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The Industrial Revolution and Its Impact on European Society



CHAPTER OUTLINE

- The Industrial Revolution in Great Britain
- The Spread of Industrialization
- The Social Impact of the Industrial Revolution
- Conclusion

FOCUS QUESTIONS

- What conditions and developments coalesced in Great Britain to bring about the first Industrial Revolution?
- What were the basic features of the new industrial system created by the Industrial Revolution?
- How did the Industrial Revolution spread from Great Britain to the Continent and the United States, and how did industrialization in those areas differ from British industrialization?
- What effects did the Industrial Revolution have on urban life, social classes, family life, and standards of living?
- What were working conditions like in the early decades of the Industrial Revolution, and what efforts were made to improve them?

THE FRENCH REVOLUTION dramatically and quickly altered the political structure of France, and the Napoleonic conquests spread many of the revolutionary principles in an equally rapid and stunning fashion to other parts of Europe. During the late eighteenth and early nineteenth centuries, another revolution—an industrial one—was transforming the economic and social structure of Europe, although in a less dramatic and rapid fashion.

The period of the Industrial Revolution witnessed a quantum leap in industrial production. New sources of energy and power, especially coal and steam, replaced wind and water to create labor-saving machines that dramatically decreased the use of human and animal labor and, at the same time, increased the level of productivity. In turn, power machinery called for new ways of organizing human labor to maximize the benefits and profits from the new machines; factories replaced shop and home workrooms. Many early factories were dreadful places with difficult working conditions. Reformers, appalled at these conditions, were especially critical of the treatment of married women.

One reported: "We have repeatedly seen married females, in the last stage of pregnancy, slaving from morning to night beside these never-tiring machines, and when . . . they were obliged to sit down to take a moment's ease, and being seen by the manager, were fined for the offense." But there were also examples of well-run factories. William Cobbett described one in Manchester in 1830: "In this room, which is lighted in the most convenient and beautiful manner, there were five hundred pairs of looms at work, and five hundred persons attending those looms; and, owing to the goodness of the masters, the whole looking healthy and well-dressed."

During the Industrial Revolution, Europe experienced a shift from a traditional, labor-intensive economy based on farming and handicrafts to a more capital-intensive economy based on manufacturing by machines, specialized labor, and industrial factories. Although the Industrial Revolution took decades to spread, it was truly revolutionary in the way it fundamentally changed Europeans, their society, and their relationship to other peoples. The development of large factories encouraged mass movements of people from the countryside to urban areas where impersonal coexistence replaced the traditional intimacy of rural life. Higher levels of productivity led to a search for new sources of raw materials, new consumption patterns, and a revolution in transportation that allowed raw materials and finished products to be moved quickly around the world. The creation of a wealthy industrial middle class and a huge industrial working class (or proletariat) substantially transformed traditional social relationships.

changes in the methods of farming and stock breeding that characterized this agricultural transformation led to a significant increase in food production. British agriculture could now feed more people at lower prices with less labor. Unlike the rest of Europe, even ordinary British families did not have to use most of their income to buy food, giving them the potential to purchase manufactured goods. At the same time, a rapid growth of population in the second half of the eighteenth century provided a pool of surplus labor for the new factories of the emerging British industry. Rural workers in cottage industries also provided a potential labor force for industrial enterprises.

Britain had a ready supply of capital for investment in the new industrial machines and the factories that were needed to house them. In addition to profits from trade and cottage industry, Britain possessed an effective central bank and well-developed, flexible credit facilities. Nowhere in Europe were people so accustomed to using paper instruments to facilitate capital transactions. Many early factory owners were merchants and entrepreneurs who had profited from eighteenth-century cottage industry. Of 110 cotton spinning mills in operation in the area known as the Midlands between 1769 and 1800, 62 were established by hosiers, drapers, mercers, and others involved in some fashion in the cottage textile industry. But capital alone is only part of the story. Britain had a fair number of individuals who were interested in making profits if the opportunity presented itself (see the box on p. 585). The British were a people, as one historian has said, "fascinated by wealth and commerce, collectively and individually." These early industrial entrepreneurs faced considerable financial hazards, however. Fortunes were made quickly and lost just as quickly. The structure of early firms was open and fluid. An individual or family proprietorship was the usual mode of operation, but entrepreneurs also brought in friends to help them. They just as easily jettisoned them. John Marshall, who made money in flax spinning, threw out his partners: "As they could neither of them be of any further use, I released them from the firm and took the whole upon myself."¹

Britain was richly supplied with important mineral resources, such as coal and iron ore, needed in the manufacturing process. Britain was also a small country, and the relatively short distances made transportation readily accessible. In addition to nature's provision of abundant rivers, from the mid-seventeenth century onward, both private and public investment poured into the construction of new roads, bridges, and, beginning in the 1750s and 1760s, canals. By 1780, roads, rivers, and canals linked the major industrial centers of the North, the Midlands, London, and the Atlantic. Unlike the continental countries, Britain had no internal customs barriers to hinder domestic trade.

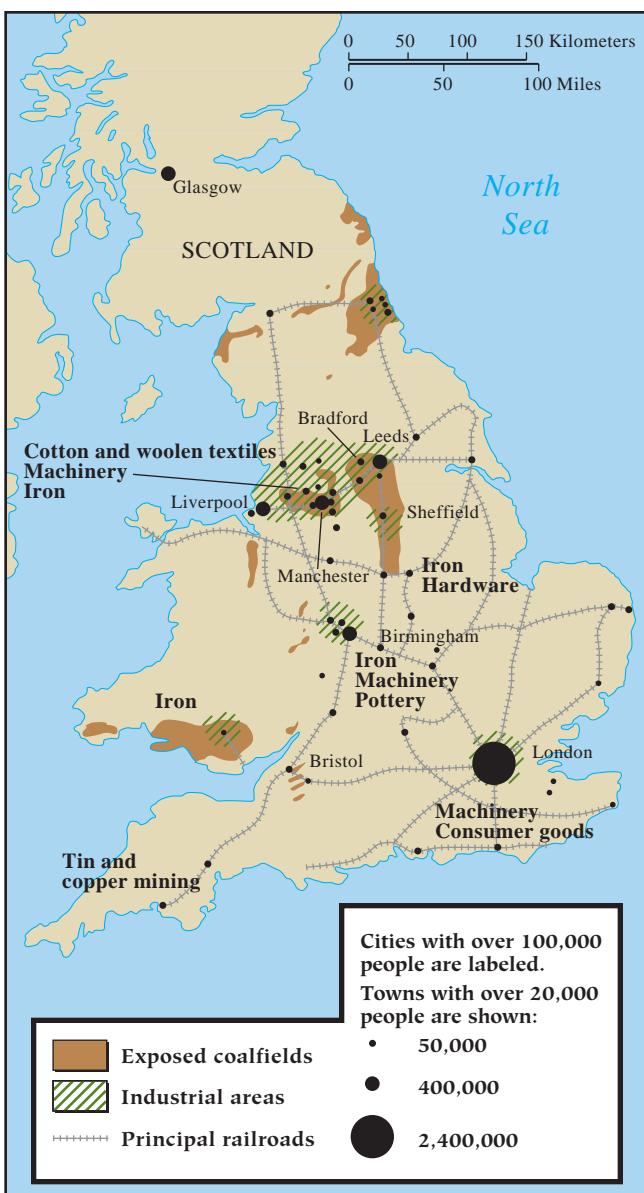
Britain's government also played a significant role in the process of industrialization. Parliament contributed to the favorable business climate by providing a stable government and passing laws that protected private property. Moreover, Britain was remarkable for the freedom

◆ The Industrial Revolution in Great Britain

Although the Industrial Revolution evolved out of antecedents that occurred over a long period of time, historians generally agree that it had its beginnings in Britain in the second half of the eighteenth century. By 1850, the Industrial Revolution had made Great Britain the wealthiest country in the world; by that time it had also spread to the European continent and the New World. By the end of the nineteenth century, both Germany and the United States would surpass Britain in industrial production.

✿ Origins

A number of factors or conditions coalesced in Britain to produce the first Industrial Revolution. One of these was the agricultural revolution of the eighteenth century. The



MAP 20.1 Britain in the Industrial Revolution.

it provided for private enterprise. It placed fewer restrictions on private entrepreneurs than any other European state.

Finally, a supply of markets gave British industrialists a ready outlet for their manufactured goods. British exports quadrupled from 1660 to 1760. In the course of its eighteenth-century wars and conquests, Great Britain had developed a vast colonial empire at the expense of its leading continental rivals, the Dutch Republic and France. Britain also possessed a well-developed merchant marine that was able to transport goods to any place in the world. A crucial factor in Britain's successful industrialization was the ability to produce cheaply those articles most in demand abroad. And the best markets abroad were not in Europe, where countries protected their own incipient industries, but in the Americas, Africa, and the East, where people wanted sturdy, inexpensive clothes rather than costly, highly finished, luxury items. Britain's machine-

produced textiles fulfilled that demand. Nor should we overlook the British domestic market. Britain had the highest standard of living in Europe and a rapidly growing population. As Daniel Defoe noted already in 1728:

For the rest, we see their Houses and Lodgings tolerably furnished, at least stuff'd well with useful and necessary household Goods: Even those we call poor People, Journey-men, working and Pains-staking People do thus; they lye warm, live in Plenty, work hard, and [need] know no Want. These are the People that carry off the Gross of your Consumption; 'tis for these your Markets are kept open late on Saturday nights; because they usually receive their Week's Wages late . . . in a Word, these are the Life of our whole Commerce, and all by their Multitude: Their Numbers are not Hundreds or Thousands, or Hundreds of Thousands, but Millions; . . . by their Wages they are able to live plentifully, and it is by their expensive, generous, free way of living, that the Home Consumption is rais'd to such a Bulk, as well of our own, as of foreign Production.²

This demand from both domestic and foreign markets and the inability of the old system to fulfill it led entrepreneurs to seek and adopt the new methods of manufacturing that a series of inventions provided. In so doing, these individuals produced the Industrial Revolution.

Technological Changes and New Forms of Industrial Organization

In the 1770s and 1780s, the cotton textile industry took the first major step toward the Industrial Revolution with the creation of the modern factory.

THE COTTON INDUSTRY

Already in the eighteenth century, Great Britain had surged ahead in the production of cheap cotton goods using the traditional methods of cottage industry. The development of the flying shuttle had sped the process of weaving on a loom and enabled weavers to double their output. This created shortages of yarn, however, until James Hargreaves's spinning jenny, perfected by 1768, enabled spinners to produce yarn in greater quantities. Richard Arkwright's water frame spinning machine, powered by water or horse, and Samuel Crompton's so-called mule, which combined aspects of the water frame and spinning jenny, increased yarn production even more. Edmund Cartwright's power loom, invented in 1787, allowed the weaving of cloth to catch up with the spinning of yarn. Even then, early power looms were grossly inefficient, enabling cottage, hand-loom weavers to continue to prosper, at least until the mid-1820s. After that they were gradually replaced by the new machines. In 1813, there were 2,400 power looms in operation in Great Britain; they numbered 14,150 in 1820, 100,000 in 1833, and 250,000 by 1850. In the 1820s, there were still 250,000 hand-loom weavers in Britain; by 1860, only 3,000 were left.

The water frame, Crompton's mule, and power looms presented new opportunities to entrepreneurs. It was

The Traits of the British Industrial Entrepreneur

Richard Arkwright (1732–1792), inventor of a spinning frame and founder of cotton factories, was a good example of the successful entrepreneur in the early Industrial Revolution in Britain. In this selection, Edward Baines, who wrote *The History of the Cotton Manufacture in Great Britain* in 1835, discusses the traits that explain the success of Arkwright and presumably other British entrepreneurs.

Edward Baines, *The History of the Cotton Manufacture in Great Britain*

Richard Arkwright rose by the force of his natural talents from a very humble condition in society. He was born at Preston on the 23rd of December, 1732, of poor parents: being the youngest of thirteen children, his parents could only afford to give him an education of the humblest kind, and he was scarcely able to write. He was brought up to the trade of a barber at Kirkham and Preston, and established himself in that business at Bolton in the year 1760. Having become possessed of a chemical process for dyeing human hair, which in that day (when wigs were universal) was of considerable value, he traveled about collecting hair, and again disposing of it when dyed. In 1761, he married a wife from Leigh, and the connections he thus formed in that town are supposed to have afterwards brought him acquainted with Highs's experiments in making spinning machines. He himself manifested a strong bent for experiments in mathematics, which he is stated to have followed with so much devotedness as to have neglected his business

and injured his circumstances. His natural disposition was ardent, enterprising, and stubbornly persevering: his mind was as coarse as it was bold and active, and his manners were rough and unpleasing. . . .

The most marked traits in the character of Arkwright were his wonderful ardor, energy, and perseverance. He commonly laboured in his multifarious concerns from five o'clock in the morning till nine at night; and when considerably more than fifty years of age,—feeling that the defects of his education placed him under great difficulty and inconvenience in conducting his correspondence, and in the general management of his business,—he encroached upon his sleep, in order to gain an hour each day to learn English grammar, and another hour to improve his writing and orthography [spelling]! He was impatient of whatever interfered with his favorite pursuits; and the fact is too strikingly characteristic not to be mentioned, that he separated from his wife not many years after their marriage, because she, convinced that he would starve his family [because of the impractical nature of his schemes], broke some of his experimental models of machinery. Arkwright was a severe economist of time; and, that he might not waste a moment, he generally traveled with four horses, and at a very rapid speed. His concerns in Derbyshire, Lancashire, and Scotland were so extensive and numerous, as to [show] at once his astonishing power of transacting business and his all grasping spirit. In many of these he had partners, but he generally managed in such a way, that, whoever lost, he himself was a gainer.

much more efficient to bring workers to the machines and organize their labor collectively in factories located next to rivers and streams, the sources of power for many of these early machines, than to leave the workers dispersed in their cottages. The concentration of labor in the new factories also brought the laborers and their families to live in the new towns that rapidly grew up around the factories.

The early devices used to speed up the processes of spinning and weaving were the products of weavers and spinners, in effect, of artisan tinkerers. But the subsequent expansion of the cotton industry and the ongoing demand for even more cotton goods created additional pressure for new and more complicated technology. The invention that pushed the cotton industry to even greater heights of productivity was the steam engine.

THE STEAM ENGINE

The invention of the steam engine played a major role in the Industrial Revolution. It revolutionized the production of cotton goods and caused the factory system to spread to other areas of production, thereby creating whole new

industries. The steam engine secured the triumph of the Industrial Revolution.

As in much of the Industrial Revolution, one kind of change forced other changes. In many ways the steam engine was the result of the need for more efficient pumps to eliminate water seepage from deep mines. Deep coal mines were in turn the result of Britain's need and desire to find new sources of energy to replace wood. By the early eighteenth century, the British were acutely aware of a growing shortage of timber, which was used in heating, to build homes and ships, and in enormous quantities to produce the charcoal utilized in smelting iron ore to make pig iron. At the beginning of the eighteenth century, the discovery of new processes for smelting iron ore with coal and coke (see the next section) led to deeper and deeper mines for more intensive mining of coal. But as mines were dug below the water table, they filled with water. An early solution to the problem was the use of mechanical pumps powered by horses walking in circles. In one coal mine in Warwickshire, for example, 500 horses were used to lift the water from the mine, bucket by bucket. The need for more efficient pumps led Thomas Newcomen to develop

a steam pump or, as it was called, an “atmospheric engine” that was first used in 1712. Though better than horses, it was still inefficient.

In the 1760s, a Scottish engineer, James Watt (1736–1819), was asked to repair a Newcomen engine. Instead he added a separate condenser and steam pump and transformed Newcomen’s machine into a genuine steam engine. Power was derived not from air pressure as in Newcomen’s atmospheric engine, but from steam itself. Much more efficient than a Newcomen engine, Watt’s engine could pump water three times as quickly. Initially, it possessed one major liability, however; as a contemporary noted in 1778: “the vast consumption of fuel in these engines is an immense drawback on the profit of our mines, for every fire-engine of magnitude consumes £3000 worth of coals per annum. This heavy tax amounts almost to a prohibition.”³ As steam engines were made more efficient, however, they also became cheaper to use.

In 1782, James Watt enlarged the possibilities of the steam engine when he developed a rotary engine that could turn a shaft and thus drive machinery. Steam power could now be applied to spinning and weaving cotton, and before long cotton mills using steam engines were multiplying across Britain. By 1850, seven-eighths of the power available to the entire British cotton industry came from steam. Since steam engines were fired by coal, they did not need to be located near rivers; entrepreneurs now had greater flexibility in their choice of location.

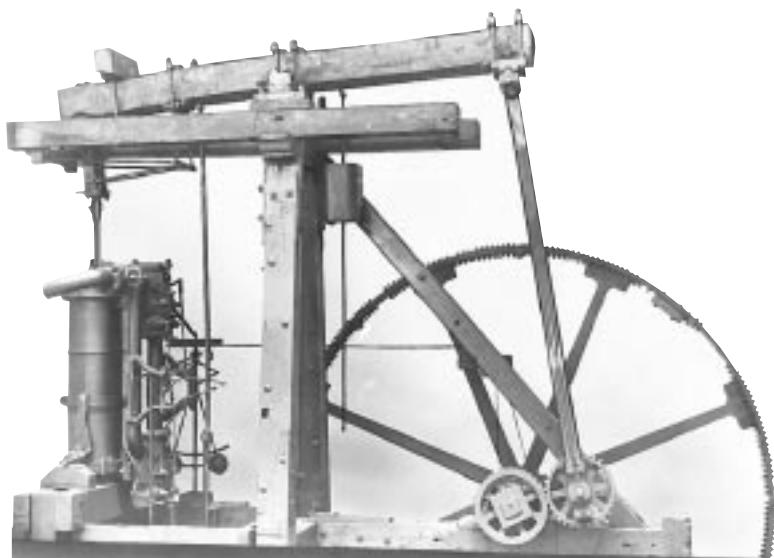
The new boost given to cotton textile production by technological changes became readily apparent. In 1760, Britain had imported 2.5 million pounds of raw cotton, which was farmed out to cottage industries. All work was done by hand either in workers’ homes or in the small shops of master weavers. In 1787, the British imported 22 million pounds of cotton; most of it was spun on machines, some powered by water in large mills. By 1840, 366 million pounds of cotton were imported annually,

much of it from the American South where it was grown by plantation owners using slave labor. By this time, cotton cloth was Britain’s most important product by value and was produced mainly in factories, although some hand-loom weavers still worked in their cottages. The price of yarn was but one-twentieth of what it had been. The cheapest labor in India could not compete in quality or quantity with Britain. British cotton goods sold everywhere in the world. And in Britain itself, cheap cotton cloth made it possible for millions of poor people to wear undergarments, long a preserve of the rich who alone could afford underwear made with expensive linen cloth. New work clothing that was tough, comfortable to the skin, and yet cheap and easily washable became common. Even the rich liked the colorful patterns of cotton prints and their light weight for summer use.

The steam engine proved invaluable to Britain’s Industrial Revolution. In 1800, engines were generating 10,000 horsepower; by 1850, 500,000 horsepower were being generated by stationary engines and 790,000 by mobile engines, the last largely in locomotives (see the next section). Unlike horses, the steam engine was a tireless source of power and depended for fuel on a substance—namely, coal—that seemed then to be unlimited in quantity. The popular saying that “Steam is an Englishman” had real significance by 1850. The steam engine also replaced waterpower in such places as flour and sugar mills. Just as the need for more coal had helped lead to the steam engine, so the success of the steam engine increased the demand for coal and led to an expansion in coal production; between 1815 and 1850, the output of coal quadrupled. In turn, new processes using coal furthered the development of an iron industry.

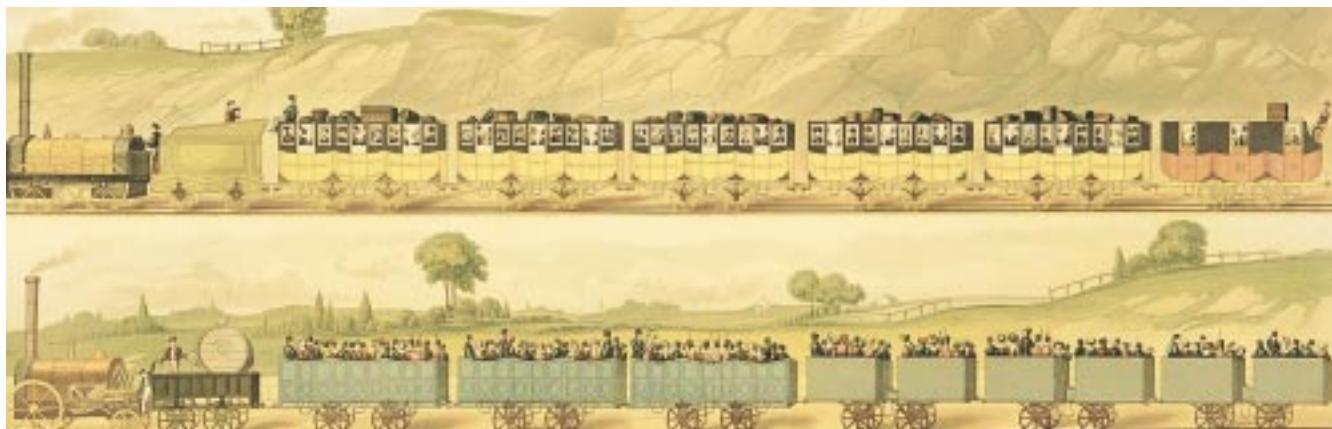
THE IRON INDUSTRY

The British iron industry was radically transformed during the Industrial Revolution. Britain had large resources of



A BOULTON AND WATT STEAM ENGINE.

Encouraged by his business partner, Matthew Boulton, James Watt developed the first genuine steam engine. Pictured here is a typical Boulton and Watt engine. Steam pressure in the cylinder on the left drives the beam upward and sets the flywheel in motion.



RAILROAD LINE FROM LIVERPOOL TO MANCHESTER. The railroad line from Liverpool to Manchester, first opened in 1830, relied on steam locomotives. As is evident in

this illustration, carrying passengers was the railroad's main business. First-class passengers rode in covered cars; second- and third-class passengers in open cars.

iron ore, but at the beginning of the eighteenth century, the basic process of producing iron had altered little since the Middle Ages and still depended heavily on charcoal. In the early eighteenth century, new methods of smelting iron ore to produce cast iron were devised based on the use of coke derived from coal. Still, a better quality of iron was not possible until the 1780s when Henry Cort developed a system called puddling, in which coke was used to burn away impurities in pig iron to produce an iron of high quality. A boom then ensued in the British iron industry. In 1740, Britain produced 17,000 tons of iron; in the 1780s, almost 70,000 tons; by the 1840s, over two million tons; and by 1852, almost three million tons, more than the rest of the world combined.

The development of the iron industry was in many ways a response to the demand for the new machines. The high-quality wrought iron produced by the Cort process made it the most widely used metal until the production of cheaper steel in the 1860s. The growing supply of less costly metal encouraged the use of machinery in other industries, most noticeably in new means of transportation.

A REVOLUTION IN TRANSPORTATION

The eighteenth century had witnessed an expansion of transportation facilities in Britain as entrepreneurs realized the need for more efficient means of moving resources and goods. Turnpike trusts constructed new roads, and between 1760 and 1830 a network of canals was built. But both roads and canals were soon overtaken by a new form of transportation that dazzled people with its promise. To many economic historians, railroads were the "most important single factor in promoting European economic progress in the 1830s and 1840s." Again, Britain was the leader in the revolution.

The beginnings of railways can be found in mining operations in Germany as early as 1500 and in British coal mines after 1600 where small handcarts filled with coal

were pushed along parallel wooden rails. The rails reduced friction, enabling horses to haul more substantial loads. By 1700, some entrepreneurs began to replace wooden rails with cast-iron rails, and by the early nineteenth century, railways—still dependent on horsepower—were common in British mining and industrial districts. The development of the steam engine led to a radical transformation of the railways.

In 1804, Richard Trevithick pioneered the first steam-powered locomotive on an industrial rail-line in south Wales. It pulled ten tons of ore and seventy people at five miles per hour. Better locomotives soon followed. The engines built by George Stephenson and his son proved superior, and it was in their workshops in Newcastle upon Tyne that the locomotives for the first modern railways in Britain were built. George Stephenson's *Rocket* was used on the first public railway line, which opened in 1830, extending thirty-two miles from Liverpool to Manchester. *Rocket* sped along at sixteen miles per hour. Within twenty years, locomotives had reached fifty miles per hour, an incredible speed to contemporary passengers. During the same period, new companies were formed to build additional railroads as the infant industry proved to be not only technically but financially successful. In 1840, Britain had almost 2,000 miles of railroads; by 1850, 6,000 miles of railroad track crisscrossed much of the country.

The railroad contributed significantly to the success and maturing of the Industrial Revolution. The railroad's demands for coal and iron furthered the growth of those industries. British supremacy in civil and mechanical engineering, so evident after 1840, was in large part based upon the skills acquired in railway building. The huge capital demands necessary for railway construction encouraged a whole new group of middle-class investors to invest their money in joint-stock companies (see Limitations to Industrialization later in this chapter). Railway construction created new job opportunities, especially for farm laborers and peasants who had long been accustomed to

OPENING OF THE ROYAL ALBERT BRIDGE. This painting by Thomas Roberts shows the ceremonies attending the official opening of the Royal Albert Bridge. I. K. Brunel, one of Britain's great engineers, designed this bridge, which carried a railroad line across the Tamar River into Cornwall. As is evident in the picture, the bridge was high enough to allow ships to pass underneath.



finding work outside their local villages. Perhaps most importantly, a cheaper and faster means of transportation had a rippling effect on the growth of an industrial economy. By reducing the price of goods, larger markets were created; increased sales necessitated more factories and more machinery, thereby reinforcing the self-sustaining nature of the Industrial Revolution, which marked a fundamental break with the traditional European economy. The great productivity of the Industrial Revolution enabled entrepreneurs to reinvest their profits in new capital equipment, further expanding the productive capacity of the economy. Continuous, even rapid, self-sustaining economic growth came to be seen as a fundamental characteristic of the new industrial economy.

The railroad was the perfect symbol of this aspect of the Industrial Revolution. The ability to transport goods and people at dramatic speeds also provided visible confirmation of a new sense of power. When railway engineers pierced mountains with tunnels and spanned chasms with breathtaking bridges, contemporaries experienced a sense of power over nature not felt before in Western civilization.

THE INDUSTRIAL FACTORY

Initially the product of the new cotton industry, the factory became the chief means of organizing labor for the new machines. As the workplace shifted from the artisan's shop and the peasant's cottage to the factory, the latter was not viewed as just a larger work unit. Employers hired workers who no longer owned the means of production but were simply paid wages to run the machines.

From its beginning, the factory system demanded a new type of discipline from its employees. Factory owners could not afford to let their expensive machinery stand idle. Workers were forced to work regular hours and in shifts to keep the machines producing at a steady pace for maximum output. This represented a massive adjustment for early factory laborers.

Preindustrial workers were not accustomed to a “timed” format. Agricultural laborers had always kept irregular hours; hectic work at harvest time might be followed by periods of inactivity. Even in the burgeoning cottage industry of the eighteenth century, weavers and spinners who worked at home might fulfill their weekly quotas by working around the clock for two or three days, followed by a leisurely pace until the next week's demands forced another work spurt.

Factory owners, therefore, faced a formidable task. They had to create a system of time-work discipline that would accustom employees to working regular, unvarying hours during which they performed a set number of tasks over and over again as efficiently as possible. One early industrialist said that his aim was “to make such machines of the men as cannot err.” Such work, of course, tended to be repetitive and boring, and factory owners resorted to tough methods to accomplish their goals. Factory regulations were minute and detailed (see the box on p. 589). Adult workers were fined for a wide variety of minor infractions, such as being a few minutes late for work, and dismissed for more serious misdoings, especially drunkenness. The latter was viewed as particularly offensive because it set a bad example for younger workers and also courted disaster in the midst of dangerous machinery. Employers found that dismissals and fines worked well for adult employees; in a time when great population growth had produced large numbers of unskilled workers, dismissal could be disastrous. Children were less likely to understand the implications of dismissal so they were sometimes disciplined more directly—frequently by beating.

The efforts of factory owners in the early Industrial Revolution to impose a new set of values were frequently reinforced by the new evangelical churches. Methodism, in particular, emphasized that people reborn in Jesus must forgo immoderation and follow a disciplined path. Laziness and wasteful habits were sinful. The acceptance of

Discipline in the New Factories

Workers in the new factories of the Industrial Revolution had been accustomed to a lifestyle free of overseers. Unlike the cottages, where workers spun thread and wove cloth in their own rhythm and time, the factories demanded a new, rigorous discipline geared to the requirements of the machines. This selection is taken from a set of rules for a factory in Berlin in 1844. They were typical of company rules everywhere the factory system had been established.

✿ The Foundry and Engineering Works of the Royal Overseas Trading Company, Factory Rules

In every large works, and in the co-ordination of any large number of workmen, good order and harmony must be looked upon as the fundamentals of success, and therefore the following rules shall be strictly observed.

1. The normal working day begins at all seasons at 6 A.M. precisely and ends, after the usual break of half an hour for breakfast, an hour for dinner and half an hour for tea, at 7 P.M., and it shall be strictly observed. . . .

Workers arriving 2 minutes late shall lose half an hour's wages; whoever is more than 2 minutes late may not start work until after the next break; or at least shall lose his wages until then. Any disputes about the correct time shall be settled by the clock mounted above the gatekeeper's lodge. . . .

3. No workman, whether employed by time or piece, may leave before the end of the working day, without having first received permission from the overseer and having given his name to the gatekeeper. Omission of these two actions shall lead to a fine of ten silver groschen [pennies] payable to the sick fund.

4. Repeated irregular arrival at work shall lead to dismissal. This shall also apply to those who are found idling by an official or overseer, and refused to obey their order to resume work. . . .
6. No worker may leave his place of work otherwise than for reasons connected with his work.
7. All conversation with fellow-workers is prohibited; if any worker requires information about his work, he must turn to the overseer, or to the particular fellow-worker designated for the purpose.
8. Smoking in the workshops or in the yard is prohibited during working hours; anyone caught smoking shall be fined five silver groschen for the sick fund for every such offense. . . .
10. Natural functions must be performed at the appropriate places, and whoever is found soiling walls, fences, squares, etc., and similarly, whoever is found washing his face and hands in the workshop and not in the places assigned for the purpose, shall be fined five silver groschen for the sick fund. . . .
12. It goes without saying that all overseers and officials of the firm shall be obeyed without question, and shall be treated with due deference. Disobedience will be punished by dismissal.
13. Immediate dismissal shall also be the fate of anyone found drunk in any of the workshops. . . .
14. Every workman is obliged to report to his superiors any acts of dishonesty or embezzlement on the part of his fellow workmen. If he omits to do so, and it is shown after subsequent discovery of a misdemeanor that he knew about it at the time, he shall be liable to be taken to court as an accessory after the fact and the wage due to him shall be retained as punishment.

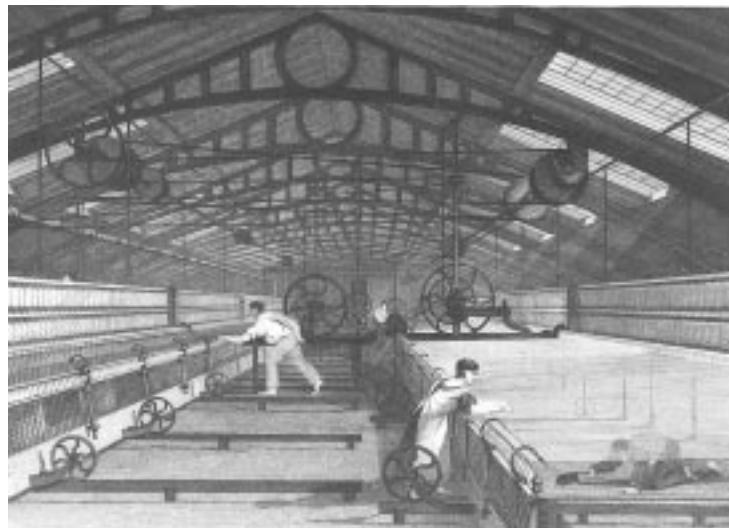
hardship in this life paved the way for the joys of the next. Evangelical values paralleled the efforts of the new factory owners to instill laborers with their own middle-class values of hard work, discipline, and thrift. In one crucial sense, the early industrialists proved successful. As the nineteenth century progressed, the second and third generations of workers came to view a regular working week as a natural way of life. It was, of course, an attitude that made possible Britain's incredible economic growth in that century.

✿ The Great Exhibition: Britain in 1851

In 1851, the British organized the world's first industrial fair. It was housed at Kensington in London in the Crys-

tal Palace, an enormous structure made entirely of glass and iron, a tribute to British engineering skills. Covering nineteen acres, the Crystal Palace contained 100,000 exhibits that showed the wide variety of products created by the Industrial Revolution. Six million people visited the fair in six months. Though most of them were Britons, who had traveled to London by train, foreign visitors were also prominent. The Great Exhibition displayed Britain's wealth to the world; it was a gigantic symbol of British success. Even trees were brought inside the Crystal Palace as a visible symbol of how the Industrial Revolution had achieved human domination over nature. Prince Albert, Queen Victoria's husband, expressed the sentiments of the age when he described the exhibition as a sign that "man is approaching a more complete

INSIDE AN EARLY COTTON FACTORY. The development of the factory changed the relationship between workers and employers as workers were encouraged to adjust to a new system of discipline that forced them to work regular hours and in shifts. This engraving depicts the interior of an early textile factory.



fulfillment of that great and sacred mission which he has to perform in this world . . . to conquer nature to his use.” Not content with that, he also linked British success to divine will: “In promoting [the progress of the human race], we are accomplishing the will of the great and blessed God.”⁴

By the year of the Great Exhibition, Great Britain had become the world’s first and richest industrial nation. Britain was the “workshop, banker, and trader of the world.” It produced one-half of the world’s coal and manufactured goods; its cotton industry alone in 1851 was equal in size to the industries of all other European countries combined. The quantity of goods produced was growing at three times the growth rate in 1780. No doubt, Britain’s certainty about its mission in the world in the nineteenth century was grounded in its incredible material success story.

their cottage industries, and witnessed growth in foreign trade. But whereas Britain’s economy began to move in new industrial directions in the 1770s and 1780s, continental countries lagged behind because they did not share some of the advantages that had made Britain’s Industrial Revolution possible. Lack of good roads and problems with river transit made transportation difficult. Toll stations on important rivers and customs barriers along state boundaries increased the costs and prices of goods. Guild restrictions were also more prevalent, creating restrictions that pioneer industrialists in Britain did not have to face. Finally, continental entrepreneurs were generally less enterprising than their British counterparts and tended to adhere to traditional business attitudes, such as a dislike of competition, a high regard for family security coupled with an unwillingness to take risks in investment, and an excessive worship of thriftness.

One additional factor also affected most of the Continent between 1790 and 1812: the upheavals associated with the wars of the French revolutionary and Napoleonic eras. Disruption of regular communications between Britain and the Continent made it difficult for continental countries to keep up with the new British technology. Moreover, the wars wreaked havoc with trade, caused much physical destruction and loss of manpower, weakened currencies, and led to political and social instability. Napoleon’s Continental System helped to ruin a number of hitherto prosperous ports. The elimination of European markets for British textiles did temporarily revive the woolen industry in France and Belgium and stimulated textile manufacturing along the Rhine and in Silesia. After 1815, however, when cheap British goods again flooded European markets, the European textile industry suffered.

In the long run, the revolutionary and Napoleonic wars created an additional obstacle to rapid industrialization by widening the gap between British and continental industrial machinery. By 1815, after Napoleon had

◆ The Spread of Industrialization

Beginning first in Great Britain, industrialization spread to the continental countries of Europe and the United States at different times and speeds during the nineteenth century. First to be industrialized on the Continent were Belgium, France, and the German states and in North America, the new nation of the United States. Not until after 1850 did the Industrial Revolution spread to the rest of Europe and other parts of the world.

✿ *Limitations to Industrialization*

In 1815, Belgium, France, and the German states were still largely agrarian. During the eighteenth century, some of the continental countries had experienced developments similar to those of Britain. They, too, had achieved population growth, made agricultural improvements, expanded



THE CRYSTAL PALACE. The Great Exhibition, organized in 1851, was a symbol of the success of Great Britain, which had become the world's first and richest industrial nation. Over 100,000 exhibits were housed in the Crystal Palace, a giant structure of cast iron and glass. This illustration shows the front of the palace and some of its numerous visitors.

finally been defeated and normal communication between Britain and the Continent had been restored, British industrial equipment had grown larger and become more expensive. As a result, self-financed family enterprises were either unable or unwilling to raise the amount of capital necessary to modernize by investing in the latest equipment. Instead, most entrepreneurs in France, Belgium, and Germany initially chose to invest in used machines and less productive mills. Consequently, industrialization on the Continent faced numerous hurdles, and as it proceeded in earnest after 1815, it did so along lines that were somewhat different from Britain's.

Lack of technical knowledge was initially a major obstacle to industrialization. But the continental countries possessed an advantage here; they could simply borrow British techniques and practices. Of course, the British tried to prevent that. Until 1825, British artisans were prohibited from leaving the country; until 1842, the export of important machinery and machine parts, especially for textile production, was forbidden. Nevertheless, the British were not able to control this situation by legislation. Already by 1825, there were at least 2,000 skilled British mechanics on the Continent, and British equipment was also being sold abroad, whether legally or illegally.

Although many Britons who went abroad to sell their skills were simply skilled mechanics, a number of them were accomplished entrepreneurs who had managerial as well as technical skills. John Cockerill, for example, was an aggressive businessman who established a highly profitable industrial plant at Seraing near Liège in southern Belgium in 1817. Encouraged by the Belgian government, Cockerill thought nothing of pirating the innovations of other British industrialists to further his own factories. Aware of their importance, British technicians abroad were often contentious and arrogant, arousing the anger of continental industrialists. Fritz Harkort, who initiated the engineering industry in Germany, once exclaimed that he

could scarcely wait for Germans to be trained "so that the Englishmen could all be whipped out: we must even now tread softly with them, for they're only too quick to speak of quitting if one does so little as not look at them in a friendly fashion."⁵

Gradually, the Continent achieved technological independence as local people learned all the skills their British teachers had to offer. By the 1840s, a new generation of skilled mechanics from Belgium and France was spreading their knowledge east and south, playing the same role that the British had earlier. More importantly, however, continental countries, especially France and the German states, began to establish a wide range of technical schools to train engineers and mechanics.

That government played an important role in this regard brings us to a second difference between British and continental industrialization. Governments in most of the continental countries were accustomed to playing a significant role in economic affairs. Furthering the development of industrialization was a logical extension of that attitude. Hence, governments provided for the costs of technical education; awarded grants to inventors and foreign entrepreneurs; exempted foreign industrial equipment from import duties; and, in some places, even financed factories. Of equal, if not greater importance in the long run, governments actively bore much of the cost of building roads and canals, deepening and widening river channels, and constructing railroads. By 1850, a network of iron rails had spread across Europe, although only Germany and Belgium had completed major parts of their systems by that time. Although European markets did not feel the real impact of the railroad until after 1850, railroad construction itself in the 1830s and 1840s gave great impetus to the metalworking and engineering industries.

Governments on the Continent also used tariffs to further industrialization. After 1815, cheap British goods flooded continental markets. The French responded with high tariffs to protect their fledgling industries. The most

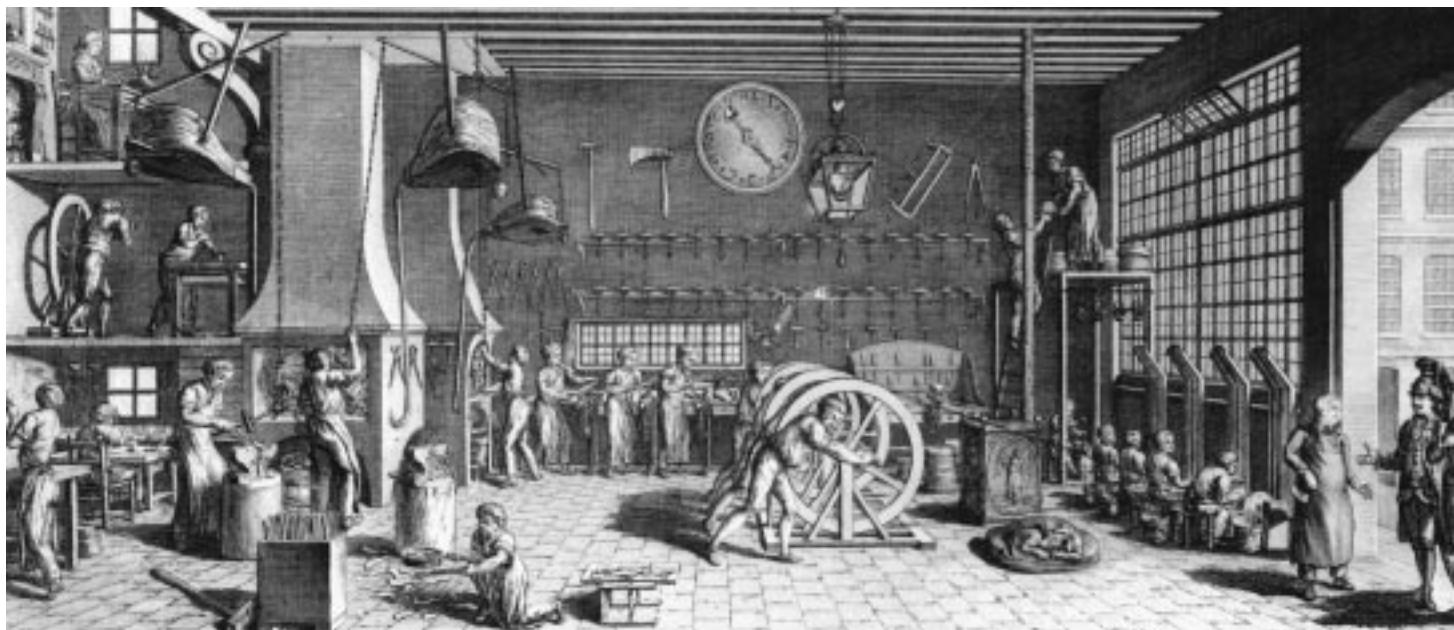


systematic exposition for the use of tariffs, however, was made by a German writer, Friedrich List (1789–1846), who emigrated to America and returned to Germany as a United States consul. In his *National System of Political Economy*, written in 1844, List advocated a rapid and large-scale program of industrialization as the surest path to develop a nation's strength. To assure that path to industrialization, he felt that a nation must use protective tariffs. If countries followed the British policy of free trade, then cheaper British goods would inundate national markets and destroy infant industries before they had a chance to grow. Germany, he insisted, could not compete with Britain without protective tariffs.

A third significant difference between British and continental industrialization was the role of the joint-stock investment bank on the Continent. Such banks mobilized the savings of thousands of small and large investors, creating a supply of capital that could then be plowed back into industry. Previously, continental banks had been

mostly merchant or private banks, but in the 1830s two Belgian banks, the Société Générale and the Banque de Belgique, took a new approach. By accepting savings from many depositors, they developed large capital resources that they invested on a large scale in railroads, mining, and heavy industry. These investments were especially important to the Belgian coal industry, which became the largest on the Continent in the 1840s. Shareholders in these joint-stock corporations had limited liability; they could only be held responsible for the amount of their investment.

Similar institutions emerged in France and German-speaking lands as well in the 1850s with the establishment of the Crédit Mobilier in France, the Darmstadt Bank in Germany, and the Kreditanstalt in Austria. They, too, took in savings of small investors and bought shares in the new industries. The French consul in Leipzig noted their significance: "Every town and state [in Germany]," he pointed out, "however small it may be, wants its bank and its Crédit Mobilier." These investments proved invaluable



THE SPREAD OF INDUSTRIALIZATION: FRENCH IRONWORKS. Industrialization on the Continent lagged considerably behind that of Great Britain. This 1800 engraving shows

the Manufacture Nationale, a small French ironworks in Paris. Industrialization in France was a slow process until the mid-nineteenth century.

to continental industrialization. By starting with less expensive machines, the British had been able to industrialize largely through the private capital of successful individuals who reinvested their profits. On the Continent advanced industrial machines necessitated large amounts of capital; joint-stock industrial banks provided it.

Centers of Continental Industrialization

The Industrial Revolution on the Continent occurred in three major centers between 1815 and 1850—Belgium, France, and the German states. Here, too, cotton played an important role, although it was not as significant as heavy industry. France was the continental leader in the manufacture of cotton goods but still lagged far behind Great Britain. In 1849, France used 64,000 tons of raw cotton, Belgium, 11,000, and Germany, 20,000, whereas Britain utilized 286,000 tons. Continental cotton factories were older, used less efficient machines, and had less productive labor. In general, continental technology in the cotton industry was a generation behind Great Britain. But that is not the whole story. With its cheap coal and scarce water, Belgium gravitated toward the use of the steam engine as the major source of power and invested in the new machines. By the mid-1840s, Belgium had the most modern cotton-manufacturing system on the Continent.

The development of cotton manufacturing on the Continent and in Britain differed in two significant ways. Unlike Britain, where cotton manufacturing was mostly centered in Lancashire (in northwestern England) and the Glasgow area, cotton mills in France, Germany, and, to a

lesser degree, Belgium were dispersed through many regions. Noticeable, too, was the mixture of old and new. The old techniques of the cottage system, such as the use of hand looms, held on much longer. In the French district of Normandy, for example, in 1849 eighty-three mills were still driven by hand or animal power.

As traditional methods persisted alongside the new methods in cotton manufacturing, the new steam engine came to be used primarily in mining and metallurgy on the Continent rather than in textile manufacturing. At first, almost all of the steam engines on the Continent came from Britain; not until the 1820s was a domestic machine industry developed.

In Britain, the Industrial Revolution had been built upon the cotton industry; on the Continent, the iron and coal of heavy industry led the way. As in textiles, however, heavy industry on the Continent before 1850 was a mixture of old and new. The adoption of new techniques, such as coke-smelted iron and puddling furnaces, coincided with the expansion of old-type charcoal blast furnaces. Before 1850, Germany lagged significantly behind both Belgium and France in heavy industry, and most German iron manufacturing remained based on old techniques. Not until the 1840s was coke-blast iron produced in the Rhineland. At that time, no one had yet realized the treasure of coal buried in the Ruhr valley. A German official wrote in 1852 that “it is clearly not to be expected that Germany will ever be able to reach the level of production of coal and iron currently attained in England. This is implicit in our far more limited resource endowment.” Little did he realize that although the industrial development of continental Europe was about a generation behind Britain at

mid-century, after 1850 an incredibly rapid growth in continental industry would demonstrate that Britain was not, after all, destined to remain the world's greatest industrial nation.

The Industrial Revolution in the United States

In 1800, the United States was an agrarian society. There were no cities over 100,000, and six out of every seven American workers were farmers. By 1860, however, the population had grown from 5 to 30 million people, larger than Great Britain. Almost half of them lived west of the Appalachian Mountains. The number of states had more than doubled, from sixteen to thirty-four, and nine American cities had over 100,000 in population. Only 50 percent of American workers were farmers. Between 1800 and the eve of the Civil War, the United States had experienced an industrial revolution and the urbanization that accompanied it.

The initial application of machinery to production was accomplished—as in continental Europe—by borrowing from Great Britain. A British immigrant, Samuel Slater, established the first textile factory using water-powered spinning machines in Rhode Island in 1790. By 1813, factories with power looms copied from British versions were being established. Soon thereafter, however, Americans began to equal or surpass British technical inventions. The Harpers Ferry arsenal, for example, built muskets with interchangeable parts. Because all the individual parts of a musket were identical (for example, all triggers were the same), the final product could be put together quickly and easily; this enabled Americans to avoid the more costly system in which skilled workers fitted together individual parts made separately. The so-called American system reduced costs and revolutionized production by saving labor, important to a society that had few skilled artisans.

Unlike Britain, the United States was a large country. The lack of a good system of internal transportation seemed to limit American economic development by making the transport of goods prohibitively expensive. This deficiency was gradually remedied, however. Thousands of miles of roads and canals were built linking east and west. The steamboat facilitated transportation on the Great Lakes, Atlantic coastal waters, and rivers. It was especially important to the Mississippi valley; by 1860, 1,000 steamboats plied that river (see the box on p. 595). Most important of all in the development of an American transportation system was the railroad. Beginning with 100 miles in 1830, by 1860 more than 27,000 miles of railroad track covered the United States. This transportation revolution turned the United States into a single massive market for the manufactured goods of the Northeast, the early center of American industrialization.

Labor for the growing number of factories in this area came primarily from rural New England. The United

States did not possess a large number of craftspeople, but it did have a rapidly expanding farm population; its size in the Northeast soon outstripped the available farmland. While some of this excess population, especially men, went west, others, mostly women, found work in the new textile and shoe factories of New England. Indeed, women made up more than 80 percent of the laboring force in the large textile factories. In Massachusetts mill towns, company boarding houses provided rooms for large numbers of young women who worked for several years before marriage. Outside Massachusetts, factory owners sought entire families including children to work in their mills; one mill owner ran this advertisement in a newspaper in Utica, New York: "Wanted: A few sober and industrious families of at least five children each, over the age of eight years, are wanted at the Cotton Factory in Whitestown. Widows with large families would do well to attend this notice." When a decline in rural births threatened to dry up this labor pool in the 1830s and 1840s, European immigrants, especially poor and unskilled Irish, English, Scottish, and Welsh, appeared in large numbers to replace American women and children in the factories.

Women, children, and these immigrants had one thing in common as employees; they were largely unskilled laborers. Unskilled labor pushed American industrialization into a capital-intensive pattern. Factory owners invested heavily in machines that could produce in quantity at the hands of untrained workers. In Britain, the pace of mechanization was never as rapid because Britain's supply of skilled artisans made it more profitable to pursue a labor-intensive economy.

By 1860, the United States was well on its way to being an industrial nation. In the Northeast, the most industrialized section of the country, per capita income was 40 percent higher than the national average. Diets, it has been argued, were better and more varied; machine-made clothing was more abundant. Industrialization did not necessarily lessen economic disparities, however. Despite a growing belief in a myth of social mobility based upon equality of economic opportunity, the reality was that the richest 10 percent of the population in the cities held 70 to 80 percent of the wealth compared to 50 percent in 1800. Nevertheless, American historians generally argue that while the rich got richer, the poor, thanks to an increase in their purchasing power, did not get poorer.

◆ *The Social Impact of the Industrial Revolution*

Eventually, the Industrial Revolution revolutionized the social life of Europe and the world. Although much of Europe remained bound by its traditional ways, already in the first half of the nineteenth century, the social impact

“S-t-e-a-m-boat a-coming!”

Steamboats and railroads were crucial elements in a transportation revolution that enabled industrialists to expand markets by shipping goods cheaply and efficiently. At the same time, these marvels of technology aroused a sense of power and excitement that was an important aspect of the triumph of industrialization. The American novelist Mark Twain captured this sense of excitement in this selection from *Life on the Mississippi*.

✿ **Mark Twain, *Life on the Mississippi***

After all these years I can picture that old time to myself now, just as it was then: the white town drowsing in the sunshine of a summer's morning; the streets empty, or pretty nearly so; one or two clerks sitting in front of the Water street stores, with their splint-bottomed chairs tilted back against the walls, chins on breasts, hats slouched over their faces, asleep; . . . two or three lonely little freight piles scattered about the “levee”; a pile of “skids” on the slope of the stone-paved wharf, and the fragrant town drunkard asleep in the shadow of them; . . . the great Mississippi, the majestic, the magnificent Mississippi, rolling its mile-wide along, shining in the sun; the dense forest away on the other side; the “point” above the town, and the “point” below, bounding the river glimpse and turning it into a sort of sea, and withal a very still and brilliant and lonely one. Presently a film of dark smoke appears above on those remote “points”; instantly a negro drayman, famous for his quick eye and prodigious voice, lifts up to cry, “S-t-e-a-m-boat a-coming!” and the scene changes! The town drunkard stirs, the clerks wake up, a furious clatter of drays follows, every house and store pours out a human contribution, and all in a twinkling the dead town [Hannibal, Missouri] is alive and moving. Drays, carts, men, boys,

all go hurrying from many quarters to a common center, the wharf. Assembled there, the people fasten their eyes upon the coming boat as upon a wonder they are seeing for the first time. And the boat is rather a handsome sight, too. She is long and sharp and trim and pretty; she has two tall, fancy-topped chimneys, with a gilded device of some kind swung between them; a fanciful pilot-house, all glass and “ginger bread,” perched on top of the “texas” deck behind them; the paddle-boxes are gorgeous with a picture or with gilded rays above the boat's name; the boiler deck, the hurricane deck, and the texas deck are fenced and ornamented with clean white railings; there is a flag gallantly flying from the jack-staff; the furnace doors are open and the fires glaring bravely; the upper decks are black with passengers; the captain stands by the big bell, calm, imposing, the envy of all; great volumes of the blackest smoke are rolling and tumbling out of the chimneys—a husbanded grandeur created with a bit of pitch pine just before arriving at a town; the crew are grouped on the forecastle; the broad stage is run far out over the port bow, and an envied deck-hand stands picturesquely on the end of it with a coil of rope in his hand; the pent steam is screaming through the gaugecocks; the captain lifts his hand, a bell rings, the wheels stop; then they turn back, churning the water to foam, and the steam is at rest. Then such a scramble as there is to get aboard, and to get ashore, and to take in freight and discharge freight, all at one and the same time; and such a yelling and cursing as the mates facilitate it all with! Ten minutes later the steamer is under way again, with no flag on the jack-staff and no black smoke issuing from the chimneys. After ten more minutes the town is dead again, and the town drunkard asleep by the skids once more.

of the Industrial Revolution was being felt, and future avenues of growth were becoming apparent. Vast changes in the number of people and where they lived were already dramatically evident.

✿ **Population Growth**

Population increases had already begun in the eighteenth century, but they became dramatic in the nineteenth century. They were also easier to discern because record keeping became more accurate. In the nineteenth century, governments began to take periodic censuses and systematically collect precise data on births, deaths, and marriages. In Britain, for example, the first census was taken in 1801, and a systematic registration of births, deaths, and marriages was begun in 1836. In 1750, the total Euro-

pean population stood at an estimated 140 million; by 1800, it had increased to 187 million and by 1850 to 266 million, almost twice its 1750 level.

This population explosion cannot be explained by a higher birthrate for birthrates were declining after 1790. Between 1790 and 1850, Germany's birthrate dropped from 40 per 1,000 to 36.1; Great Britain's from 35.4 to 32.6, and France's from 32.5 to 26.7. The key to the expansion of population was the decline in death rates evident throughout Europe. Historians now believe that two major causes explain this decline. There was a drop in the number of deaths from famines, epidemics, and war. Major epidemic diseases, in particular, such as plague and smallpox declined noticeably, although small-scale epidemics continued. The ordinary death rate also declined as a general increase in the food supply, already evident in the

The Great Irish Famine

The Great Irish Famine was one of the nineteenth century's worst natural catastrophes. Overly dependent on a single crop, the Irish were decimated by the potato blight. In this selection, an Irish nationalist reported what he had witnessed in Galway in 1847.

✿ John Mitchel, *The Last Conquest of Ireland*

In the depth of winter we traveled to Galway, through the very center of that fertile island, and saw sights that will never wholly leave the eyes that beheld them—cowring wretches, almost naked in the savage weather, prowling in turnip-fields, and endeavoring to grub up roots which had been left, but running to hide as the mail-coach rolled by;—very large fields where small farms had been “consolidated,” showing dark bars of fresh mold running through them where the ditches had been leveled;—groups and families, sitting or wandering

on the high-road, with failing steps and dim patient eyes, gazing hopelessly into infinite darkness; before them, around them, above them, nothing but darkness and despair—parties of tall brawny men, once the flower of Meath and Galway, stalking by with a fierce but vacant scowl; as if they knew that all this ought not to be, but knew not whom to blame, saw none whom they could rend in their wrath. . . . Around those farmhouses which were still inhabited were to be seen hardly any stacks of grain; the poor-rate collector, the rent agent, the county-cess collector had carried it off; and sometimes I could see in front of the cottages little children leaning against a fence when the sun shone out—for they could not stand—their limbs fleshless, their bodies half naked, their faces bloated yet wrinkled, and of a pale greenish hue,—children who would never, it was too plain, grow up to be men and women.

agricultural revolution of Britain in the late eighteenth century, spread to more areas. More food enabled a greater number of people to be better fed and therefore more resistant to disease. Famine largely disappeared from western Europe, although there were dramatic exceptions in isolated areas, Ireland being the most significant.

Although industrialization itself did not cause population growth, industrialized areas did experience a change in the composition of the population. By 1850, the proportion of the active population involved in manufacturing, mining, or building had risen to 48 percent in Britain, 37 percent in Belgium, and 27 percent in France. But the actual areas of industrialization in 1850 were minimal, being concentrated in northern and central England, northern France, Belgium, and sections of western and eastern Germany. As one author has commented, “they were islands in an agricultural sea.”

This minimal industrialization, in light of the growing population, meant severe congestion in the countryside where a growing population divided the same amount of land into ever-smaller plots and also created an ever-larger mass of landless peasants. Overpopulation, especially noticeable in parts of France, northern Spain, southern Germany, Sweden, and Ireland, magnified the already existing problem of rural poverty. In Ireland, it produced the century’s greatest catastrophe.

✿ THE GREAT HUNGER

Ireland was one of the most oppressed areas in western Europe. The predominantly Catholic peasant population rented land from mostly absentee British Protestant landlords whose primary concern was collecting their rents. Irish peasants lived in mud hovels in desperate poverty. The cultivation of the potato, a nutritious and relatively easy food to grow that produced three times as much food

per acre as grain, gave Irish peasants a basic staple that enabled them to survive and even expand in numbers. As only an acre or two of potatoes was sufficient to feed a family, Irish men and women married earlier than elsewhere and started having children earlier as well. This led to significant growth in the population. Between 1781 and 1845, the Irish population doubled from four to eight million. Probably half of this population depended on the potato for survival. In the summer of 1845, the potato crop in Ireland was struck by blight due to a fungus that turned the potatoes black. Between 1845 and 1851, the Great Famine decimated the Irish population (see the box above). Over one million died of starvation and disease, and almost two million emigrated to the United States and Britain. Of all the European nations, only Ireland had a declining population in the nineteenth century. But other countries, too, faced problems of dire poverty and declining standards of living as their populations exploded.

The flight of so many Irish to America reminds us that the traditional safety valve for overpopulation has always been emigration. Between 1821 and 1850, the number of emigrants from Europe averaged about 110,000 a year. Most of these emigrants came from places like Ireland and southern Germany, where peasant life had been reduced to marginal existence. Times of agrarian crisis resulted in great waves of emigration. Bad harvests in Europe in 1846–1847 (such as the catastrophe in Ireland) produced massive numbers of emigrants. In addition to the estimated 1.6 million from Ireland, for example, 935,000 people left Germany between 1847 and 1854. More often than emigrating, however, the rural masses sought a solution to their poverty by moving to towns and cities within their own countries to find work. It should not astonish us, then, that the first half of the nineteenth century was a period of rapid urbanization.

The Growth of Cities

Although the Western world would not become a predominantly urban society until the twentieth century, cities and towns had already grown dramatically in the first half of the nineteenth century, a phenomenon related to industrialization. Cities had traditionally been centers for princely courts, government and military offices, churches, and commerce. By 1850, especially in Great Britain and Belgium, they were rapidly becoming places for manufacturing and industry. With the steam engine, entrepreneurs could locate their manufacturing plants in urban centers where they had ready access to transportation facilities and unemployed people from the country looking for work.

In 1800, Great Britain had one major city, London, with a population of 1 million, and six cities between 50,000 and 100,000. Fifty years later, London's population had swelled to 2,363,000, and there were nine cities over 100,000 and eighteen cities with populations between 50,000 and 100,000. All together, these twenty-eight cities accounted for 5.7 million or one-fifth of the total British population. When the populations of cities under 50,000 are added to this total, we realize that more than 50 percent of the British population lived in towns and cities by 1850. Britain was forced to become a food importer rather than an exporter as the number of people involved in agriculture declined to 20 percent of the population.

Urban populations also grew on the Continent, but less dramatically. Paris had 547,000 inhabitants in 1800, but only two other French cities had populations of 100,000: Lyons and Marseilles. In 1851, Paris had grown to 1 million while Lyons and Marseilles were still under 200,000. German and Austrian lands had only three cities with over 100,000 inhabitants (Vienna had 247,000) in 1800; fifty years later, there were only five, but Vienna had grown to 440,000. As these figures show, urbanization did not proceed as rapidly here as in Britain; of course, neither had industrialization. Even in Belgium, the most heavily industrialized country on the Continent, almost 50 percent of the male workforce was still engaged in agriculture by midcentury.

URBAN LIVING CONDITIONS IN THE EARLY INDUSTRIAL REVOLUTION

The dramatic growth of cities in the first half of the nineteenth century produced miserable living conditions for many of the inhabitants. Of course, the quality of life had been poor for centuries for many people in European cities, but the rapid urbanization associated with the Industrial Revolution intensified the problems in the first half of the nineteenth century and made these wretched conditions all the more apparent. City authorities of whatever kind either felt little responsibility for these conditions or more frequently did not have the skills to cope with the complex, new problems associated with such rapidly growing populations. City authorities might also often be fac-



A NEW INDUSTRIAL TOWN. Cities and towns grew dramatically in Britain in the first half of the nineteenth century, largely as a result of industrialization. Pictured here is Saltaire, a model textile factory and town founded near Bradford by Titus Salt in 1851. To facilitate the transportation of goods, the town was built on the Leeds and Liverpool canals.

tory owners who possessed little or no tradition of public service or public responsibility.

Wealthy, middle-class inhabitants, as usual, insulated themselves as best they could, often living in suburbs or the outer ring of the city where they could have individual houses and gardens. In the inner ring of the city stood the small row houses, some with gardens, of the artisans and lower middle class. Finally, located in the center of most industrial towns were the row houses of the industrial workers. This report on working-class housing in the British city of Birmingham in 1843 gives an idea of the general conditions they faced:

The courts [of working-class row houses] are extremely numerous; . . . a very large portion of the poorer classes of the inhabitants reside in them. . . . The courts vary in the number of the houses which they contain, from four to twenty, and most of these houses are three stories high, and built, as it is termed, back to back. There is a wash-house, an ash-pit, and a privy at the end, or on one side of the court, and not unfrequently one or more pigsties and heaps of manure. Generally speaking, the privies in the old courts are in a most filthy condition. Many which we have inspected were in a state which renders it impossible for us to conceive how they could be used; they were without doors and overflowing with filth.

The people who lived in such houses were actually the fortunate; the truly unfortunate were those forced to live in cellars. One reformer asked, "How can a hole underground of from 12 to 15 feet square admit of ventilation so as to fit it for a human habitation?" Rooms were not large and were frequently overcrowded, as this government report of 1838 revealed: "I entered several of the tenements. In one of them, on the ground floor, I found six persons occupying a very small room, two in bed, ill with fever. In the room above this were two more persons in one bed ill with fever." Another report said: "There were

63 families where there were at least five persons to one bed; and there were some in which even six were packed in one bed, lying at the top and bottom—children and adults.”⁶

Sanitary conditions in these towns were appalling. Due to the lack of municipal direction, city streets were often used as sewers and open drains: “In the center of this street is a gutter, into which potato parings, the refuse of animal and vegetable matters of all kinds, the dirty water from the washing of clothes and of the houses, are all poured, and there they stagnate and putrefy.”⁷ Unable to deal with human excrement, cities in the new industrial era smelled horrible and were extraordinarily unhealthy. Towns and cities were fundamentally death traps. As deaths outnumbered births in most large cities in the first half of the nineteenth century, only a constant influx of people from the country kept them alive and growing.

Adding to the deterioration of urban life was the adulteration of food. Consumers were defrauded in a variety of ways: alum was added to make bread look white and hence more expensive; beer and milk were watered down; and red lead despite its poisonous qualities was substituted for pepper. The government refused to intervene; a parliamentary committee stated that “more benefit is likely to result from the effects of a free competition . . . than can be expected to result from any regulations.” It was not until 1875 that an effective Food and Drugs Act was passed in Britain.

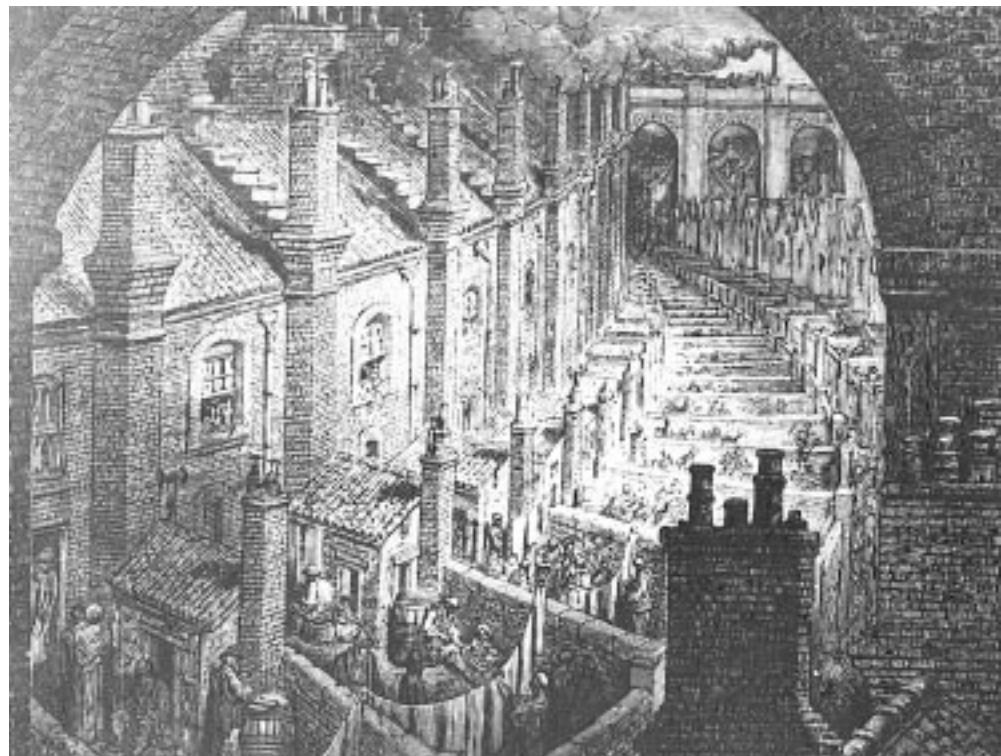
Our knowledge of the pathetic conditions in the early industrial cities is largely derived from an abundance of social investigations. Such investigations began in France

in the 1820s. In Britain the Poor Law Commissioners produced detailed reports. The investigators were often struck by the physically and morally debilitating effects of urban industrial life on the poor. They observed, for example, that young working-class men were considerably shorter and scrawnier than the sons of middle-class families and much more subject to disease. They were especially alarmed by what they considered the moral consequences of such living conditions: prostitution, crime, and sexual immoralities, all of which they saw as the effect of such squalid lives.

To many of the well-to-do middle classes, this situation presented a clear danger to society. Were not these masses of workers, sunk in crime, disease, and immorality, a potential threat to their own well-being? Might not the masses be organized and used by unscrupulous demagogues to overthrow the established order? One of the most eloquent British reformers of the 1830s and 1840s, James Kay-Shuttleworth, described them as “volcanic elements, by whose explosive violence the structure of society may be destroyed.” Another observer spoke more contemptuously in 1850:

They live precisely like brutes, to gratify . . . the appetites of their uncultivated bodies, and then die, to go they have never thought, cared, or wondered whither. . . . Brought up in the darkness of barbarism, they have no idea that it is possible for them to attain any higher condition; they are not even sentient enough to desire to change their situation. . . . they eat, drink, breed, work and die; and . . . the richer and more intelligent classes are obliged to guard them with police.⁸

SLUMS OF INDUSTRIAL LONDON. Industrialization and rapid urban growth produced dreadful living conditions in many nineteenth-century cities. Filled with garbage and human waste, cities often smelled terrible and were extremely unhealthy. This drawing by Gustave Doré shows a London slum district overshadowed by rail viaducts.



Some observers were less arrogant, however, and wondered if the workers could be held responsible for their fate.

One of the best of a new breed of urban reformers was Edwin Chadwick (1800–1890). With a background in law, Chadwick became obsessed with eliminating the poverty and squalor of the metropolitan areas. He became a civil servant and was soon appointed to a number of government investigatory commissions. As secretary of the Poor Law Commission, he initiated a passionate search for detailed facts about the living conditions of the working classes. After three years of investigation, Chadwick summarized the results in his *Report on the Condition of the Labouring Population of Great Britain*, published in 1842. In it he concluded that “the various forms of epidemic, endemic, and other disease” were directly caused by the “atmospheric impurities produced by decomposing animal and vegetable substances, by damp and filth, and close overcrowded dwellings [prevailing] amongst the population in every part of the kingdom.” Such conditions, he argued, could be eliminated. As to the means: “The primary and most important measures, and at the same time the most practicable, and within the recognized province of public administration, are drainage, the removal of all refuse of habitations, streets, and roads, and the improvement of the supplies of water.”⁹ In other words, Chadwick was advocating a system of modern sanitary reforms consisting of efficient sewers and a supply of piped water. Six years after his report and largely due to his efforts, Britain’s first Public Health Act created a National Board of Health empowered to form local boards that would establish modern sanitary systems.

Many middle-class citizens were quite willing to support the public health reforms of men like Chadwick because of their fear of cholera. Outbreaks of this deadly disease had ravaged Europe in the early 1830s and late 1840s and were especially rampant in the overcrowded cities. As city authorities and wealthier residents became convinced that filthy conditions helped to spread the disease, they began to support the call for new public health measures.

New Social Classes: The Industrial Middle Class

The rise of industrial capitalism produced a new middle-class group. The bourgeois or middle class was not new; it had existed since the emergence of cities in the Middle Ages. Originally, the bourgeois was the burgher or town dweller, whether active as a merchant, official, artisan, lawyer, or scholar, who enjoyed a special set of rights from the charter of the town. As wealthy townspeople bought land, the original meaning of the word *bourgeois* became lost, and the term came to include people involved in commerce, industry, and banking as well as professionals, such as lawyers, teachers, physicians, and government

officials at various levels. At the lower end of the economic scale were master craftspeople and shopkeepers.

Lest we make the industrial middle class too much of an abstraction, we need to look at who the new industrial entrepreneurs actually were. These were the people who constructed the factories, purchased the machines, and figured out where the markets were. Their qualities included resourcefulness, single-mindedness, resolution, initiative, vision, ambition, and often, of course, greed. As Jedediah Strutt, the cotton manufacturer said, “Getting of money . . . is the main business of the life of men.”

But this was not an easy task. The early industrial entrepreneurs were called upon to superintend an enormous array of functions that are handled today by teams of managers; they raised capital, determined markets, set company objectives, organized the factory and its labor, and trained supervisors who could act for them. The opportunities for making money were great, but the risks were also tremendous. The cotton trade, for example, which was so important to the early Industrial Revolution, was intensely competitive. Only through constant expansion could one feel secure, so early entrepreneurs reinvested most of their initial profits. Fear of bankruptcy was constant, especially among small firms. Furthermore, most early industrial enterprises were small. Even by the 1840s, only 10 percent of British industrial firms employed more than 5,000 workers; 43 percent had fewer than 100 workers. As entrepreneurs went bankrupt, new people could enter the race for profits, especially since the initial outlay required was not gigantic. In 1816, only one mill in five in the important industrial city of Manchester was in the hands of its original owners.

The social origins of industrial entrepreneurs were incredibly diverse. Many of the most successful came from a mercantile background. Three London merchants, for example, founded a successful ironworks in Wales that owned eight steam engines and employed 5,000 men. In Britain, land and domestic industry were often interdependent. Joshua Fielden, for example, acquired sufficient capital to establish a factory by running a family sheep farm while working looms in the farmhouse. Intelligent, clever, and ambitious apprentices who had learned their trades well could also strike it rich. William Radcliffe’s family engaged in agriculture and spinning and weaving at home; he learned quickly how to succeed:

Availing myself of the improvements that came out while I was in my teens . . . with my little savings and a practical knowledge of every process from the cotton bag to the piece of cloth . . . I was ready to commence business for myself and by the year 1789 I was well established and employed many hands both in spinning and weaving as a master manufacturer.¹⁰

By 1801, Radcliffe was operating a factory employing 1,000 workers.

Members of dissenting religious minorities were often prominent among the early industrial leaders of Britain. The Darbys and Lloyds who were iron

manufacturers, the Barclays and Lloyds who were bankers, and the Trumans and Perkins who were brewers were all Quakers. These were expensive trades and depended upon the financial support that co-religionists in religious minorities provided for each other. Most historians believe that a major reason members of these religious minorities were so prominent in business was that they lacked other opportunities. Legally excluded from many public offices, they directed their ambitions into the new industrial capitalism.

It is interesting to note that in Britain in particular aristocrats also became entrepreneurs. The Lambtons in Northumberland, the Curwens in Cumberland, the Norfolks in Yorkshire, and the Dudleys in Staffordshire all invested in mining enterprises. This close relationship between land and industry helped Britain to assume the leadership role in the early Industrial Revolution.

By 1850, in Britain at least, the kind of traditional entrepreneurship that had created the Industrial Revolution was declining and was being replaced by a new business aristocracy. This new generation of entrepreneurs stemmed from the professional and industrial middle classes, especially as sons inherited the successful businesses established by their fathers. It must not be forgotten, however, that even after 1850 a large number of small businesses existed in Britain and some were still founded by people from humble backgrounds. Indeed, the age of large-scale corporate capitalism did not begin until the 1890s (see Chapter 23).

Increasingly, the new industrial entrepreneurs—the bankers and owners of factories and mines—came to amass much wealth and play an important role alongside the traditional landed elites of their societies. The Industrial Revolution began at a time when the pre-industrial agrarian world was still largely dominated by landed elites. As the new bourgeoisie bought great estates and acquired social respectability, they also sought political power, and in the course of the nineteenth century, their wealthiest members would merge with those old elites.

New Social Classes: Workers in the Industrial Age

At the same time the members of the industrial middle class were seeking to reduce the barriers between themselves and the landed elite, they also were trying to separate themselves from the laboring classes below them. The working class was actually a mixture of different groups in the first half of the nineteenth century. In the course of the nineteenth century, factory workers would form an industrial proletariat, but in the first half of that century, they by no means constituted a majority of the working class in any major city, even in Britain. According to the 1851 census in Britain, there were 1.8 million agricultural laborers and 1 million domestic servants, but only 811,000 workers in the cotton and woolen industries. Even one-third of these were still working in small workshops or in their own homes.

Within the cities, artisans or craftspeople remained the largest group of urban workers during the first half of the nineteenth century. They worked in numerous small industries, such as shoemaking, glovemaking, bookbinding, printing, and bricklaying. Some craftspeople formed a kind of aristocracy of labor, especially those employed in such luxury trades as coachbuilding and clockmaking who earned higher wages than others. Artisans were not factory workers; they were traditionally organized in guilds where they passed on their skills to apprentices. But guilds were increasingly losing their power, especially in industrialized countries. Fearful of losing out to the new factories that could produce goods more cheaply, artisans tended to support movements against industrialization. Industrialists welcomed the decline of skilled craftspeople, as one perceptive old tailor realized in telling his life story:

It is upwards of 30 years since I first went to work at the tailoring trade in London. . . . I continued working for the honorable trade and belonging to the Society [for tailors] for about 15 years. My weekly earnings then averaged £1 16s. a week while I was at work, and for several years I was seldom out of work . . . no one could have been happier than I was. . . . But then, with my sight defective . . . I could get no employment at the honorable trade, and that was the ruin of me entirely; for working there, of course, I got “scratched” from the trade society, and so lost all hope of being provided for by them in my helplessness. The workshop . . . was about seven feet square, and so low, that as you [sat] on the floor you could touch the ceiling with the tip of your finger. In this place seven of us worked. [The master] paid little more than half the regular wages, and employed such men as myself—only those who couldn’t get anything better to do. . . . I don’t think my wages there averaged above 12s. a week. . . . I am convinced I lost my eyesight by working in that cheap shop. . . . It is by the ruin of such men as me that these masters are enabled to undersell the better shops. . . . That’s the way, sir, the cheap clothes is produced, by making blind beggars of the workmen, like myself, and throwing us on the parish in our old age.¹¹

Servants also formed another large group of urban workers, especially in major cities like London and Paris. Many were women from the countryside who became utterly dependent upon their upper- and middle-class employers.

WORKING CONDITIONS FOR THE INDUSTRIAL WORKING CLASS

Workers in the new industrial factories also faced wretched working conditions. We have already observed the psychological traumas workers experienced from their employers’ efforts to break old preindustrial work patterns and create a well-disciplined labor force. But what were the physical conditions of the factories?

Unquestionably, in the early decades of the Industrial Revolution, “places of work,” as early factories were called, were dreadful. Work hours ranged from twelve to sixteen hours a day, six days a week, with a half hour for lunch and dinner. There was no security of employment and no minimum wage. The worst conditions were in the

cotton mills where temperatures were especially debilitating. One report noted that “in the cotton-spinning work, these creatures are kept, fourteen hours in each day, locked up, summer and winter, in a heat of from eighty to eighty-four degrees.” Mills were also dirty, dusty, and unhealthy:

Not only is there not a breath of sweet air in these truly infernal scenes, but . . . there is the abominable and pernicious stink of the gas to assist in the murderous effects of the heat. In addition to the noxious effluvia of the gas, mixed with the steam, there are the dust, and what is called cotton-flyings or fuz, which the unfortunate creatures have to inhale; and . . . the notorious fact is that well constituted men are rendered old and past labor at forty years of age, and that children are rendered decrepit and deformed, and thousands upon thousands of them slaughtered by consumptions, before they arrive at the age of sixteen.¹²

Thus ran a report on working conditions in the cotton industry in 1824.

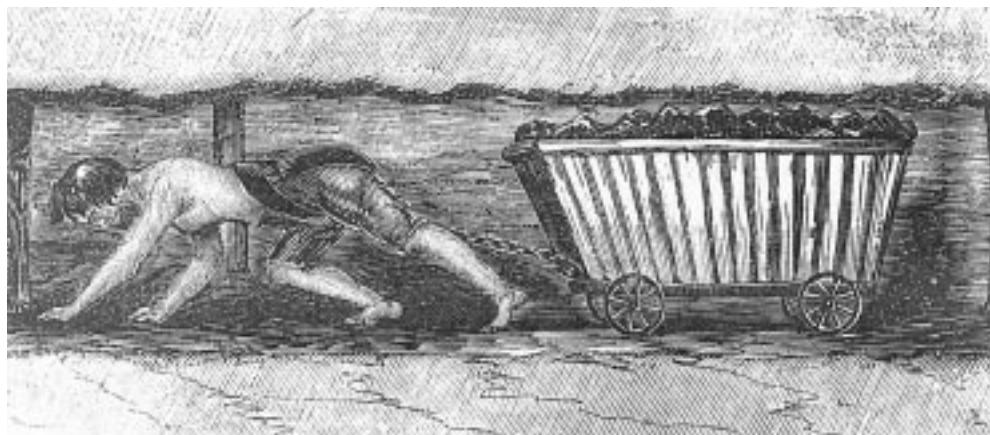
Conditions in the coal mines were also harsh. The introduction of steam power meant only that steam-powered engines mechanically lifted coal to the top. Inside the mines, men still bore the burden of digging the coal out while horses, mules, women, and children hauled coal carts on rails to the lift. Dangers abounded in coal mines; cave-ins, explosions, and gas fumes (called “bad air”) were a way of life. The cramped conditions—tunnels often did not exceed three or four feet in height—and constant dampness in the mines resulted in deformed bodies and ruined lungs.

Both children and women were employed in large numbers in early factories and mines. Children had been an important part of the family economy in pre-industrial times, working in the fields or carding and spinning wool at home with the growth of cottage industry. In the Industrial Revolution, however, child labor was exploited more than ever and in a considerably more systematic fashion (see the boxes on pp. 602–603). The owners of cotton factories appreciated certain features of child labor. Children had an especially delicate touch as spinners of cotton. Their smaller size made it easier for them

to crawl under machines to gather loose cotton. Moreover, children were more easily broken to factory work. Above all, children represented a cheap supply of labor. In 1821, 49 percent of the British people were under twenty years of age. Hence, children made up a particularly abundant supply of labor, and they were paid only about one-sixth or one-third of what a man was paid. In the cotton factories in 1838, children under eighteen made up 29 percent of the total workforce; children as young as seven worked twelve to fifteen hours per day six days a week in cotton mills.

Especially terrible in the early Industrial Revolution was the use of so-called pauper apprentices. These were orphans or children abandoned by their parents who had wound up in the care of local parishes. To save on their upkeep, parish officials found it convenient to apprentice them to factory owners looking for a cheap source of labor. These children worked long hours under strict discipline and received inadequate food and recreation; many became deformed from being kept too long in unusual positions. Although economic liberals and some industrialists were against all state intervention in economic matters, Parliament eventually remedied some of the worst ills of child abuse in factories and mines (see Efforts at Change: Reformers and Government later in this chapter). The legislation of the 1830s and 1840s, however, primarily affected child labor in textile factories and mines. It did not touch the use of children in small workshops or the nonfactory trades that were not protected. As these trades were in competition with the new factories, conditions there were often even worse. Pottery works, for example, were not investigated until the 1860s when it was found that 17 percent of the workers were under eleven years of age. One investigator reported what he found:

The boys were kept in constant motion throughout the day, each carrying from thirty to fifty dozen of molds into the stoves, and remaining . . . long enough to take the dried earthenware away. The distance thus run by a boy in the course of a day . . . was estimated at seven miles. From the very nature of this exhausting occupation children were rendered pale, weak and unhealthy. In the depth of winter,



WOMEN IN THE MINES.
Both women and children were often employed in the early factories and mines of the nineteenth century. As is evident in this illustration of a woman dragging a cart loaded with coal behind her, they often worked under very trying conditions.

Child Labor: Discipline in the Textile Mills

Child labor was certainly not new, but in the early Industrial Revolution it was exploited more systematically. These selections are taken from the Report of Sadler's Committee, which was commissioned in 1832 to inquire into the condition of child factory workers.

✿ How They Kept the Children Awake

It is a very frequent thing at Mr. Marshall's [at Shrewsbury] where the least children were employed (for there were plenty working at six years of age), for Mr. Horseman to start the mill earlier in the morning than he formerly did; and provided a child should be drowsy, the overseer walks round the room with a stick in his hand, and he touches that child on the shoulder, and says, "Come here." In a corner of the room there is an iron cistern; it is filled with water; he takes this boy, and takes him up by the legs, and dips him over head in the cistern, and sends him to work for the remainder of the day....

What means were taken to keep the children to their work?—Sometimes they would tap them over the head, or nip them over the nose, or give them a pinch of snuff, or throw water in their faces, or pull them off where they were, and job them about to keep them waking.

✿ The Sadistic Overseer

Samuel Downe, age 29, factory worker living near Leeds; at the age of about ten began work at Mr.

Marshall's mills at Shrewsbury, where the customary hours when work was brisk were generally 5 A.M. to 8 P.M., sometimes from 5:30 A.M. to 8 or 9:

What means were taken to keep the children awake and vigilant, especially at the termination of such a day's labor as you have described?—There was generally a blow or a box, or a tap with a strap, or sometimes the hand.

Have you yourself been strapped?—Yes, most severely, till I could not bear to sit upon a chair without having pillows, and through that I left. I was strapped both on my own legs, and then I was put upon a man's back, and then strapped and buckled with two straps to an iron pillar, and flogged, and all by one overseer; after that he took a piece of tow, and twisted it in the shape of a cord, and put it in my mouth, and tied it behind my head.

He gagged you?—Yes; and then he orders me to run round a part of the machinery where he was overseer, and he stood at one end, and every time I came there he struck me with a stick, which I believe was an ash plant, and which he generally carried in his hand, and sometimes he hit me, and sometimes he did not; and one of the men in the room came and begged me off, and that he let me go, and not beat me any more, and consequently he did.

You have been beaten with extraordinary severity?—Yes, I was beaten so that I had not power to cry at all, or hardly speak at one time. What age were you at that time?—Between 10 and 11.

with the thermometer in the open air sometimes below zero, boys, with little clothing but rags, might be seen running to and fro on errands or to their dinners with the perspiration on their foreheads, "after laboring for hours like little slaves." The inevitable result of such transitions of temperature were consumption, asthma, and acute inflammation.¹³

Little wonder that child labor legislation enacted in 1864 included pottery works.

By 1830, women and children made up two-thirds of the cotton industry's labor. However, as the number of children employed declined under the Factory Act of 1833, their places were taken by women, who came to dominate the labor forces of the early factories. Women made up 50 percent of the labor force in textile (cotton and woolen) factories before 1870. They were mostly unskilled labor and were paid half or less of what men received. Excessive working hours for women were outlawed in 1844, but only in textile factories and mines; not until 1867 were they outlawed in craft workshops.

The employment of children and women in large part represents a continuation of a preindustrial kinship pattern. Cottage industry had always involved the efforts

of the entire family, and it seemed perfectly natural to continue this pattern. Men migrating from the countryside to industrial towns and cities took their wives and children with them into the factory or into the mines. Of 136 employees in Robert Peel's factory at Bury in 1801, 95 belonged to twenty-six families. The impetus for this family work often came from the family itself. The factory owner Jedediah Strutt was opposed to child labor under ten but was forced by parents to take children as young as seven.

The employment of large numbers of women in factories did not produce a significant transformation in female working patterns, as was once assumed. Studies of urban households in France and Britain, for example, have revealed that throughout the nineteenth century traditional types of female labor still predominated in the women's work world. In 1851, fully 40 percent of the female workforce in Britain consisted of domestic servants. In France, the largest group of female workers, 40 percent, worked in agriculture. In addition, only 20 percent of female workers in Britain labored in factories, and only 10 percent did so in France. Regional and local studies have

Child Labor: The Mines

After examining conditions in British coal mines, a government official commented that “the hardest labor in the worst room in the worst-conducted factory is less hard, less cruel, and less demoralizing than the labor in the best of coal-mines.” Yet it was not until 1842 that legislation was passed eliminating the labor of boys under ten from the mines. This selection is taken from a government report on the mines in Lancashire.

✿ The Black Holes of Worsley

Examination of Thomas Gibson and George Bryan, witnesses from the coal mines at Worsley:

Have you worked from a boy in a coal mine?—
(Both) Yes.

What had you to do then?—Thrutching the basket and drawing. It is done by little boys; one draws the basket and the other pushes it behind. Is that hard labor?—Yes, very hard labor.

For how many hours a day did you work?—Nearly nine hours regularly; sometimes twelve; I have worked about thirteen. We used to go in at six in the morning, and took a bit of bread and cheese in our pocket, and stopped two or three minutes; and some days nothing at all to eat.

How was it that sometimes you had nothing to eat?—We were over-burdened. I had only a mother, and she had nothing to give me. I was sometimes half starved. . . .

Do they work in the same way now exactly?—Yes, they do; they have nothing more than a bit of bread and cheese in their pocket, and sometimes can't eat it all, owing to the dust and damp and badness of air; and sometimes it is as hot as an oven; sometimes I have seen it so hot as to melt a candle.

What are the usual wages of a boy of eight?—They used to get 3d or 4d a day. Now a man's wages is divided into eight eighths; and when a boy is eight years old he gets one of those eighths; at eleven, two eighths; at thirteen, three eighths; at fifteen, four eighths; at twenty, man's wages.

What are the wages of a man?—About 15s if he is in full employment, but often not more than 10s, and out of that he has to get his tools and candles. He consumes about four candles in nine hours' work, in some places six; 6d per pound, and twenty-four candles to the pound.

Were you ever beaten as a child?—Yes, many a score of times; both kicks and thumps.

Are many girls employed in the pits?—Yes, a vast of those. They do the same kind of work as the boys till they get about 14 years of age, when they get the wages of half a man, and never get more, and continue at the same work for many years.

Did they ever fight together?—Yes, many days together. Both boys and girls; sometimes they are very loving with one another.

also found that most of the workers were single women. Few married women worked outside their homes.

The Factory Acts that limited the work hours of children and women also began to break up the traditional kinship pattern of work and led to a new pattern based on a separation of work and home. Men came to be regarded as responsible for the primary work obligations as women assumed daily control of the family and performed low-paying jobs such as laundry work that could be done in the home. Domestic industry made it possible for women to continue their contributions to family survival.

Historians have also reminded us that if the treatment of children in the mines and factories seems particularly cruel and harsh, contemporary treatment of children in general was often brutal. Beatings, for example, had long been regarded, even by dedicated churchmen and churchwomen, as the best way to discipline children.

✿ Standards of Living

One of the most heated debates on the Industrial Revolution concerns the standard of living. Most historians assume that in the long run the Industrial Revolution

increased living standards dramatically in the form of higher per capita incomes and greater consumer choices. But did the first generation of industrial workers experience a decline in their living standards and suffer unnecessarily? Some historians have argued that early industrialization required huge profits to be reinvested in new and ever more expensive equipment; thus, to make the requisite profits, industrialists had to keep wages low. Others have questioned that argument, pointing out that initial investments in early machinery were not necessarily large nor did they need to be. What certainly did occur in the first half of the nineteenth century was a widening gap between rich and poor. One estimate, based on income tax returns in Britain, is that the wealthiest 1 percent of the population increased its share of the national product from 25 percent in 1801 to 35 percent in 1848.

Wages, prices, and consumption patterns are some of the criteria used for measuring the standard of living. Between 1780 and 1850, as far as we can determine from the available evidence, both wages and prices fluctuated widely. Most historians believe that during the Napoleonic wars the increase in prices outstripped wages. Between

1815 and 1830, a price fall was accompanied by a slight increase in wages. But from 1830 to the late 1840s, real wages seem to have improved although regional variations make generalizations dangerous.

When we look at consumption patterns, we find that in Britain in 1850 tea, sugar, and coffee were still semiluxuries consumed primarily by the upper and middle classes and better-off artisans. Meat consumption per capita was less in 1840 than in 1780. On the other hand, a mass market had developed in the cheap cotton goods so important to the Industrial Revolution. As a final note on the question of the standard of living, some historians who take a positive view of the early Industrial Revolution have questioned what would have happened to Britain's growing population without the Industrial Revolution. Would it have gone the way of Ireland's in the Great Hunger of the mid-nineteenth century? No one really knows.

No doubt the periodic crises of overproduction that haunted industrialization from its beginnings caused even further economic hardship. Short-term economic depressions brought high unemployment and increased social tensions. Unemployment figures could be astronomical. During one of these economic depressions in 1842, for example, 60 percent of the factory employees in Bolton were laid off. Cyclical depressions were particularly devastating in towns whose prosperity rested on one industry.

Overall we can say that some evidence exists for an increase in real wages for the working classes between 1790 and 1850, especially in the 1840s. But can standards of living be assessed only in terms of prices, wages, and consumption patterns? No doubt those meant little to people who faced dreadful housing, adulterated food, public health hazards, and the psychological traumas associated with a complete change in work habits and way of life. The real gainers in the early Industrial Revolution were members of the middle class—and some skilled workers whose jobs were not eliminated by the new machines. But industrial workers themselves would have to wait until the second half of the nineteenth century to reap the benefits of industrialization.

Efforts at Change: The Workers

Before long, workers looked to the formation of labor organizations to gain decent wages and working conditions. The British government, reacting against the radicalism of the French revolutionary working classes, had passed a series of Combination Acts in 1799 and 1800 outlawing associations of workers. The legislation failed to prevent the formation of trade unions, however. Similar to the craft societies of earlier times, these new associations were formed by skilled workers in a number of new industries, including the cotton spinners, ironworkers, coal miners, and shipwrights. These unions served two purposes. One was to preserve their own workers' position by limiting entry into their trade; another was to gain benefits from the employers. These early trade unions had limited goals.

They favored a working-class struggle against employers, but only to win improvements for the members of their own trades.

Some trade unions were even willing to strike to gain their goals. Bitter strikes were carried out by hand-loom weavers in Glasgow in 1813, cotton spinners in Manchester in 1818, and miners in Northumberland and Durham in 1810. Such blatant illegal activity caused Parliament to repeal the Combination Acts in 1824, accepting the argument of some members that the acts themselves had so alienated workers that they had formed unions. Unions were now tolerated, but other legislation enabled authorities to keep close watch over their activities.

In the 1820s and 1830s, the union movement began to focus on the creation of national unions. One of the leaders in this effort was a well-known cotton

A TRADE UNION MEMBERSHIP CARD. Skilled workers in a number of new industries formed trade unions in an attempt to gain higher wages, better working conditions, and special benefits. The scenes at the bottom of this membership card for the Associated Shipwright's Society illustrate some of the medical and social benefits it provided for its members.



magnate and social reformer, Robert Owen (1771–1858). Owen came to believe in the creation of voluntary associations that would demonstrate to others the benefits of cooperative rather than competitive living (see Chapter 21 on the utopian socialists). Although Owen's program was not directed specifically to trade unionists, his ideas had great appeal to some of their leaders. Under Owen's direction, plans emerged for a Grand National Consolidated Trades Union, which was formed in February 1834. As a national federation of trade unions, its primary purpose was to coordinate a general strike for the eight-hour working day. Rhetoric, however, soon outpaced reality, and by the summer of the same year, the lack of real working-class support led to its total collapse. Afterward, the union movement reverted to trade unions for individual crafts. The largest and most successful was the Amalgamated Society of Engineers, formed in 1850. Its provision of generous unemployment benefits in return for a small weekly payment was precisely the kind of practical gains these trade unions sought. Larger goals would have to wait.

Trade unionism was not the only type of collective action by workers in the early decades of the Industrial Revolution. The Luddites were skilled craftspeople in the Midlands and northern England who in 1812 attacked the machines that they believed threatened their livelihoods. These attacks failed to stop the industrial mechanization of Britain and have been viewed as utterly naive. Some historians, however, have also seen them as an intense eruption of feeling against unrestrained industrial capitalism. The inability of 12,000 troops to find the culprits provides stunning evidence of the local support they received in their areas.

A much more meaningful expression of the attempts of British workers to improve their condition developed in the movement known as Chartism. It was the first "important political movement of working men organized during the nineteenth century." Its aim was to achieve political democracy. A People's Charter drawn up in 1838 demanded universal male suffrage, payment for members of Parliament, and annual sessions of Parliament (see the box on p. 606). Two national petitions incorporating these points, affixed with millions of signatures, were presented to Parliament in 1839 and 1842. Both were rejected by the members of Parliament who were not at all ready for political democracy. As one member said, universal suffrage would be "fatal to all the purposes for which government exists" and was "utterly incompatible with the very existence of civilization." After 1843, Chartism as a movement had largely played itself out. It had never really posed a serious threat to the British establishment, but it had not been a total failure either. Its true significance stemmed from its ability to arouse and organize millions of working-class men and women, to give them a sense of working-class consciousness that they had not really possessed before. This political education of working people was important to

the ultimate acceptance of all the points of the People's Charter in the future.

Efforts at Change: Reformers and Government

Efforts to improve the worst conditions of the industrial factory system also came from outside the ranks of the working classes. From its beginning, the Industrial Revolution had drawn much criticism. Romantic poets like William Wordsworth (see Chapter 21) decried the destruction of the natural world:

*I grieve, when on the darker side
Of this great change I look; and there behold
Such outrage done to nature as compels
The indignant power to justify herself.*

Reform-minded individuals, be they factory owners who felt twinges of conscience or social reformers in Parliament, campaigned against the evils of the industrial factory, especially condemning the abuse of children. One hoped for the day "that these little ones should once more see the rising and setting of the sun."

As it became apparent that the increase in wealth generated by the Industrial Revolution was accompanied by ever-increasing numbers of poor people, more and more efforts were made to document and deal with the problems. As reports from civic-minded citizens and parliamentary commissions intensified and demonstrated the extent of poverty, degradation, and suffering, the reform efforts began to succeed.

Their first success was a series of Factory Acts passed between 1802 and 1819 that limited labor for children between the ages of nine and sixteen to twelve hours a day; the employment of children under nine years old was forbidden. Moreover, the laws stipulated that children were to receive instruction in reading and arithmetic during working hours. But these acts applied only to cotton mills, not to factories or mines where some of the worst abuses were taking place. Just as important, no provision was made for enforcing the acts through a system of inspection.

In the reform-minded decades of the 1830s and 1840s, new legislation was passed. The Factory Act of 1833 strengthened earlier labor legislation. All textile factories were now included. Children between nine and thirteen could work only eight hours a day; those between thirteen and eighteen, twelve hours. Factory inspectors were appointed with the power to fine those who broke the law. Another piece of legislation in 1833 required that children between nine and thirteen have at least two hours of elementary education during the working day. In 1847, the Ten Hours Act reduced the work day for children between thirteen and eighteen to ten hours. Women were also now included in the ten-hour limitation. In 1842, a Coal Mines Act eliminated the employment of boys under ten and women in mines. Eventually, men too would benefit from the move to restrict factory hours.

The Political Demands of the Chartist Movement

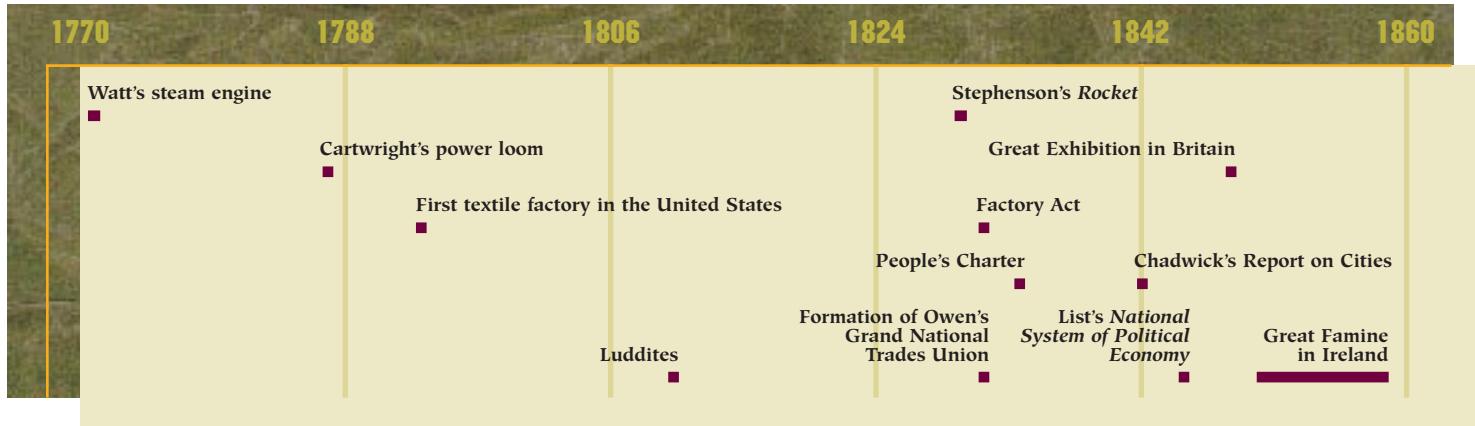
In the late 1830s and early 1840s, working-class protest centered on achieving a clear set of political goals, particularly universal male suffrage, as the means to achieve economic and social improvements. This selection is taken from one of the national petitions presented to Parliament by the Chartist movement. Although the petition failed, Chartism helped to arouse and organize millions of workers.

✿ National Petition (1839)

To the Honorable the Commons of the United Kingdom of Great Britain and Ireland, in Parliament assembled, the Petition of the undersigned, their suffering countrymen, HUMBLY SHOWS,—

The energies of a mighty kingdom have been wasted in building up the power of selfish and ignorant men, and its resources squandered for their aggrandizement. The good of a part has been advanced at the sacrifice of the good of the nation. The few have governed for the interest of the few, while the interests of the many have been sottishly neglected, or insolently . . . trampled upon. . . . We come before your honorable house to tell you, with all humility, that this state of things must not be permitted to continue. That it cannot long continue, without very seriously endangering the stability of the throne, and the peace of the kingdom, and that if, by God's help, and all lawful and constitutional appliances, an end can be put to it, we are fully resolved that it shall speedily come to an end. . . . Required, as we are universally, to support and obey the laws, nature and reason entitle us to demand that in the making of the laws the universal voice shall be implicitly listened to. We perform the duties of freemen; we must have the privileges of freemen. Therefore, we demand universal suffrage.

The suffrage, to be exempt from the corruption of the wealthy and the violence of the powerful, must be secret. . . . To public safety, as well as public confidence, frequent elections are essential. Therefore, we demand annual parliaments. With power to choose, and freedom in choosing, the range of our choice must be unrestricted. We are compelled, by existing laws, to take for our representatives men who are incapable of appreciating our difficulties, or have little sympathy with them; merchants who have retired from trade and no longer feel its harassings; proprietors of land who are alike ignorant of its evils and its cure; lawyers by whom the notoriety of the senate is courted only as a means of obtaining notice in the courts. . . . We demand that in the future election of members of your . . . house, the approbation of the constituency shall be the sole qualification, and that to every representative so chosen, shall be assigned out of the public taxes, a fair and adequate remuneration for the time which he is called upon to devote to the public service. . . . Universal suffrage will, and it alone can, bring true and lasting peace to the nation; we firmly believe that it will also bring prosperity. May it therefore please your honorable house, to take this our petition into your most serious consideration, and to use your utmost endeavors, by all constitutional means, to have a law passed, granting to every male of lawful age, sane mind, and unconvicted of crime, the right of voting for members of parliament, and directing all future elections of members of parliament to be in the way of secret ballot, and ordaining that the duration of parliament, so chosen, shall in no case exceed one year, and abolishing all property qualifications in the members, and providing for their due remuneration while in attendance on their parliamentary duties.



CONCLUSION

The Industrial Revolution became one of the major forces of change in the nineteenth century as it led Western civilization into the industrial era that has characterized the modern world. Beginning in Britain, its spread to the Continent and the new American nation ensured its growth and domination of the Western world.

The Industrial Revolution seemed to prove to Europeans the underlying assumption of the Scientific Revolution of the seventeenth century—that human beings were capable of dominating nature. By rationally manipulating the material environment for human benefit, people could create new levels of material prosperity and produce machines not dreamed of in their wildest imaginings. Lost in the excitement of the Industrial Revolution were the voices that pointed to the dehumanization of the workforce and the alienation from one's work, one's associates, one's self, and the natural world.

The Industrial Revolution also transformed the social world of Europe. The creation of an industrial proletariat produced a whole new force for change. The development of a wealthy industrial middle class presented a challenge to the long-term hegemony of landed wealth. Though that wealth had been threatened by the fortunes of commerce, it had never been overturned. But the new bourgeoisie was more demanding. How, in some places, this new industrial bourgeoisie came to play a larger role in the affairs of state will become evident in the next chapter.

NOTES

1. Quoted in W. Gorden Rimmer, *Marshall's of Leeds, Flax-Spinners 1788–1886* (Cambridge, 1960), p. 40.
2. Daniel Defoe, *A Plan of the English Commerce* (Oxford, 1928), pp. 76–77.
3. Quoted in David Landes, *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present* (Cambridge, 1969), pp. 99–100.
4. Quoted in Albert Tucker, *A History of English Civilization* (New York, 1972), p. 583.
5. Quoted in Landes, *The Unbound Prometheus*, pp. 149–150.
6. Quotations can be found in E. Royston Pike, *Human Documents of the Industrial Revolution in Britain* (London, 1966), pp. (in order of quotations) 320, 313, 314, 343.
7. Ibid., p. 315.
8. Quoted in A. J. Donajgrodzi, ed., *Social Control in Nineteenth Century Britain* (London, 1977), p. 141.
9. Quoted in Pike, *Human Documents of the Industrial Revolution in Britain*, pp. 343–344.

10. Quoted in Eric J. Evans, *The Forging of the Modern State: Early Industrial Britain, 1783–1870* (London, 1983), p. 113.
11. Henry Mayhew, *London Labour and the London Poor* (London, 1851), 1:342–343.
12. Quoted in Pike, *Human Documents of the Industrial Revolution in Britain*, pp. 60–61.
13. Quoted in Evans, *The Forging of the Modern State*, p. 124.

SUGGESTIONS FOR FURTHER READING

The well-written work by D. Landes, *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present* (Cambridge, 1969), is a good introduction to the Industrial Revolution. Although more technical, also of value are C. Trebilcock, *The Industrialization of the Continental Powers, 1780–1914* (London, 1981); and S. Pollard, *Peaceful Conquest: The Industrialization of Europe, 1760–1970* (Oxford, 1981). There are good collections of essays in P. Mathias and J. A. Davis, eds., *The First Industrial Revolutions* (Oxford, 1989); and M. Teich and R. Porter, eds., *The Industrial Revolution in National Context: Europe and the USA* (Cambridge, 1996). See also D. Fisher, *The Industrial Revolution* (New York, 1992). For a broader perspective, see P. Stearns, *The Industrial Revolution in World History* (Boulder, Colo., 1993). Although older and dated, T. S. Ashton, *The Industrial Revolution, 1760–1830* (New York, 1948) still provides an interesting introduction to the Industrial Revolution in Britain. Much better, however, are P. Mathias, *The First Industrial Nation: An Economic History of Britain, 1700–1914*, 2d ed. (New York, 1983); and R. Brown, *Society and Economy in Modern Britain, 1700–1850* (London, 1991). On the spread of industrialization to the Continent, see A. Milward and S. B. Saul, *The Development of the Economies of Continental Europe* (Oxford, 1977); and T. Kemp, *Industrialization in Nineteenth-Century Europe*, 2d ed. (London, 1985).

Given the importance of Great Britain in the Industrial Revolution, a number of books are available that place the Industrial Revolution in Britain in a broader context. See E. J. Evans, *The Forging of the Modern State: Early Industrial Britain, 1783–1870* (London, 1983); S. Checkland, *British Public Policy, 1776–1939: An Economic, Social and Political Perspective* (Cambridge, 1983); and P. K. O'Brien and R. Quinault, eds., *The Industrial Revolution and British Society* (New York, 1993).

The early industrialization of the United States is examined in B. Hindle and S. Lubar, *Engines of Change: The American Industrial Revolution, 1790–1860* (Washington, D.C., 1986). On the economic ties between Great Britain and the United States, see D. Jeremy, *Transatlantic Industrial Revolution: The Diffusion of Textile Technology between Britain and America, 1790–1830* (Cambridge, Mass., 1981).

A general discussion of population growth in Europe can be found in T. McKeown, *The Modern Rise of Population* (London, 1976). For an examination of urban growth, see the older but classic work of A. F. Weber, *The Growth of Cities in the Nineteenth Century: A Study in Statistics* (Ithaca, N.Y., 1963); A. R. Sutcliffe, *Towards the Planned City: Germany, Britain, the United States and France, 1780–1914* (Oxford, 1981); and L. D. Schwarz, *London in the Age of Industrialization* (New York, 1992). C. Kinealy, *A Death-Dealing Famine: The Great Hunger*

in Ireland (Chicago, 1997) is a good account of the great Irish tragedy. Many of the works cited above have much information on the social impact of the Industrial Revolution, but additional material is available in F. Crouzet, *The First Industrialists: The Problems of Origins* (Cambridge, 1985), on British entrepreneurs; J. Merriman, *The Margins of City Life* (New York, 1991), on French cities; P. Pilbeam, *The Middle Classes in Europe, 1789–1914* (Basingstoke, 1990); and T. Koditschek, *Class Formation and Urban Industrial Society* (New York, 1990). G. Himmelfarb, *The Idea of Poverty: England in the Early Industrial Age* (New York, 1984) traces the concepts of poverty and poor from the mid-eighteenth century to the mid-nineteenth century. A classic work on female labor patterns is L. A. Tilly and J. W. Scott, *Women, Work, and Family* (New York, 1978). See also J. Lown, *Women and Industrialization: Gender at Work in Nineteenth-Century England* (Minneapolis,

Minn., 1990); and L. L. Frader, “Doing Capitalism’s Work: Women in the Western European Industrial Economy,” in R. Bridenthal, S. M. Stuard, and M. E. Wiesner, eds., *Becoming Visible*, 3d ed. (Boston, 1998).



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