medieval floor-tiles can, in theory at least, provide evidence for distinguishing between itinerancy or settled production.

#### ITINERANT WORKING

That medieval craftsmen worked itinerantly has been inferred from documentary sources which are mainly concerned with masons. These have been considered in detail by Knoop and Jones,<sup>12</sup> Salzman<sup>13</sup> and Colvin.<sup>14</sup> The sources comprise the building accounts of a relatively small number of sites, the majority of which date to the later 14th and 15th centuries. They are mainly concerned with royal works, particularly the Palace and Abbey of Westminster, Vale Royal Abbey, Beaumaris, Caernarfon, Windsor, Rochester and Sandgate Castles, Eton College and King's College, Cambridge. Salzman makes an important distinction between royal and other building projects.<sup>15</sup> Royal works, such as castles and bridges, would often be needed urgently and built as quickly as possible, and so may have led to the concentration of craftsmen from a wide area to ensure speedy completion. The construction of religious houses, in contrast, continued over much longer periods of time. The gazetteer of church building works provided by Richard Morris shows that many church building projects extended over several decades and would have enabled long-term employment.<sup>16</sup> Gilyard-Beer argues that the masons working on the 13th-century building project at Guisborough Priory in Cleveland saw this site as providing steady work for more than one generation of their craft.<sup>17</sup> More than twenty masons and carpenters are known to have worked here. They were very much part of the local community, owning property in and around the town, and bringing their families up there. The master mason, Adam Horner, was buried in the Priory Church. It is questionable, therefore, how far some of the documentary sources regarding itinerant masons are relevant to tilers, particularly in the 13th century.

Archaeological evidence has also been used to suggest itinerancy. The assumption is made that when the tilers moved from one site to another they would use the same set of stamps to make tiles at both sites. These stamps, usually made of wood, were used in tile manufacture to make an impression of the design on the clay quarries. A stamp was cut so that a reversed version of the design stood out in relief; it was pressed on to the red clay quarries, on which the design would appear as a depressed area, the right way round. The depression was usually filled with white clay (inlaid), the whole surface was covered with glaze and the tile was fired in a kiln. The same stamp was therefore used in the manufacture of a large number of tiles. Where it is found to have been used on tiles at different sites the tiles are likely to have been produced by the same tilers.

Of course tiles made using the same stamps on several sites might be made from a settled tiler and delivered to those sites. However, where tiles found at different *kiln* sites are thought to be made using the same stamps the argument for itinerancy grows stronger, although there are other possible explanations. Most obviously, stamps, like other pieces of equipment, might be sold or perhaps given away. It is not certain whether the stamps would have been the property of the tilers or of their employers. Similarities in aspects of manufacture other than the use of the stamp would, in these circumstances, support the argument for itinerancy.

One of the major difficulties of identifying accurately tiles made using the same stamps is that design ideas were copied very widely among medieval tilers and other craftsmen. This is demonstrated by the sixteen versions of the de Clare arms and 63 versions of fleur-de-lis designs in the British Museum collection, which includes tiles from sites all over the country,<sup>18</sup> or by the long list of sites with similar designs to tiles made at Nash Hill in Wiltshire.<sup>19</sup> These 'Wessex' designs were extremely popular in the 13th century. Work on the tiles from Bordesley Abbey, near Redditch, in Hereford and Worcester, provides a detailed instance in which fashionable designs have been adopted by two separate workshops.<sup>20</sup> One group of tiles from this site is remarkably similar in design to some of the Nash Hill types, but in no case was the same stamp used and although the tiles were inlaid, other aspects of manufacture varied. The widespread use of similar designs on medieval tiles makes comparisons based on design alone very difficult. In these circumstances comparisons of stamp impressions have to be made with care and this is not possible from drawings reduced for publication.

Different modes of working may also be identifiable from the level of investment and layout of production sites. Kiln sites used in itinerant production might be expected to be less substantial than those of their more settled counterparts. This would be modified, however, by the need for settled tileries to bear their own production costs. Among itinerant tilers, where materials were provided by the customer, this may have been a less pressing consideration.

Where kiln sites are not known, itinerancy is more difficult to establish. However, where it can be shown that different clays were used to make quarries impressed with the same stamp, the tiler(s) could again be argued to be moving around, since tilers moving from site to site are unlikely to take clay with them. The use of the same stamp with different clays does not, of course, necessarily denote

itinerancy. A settled workshop supplying a number of sites might use several clay sources. The argument for itinerancy would be strengthened where tiles from more than two sites were made using the same stamp but varying in clay type.

Several studies involving the use of scientific techniques to analyse clays have been carried out in order to investigate such possibilities. The results of such analyses are, however, often difficult to interpret because of the problem of deciding where differences in chemical composition can be attributed to variation in a single clay source or can be considered geographically separate. It is perhaps for this reason that such techniques have been more successful at showing where tiles of the same fabric occur at different sites, thus discounting the possibility of itinerancy. Vince's work on the pottery and tile fabrics from the Severn Valley shows, for example, that tiles at Gloucester Cathedral and Malvern Priory, which were made using the same stamps, were also made of the same fabric.<sup>21</sup> This is supported by Eames, who notes that tiles from both sites are found with and without cracks in the stamps. Cracks often developed in wooden stamps after they had been in use for some time. These cracks leave a line of body clay across the design on the finished tile. Where a whole stamp is used at one site, and it is cracked at another, the order in which the tiles were made is clear. Since tiles with and without cracks appear at both Gloucester and Malvern, Eames concludes that they were made at the same time.<sup>22</sup> In another case analysis of later 14th- or 15th-century tiles made with the same stamps from Bordesley Abbey, Hereford and Worcester, the Dominican Friary at Worcester, Hailes Abbey, Gloucestershire, and the Carmelite Friary, Bristol, suggests that despite their wide distribution the tiles were made of clay of similar composition.<sup>23</sup>

One further indication of the activities of itinerant tilers could be the distribution patterns of their products. While the products from a settled tiler might be expected to cluster in an area around the tiler or be distributed along adjacent waterways, tiles made on an itinerant basis might have a more linear distribution pattern and be spread over much greater distances.

Detailed work on tiles and fabrics from all relevant sites is, therefore, required in order to distinguish between different modes of production. The following cases where itinerancy is a possibility show some of the intricacies involved.

A kiln and tile pavements thought to date to the early 14th century have been excavated at the Augustinian Priory at Norton, Runcorn in Cheshire.<sup>24</sup> Decorated tiles were certainly made at Norton. A few tiles using the Norton stamps but a different clay were also identified at the church of the Austin Friars at Warrington, 8 km away.<sup>25</sup>

Superficially this suggests that the tilers were working on an itinerant basis. However, differences in the manufacture of the Warrington tiles show that they are not the work of the Norton craftsmen. They are of far inferior quality, no white slip is used, the glaze is less robust, and unlike the Norton tiles the sides of the tiles are not bevelled. It has been suggested that a less experienced member of the group of tilers working at Norton took some of the stamps to Warrington to set up business on his own.<sup>26</sup> Another explanation might be that the stamps were sold or given to the neighbouring house after they had been used at Norton.

The main group of tilers working at Norton Priory are also argued to have been itinerant. The tiles involved are an elaborate series, made using a variety of unusual techniques. They include a Temptation panel and an *opus sectile* lion; this is a mosaic in which several irregular shaped tiles are fitted together to make the picture of a lion.<sup>27</sup> These are very similar to tiles at Warden Abbey and her daughter house, Sawtry Abbey, both in Bedfordshire, and Prior Crauden's chapel at Ely Cathedral, Cambridgeshire. Tiles of this type were certainly made in the kiln at Norton Priory while manufacturing debris at Warden suggests that tiles were also made there.<sup>28</sup> Patrick Greene has proposed a sequence for the production of these tiles at each site, with work at Norton in the early 14th century, then at Ely, and then at Warden between 1324 and 1330.<sup>29</sup> If these tiles were produced on an itinerant basis, it is clear that the tilers were travelling long distances.

The strong similarities in style and decorative technique noted by Greene might indeed suggest that all these tiles were made by the same tilers. However the parallels are much closer between the Warden and Ely pavements than with the possibly earlier and definitely cruder Norton Priory tiles.<sup>30</sup> There is as yet no clear evidence for production at the other East Anglian sites.

Caution is required when considering itinerant production at these sites because most of the techniques involved the use of templates or were applied by hand, rather than made using intricately carved stamps. Similarities of design (rather than the use of the same stamp) might be explained by the circulation of drawings or pattern books, rather than itinerant tilers. In fact one of the tiles at Norton suggests that drawings were sometimes used. This is a rectangular calendar tile in which pin pricks have been made round the outline of the drawing. The design could then be drawn on the tile using a 'join-up-the-dots' method. A similar technique was used in medieval fresco work, in which the design was drawn as a cartoon, pin holes were made round the outlines of the main figures, and charcoal dust was pushed through the pin holes on to the wall.

An earlier instance of itinerancy has been suggested by Christopher Norton for the tiler(s) responsible for the late 12th- or early 13th-century pavement in the Chapter House of St Albans Abbey.<sup>31</sup> Similar relief-decorated tiles are also known from Hertford Priory and Wymondham Abbey, 20 km and 135 km away respectively. Norton suggests that the distances involved, particularly to Wymondham, and the lack of waterways for transport argue for the work of itinerant tilers. He also notes that Hertford and Wymondham were both dependencies of St Albans. Itinerancy is clearly a possibility in this case, but the close links between the houses may have meant that overland transport was available for other reasons. Moorhouse has noted that long distance imports of pottery to Sandal Castle could be explained by the movement of members of the Warenne family between their scattered estates.<sup>32</sup>

The distribution of 13th-century ceramic mosaic pavements on sites in NE. England has led to the suggestion that itinerant tilers were also working in this region.<sup>33</sup> The suggested sequence for the tilers' operations is based on the idea that the variety and complexity of the pavements increased from one site to the next. As in the case of Norton Priory and Warden Abbey, stamps are only rarely used to impress

a design on these tiles. However detailed work on the methods used to cut out the tiles and in some cases mark their sides shows that the same tilers were involved in production at several sites.

In another instance it has been argued that itinerant tilers moved from production at Henry III's palace of Clarendon in Wiltshire, to an independently owned site at Nash Hill, Lacock, Wiltshire.<sup>34</sup> The tiles are decorated with inlaid designs, a technique thought to be introduced from France. The movement of tilers from Clarendon to Nash Hill has been seen as indicative of the way in which the tradition of making inlaid tiles spread across S. England in the 13th century.<sup>35</sup> It was thought that two designs at Nash Hill<sup>36</sup> were made with the same stamps as those found at the Clarendon kiln.<sup>37</sup> Recent republication of the Nash Hill designs must, however, cast doubt on whether or not the same stamps were used at these sites and thus whether the same tilers were involved.<sup>38</sup> A further problem with the interpretation of the Clarendon and Nash Hill tilers moving from one site to the other is one of dating. Although tile production at Nash Hill is difficult to date accurately, it is thought that tiles were being made here about 50 years after those at Clarendon. It seems unlikely, given this timescale, that the same tilers were involved.

It is notable that the most likely cases of itinerancy outlined above involve high-quality pavements supplied to large ecclesiastical or royal estates in the 13th and early 14th century. The evidence from kiln sites on estates suggests that production in these circumstances was subject to very different constraints to those encountered by tilers working independently.<sup>39</sup> The cost of production appears to have been of secondary importance to the quality of the product. Raw materials, transport and support in other technologies such as metal working would have been readily available and their cost may well have been absorbed by the estate.

#### INTERMITTENT PRODUCTION

There is some, albeit slight, archaeological evidence to indicate that between the extremes of itinerant and settled tileries there existed a level of intermittent production in which the location of the production site remained constant but was used on an irregular basis. This is suggested by a number of excavated roof, floor or pottery kiln sites in which the kilns were replaced at intervals, often on the same spot. Nash Hill, where a sequence of four kilns was excavated, is one of these sites.<sup>40</sup> Others include Meaux in Yorkshire where two kilns producing roof-tile were built on top of the floor-tile kiln;<sup>41</sup> Haverholme Priory, Lincolnshire, where three kilns overlay one another;<sup>42</sup> Binstead, East Sussex, where four building periods and several kilns were identified;<sup>43</sup> and at Little Brickhill in Buckinghamshire,<sup>44</sup> and Shulbrede Priory in E. Sussex,<sup>45</sup> where successive kilns were also found.

These rebuildings have usually been argued to show that kilns did not last very long. Eames has suggested that a tile kiln would not have lasted longer than about four years, even with regular repairs,<sup>46</sup> and at Laverstock, Wiltshire, a life of about five years for each of the pottery kilns was thought likely.<sup>47</sup> However, more recent excavations, at the Danbury tilerly in Essex, have suggested that the working life of a kiln of similar structure to those mentioned above could be much longer than four or

five years.<sup>48</sup> Kiln 1 at Danbury is thought to have been in use for between 40 and 60 years and showed no sign of serious deterioration. Experimental work has suggested a life expectancy for kilns of twenty years.<sup>49</sup> It is possible that differences in the working life of kilns reflect different modes of working by the craftsmen.

Few of the sites on which kilns were replaced have been published in detail or investigated beyond the actual structure of the kilns. The most detailed information comes from the rescue excavation of the four kilns thought to date from the late 13th century at Nash Hill.<sup>50</sup> The earliest of the kilns was thought to have been used for roof tile, the next two for pottery, while the last was associated with large quantities of pottery and floor tile. The excavator suggested that each of the kilns may have been in use for only three or four years, with little time elapsing between phases. The range of products was wide, including roof furniture, with crested ridge tiles, chimney pots and bird-like objects, unglazed, plain glazed and decorated floor tile, and all the major types of pottery vessels, especially cooking pots, bowls and jugs. The little available documentary evidence suggests that the site was an independent operation, rather than being owned by a monastery or large secular estate. The floor tiles made at Nash Hill were used at two local abbeys (Lacock and Stanley) which are 2 km and 5 km away respectively.<sup>51</sup> In their interpretation of the site, the excavators saw the pottery and tiling activities at Nash Hill as quite separate industries, organized in different ways and carried out by different people. The pottery is thought to have been produced by local people, while the tiles are argued to be the work of itinerant tilers, using the facilities of the potters for a short time.<sup>52</sup>

This interpretation depends upon a sharp division between the product types and the successive kilns; something which is not entirely supported by the excavation. An inlaid tile found in the structure of the earliest kiln suggests that decorated tiles were already being produced here.<sup>53</sup> Continuity in production methods might also be indicated by the similarity between the phase 1 and phase 4 kilns, which were identical, and by the pottery which was of the same types and fabrics from all phases.<sup>54</sup> It seems unlikely that tilers arriving here would have built their kiln on the same spot as established potters.

An alternative view of the Nash Hill site is to see the same people involved in producing a wide range of products, but working on an intermittent basis. It seems possible that sites at which kilns were abandoned and subsequently rebuilt were integrated into agricultural cycles. Experimental work has shown that the successful firing of kilns depends upon a supply of small, dry wood which will burn quickly producing a high temperature.<sup>55</sup> This type of wood is one of the products of coppice woodland which was harvested at regular intervals. Rackham has estimated that the average coppicing cycle before 1400 was 6.5 years.<sup>56</sup> Coppicing cycles tended to lengthen and become more regular through the medieval period, with a seven-year rotation in the 14th century lengthening to ten or eleven years in 1584 and fifteen years in 1765. In some circumstances the most effective way of utilizing this woodland resource may have been to build temporary kilns near areas of coppice and abandon them once the supply of suitable wood was used up. When the area was coppiced again it may have been easier to rebuild from the foundations rather than trying to resuscitate the old kiln. Crossley notes the close relationship between

post-medieval pottery kilns and the availability of coppice woodland in some regions.<sup>57</sup> He suggests that the location of these kilns would also be influenced by competition from other industries, such as iron working, which required quantities of coppice for making charcoal. Gooder points out that in the Nuneaton area clayworkers' pits and many kilns are sited along hedgerows thought to date from the 13th century, thereby minimizing interference to agriculture.<sup>58</sup> The shifting kiln sites excavated at Chilvers Coton, Nuneaton,<sup>59</sup> may have been a response to the availability of raw materials modified by competition for land for farming. Blanchard argues that the shifting pattern of medieval lead production could be explained in this way.<sup>60</sup> These industries, located in close proximity to sources of raw materials, were also dependent on access to markets. However the change in products witnessed at Nash Hill and other sites shows that some flexibility in what was produced was possible.

#### SETTLED PRODUCTION

More settled and permanent modes of production would be indicated archaeologically by the occurrence of tiles using the same stamps, clays and manufacturing techniques at more than one consumer site. Kiln sites used in settled production would be in operation for longer periods than those of itinerant tilers, and ancillary buildings such as workshops and drying sheds would probably be more substantially constructed and purpose-built. Settled tileries are also likely to be larger, perhaps with more than one kiln in operation, and have a greater capacity for the storage of clay, fuel and finished goods. Some attempt might be made to extend the length of the working season at these sites or to expand the range of products in order to appeal to a broader market. The distribution of products from settled tileries would tend to cluster around the production centre.

A major difficulty faced by such industries would be the need for continued access to both raw materials and markets. In an itinerant system of production people moved to their customers and raw materials. Among settled tileries the expense and capabilities of available forms of transport would be important factors in their long-term viability. Water transport has long been seen as the cheapest way of moving heavy goods like building materials in the medieval period. However recent studies suggest that the feasibility of moving such goods overland may have been underestimated. Harrison's work suggests that there was a well established and extensive network of roads and bridges by 1300.<sup>61</sup> Langdon has argued that a widespread change from ox- to horse-drawn vehicles had taken place by the early 14th century, allowing smaller loads to be carried twice as quickly as previously.<sup>62</sup> Langdon estimates that a horse-drawn vehicle could pull a load of about one ton. A square floor tile measuring 13.5 cm across, typical of a type made in Nottingham in the 14th century, weighs about 0.75 kilo. If 1,270 of these tiles represent the maximum horse-drawn load they would pave an area of about 23 m<sup>2</sup>. While this would be an insignificant area in an abbey church it would go some way to providing the flooring of the chancel of a parish church or the hall of a manor. The market for floor tiles expanded from the beginning of the 14th century to include smaller sites

such as manors and parish churches.<sup>63</sup> The use of horses may have been important to small producers, augmenting more traditional forms of transport and extending the range over which goods could be distributed from a settled base.

Danbury, in Essex, is an excavated example of a small settled tiliary.<sup>64</sup> One of the kilns found here continued in use from 1275/85 to 1325/35, with a second kiln in the enclosure in use for part of the time. Three ancillary buildings were identified. The kilns and buildings suggest considerable capital investment. Hearths in one of the buildings, and the location of the drying shed to take advantage of the warm air from one of the kilns, could be indications of attempts to lengthen the working year. Both roof and floor tile was made here. The site chosen by the tilers at Danbury lies in an area of poor agricultural land with good access to raw materials and located midway between a small market town and a port. Decorated tiles were distributed to several sites over a distance of 20 km, with some products travelling further afield. Tiles from Danbury on the site of a royal manor at Virginia Water in Windsor Great Park are most likely to have been redistributed through the port of Maldon at the head of the Blackwater estuary.<sup>65</sup> This distribution pattern compares well with that for roof tile<sup>66</sup> and contrasts with the very local distribution from Nash Hill.<sup>67</sup> It is not known why the tiliary at Danbury eventually failed but competition from larger industries operating over longer distances, such as Penn in Buckinghamshire and Tyler Hill in Kent, is one possibility.

The difficulty of maintaining production from a settled base is perhaps illustrated by changes in the mode of production adopted by a group of late 13th-century tilers in the Garonne valley in France. Christopher Norton suggests that here a settled tiliary supplying sites in and around Bordeaux may have become itinerant once the demand in the Bordeaux area was filled.<sup>68</sup> The reuse of old designs and introduction of new ones at a series of sites suggests that the tilers moved upstream, supplying sites around Toulouse, before travelling to Lagrasse, Narbonne and Montpellier near the S. Coast.

Fourteenth-century tile distributions in the NE. Midlands of England might be explained in a similar way, or perhaps by tilers based at settled workshops setting up temporary kilns to fill individual orders at more distant sites. In the 1890s John Ward noted that tiles of the same designs had been found on several sites in this area. In a series of articles he compared tiles from Lenton Priory in Nottinghamshire with examples from Dale, Nottingham and Repton and concluded that they had been made by tilers travelling from site to site.<sup>69</sup> However more recently the fabrics of tiles from these and other sites, including Nottingham, Repton Priory, Dale Abbey, Lenton Priory, Beauchief Abbey, Beauvale Priory, Ulverscroft Priory and Chilvers Coton, have been examined using neutron activation and multivariate statistical techniques with less conclusive results.<sup>70</sup> Kilns are known from Nottingham, Lenton Priory, Dale Abbey, Repton Priory and Chilvers Coton. Unfortunately many of these kilns were excavated either a long time ago, or under rescue conditions, and the association of tiles and kilns is not always certain. The dating of the tiles is insecure but generally placed in the 14th century. Analysis of the tile fabrics showed that while site-specific clay sources could be identified at Chilvers Coton and Repton, tiles from Nottingham and the surrounding area, including Lenton, Dale, Beauvale

and Beauchief, were allocated to several compositional groups, each of which occurred at a number of sites.

Complex changes in the supply of tiles is also suggested at Bordesley Abbey, Hereford and Worcester, where fourteen different tile production groups, spanning three centuries, were identified.<sup>71</sup> Neutron activation of a sample of these, plus some comparative material, provided much useful information about the likely place of manufacture of different groups of tiles, but the results did not demonstrate any clear case of itinerancy. A group of late 13th-century tiles, made using the same stamps from Bordesley Abbey church, the adjoining chapel of St Stephen's, Hailes Abbey in Gloucestershire, and Kenilworth Castle and Priory in Warwickshire, were not made from identifiably different clays at each site. Several clay sources appear to have been used, which cross-cut the various sites.<sup>72</sup> Slight differences in the manufacture of these tiles do suggest they were made as a series of separate orders. Although the mobility of the tilers is uncertain it is likely that they were working on a commercial basis. Commercial production by professional tilers is probable at a similar date in Essex and the S. Midlands.<sup>73</sup>

A characteristic of several settled medieval tileries of the 14th and 15th centuries is that they produced a range of ceramics, possibly in an attempt to broaden their market base.<sup>74</sup> Consequently, in this period, the modes of production of different types of ceramics are not discrete. Floor tile, particularly decorated tile, was probably a sideline in these amalgamated industries, but has received more attention because of the greater possibility of establishing chronologies and identifying distribution patterns. Little is known about the early production of roof tile. Excavations of a few roof tile kilns on monastic sites, for example at Meaux Abbey in Humberside,<sup>75</sup> Haverholme Priory in Lincolnshire,<sup>76</sup> and Shouldham Priory in Norfolk,<sup>77</sup> suggest that it was fired as a single product in a similar way to floor tile, but the dating for these sites is insecure. At Meaux the roof tile kilns were later than the earlier 13th-century floor tile kiln.

However, not all later, settled, industries were large scale or produced a wide range of products. A roof tilerly was set up on two adjoining tofts in the later 15th-century village of Lyveden in Northamptonshire.<sup>78</sup> The land had previously been in agricultural use and the longhouse on one of the tofts served as both home and workplace. The extent of product distribution is not known. The 11th/12th-century iron smelting complex and 13th-century potting industries also sited at Lyveden demonstrate that there had been a long tradition of industrial activity here. The establishment of such a tradition and the customs which would accompany it may have been as important a factor in the siting of these industries as either the accessibility of raw materials or markets.

Although frequently combined with the production of roof tile and pottery in the 14th and 15th centuries, floor tile rarely appears to overlap with brick production.<sup>79</sup> T. P. Smith has looked at the documentary evidence for brickworks and notes the frequency with which production sites are located close to consumers in the 14th and 15th centuries.<sup>80</sup> In several cases both brickworks and roof tileries were sited in or on the edge of towns. Some of these were municipal works, such as the Vicars Choral and Carmelite tileries at York<sup>81</sup> or the corporation brick industry at Hull.<sup>82</sup>

These sites were either leased or worked using directly employed labour. On rural sites brickworks were often related to a major building project, perhaps also supplying other sites in the vicinity.<sup>83</sup> These works were not necessarily short-lived. The 14th-century building works for Ralph, Lord Cromwell, contained at Tattersall in Lincolnshire for 40 years.<sup>84</sup> At least two kilns owned by Lord Cromwell were used to provide bricks for Tattershall. This dependence on one major building project may also be relevant to the documented 14th-century tilerly at Penn in Buckinghamshire. Cherry points out that the expansion of this industry from the middle of the 14th century may have been a consequence of the royal building works at Windsor.<sup>85</sup>

Differences in the modes of production adopted by brick and tile makers are, however, also apparent. These are highlighted by the extensive 16th-century documentation relating to Hampton Court recently studied by Musty.<sup>86</sup> Bricks were made at the Palace when large quantities were required or local brickmakers were unable to provide them. Thus bricks were made on site when building first began by a brickmaker who had worked on other royal building projects. A number of local suppliers working within ten miles of the site took over from 1529, with one of their number acting as both producer and wholesaler — making bricks himself as well as organizing production elsewhere. When he disappears from the records bricks are bought in from a number of suppliers. Some of the more distant of these travelled to Hampton to work on site for periods of at least two or three months a year. Subsequently all bricks were once again supplied by brickmakers in the more immediate vicinity of the site. Tiles, by contrast, were not made on site at any time but supplied throughout by a number of local producers. These suppliers might perhaps be comparable with the firmly settled tileries of 15th-century Hampshire.<sup>87</sup> Brick production at Hampton Court seems to have occurred when demand outstripped the capacity of local suppliers, or the organization of local manufacturers was disrupted for some reason.

The much greater volume and weight of brick than tile in a building project means that comparisons between masons and brickmakers may be more appropriate than between masons and tilers. However changes in the perception of different building materials from high-status to mundane goods may also have been an important factor in the timing of changes in modes of production. Cases where craftsmen travelled from very long distances or came from overseas occur on the most prestigious sites when the materials involved were newly fashionable. Similar patterns of working among tilers and brickmakers may therefore be discernible at different times. Continental tilers are thought to have travelled to the royal palace of Clarendon in the earlier 13th century, and to have supplied Canterbury at the turn of the 14th century.<sup>88</sup> In perhaps not dissimilar circumstances bricklayers were brought from East Anglia in the later 14th century to work at Kirby Muxloe in Leicestershire, and on the country house of the magnate William, Lord Hastings.<sup>89</sup> Comparable arrangements may apply to some of the brickmakers working on the house, college, school and almshouses at Tattershall in Lincolnshire.<sup>90</sup>

## CONCLUSIONS

The modes of working adopted by tilers in the earlier 13th century are still unclear. Tile production occurred on rural estates and almost all our examples are from monasteries. Many religious houses and some high-status secular sites were supplied with newly fashionable, good quality floors at this time. One possibility is that these were supplied by itinerant tilers, working professionally, moving from one site to the next. Some of these tilers may have had continental origins. This would suggest that access to tiles was limited by supply rather than demand and that customers were forced to set up their own production sites to satisfy their needs. The response of the market to demand in these circumstances must be described as cumbersome and contrasts with the level of peasant involvement discussed by Dyer.<sup>91</sup>

There are, however, other possibilities which have been given much less consideration than itinerancy. One of these is that tilers at this time were rarely independent, professional craftsmen but members of religious communities. Religious houses had the necessary resources for manufacture, and the Cistercians in particular were well placed to exploit those resources, with an ideology advocating self-sufficiency and large numbers of lay brothers to put it into practice. Monastic houses were clearly involved in other industrial activities, as shown by the metal-working sites at Norton Priory in Cheshire<sup>92</sup> and Bordesley Abbey in Hereford and Worcester.<sup>93</sup> A lone reference to tile production by a member of the Cistercian house of Beaubec in Normandy has been discussed by Norton.<sup>94</sup> Active participation by monasteries in tile production might also be suggested by the Latin labels and Arabic numerals scratched on to tiles at Warden Abbey,<sup>95</sup> and by the likely inspiration from manuscripts for some tile designs.<sup>96</sup> Production carried out in this way would operate outside, or without, a market economy and, in Braudel's terms, the tiles would only have use value.<sup>97</sup>

A further possibility is that 13th-century monasteries specialized in some industrial activities, supplying themselves and other sites in exclusive exchange networks. Monasteries may have been particularly involved in producing high-status goods. This would argue for a much more active economic role for monasteries, perhaps also insinuating that their secular counterparts were relatively disinterested in production.

In several regions professional tilers running small, sometimes part-time, commercial tileries become apparent in the archaeological record in the last quarter of the 13th century. This suggests a much wider recognition of the exchange value of these goods from this time. Should this new generation of tilers be seen as responding to new opportunities for successful investment in small-scale production, or were they instead desperate for alternative occupations to alleviate the adverse conditions in agriculture? It seems that some late 13th-century workshops were relatively short-lived, perhaps forced to move on or give up as local markets became saturated, local supplies of raw materials became exhausted or the competition for either markets or materials became overwhelming. The smallest of these producers may have filled gaps between the bigger building projects by selling their goods through several local markets or peddling them directly to customers in their close vicinity.

These industries contrast with the more settled producers of the later 14th and 15th centuries. It seems possible that periods in which tilers were most flexible and innovative in their response to the market were those in which times were hardest. Production in better times may in contrast have been more cautious, and more closely oriented to secure urban markets or large building projects.

## NOTES

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