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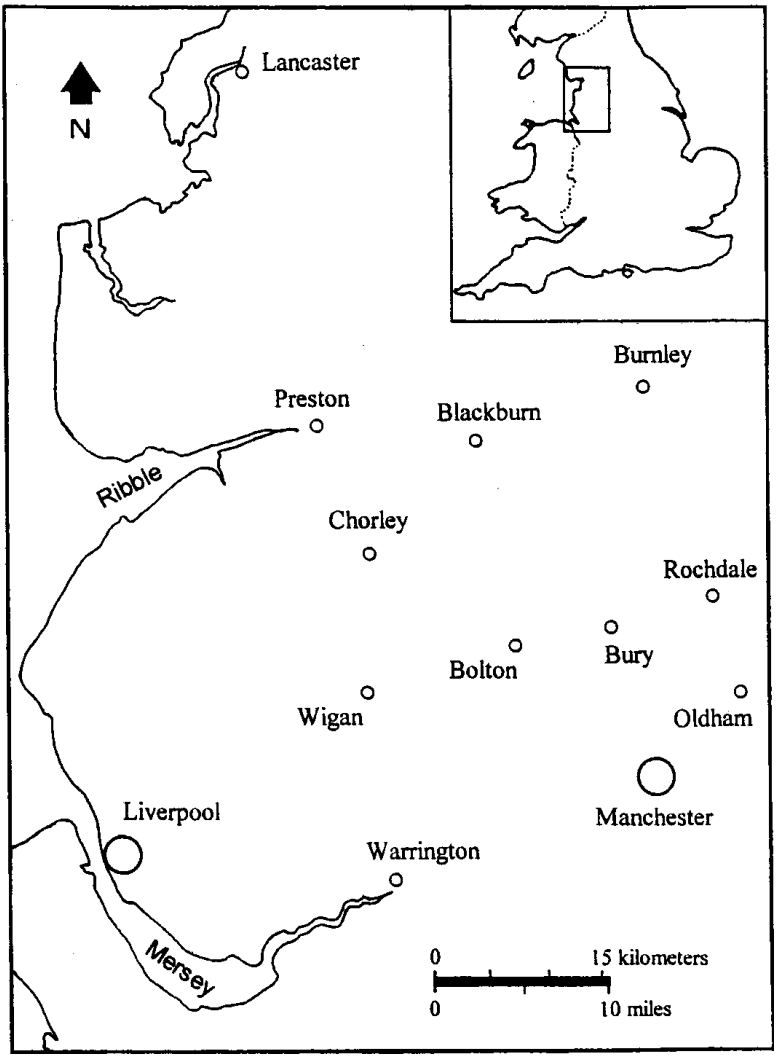
The extent to which an 'Industrial Revolution' can be seen to have occurred in Britain between the late eighteenth century and the mid-nineteenth century depends largely on the perspective taken. Those who discern that the industrialisation process brought only a limited degree of change during this period, and who may be seen to belong to the gradualist school of thought, base their views largely on calculations that reveal little difference in the rate at which the British economy grew. Thus, they argue, there was no marked discontinuity in economic growth at national level. They observe, too, that notable economic change had taken place prior to the Industrial Revolution era, particularly in relation to the high proportion of the labour force that had switched from agricultural work to industrial work, a consequence of rising labour productivity (output per person) amongst agricultural workers. In other words, they maintain, a marked and sustained change had already occurred in the country's economic structure.[1]

Those who do favour the notion of an industrial revolution are critical of the data on which national growth estimates are based. They highlight the incompleteness of the data, complaining that assumptions have to be made about levels of output in different industries, including the service industries, and about the weighting that should be attached to them in calculating overall growth rates. The critics also argue that the price data used are inadequate, causing problems in calculating output values and hence in assessing how these values changed over time. And they point out that the same types of problems arise in trying to calculate whether or not any discontinuity occurred in labour productivity. The charge is also made that too much emphasis is placed on national economic growth at the expense of the changes that occurred at regional level. At issue here is the point that industrialisation was concentrated in a relatively small number of regions in Britain, as was the case in other countries.[2] Accordingly, even if

[1] See especially, N.F.R. Crafts, *British Economic Growth during the Industrial Revolution* (1985).
[2] For the regional dimension to industrialisation, see S. Pollard, *Peaceful Conquest* (1981) ch.1; P. Hudson, *The Industrial Revolution* (1992) ch.4; and S. King and G. Timmins, *Making Sense of the Industrial Revolution* (2001) ch.2.



1. Location of Lancashire textile towns. The main textile zone was largely confined within the area enclosed by Manchester, Wigan, Preston and Burnley.

there were no marked advances in economic growth and labour productivity at national level during the Industrial Revolution era, there were in the main industrialising regions.[3]

Within the context of the debate about gradual as opposed to pronounced economic change in Britain, this article explores the notion of an industrial revolution from a regional perspective, taking Lancashire, the world's first major industrial region, as a case study (see Figure 1). The argument is made that fundamental economic and social change indeed occurred in the region from the late eighteenth to the mid-nineteenth century, fuelled by the remarkable expansion of cotton textile manufacturing, but that some changes were far more pronounced than others. To examine this notion, three key issues are selected. The first concerns the expansion of the economy and changes in its structure. The second deals with alterations to the way people led their working lives, especially in relation to the rise of factory production. The third, which can all too easily be neglected, concerns the manner in which intensifying industrialisation impacted on the built environment.

The expansion of the economy

Some indication of the changing pace at which the economy of Lancashire grew during the Industrial Revolution period can be gauged from figures of raw cotton imports.[4] These are available for most years from the late 1600s and those shown in Table 1 are calculated as averages per decade.[5] The percentage changes in these averages from decade to decade are also given. In interpreting the figures, it should be remembered that all the raw cotton processed in Britain had to be imported and that, during the Industrial Revolution era, Britain's production of cotton textiles was strongly concentrated in Lancashire.[6]

[3] See especially M. Berg and P. Hudson, 'Rehabilitating the Industrial Revolution', *Economic History Review,* XLV (1992) 24-50.

[4] B.R. Mitchell, *British Historical Statistics* (1988) 330-331, 334.

[5] For further comment on the figures, see G. Timmins, *Made in Lancashire* (1998) 85.

[6] W. Farrer and J. Brownbill eds., *A History of the County of Lancaster*, pt. 13 (1920 reprint of 1908 edition) 382.

Table 1. – Raw cotton imports into Britain, c.1700-1840.

Years	Cotton imports (million lbs)	Percentage Change
1698/1710	1.10	
1711/1720	1.48	34.6
1721/1730	1.51	2.0
1730/1740	1.72	13.9
1741/1750	2.14	24.4
1751/1760	2.76	29.0
1761/1770	3.68	33.3
1771/1780	5.13	39.4
1781/1790	17.92	249.3
1791/1800	30.74	71.5
1801/1810	66.77	118.7
1811/1820	106.18	59.0
1821/1830	183.80	73.1
1831/1840	337.10	83.4

Three points stand out in these figures. Firstly, a slow but steady rise is discernible during the decades leading up to the Industrial Revolution period, indicating that sustained growth was already being experienced in the cotton textile industry. Secondly, that the figures surged during the closing two decades of the century suggests that a marked discontinuity occurred in the rate at which this growth took place. Thirdly, although the rate of growth per decade slowed down thereafter, and showed considerable fluctuation, the absolute increase continued to rise substantially. Given the high importance of the cotton industry in Lancashire it seems probable that the raw cotton import figures strongly reflect the general pattern of growth in the Lancashire economy as a whole. It is important to remember, of course, that the figures identify long-term growth patterns and that, periodically, short-term upturns and downturns in economic activity occurred. Nevertheless, the essential point is that the raw cotton import figures give a clear indication that, during the closing decades of the

eighteenth century, the Lancashire economy changed from slow to much more rapid long-term growth.

A key question to arise is whether this acceleration in growth rate was accompanied by a marked degree of change in the structure of the Lancashire economy. Research based on a sample of 28,000 probate records relating to southern Lancashire and Cheshire indicates that no dramatic change occurred in male occupational structure between 1700 and 1760, implying that the main shifts from agricultural to industrial activity took place either before or after this period. Yet the same data show that a strong industrial emphasis had already emerged in southeast and central Lancashire - the county's main textile zone - with nearly half the sample workforce being employed in manufacturing compared with about 40 per cent in agriculture.[7] Occupational data taken from parish registers for the mid-1720s reveal figures of similar magnitude in the main textile zone, though with evidence of much stronger change at local level. In Bolton parish, for instance, a sample of 200 male occupations recorded between 1724-26 places no fewer than 69 per cent in the manufacturing category (with 49 per cent of them in weaving) compared with only six per cent in agriculture.[8] Despite the well-known limitations of occupational data taken from both probate records and parish registers, they are consistent in pointing to a high degree of change having occurred in the economic structure of Lancashire's main textile zone well before the Industrial Revolution, giving some credence to the gradualist cause. And though it does seem probable that further change occurred beyond the mid-eighteenth century, with manufacturing and service occupations growing proportionately at the expense of those in agriculture, it is hard to see that change of this type could have arisen to any great extent, if at all, in such places as Bolton parish. This said, it is evident that in some lowland districts manufacturing activity did make notable progress as the handloom weaving trade made ever-greater demands on labour. Thus in the parish of Croston, to the west of Chorley, baptism registers record 67 per cent of fathers as being employed in agriculture between 1769 and 1771, with a further 8 per cent as weavers. By 1789-91, the respective figures were 54 per cent and 26 per cent.[9]

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[7] J. Stobart, 'Geography and Industrialization: The Space Economy of Northwest England, 1701-1760', *Transactions of the Institute of British Geographers* (1996) 682-684 and 686

[8] Timmins, *Lancashire*, 70.

[9] Ibidem, 162.

Whilst the degree of structural change between the main sectors of the Lancashire economy was therefore not very pronounced during the Industrial Revolution era, there still remains the possibility of significant developments arising within them. In fact, the most important was in the textile industry itself and concerns the switch from producing fustians - cloths made from a linen warp and a cotton thread - to cloths made entirely of cotton. Of crucial importance in making the transition was the development of a cotton thread that was strong enough to be used as warp and hence able to withstand the wear and tear to which it was subjected in the weaving process. Such a thread was supplied by Arkwright's water frame, patented in 1769. Moreover, another fundamental development arose in cotton cloth production when, a decade later, Samuel Crompton introduced his mule, a machine that was capable of spinning threads that were fine as well as strong.[10] Thus the product range of the cotton industry was transformed, enabling a much wider range of goods to be made available, including the finest muslins.

Outside the cotton industry, other notable changes can be identified, as in the case of the engineering industry. From a position of bare existence prior to the Industrial Revolution, census figures reveal that the industry had grown to employ some 10,500 workers by the early 1840s. Yet even though the industry had become one of the biggest in Lancashire by this date, it employed only a few per cent of the county's total labour force and far below the 300,000 or so engaged in the various branches of cotton production.[11]

Working lives

Prior to the Industrial Revolution era, families living in the textile districts of Lancashire commonly combined domestic textile production with farming. As a rule, adult males undertook the weaving on hand looms, with wives and children supplying the thread they needed. The carding, spinning and winding processes were also done by hand and until Hargreaves' jenny was invented in the mid-1760s, the spinning wheels used produced only a single thread. The extent to which families were involved in textile

[10] For details of the water-frame and mule, see G. Timmins, 'Technological Change' in: M. Rose, *The Lancashire Cotton Industry: A History Since 1700* (1996) 41-5
[11] Timmins, *Lancashire*, 87-90 and 107.

production had long varied, as is revealed by evidence taken from probate inventories, i.e. lists of possessions made when a person died. Thus, in the Burnley area, a sample of 130 inventories for the period 1560 to 1640, shows that 60 per cent of households contained spinning wheels, but only 23 per cent contained looms.[12] It seems likely, too, that the emphasis families placed on making textiles increased over time. Rising demand for textile goods created problems in attracting sufficient labour to produce them, to the extent that the earnings differential between the agricultural and textile sectors widened. Accordingly, the attraction of working in textile production intensified.

The introduction in the late 1760s of Arkwright's water-frame heralded a dramatic change in the working lives of numerous families in textile-producing Lancashire. This machine, and the carding equipment used alongside it, required a power source and hence a factory environment in which to operate. Accordingly, some family members, mainly adult females and children, were required to work away from home, though early needs for factory labour in Lancashire were also met by pauper children from London and elsewhere.[13] From the 1780s, the trend towards mechanised spinning intensified as Crompton's mule began its rise to dominance. Given the high levels of skill demanded to operate this machine, male labour was preferred by employers, though females and children were also required to join the threads that broke during the spinning process. Powered machinery was also introduced in the cotton finishing trades, including, from the mid-1780s, a method of printing cotton cloth by means of engraved copper cylinders. As a result, some remarkable increases in labour productivity were secured. In printing, for example, one authority claimed in the 1830s that a cylinder printing machine operated by a man and a boy could produce as much as 100 hand printers, each with an assistant.[14]

Apart from increasingly taking people away from a domestic working environment, the factory system also imposed more regular hours of work. Much has been written about domestic workers in Lancashire, as elsewhere in Britain, aiming to achieve a level of income that met their needs rather than striving to earn as much as they could. If earnings were

[12] J.T. Swain, *Industry before the Industrial Revolution* (1986) 129.
[13] M.B. Rose, 'Social Policy and Business: Parish Apprenticeship and the Early Factory System', *Business History* XXXI (1989) 5-29.
[14] E. Baines, *History of the Cotton Manufacture of Great Britain* (1966 reprint of 1835 edition) 266.

high, as was generally the case with domestic handloom weavers during the late eighteenth and early nineteenth centuries,[15] working weeks could be short and leisure time plentiful, at least as far as men were concerned. This lead to the rise of the so-called 'St. Monday' and even the 'St. Tuesday' holiday.[16] However, the attempt to run factory machinery on a regular basis, a possibility that seems to have been enhanced as steam power became increasingly preferred to water power, clashed with such an ideal. For the factory worker, the opportunity to operate on what would nowadays be referred to as a flexitime basis was not a consideration.

Whilst the rise of factory-based production gained a strong influence on the working lives of a great many Lancastrians, its impact should not be over emphasised. The key point here is that most economic activity continued to take place outside the factory environment, a reflection of the limited headway that mechanised production techniques had made in most industries. Moreover, even in the textile industries, weaving converted to mechanised factory production at a much slower rate than spinning and finishing. It is true that the number of handloom weavers in the county, the great bulk of whom worked domestically, declined strikingly in numbers from about 170,000 in the early nineteenth century to about 60,000 at mid-century.[17] For the most part, though, this decline occurred as late as the 1840s, influenced both by the long-delayed appearance of a reliable power loom and a major upturn in the economy that encouraged massive investment in a wide range of industries, including cotton manufacturing. Even in the cotton industry, therefore, families working in domestic premises remained important for much of the Industrial Revolution era and was by no means insignificant in later times, especially because the surviving handloom weavers tended to concentrate on producing higher quality cloths.[18]

Such a line of argument requires qualification, however, since even within the domestic production of textiles notable changes in family working practices took place. Firstly, women increasingly turned to weaving. The rise of mechanised spinning from the late eighteenth century posed a severe threat to their employment opportunities, especially as men were

[15] D. Bythell, *The Handloom Weavers* (1969) chs. 5 and 6.
[16] D. Reid, 'Weddings, Weekdays, Work and Leisure in Urban England, 1791-1911: the Decline of St.Monday Revisited', *Past and Present* CLIII (1996) 135-63.
[17] G.Timmins, *The Last Shift* (1993) 36-9.
[18] Timmins, *Last Shift*, chs. 5 and 6.

deemed preferable to women in operating the mule. However, given the slow mechanisation of cotton weaving and the strong expansion of cotton textile production, women were able to convert to handloom weaving. Accordingly, a more diverse handloom weaving labour force emerged. Secondly, as the handloom weaving trade declined, some family members turned to other types of work. By no means all of them did so and families relying solely on handloom weaving in the mid-nineteenth century were by no means uncommon. Their family income was sufficient to sustain them, at least when work was available. Those who did seek other jobs were frequently the younger members of the family, many of whom were able to enter factory work.[19] Thirdly, that a great deal of handloom weaving came to take place in urban areas meant that the link between farming and weaving was weakened. Indeed, even in rural areas families increasingly specialised in handloom weaving, the cottages they occupied having little land attached to them.

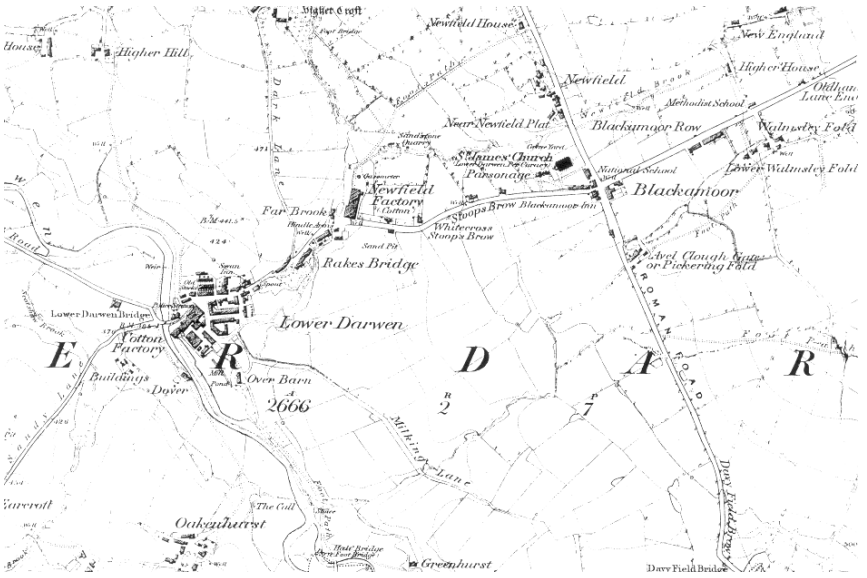
The built environment

The unprecedented expansion of Lancashire's industry and commerce during the Industrial Revolution period had a profound impact on the extent of the built environment and on its character. With regard to the former, the principal issue to address is the rise of industrial colonies.[20] A feature of rural and urban development alike, these colonies were particularly common in the textile industry, though they occurred in other industries, too, including coal mining. With regard to the latter, the main consideration is the new types of premises that were built to accommodate industrial and commercial activity. These premises tended to display strong vernacular qualities rather than to be concerned with stylish appearance, but they nonetheless brought a distinctive change to the built environment, both in relation to factory and domestic production.

Lancashire's early cotton spinning factories frequently relied on water power, the river valley sites they occupied were sometimes situated close to urban centres, but more often they were remote. In order to attract labour, the factory owners commonly provided accommodation and other

[19] Timmins, *Last Shift*, 133-135.
[20] J.D. Marshall, 'Colonisation as a factor in the planting of towns in North-West England' in: H.J. Dyos ed., *The Study of Urban History* (1968) 215-30.

social amenities and in some cases quite sizeable factory villages emerged. Lower Darwen, situated about two miles to the south of Blackburn town centre, provides an example. The extent of its growth by the mid-1840s is shown in Figure 2, which is extracted from the first edition six-inch to the mile Ordnance Survey (OS) map. As can be seen, the factory buildings were situated close to a river (the Darwen) which flows northwards through the village, a mill pond or reservoir being constructed to store the water required to power the waterwheel. Several rows of four-roomed cottages were constructed to the north and east of the factory, providing homes for about 100 families. Social amenities within the village included an inn and a police station and a school was opened in 1841.[21] Other schools, along with church facilities, were available at nearby Blackamoor. The motivation of factory village owners in providing social amenities for their workers has provoked considerable debate amongst historians, especially in relation to



2. Lower Darwen in the mid-1840s. The terrain is hilly. Lower Darwen lies about 400 feet above sea level and the ground rises to the east.

[21] M. Rothwell, *Industrial Heritage: A Guide to the Industrial Archaeology of Blackburn*, pt. 1 (1985) 15.

how far paternalistic ideals, including the control of drinking and the provision of separate bedrooms for older children of each sex, might have been more important than notions of managerial necessity in attracting and controlling labour.[22]

By no means all Lancashire's rural factory colonies attained the size of Lower Darwen, as is evident in the case of the neighbouring colony at Newfield (see Figure 2). Yet, in some upland river valleys, even very small factory colonies could collectively have a notable impact on the built environment because of the frequency with which they occurred. The steepness of such valleys enabled falls of water, and hence potential mill sites, to be generated within relatively short distances of one another. The reservoirs needed to store water for turning the waterwheels added to the environmental impact of these sites. And in some instances, especially in bleaching and printing cotton cloth, mill proprietors might construct several reservoirs in order to meet their processing as well as their power needs.

Added to the impact of factory colonisation on Lancashire's rural environment was that of handloom weavers' colonisation. Again, the size of the colonies varied. Commonly they comprised single, isolated rows of up to about a dozen cottages in which loomshops were provided. In some cases, however, several rows of cottages were built in close proximity - sometimes adjoining each other - giving rise to small centres of settlement. In Figure 2, Blackamoor provides an example of this. As a rule, rows of handloom weavers' cottages were built directly alongside roads to facilitate the delivery of warp and weft for weaving and the dispatch of the woven pieces. And in some cases, rural industrial colonies might contain both handloom weavers' cottages and cottages for factory workers. But the essential point to make here is that handloom weavers' colonies became widespread in the rural districts of textile Lancashire between the 1780 and 1820s - tens of thousands of handloom weavers' cottages were built - adding a particularly distinctive element to the built environment.[23]

Industrial colonies also played a key role in the growth of Lancashire's urban areas. As far as colonies based on factory industry are

[22] For a recent contribution, see G. Timmins, 'Housing Quality in Rural Textile Colonies, c.1800-c.1850: The Ashworth Settlements Revisited', *Industrial Archaeology Review* XXII (2000) 21-37.

[23] For further details of handloom weavers' colonies, see G. Timmins, *Handloom Weavers' Cottages in Central Lancashire* (1977) ch. 4.

concerned, location points tended to be alongside canals, rivers or main roads on the fringes of built up areas. Since the factories normally relied on steam power, the riverside and canal-side locations brought advantage by providing water for steam raising, with canals also facilitating bulk transportation of coal and raw cotton. Some impression of how industrial colonisation promoted urban growth can be gained from studying a further extract from the mid-1840s six-inch OS map, this time relating to the small town of Over Darwen, situated about three miles to the south of Blackburn (see Figure 3). The original centre of the town was located to the east of the main road (Market Street), which was constructed in the late 1790s. As can be seen, several cotton mills and associated rows of houses were built along the main road, roughly doubling the extent of the built up area.

3. Over Darwen in the mid-1840s. Over Darwen (now Darwen) has a valley location, with relatively flat land adjoining the main road. No canal passed through, so the main road assumed high importance as a means of communication.

The impact that the formation of handloom weavers' colonies had in extending the built up area of towns may generally have been less significant than that of factory colonies. It was nonetheless of considerable

importance. Nigel Morgan's research has revealed that at least a thousand handloom weavers' cottages had been built in Preston by the 1820s, representing about a quarter of the towns total housing stock.[24] As with factory colonies, the tendency was to occupy sites on urban fringes, the cottages at Leigh Row and Leigh Street, Chorley providing an example (see Figure 4). That these cottages were built for handloom weavers is indicated by the flights of steps to the front and back doors, a point that is returned to below.

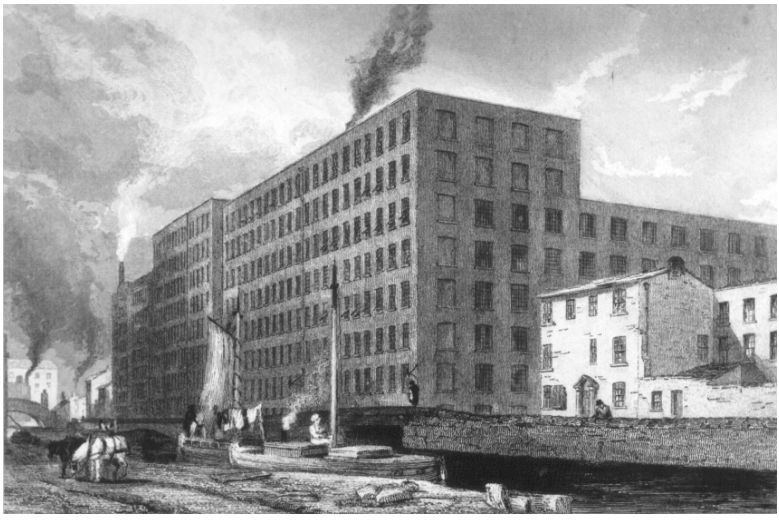
4. Handloom weavers colony at Leigh Street and Leigh Row, Chorley. Other cottages shown on the map extract also have flights of steps to the front and rear doors and would also have contained cellar loomshops.

Aside from extending the built environment, the creation of industrial colonies profoundly altered its character. In the first place, as the map evidence presented above indicates, these colonies played a major part in bringing small terraced houses - houses built in continuous rows - to prominence. Such houses were relatively cheap to build and could take a range of forms, including those that were built back-to-back - that is, they

[24] N. Morgan, *Vanished Dwellings* (1990).

shared a back wall as well as side walls. Moreover, terraced houses offered varying accommodation standards not only in relation to the form they could take, but also according to location, quality of construction, range of amenities and number of rooms. But what must be emphasised is that the small terraced house became ubiquitous in Lancashire during the Industrial Revolution, emerging in its various forms, as the standard type of dwelling for working-class people.

A second way in which industrial colonies impacted strongly on the character of the built environment was through textile mill construction. In the spinning branch of the industry, multi-storey buildings, complete with tall chimney stacks to provide draught for steam engine boilers and to reduce smoke nuisance, came to dominate the skyline, sometimes, as in the case of those in Union Street, Manchester, to a remarkable degree (see Figure 5).[25] In the weaving branch of the industry, mechanisation was delayed, but during the second quarter of the nineteenth century, power looms came to be accommodated increasingly in distinctive single-storied



5. Early textile mills in Manchester. The mills are eight storeys high and of plain appearance.

[25] The mills, situated by the Rochdale canal, belonged to Murray and Company and to McConel and Kennedy. See *Lancashire Illustrated*, opposite p. 40.

6. Former handloom weavers' cottages with cellar loomshops, West View Place, Blackburn. As in the case of the textile mills, the cottages are of plain appearance, though they have arched doorways with keystones.

sheds with saw-toothed roofs. The preference for such buildings, which were relatively expensive in terms of the ground space they occupied, was strongly influenced by the need to create a humid atmosphere in which cotton weaving could take place.[26]

The third way in which industrial colonies helped to transform the character of Lancashire's built environment was through the construction of cottages specially designed for handloom weaving. Before the Industrial Revolution, several carders and spinners were needed to supply the warp and weft requirements of a single weaver, so that, as a rule, cottages in which weaving took place would have housed one or two looms at the most. During the late eighteenth and early nineteenth centuries, however, mechanised spinning massively increased the supply of thread, whilst weaving remained largely a handicraft activity. As a result, work opportunities in weaving were greatly expanded and families came to operate a greater number of looms, generally up to four in the cotton industry. To accommodate these extra looms, cottages with designated

[26] For details, see Timmins, *Lancashire,* 188-9.

loomshops were required. The preferred position for loomshops was in the upper storeys of these cottages in order to maximise the advantages to be derived from natural light, but those used for cotton weaving in Lancashire were mostly, though not entirely, situated at ground floor level or cellar level. Examples of the latter type are shown in Figure 6. As can be seen, the loomshop windows had to be raised above ground level requiring the inconvenience of steps to both front and rear doors.[27] The point here is that in weaving the finer grades of cloth especially, such as muslins, a humid atmosphere was required and this could be more readily obtained at lower levels.[28]

Consideration of the extent and nature of industrial colonies provides no more than partial insights into the ways Lancashire's built environment was transformed during the Industrial Revolution period. Space limitations prevent a full analysis, but other dimensions of the issue may be briefly mentioned. In most towns, but especially in Manchester and Liverpool, warehousing facilities became far more impressive features of the built environment than hitherto, adding further to the multi-storey buildings in which economic activity increasingly took place. In part, this warehousing was associated with substantial docks development, especially in Liverpool, and with the construction of canal-side wharves in major towns. But, from the 1830s, warehouse construction was also associated with the presence of railways.[29] In fact, both through the facilities they required to operate, and the bridging, cutting and embanking that the creation of their route-ways required, both canals and railways had a marked impact on the development of Lancashire's built environment. And this is also true with regard to roads, a major programme of route re-alignment and new road building being undertaken between the 1790s and 1820s, as much concerned with gradient easing as with improving road surfaces.[30]

Conclusion

Whilst it is easy to over-emphasise the extent of the economic and social changes that occurred in Lancashire during the Industrial Revolution

[27] The extract is from the 1847 five feet to the mile OS map of Chorley, sheet 3.
[28] For further discussion, see Timmins, *Weavers' Cottages*, ch. 1.
[29] For details, see R. McNeil and A.D. George, *The Heritage Atlas 3, Warehouse Album* (1997).
[30] Timmins, *Lancashire*, 142-3.

period, and the impact they had, marked discontinuities can nonetheless be discerned. During the closing decades of the eighteenth century, the growth of cotton textile manufacturing, by far the county's dominant industry, accelerated sharply, reflecting both supply-side advances that included major technological breakthroughs, as well a surging demand for all-cotton goods, influenced both by improving quality and falling prices. This growth was associated with fundamental changes in working practices, most evidently in relation to the rise in factory work, though it also influenced the gender division of labour within domestic weaving. Furthermore the appearance of the built environment was profoundly changed by this growth, bringing great numbers of new and highly distinctive types of premises for centralised and domestic industry alike.

Viewed from a regional perspective, therefore, the argument for British industrialisation being characterised by marked discontinuity is compelling. Of course, both the nature and extent of such discontinuity may have varied considerably from one industrial region to another and may have been more pronounced in Lancashire - or at least parts of Lancashire - than elsewhere. Certainly the Lancashire textile district of 1840 was a very different place from that of 1770 and for numerous families living in the district, the traditional ways of living and working were fundamentally changed.