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In 1827, shortly after marrying at the age of twenty-three, Betty Harris took a job as a drawer in a coal pit near Manchester, England. A drawer's job involved crawling down narrow mine shafts and hauling loads of coal from the bottom of the pit, where miners chipped it from the earth, to the surface. From there the coal went to fuel the steam engines that powered the factories and the mills of early industrial society. Drawers performed unskilled labor for low wages, but their work was essential for the emergence of industrial production.

While working, Harris wore a heavy belt around her waist. Hitched to the belt was a chain that passed between her legs and attached to the coal cart that she pulled through the mine shafts, often while creeping along on hands and knees. The belt strained against her body, and the mine shafts were steep and slippery. Yet every work day, even when she was pregnant, Harris strapped on her belt and chain at 6:00 A.M., removing her bindings only at the end of the shift twelve hours later.

Work conditions for Betty Harris were less than ideal. She labored in the coal pit with six other women and six boys and girls. All members of the crew experienced hardships and exploitation. Harris reported that drawing coal was "very hard work for a woman," and she did not exaggerate. She and her companions often had to crawl through water that collected in the mine shafts during rainstorms, and the men who mined coal in the pits showed scant respect for the lowly, ill-paid drawers. The belts and chains worn by drawers often chafed their skin raw, and miners contributed to their physical discomfort by beating them for slow or clumsy work. The miners, many of whom shed their clothes and worked naked in the hot, oppressive coal pits, also took sexual liberties with the women and girl drawers: Harris personally knew several illegitimate children conceived during forced sexual encounters in the coal pits.

Betty Harris faced her own sexual problems once she arrived home. Exhausted from twelve hours of work, with only a one-hour break for a midday meal consisting of bread and butter, she often tried to discourage her husband's advances. Her husband had little patience, however, and Harris remarked that "my feller has beaten me many a time for not being ready." Harris's work schedule made comfortable family life impossible. A cousin had to care for her two children during the day, and Harris tended to them and her husband at night. The grinding demands of the coal pit took a toll: at age thirty-seven, after fourteen years in the mines, Harris admitted that "I am not so strong as I was, and cannot stand my work so well as I used to."

Not all industrial workers suffered the indignities that coal drawers endured, but Betty Harris's experience nonetheless illustrates some of the deep changes that industrialization wrought in patterns of work and family life. Beginning in the late eighteenth century, workers and their

OPPOSITE: Young woman at work in a mechanized mill in the 1830s.

families had to adjust to the sometimes harsh demands of the machine age. First in Britain, then in western Europe, North America, Russia, and Japan, machines and factories transformed agricultural societies into industrial societies. At the heart of this transformation were technological changes based on newly developed, inanimate sources of power that led to the extensive use of machinery in manufacturing. Machine production raised worker productivity, encouraged economic specialization, and promoted the growth of large-scale enterprise. Industrial machinery transformed economic production by turning out high-quality products quickly, cheaply, and efficiently. The process of industrialization encouraged rapid technological innovation and over the long term raised material standards of living in much of the world.

But the impact of industrialization went beyond economics, generating widespread and often unsettling social change as well. Early industrialists created a new work environment, the factory, which concentrated large numbers of workers under one roof to operate complicated machinery. The concentration of workers made it possible to rely on inanimate motive power such as waterwheels or steam engines. Factories also enabled managers to impose work discipline and closely supervise the quality of production at their plants. By moving work outside the home, however, factories drew fathers, mothers, and children in different directions, altered traditional patterns of domestic life, and strained family relations in the industrial era.

Industrialization encouraged rapid urbanization and migration. New cities mushroomed to house workers who left the countryside for jobs in factories. Millions of migrants traveled even farther, crossing the seas in search of opportunities in new lands. Often, however, early industrial workers found themselves living in squalor and laboring under dangerous conditions.

Social critics and reformers worked to alleviate the problems of early industrial society. Most scathing and influential of the critics were the German theorists Karl Marx and Friedrich Engels, who called for the destruction of capitalism and the establishment of a more just and equitable socialist society. Despite their appeals, capitalism and industrialization flourished and spread rapidly from Britain to continental Europe, North America, and Asia. Although industrialization spread unevenly around the globe, it profoundly influenced social and economic conditions throughout the world, since industrial societies created a new international division of labor that made most African, Asian, and American lands dependent on the export of raw materials.

Patterns of Industrialization

Industrialization refers to a process that transformed agrarian and handicraft-centered economies into economies distinguished by industry and machine manufacture. The principal features of this process were technological and organizational changes that transformed manufacturing and led to increased productivity. Critical to industrialization were technological developments that made it possible to produce goods by machines rather than by hand and that harnessed inanimate sources of energy such as coal and petroleum. Organizational changes accompanied technological developments. By the end of the nineteenth century, the factory had become the predominant site of industrial production in Europe, the United States, and Japan. Factory production strongly encouraged the emergence of new divisions of labor as interchangeable parts and belt-driven assembly lines made the mass production of goods a hallmark of industrialized societies. The need to invest in increasingly expensive equipment encouraged the formation of large businesses: by the mid-nineteenth century many giant corporations had joined together to control trade through trusts and cartels.

Foundations of Industrialization

By the mid-eighteenth century, several areas of the world—Great Britain in western Europe, the Yangzi Delta in China, Japan—exhibited growing and dynamic economies that shared many common features. High agricultural productivity in those regions resulted in significant population growth. High population densities in turn encouraged occupational specialization and permitted many individuals to work at tasks other than cultivation. Navigable rivers and networks of canals facilitated trade and transport, and cities and towns were home to sophisticated banking and financial institutions. At the same time, these commercially sophisticated economies ran up against difficult ecological obstacles—especially soil depletion and deforestation—that threatened continued population growth and consumption levels. First Great Britain and subsequently the other regions of western Europe transcended these ecological constraints by exploiting coal deposits fortuitously found at home and natural resources found abroad.

Coal played a crucial role in the industrialization of Great Britain. Until the eighteenth century, wood had served as the primary source of fuel for iron production, home heating, and cooking. Prodigious uses of wood, however, had also hastened deforestation, causing serious wood shortages. Geographic luck had placed some of western Europe's largest coal deposits in Great Britain, within easy reach of water transport, centers of commerce, and pools of skilled labor. The fortunate conjunction of coal deposits and the skills necessary to extract this fuel encouraged the substitution of coal for wood, thus creating a promising framework for industrialization. In the absence of easily accessible coal deposits, it was unlikely that the economy could have supported an expanding iron production and the application of steam engines to mining and industry—both crucial to the industrial process in Great Britain. In this respect Britain's experience proved unique and differed from that of China, where the breakthrough to industrialization occurred at a later time. In China, geography conspired against an important early shift from wood to coal, because the main coal-producing regions of northwest China were too distant from the Yangzi Delta, economically China's most promising region.

The unique economic relationship between Europe and the Americas gave Great Britain additional ecological relief. The conquered and colonized lands of the Americas lifted European land constraints by supplying European societies with a growing volume of primary products. During the eighteenth century the slave-based plantations of northeastern Brazil, the Caribbean islands, and later the southern United States supplied Europe with huge amounts of sugar and cotton; the former increased available food calories while the latter kept emerging textile industries going. Neither of these products could have been grown in Europe. The plantation economies of the Caribbean islands in particular also created significant markets for manufactured imports from Europe, the poverty of slaves notwithstanding. Almost one-half of the proceeds from sugar exports paid for the importation of manufactured goods from Europe, including cheap cotton cloth for slaves to wear. The significance of valuable American resources grew after 1830, when large amounts of grain, timber, and beef traveled across the Atlantic to European destinations. All of these products grew on colonial acreage, which expanded Europe's land base. Later in the century, American lands also served as outlets for Europe's surplus population.

Access to coal deposits and the exploitation of overseas resources provided a context—one not yet available to societies such as China's—that increased the odds for an industrial breakthrough. This industrial expansion, in fact, started with Britain's textiles. Beginning about the mid-eighteenth century, consumer demand encouraged a transformation of the British cotton industry.

Coal and Colonies

Mechanization of the Cotton Industry

During the seventeenth century, English consumers had become fond of calicoes—inexpensive, brightly printed textiles imported from India. Cotton cloth came into demand because it was lighter, easier to wash, and quicker to dry than wool, which was the principal fabric of European clothes before the nineteenth century. Threatened by the popularity of cotton products, British wool producers persuaded Parliament to pass a series of laws to protect the domestic wool industry. The Calico Acts of 1720 and 1721 prohibited imports of printed cotton cloth and restricted the sale of calicoes at home. Parliament even passed a law requiring corpses to be buried in woolen shrouds, but legislation did not dampen consumers' enthusiasm for cotton. Consumer demand for cotton products drove the development of a British cotton textile industry.

Demand for cotton was so strong that producers had to speed up spinning and weaving to supply growing domestic and foreign markets. To increase production they turned to inventions that rapidly mechanized the cotton textile industry. In the early 1730s, artisans began to develop labor-saving devices for spinning and weaving cotton, thereby moving away from hand-based techniques derived from the wool and linen industries. The first important technological breakthrough came in 1733 when Manchester mechanic John Kay invented the flying shuttle. This device speeded up the weaving process and stimulated demand for thread. Within a few years, competitions among inventors resulted in the creation of several mechanical spinning devices. The most important was Samuel Crompton's "mule," built in 1779. Adapted for steam power by 1790, the mule became the device of choice for spinning cotton. The mule turned out strong, fine thread, and it worked fast as well. A worker using a steam-driven mule could produce a hundred times more thread than a worker using a manual spinning wheel.

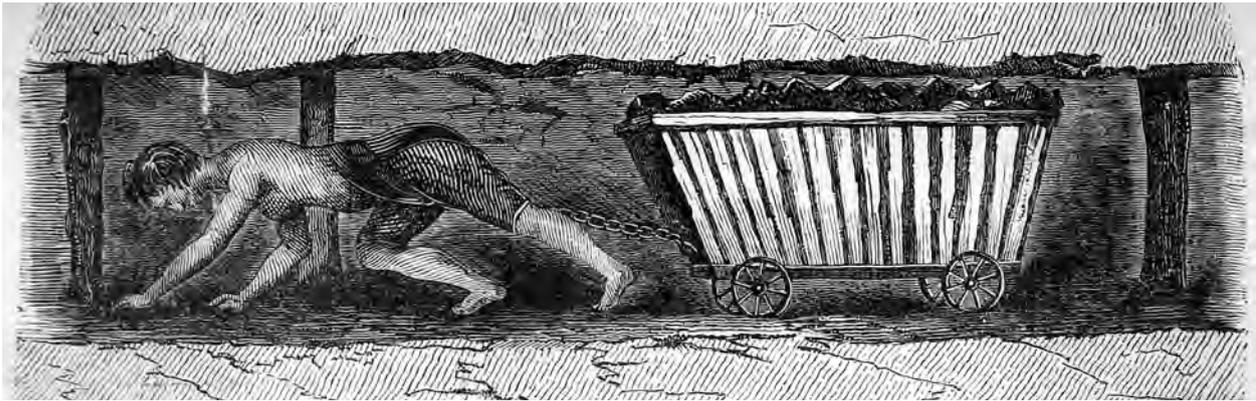
The new spinning machines created an imbalance in manufacturing because weavers could not keep up with the production of thread, so innovators turned their attention next to weaving. In 1785 Edmund Cartwright, a clergyman without training or experience in either mechanics or textiles, patented a water-driven power loom that inaugurated an era of mechanical weaving. Within two decades steam moved the power loom, and by the 1820s it had largely supplanted hand weavers in the cotton industry. A young boy working on two power looms could produce fifteen times more cloth than the fastest hand weaver. Collectively, these technological developments permitted the production of textile goods in great volume and variety and at low cost. By 1830 half a million people worked in the cotton business, Britain's leading industry, which accounted for 40 percent of exports.

Steam Power

The most crucial technological breakthrough of the early industrial era was the development of a general-purpose steam engine in 1765 by James Watt, an instrument maker at the University of Glasgow in Scotland. Steam engines burned coal to boil water and create steam, which drove mechanical devices that performed work. Even before Watt's time, primitive steam engines had powered pumps that drew water out of coal mines, but those devices consumed too much fuel to be useful for other purposes. Watt's version relied on steam to force a piston to turn a wheel, whose rotary motion converted a simple pump into an engine that had multiple uses. Watt's contemporaries used the term *horsepower* to measure the energy generated by his steam engine, which did the work of numerous animals. By 1800 more than a thousand of Watt's steam engines were in use in the British isles. They were especially prominent in the textile industry, where their application resulted in greater productivity for manufacturers and cheaper prices for consumers.

Iron and Steel

Innovation did not stop with cotton production and steam engines. The iron and steel industries also benefited from technological refinement, and the availability of



A woman working as a drawer in a British coal mine drags her coal cart with the aid of a belt and chain. Manually produced coal fueled the machines of early industrial society.

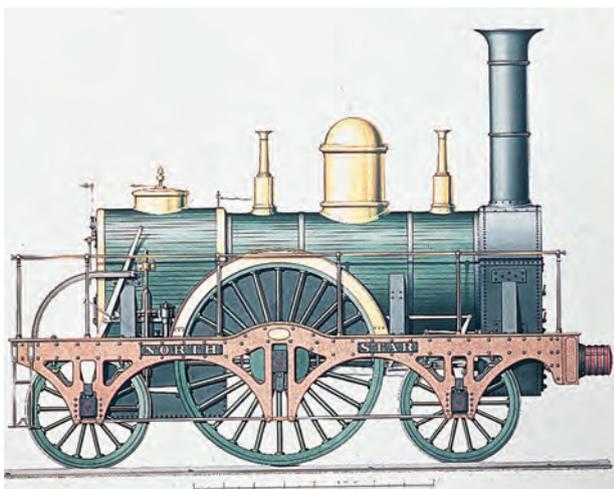
inexpensive, high-quality iron and steel reinforced the move toward mechanization. After 1709 British smelters began to use coke (a purified form of coal) rather than more expensive charcoal as a fuel to produce iron. Deforestation in England had made wood—the principal source of charcoal—scarce. Besides being cheaper than charcoal, coke made it possible for producers to build bigger blast furnaces and turn out larger lots of iron. As a result, British iron production skyrocketed during the eighteenth century, and prices to consumers fell. Inexpensive iron fittings and parts made industrial machinery stronger, and iron soon became common in bridges, buildings, and ships.

The nineteenth century was an age of steel rather than iron. Steel is much harder, stronger, and more resilient than iron, but until the nineteenth century it was very expensive to produce. Between 1740 and 1850 a series of improvements simplified the process. In 1856 Henry Bessemer built a refined blast furnace known as the Bessemer converter that made it possible to produce steel cheaply and in large quantities. Steel production rose sharply, and steel quickly began to replace iron in tools, machines, and structures that required high strength.

Steam engineering and metallurgical innovations both contributed to improvements in transportation technology. James Watt's steam engine did not adapt well to transportation uses because it consumed too much coal. After his patent expired, however, inventors devised high-pressure engines that required less fuel. In 1815 George Stephenson, a self-educated Englishman, built the first steam-powered locomotive. In 1829 his Rocket won a contest by reaching a speed of 45 kilometers (28 miles) per hour. Although they were more efficient than Watt's invention, Stephenson's engines still burned too much coal for use at sea. Sailing ships remained the most effective means of transport over the seas until the middle of the nineteenth century, when refined engines of high efficiency began to drive steamships.

Because they had the capacity to carry huge cargoes, railroads and steamships dramatically lowered transportation costs. They also contributed to the creation of dense transportation networks that linked remote interior regions and distant shores more closely than ever before. Between 1830 and 1870, British entrepreneurs laid about 20,000 kilometers (13,000 miles) of railroads, which linked industrial centers, coal fields, iron deposits, and port cities throughout the land—and also carried some 322 million passengers as well as cargoes of raw materials and manufactured goods. Steamships proved their own versatility by advancing up rivers to points that sailboats

Transportation



■ George Stephenson's North Star engine of 1837.

could not reach because of inconvenient twists, turns, or winds. Railroads and steamships benefited from the innovations that drove the industrialization process and in turn encouraged continuing industrialization by providing rapid and inexpensive transport.

The Factory System

In the emerging capitalist society of early modern Europe (discussed in chapter 24), most manufacturing took place under the putting-out system. To avoid guild restrictions on prices and wages, entrepreneurs in early modern Europe paid individuals to work on materials in their households. That protoindustrial system of production centered on the household and usually involved fewer than ten people. During the seventeenth and early eighteenth centuries, new and larger units of production supplemented the putting-

out system. Rising demand for certain products such as textiles and the growing use of water and wind power led to the formation of protoindustrial factories, where workers performed specialized tasks under one roof. Nevertheless, the largest preindustrial workforces consisted of unskilled laborers in mines and slaves on plantations.

The Factory

The factory system replaced both the putting-out system and protoindustrial factories and became the characteristic method of production in industrial economies. It began to emerge in the late eighteenth century, when technological advances transformed the British textile industry, and by the mid-nineteenth century most cotton production took place in factories. Many of the newly developed machines were too large and expensive for home use, and it became necessary to move work to locations where entrepreneurs and engineers built complicated machinery for large-scale production. This centralization of production brought together more workers doing specialized tasks than ever before. Most industrial workers hailed from the countryside. A combination of factors provided a plentiful supply of cheap labor for the burgeoning factories, including rural overpopulation, declining job opportunities, and the financial difficulties of small farmers who had to sell their land to large landowners.

The factory system with its new machines demanded a rational organization of job functions that differed from earlier forms of industrial organization. The factory became associated with a new division of labor, one that called for a production process in which each worker performed a single task, rather than one in which a single worker completed the entire job, as was typical of handicraft traditions. In the first chapter of the *Wealth of Nations* (1776), Adam Smith used a pin factory to describe the new system of manufacture. "One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; . . . and the important business of making a pin is, in this manner, divided into about eighteen distinct operations." Factories also enabled managers to impose strict work discipline and closely supervise employees. Thus Josiah Wedgwood (1730–1795), an Englishman with a wooden leg who owned a pottery plant, held his employees to high standards in an effort to produce the highest quality pottery. When he spotted inferior work, he frequently dumped it on the factory floor and crushed it with his peg leg saying, "This will not do for Josiah Wedgwood!"

Working Conditions

With its new divisions of labor, the factory system allowed managers to improve worker productivity and realize spectacular increases in the output of manufactured

goods. But the new environment also had unsettling effects on the nature of work. The factory system led to the emergence of an owner class whose capital financed equipment and machinery that were too expensive for workers to acquire. Industrial workers themselves became mere wage earners who had only their labor services to offer and who depended on their employers for their livelihood. In addition, any broad-range skills that workers may have previously acquired as artisans often became obsolete in a work environment that rewarded narrowly defined skills. The repetitious and boring nature of many industrial jobs, moreover, left many workers alienated or estranged from their work and the products of their labor.

Equally disturbing was the new work discipline and the pace of work. Those accustomed to rural labor soon learned that the seasons, the rising and setting of the sun, and fluctuations in the weather no longer dictated work routines. Instead, clocks, machines, and shop rules established new rhythms of work. Industrial workers commonly labored six days a week for twelve to fourteen hours daily. The factory whistle sounded the beginning and the end of the working day, and throughout the day workers had to keep pace with the monotonous movements of machines. At the same time, they faced strict and immediate supervision, which made little allowance for a quick nap or socializing with friends. Floor managers pressured men, women, and children to speed up production and punished them when they did not meet expectations. Because neither the machines nor the methods of work took safety into account, early industrial workers constantly faced the possibility of maiming or fatal accidents.

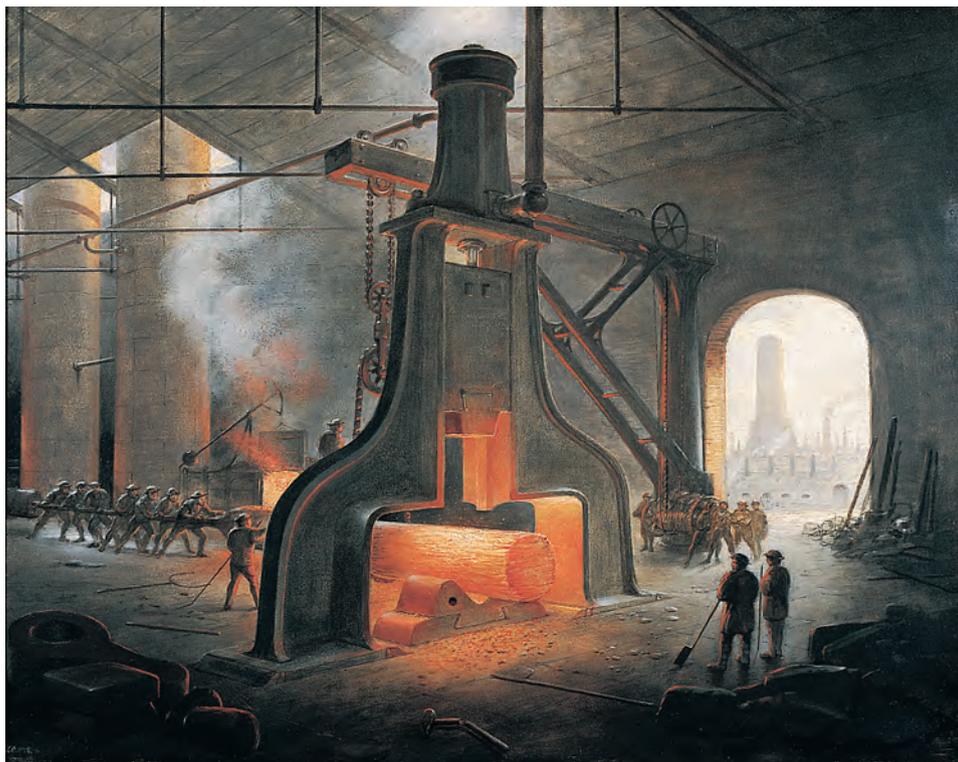
In some instances, machine-centered factories sparked violent protest. Between 1811 and 1816, organized bands of English handicraft workers known as Luddites went on a rampage and destroyed textile machines that they blamed for their low wages and unemployment. They called their leader King Lud, after a legendary boy named Ludlam who broke a knitting frame to spite his father. The movement broke out in the hosiery and lace industries around Nottingham and then spread to the wool and cotton mills of Lancashire. The Luddites usually wore masks and operated at night. Because they avoided violence against people, they enjoyed considerable popular support. Nevertheless, by hanging fourteen Luddites in 1813, the government served notice that it was unwilling to tolerate violence even against machines, and the movement gradually died out.

Industrial Protest

The Early Spread of Industrialization

Industrialization and the technological, organizational, and social transformations that accompanied it might have originated in many parts of the world where abundant craft skills, agricultural production, and investment capital could support the industrialization process. For half a century, however, industrialization took place only in Great Britain. Aware of their head start, British entrepreneurs and government officials forbade the export of machinery, manufacturing techniques, and skilled workers.

Yet Britain's monopoly on industrialization did not last forever, because enterprising entrepreneurs recognized profitable opportunities in foreign lands and circumvented government regulations to sell machinery and technical know-how abroad. Moreover, European and North American businesspeople did their best to become acquainted with British industrial techniques and lure British experts to their lands. European and North American entrepreneurs did not hesitate to bribe or even kidnap British engineers, and they also smuggled advanced machinery out of the British isles. Sometimes they got poor value for their investments: they found that it was difficult to attract the best British experts to foreign lands and had to make do with drunkards or second-rate specialists who demanded high pay but made little contribution to industrialization.



■ Workers tend to a massive steam hammer under dangerous conditions.

Industrialization in Western Europe

Nevertheless, by the mid-nineteenth century industrialization had spread to France, Germany, Belgium, and the United States. The French revolution and the Napoleonic wars helped set the stage for industrialization in western Europe by abolishing internal trade barriers and dismantling guilds that discouraged technological innovation and restricted the movement of laborers. The earliest continental center of industrial production was Belgium, where coal, iron, textile, glass, and armaments production flourished in the early nineteenth century. About the same time, France also moved toward industrialization. By 1830 French firms employed about fifteen thousand skilled British workers who helped establish mechanized textile and metallurgical industries in France. By the mid-nineteenth century, French engineers and inventors were devising refinements and innovations that led to greater efficiencies especially in metallurgical industries. Later in the century a boom in railroad construction stimulated economic development while also leading to decreased transportation costs.

German industrialization proceeded more slowly than did Belgian and French, partly because of political instability resulting from competition between the many German states. After the 1840s, however, German coal and iron production soared, and by the 1850s an extensive railroad network was under construction. After unification in 1871, Bismarck's government sponsored rapid industrialization in Germany. In the interests of strengthening military capacity, Bismarck encouraged the development of heavy industry, and the formation of huge businesses became a hallmark of German industrialization. The giant Krupp firm, for example, dominated mining, metallurgy, armaments production, and shipbuilding.

Industrialization in North America

Industrialization transformed North America as well as western Europe in the nineteenth century. In 1800 the United States possessed abundant land and natural



Map 30.1 Industrial Europe ca. 1850. Locate the places marked as emerging industrial areas. Are there any features those areas have in common? If so, what are they?

resources but few laborers and little money to invest in business enterprises. Both labor and investment capital came largely from Europe: migrants crossed the Atlantic in large numbers throughout the nineteenth century, and European bankers and businesspeople eagerly sought opportunities to invest in businesses that made use of American natural resources. American industrialization began in the 1820s when entrepreneurs lured British crafts workers to New England and built a cotton textile industry. By midcentury well over a thousand mills were producing fabrics from raw cotton grown in the southern states, and New England had emerged as a site for the industrial production also of shoes, tools, and handguns. In the 1870s heavy iron and steel industries emerged in areas such as western Pennsylvania and central Alabama where

there were abundant supplies of iron ore and coal. By 1900 the United States had become an economic powerhouse, and industrialization had begun to spill over into southern Canada.

The vast size of the United States was advantageous to industrialists because it made abundant natural resources available to them, but it also hindered travel and communication between the regions. To facilitate transportation and distribution, state governments built canals, and private investors established steamship lines and railroad networks. By 1860 rails linked the industrial northeast with the agricultural south and the midwestern cities of St. Louis and Chicago, where brokers funneled wheat and beef from the plains to the more densely populated eastern states. As in other lands, railroad construction in the United States spurred industrialization by providing cheap transportation and stimulating coal, iron, and steel industries.

Industrial Capitalism

Mass Production

Cotton textiles were the major factory-made products during the early phase of industrialization, but new machinery and techniques soon made it possible to extend the factory system to other industries. Furthermore, with refined manufacturing processes, factories could mass-produce standardized articles. An important contribution to the evolving factory system came from the American inventor Eli Whitney (1765–1825). Though best remembered as the inventor of the cotton gin (1793), Whitney also developed the technique of using machine tools to produce large quantities of interchangeable parts in the making of firearms. In conventional methods a skilled worker made a complete musket, forming and fitting each unique part; Whitney designed machine tools with which unskilled workers made only a particular part that fit every musket of the same model. Before long, entrepreneurs applied Whitney's method to the manufacture of everything from clocks and sewing machines to uniforms and shoes. By the middle of the nineteenth century, mass production of standardized articles was becoming the hallmark of industrial societies.

In 1913 Henry Ford improved manufacturing techniques further when he introduced the assembly line to automobile production. Instead of organizing production around a series of stations where teams of workers assembled each individual car using standardized parts, Ford designed a conveyor system that carried components past workers at the proper height and speed. Each worker performed a specialized task at a fixed point on the assembly line, which churned out a complete chassis every 93 minutes—a task that previously had taken 728 minutes. The subdivision of labor and the coordination of operations resulted in enormous productivity gains, enabling Ford Motor Company to produce half the world's automobiles in the early twentieth century. With gains in productivity, car prices plummeted, allowing millions of people to purchase automobiles. The age of the motor car had arrived.

Big Business

As the factory evolved, so too did the organization of business. Industrial machinery and factories were expensive investments, and they encouraged businesses to organize on a large scale. Thus industrialization spurred the continuing development of capitalist business organization. Entrepreneurs in early modern Europe formed private businesses in the hopes of profiting from market-oriented production and trade. Some businesses, such as the English East India Company and other commercial concerns, organized joint-stock companies in the interests of spreading risk, achieving efficiency, and maximizing profits. With industrialization, manufacturers followed the lead of merchants by organizing on a large scale.

The Corporation

During the 1850s and 1860s, government authorities in Britain and France laid the legal foundations for the modern corporation, which quickly became the most

common form of business organization in industrial societies. A corporation was a private business owned by hundreds, thousands, or even millions of individual and institutional investors who financed the business through the purchase of stocks representing shares in the company. When a corporation flourished, investors received dividends in proportion to their stake in the company. But if a corporation went bankrupt, laws protected shareholders from any liability or financial loss beyond the extent of their investments. Thus corporate organization was extremely attractive to investors. By the late nineteenth century, corporations controlled most businesses requiring large investments in land, labor, or machinery, including railroads, shipping lines, and industrial concerns that produced iron, steel, and armaments. Meanwhile, an array of investment banks, brokerage firms, and other financial businesses arose to serve the needs of industrial capitalists organized in corporations.

To protect their investments, some big businesses of the late nineteenth century sought not only to outperform their competitors in the capitalist marketplace but also to eliminate competition. Business firms formed associations to restrict markets or establish monopolies in their industries. Large-scale business organizations formed trusts and cartels. The difference between the two was largely a technical one, and both shared a common goal: to control the supply of a product and hence its price in the marketplace. Some monopolists sought to control industries through vertical organization, by which they would dominate all facets of a single industry. The industrial empire of the American petroleum producer John D. Rockefeller, for example, which he ruled through Standard Oil Company and Trust, controlled almost all oil drilling, processing, refining, marketing, and distribution in the United States. Control over all aspects of the petroleum industry enabled Standard Oil to operate efficiently, cut costs, and undersell its competitors. Vertical organization of this kind offered large corporations great advantages over smaller companies.

Other monopolists tried to eliminate competition by means of horizontal organization, which involved the consolidation or cooperation of independent companies in the same business. Thus cartels sought to ensure the prosperity of their members by absorbing competitors, fixing prices, regulating production, or dividing up markets. The German firm IG Farben, the world's largest chemical concern until the middle of the twentieth century, grew out of a complex merger of chemical and pharmaceutical manufacturers that controlled as much as 90 percent of production in chemical industries. By the end of the nineteenth century, some governments outlawed these combinations and broke them up. Yet, when governments proved unwilling to confront large businesses, or when the public remained ignorant or indifferent, monopolistic practices continued well into the twentieth century.

*Monopolies, Trusts,
and Cartels*

Industrial Society

Industrialization brought material benefits in its train: inexpensive manufactured products, rising standards of living, and population growth. Yet industrialization also unleashed dramatic and often unsettling social change. Massive internal and external migrations took place as millions of people moved from the countryside to work in new industrial cities, and European migrants crossed the Atlantic by the tens of millions to seek opportunities in the less densely populated lands of the western hemisphere. Industrialization encouraged the emergence of new social classes—especially the middle class and the working class—and forced men, women, and children to adjust to distinctly new patterns of family and work life. Reformers sought to alleviate the social and economic problems that accompanied industrialization. The most influential



Exhibitors from around the world displayed fine handicrafts and manufactured goods at the Crystal Palace exhibition of 1851 in London. Industrial products from Britain and the United States particularly attracted the attention of visitors to the enchanting and futuristic exhibition hall.

critics were the socialists, who did not object to industrialization per se but worked toward the building of a more equitable and just society.

The Fruits of Industry

Industrialization brought efficiencies in production that flooded markets with affordable manufactured goods. In 1851 the bounty of industry went on display in London at the Crystal Palace, a magnificent structure made of iron and glass that enclosed trees, gardens, fountains, and manufactured products from around the world. Viewers flocked to the exhibition to see industrial products such as British textiles, iron goods, and machine tools. Colt revolvers and sewing machines from the United States also attracted attention as representatives of the “American system of manufacture,” which used interchangeable parts in producing large quantities of standardized goods at low prices. Observers marveled at the Crystal Palace exhibits and congratulated themselves on the achievements of industrial society.

In many ways, industrialization raised material standards of living. Industrial production led to dramatic reductions in the cost of clothing, for example, so individuals

were able to add variety to their wardrobes. By the early nineteenth century, all but the desperately poor could afford several changes of clothes, and light, washable underwear came into widespread use with the availability of inexpensive manufactured cotton. Industrial factories turned out tools that facilitated agricultural work, while steam-powered locomotives delivered produce quickly and cheaply to distant markets, so industrialization contributed as well to a decline in the price of food. Consumers in early industrial Europe also filled their homes with more furniture, cabinets, porcelain, and decorative objects than any but the most wealthy of their ancestors.

The populations of European and Euro-American peoples rose sharply during the eighteenth and nineteenth centuries, and they reflected the rising prosperity and standards of living that came with industrialization. Between 1700 and 1800 the population of Europe increased from 105 to 180 million, and during the nineteenth century it more than doubled to 390 million. Demographic growth in the western hemisphere—fueled by migration from Europe—was even more remarkable. Between 1700 and 1800 the population of North America and South America rose from 13 million to 24 million and then surged to 145 million by 1900. Demographic growth was most spectacular in the temperate regions of the western hemisphere. In Argentina, for example, population expanded from 300,000 in 1800 to 4.75 million in 1900—a 1,583 percent increase. In temperate North America—what is now the United States—population rose from 6 million to 76 million (1,266 percent) during the 1800s.

The rapid population growth in Europe and the Americas reflected changing patterns of fertility and mortality. In most preindustrial societies fertility was high, but famines and epidemics resulted in high mortality, especially child mortality, which prevented explosive population growth.

Medical advances over time supplied the means to control disease and reduce mortality. A case in point was smallpox, an ancient, highly contagious, and often fatal viral disease that had killed more people than any other malady in world history. The experiments of the English physician Edward Jenner dealt an effective blow against smallpox. Knowing that milkmaids often contracted cowpox, in 1797 Jenner inoculated an eight-year-old boy with cowpox and followed it six weeks later with the smallpox virus. The boy became ill but soon recovered fully, leading Jenner to deduce that cowpox conferred immunity against smallpox. Later called vaccination (from *vacca*, the Latin word for “cow”), Jenner’s procedure not only created a powerful weapon in the war against smallpox but also laid the foundation for scientific immunology. Over time, physicians developed vaccines that prevented sickness and death from polio, tetanus, typhoid, whooping cough, and many other diseases that once plagued humankind.

High birthrates were common also in early industrializing societies, but death rates fell markedly because better diets and improved disease control reduced child mortality. Because more infants survived to adulthood, the population of early industrializing societies grew rapidly. By the late nineteenth century, better diets and improved sanitation led to declining levels of adult as well as child mortality, so populations of industrial societies expanded even faster. Britain and Germany, the most active sites of early industrialization, experienced especially fast population growth. Between 1800 and 1900 the British population increased from 10.5 million to 37.5 million while German numbers rose from 18 million to 43 million.

Beginning in the nineteenth century, industrializing lands experienced a social change known as the *demographic transition*, which refers to shifting patterns of fertility and mortality. As industrialization transformed societies, fertility began a marked decline. In the short run, mortality fell even faster than fertility, so the populations of industrial societies continued to increase. Over time, however, declining birthrates led to

Population Growth

The Demographic Transition



A French newspaper sponsored free smallpox vaccinations in 1905; the serum of a cow infected with cowpox is being injected into awaiting Parisians.

Birth Control

lower population growth and relative demographic stability. The principal reason for declining fertility in industrial lands was voluntary birth control through contraception.

For thousands of years, people tried to find deliberate ways of preventing or reducing the probability of pregnancy resulting from sexual intercourse. Some of the methods, such as coitus interruptus, proved not to be particularly reliable, and others, such as sexual abstinence, turned out to be unrealistic. More ingenious methods of birth control such as vaginal depositories, cervical caps, or drinkable concoctions designed to prevent pregnancies or induce miscarriages usually carried serious health risks for women. Because none of those methods proved effective, people throughout the world had resorted to abortion or infanticide.

The first efficient means of contraception without negative side effects was the male condom. Initially made of animal intestines, it came into use in the seventeenth century. In reference to its place of origin, the Italian adventurer and womanizer Casanova called the condom an “English riding coat.” The effectiveness and popularity of the condom soared in the mid-nineteenth century with the arrival of the latex condom, which served both as a contraceptive device and as a barrier against syphilis, a much-feared venereal disease. Since then, a plethora of contraceptive devices has become available.

Married couples might have chosen to have fewer offspring because raising them cost more in industrial than in agricultural societies or because declining child mortality meant that any children born were more likely to survive to adulthood. In any case

the demographic transition accompanied industrialization in western Europe, the United States, Japan, and other industrializing lands as well.

Urbanization and Migration

Industrialization and population growth strongly encouraged migration and urbanization. Within industrial societies, migrants flocked from the countryside to urban centers in search of work. Industrial Britain led the world in urbanization. In 1800 about one-fifth of the British population lived in towns and cities of 10,000 or more inhabitants. During the following century a largely rural society became predominantly urban, with three-quarters of the population working and living in cities. That pattern repeated itself in continental Europe, the United States, Japan, and the rest of the industrialized world. By 1900 at least 50 percent of the population in industrialized lands lived in towns with populations of 2,000 or more. The increasing size of cities reflected this internal migration. In 1800 there were barely twenty cities in Europe with populations as high as 100,000, and there were none in the western hemisphere. By 1900 there were more than 150 large cities in Europe and North America combined. With a population of 6.5 million, London was the largest city in the world, followed by New York with 4.2 million, Paris with 3.3 million, and Berlin with 2.7 million.

With urbanization came intensified environmental pollution. Although cities have always been putrid and unsanitary places, the rapid increase in urban populations during the industrial age dramatically increased the magnitude and severity of water and air pollution. The widespread burning of fossil fuels, such as wood and coal, fouled the air with vast quantities of chemicals and particulate matter. This pollution led to typical occupational diseases among some trades. Chimney sweeps, for instance, contracted cancer of the scrotum from hydrocarbon deposits found in chimney soot. Effluents from factories and mills and an increasing amount of untreated sewage dirtied virtually every major river. No part of a city was immune to the constant stench coming from air and water pollution. Worse, tainted water supplies and unsanitary living conditions led to periodic epidemics of cholera and typhus, and dysentery and tuberculosis were also common maladies. Until the latter part of the nineteenth century, urban environments remained dangerous places in which death rates commonly exceeded birthrates, and only the constant stream of new arrivals from the country kept cities growing.

Income determined the degree of comfort and security offered by city life. The wealthy typically tried to insulate themselves the best they could from urban discomforts by retreating to their elegant homes in the newly growing suburbs. The working poor, in contrast, crowded into the centers of cities to live in shoddy housing constructed especially for them. The rapid influx of people to expanding industrial cities such as Liverpool and Manchester encouraged the quick but slipshod construction of dwellings close to the mills and factories. Industrial workers and their families occupied overcrowded tenements lacking in comfort and amenities. The cramped spaces in apartments obliged many to share the same bed, increasing the likelihood of incestuous relationships and the ease of disease transmission. The few open spaces outside the buildings were usually home to herds of pigs living in their own dung or were depositories for pools of stagnant water and human waste. Whenever possible, the inhabitants of such neighborhoods flocked to parks and public gardens.

By the later nineteenth century, though, government authorities were tending to the problems of the early industrial cities. They improved municipal water supplies, expanded sewage systems, and introduced building codes that outlawed the construction of rickety tenements to accommodate poorly paid workers. Those measures made city

The Urban Environment

Sources from the Past

Thomas Malthus on Population

The Reverend Thomas R. Malthus (1766–1834), English economist and pioneer of modern population study, generated controversy with his pessimistic predictions regarding the future of humanity. In his famous Essay on the Principle of Population (1798, rev. ed. 1803), he insisted that poverty and distress are the inevitable consequences of unchecked population growth. Malthus argued that demand for food will invariably exceed the means of subsistence.

The principal object of the present essay is to examine the effects of one great cause intimately united with the very nature of man; which, though it has been constantly and powerfully operating since the commencement of society, has been little noticed by the writers who have treated this subject. . . . The cause to which I allude is the constant tendency in all animated life to increase beyond the nourishment prepared for it.

This is incontrovertibly true. Through the animal and vegetable kingdoms Nature has scattered the seeds of life abroad with the most profuse and liberal hand; but has been comparatively sparing in the room and the nourishment necessary to rear them. The germs of existence contained in this earth, if they could freely develop themselves, would fill millions of worlds in the course of a few thousand years. Necessity, that imperious, all pervading law of nature, restrains them within the prescribed bounds. The race of plants and the race of animals shrink under this great restrictive law; and man cannot by any efforts of reason escape from it.

It may safely be pronounced, therefore, that population, when unchecked, goes on doubling itself every twenty-five years, or increases in a geometrical ratio. . . . It may fairly be pronounced, therefore, that considering the present average state of the earth, the means of subsistence, under circumstances the most favorable to human industry, could not possibly be made to increase faster than in an arithmetical ratio.

The ultimate check to population appears then to be want of food, arising necessarily from the different ratios according to which population and food increase. But this ultimate check is never the immediate check, except in the cases of actual famine.

The immediate check may be stated to consist in all those customs and diseases, which seem to be gener-

ated by a scarcity of the means of subsistence; and all those causes, independent of this scarcity, whether of a moral or physical nature, which tend prematurely to weaken and destroy the human frame.

These checks to population which are constantly operating with more or less force in every society, and keep down the number to the level of the means of subsistence, may be classed under two general heads—the preventative and positive checks.

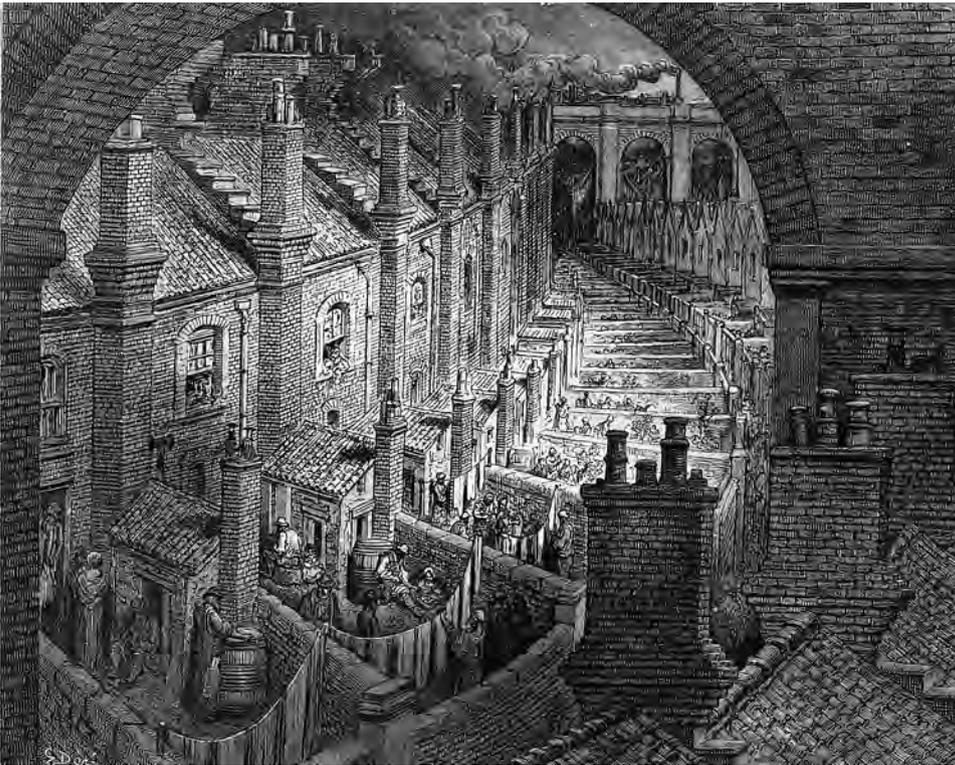
The preventative check, as far as it is voluntary, is peculiar to man, and arises from that distinctive superiority in his reasoning faculties which enables him to calculate distant consequences. . . . These considerations are calculated to prevent, and certainly do prevent, a great number of persons in all civilised nations from pursuing the dictate of nature in an early attachment to one woman. . . . [T]he restraint from marriage which is not followed by irregular gratifications may properly be termed moral restraint.

The positive checks to population are extremely various, and include every cause, whether arising from vice or misery, which in any degree contributes to shorten the natural duration of human life. Under this head, therefore, may be enumerated all unwholesome occupations, severe labor and exposure to the seasons, extreme poverty, bad nursing of children, great towns, excesses of all kinds, the whole train of common diseases, and epidemics, wars, plague, and famine.

FOR FURTHER REFLECTION

Were Malthus's fears about a lack of food realized during the age of industrialization, or did aspects of the new industrial society in fact help to prevent those fears from being realized?

SOURCE: Thomas R. Malthus. *An Essay on Population*. London: J. M. Dent, 1914, pp. 6–15.



This landscape of cramped working-class housing was one of the many drawings of London that the French book illustrator Gustave Doré produced between 1869 and 1871.

life safer and brought improved sanitation that helped to eliminate epidemic disease. City authorities also built parks and recreational facilities to make cities more livable.

While workers moved from the countryside to urban centers, rapid population growth in Europe encouraged massive migration to the Americas, especially to the United States. During the nineteenth and early twentieth centuries, about fifty million Europeans migrated to the western hemisphere, and this flow of humanity accounts for much of the stunning demographic growth of the Americas. Many of the migrants intended to stay for only a few years and fully expected to return to their homelands with a modest fortune made in the Americas. Indeed, some did return to Europe: about one-third of Italian migrants to the Americas made the trip back across the Atlantic. The vast majority, however, remained in the western hemisphere. They and their descendants transformed the Americas into Euro-American lands.

Most of the migrants came from the British isles in the early nineteenth century, from Germany, Ireland, and Scandinavia in the middle decades, and from eastern and southern Europe in the late nineteenth century. Migration reflected difficult political, social, and economic circumstances in Europe: British migrants often sought to escape dangerous factories and the squalor of early industrial cities, most Irish migrants departed during the potato famines of the 1840s, and millions of Jews left the Russian empire in the 1890s because of the tsar's anti-Semitic policies. Many of those migrants entered the workforce of the United States, where they settled in new industrial centers such as New York, Pittsburgh, and Cleveland. Indeed, labor from abroad made it possible for the United States to undergo rapid industrialization in the late nineteenth century.

Transcontinental Migration

Industry and Society

As millions of people moved from the countryside to industrial centers, society underwent a dramatic transformation. Before industrialization, the vast majority of the world's peoples worked in rural areas as cultivators or herders. Rulers, aristocrats, priests, and a few others enjoyed privileged status, and small numbers of people worked in cities as artisans, crafts workers, bureaucrats, or professionals. Many societies also made use of slave labor, occasionally on a large scale.

Industrialization radically altered traditional social structures. It encouraged the disappearance of slavery in lands undergoing industrialization, partly because the economics of industrial society did not favor slave labor. Slaves were generally poor, so they did not consume the products of industrial manufacturers in large quantities. Industrialists preferred free wage laborers who spent their money on products that kept their factories busy.

New Social Classes

Industrialization also helped bring new social classes into being. Captains of industry and enterprising businesspeople became fabulously wealthy and powerful enough to overshadow the military aristocracy and other traditionally privileged classes. Less powerful than this new elite was the middle class, consisting of small business owners, factory managers, engineers, accountants, skilled employees of large corporations, and professionals such as teachers, physicians, and attorneys. Industrial production generated great wealth, and a large portion of it flowed to the middle class, which was a principal beneficiary of industrialization. Meanwhile, masses of laborers who toiled in factories and mines constituted a new working class. Less skilled than the artisans and crafts workers of earlier times, the new workers tended to machines or provided heavy labor for low wages. Concentrated in mining and industrial centers, the working class began to influence political affairs by the mid-nineteenth century.

Industrial Families

The most basic unit of social organization—the family—also underwent fundamental change during the industrial age. In preindustrial societies the family was the basic productive unit. Whether engaged in agriculture, domestic manufacturing, or commerce, family members worked together and contributed to the welfare of the larger group. Industrialization challenged the family economy and reshaped family life by moving economic production outside the home and introducing a sharp distinction between work and family life. During the early years of industrialization, family economies persisted as fathers, mothers, and children pooled their wages and sometimes even worked together in factories. Over time, however, it became less common for family members to work in groups. Workers left their homes each day to labor an average of fourteen hours in factories, and family members led increasingly separate lives.

Men at Work and Play

Men gained increased stature and responsibility in the industrial age as work dominated public life. When production moved outside the home, some men became owners or managers of factories, although the majority served as wageworkers. Industrial work seemed to be far more important than the domestic chores traditionally carried out by women, or even the agricultural and light industrial work performed by women and children. Men's wages also constituted the bulk of their families' income. Upper-class and middle-class men especially enjoyed increased prestige at home, since they usually were the sole providers who made their families' comfortable existence possible.

Internalizing the work ethic of the industrial age, professional men dedicated themselves to self-improvement even in their leisure hours. They avidly read books and attended lectures on business or cultural themes. They also strove to instill their values in the industrial workforce and to impose work discipline on the laborers under their supervision. Threats of fines, beatings, and dismissal coerced workers into accepting factory rules against absenteeism, tardiness, and swearing. Through their

support for churches and Sunday schools, factory owners sought to persuade workers to adopt middle-class norms of respectability and morality.

For their part, industrial workers often resisted the work discipline and moral pressures they encountered at the factory. They frequently observed “Holy Monday” and stayed home to lengthen their weekly break from work on Sundays. In their leisure time they flocked to sporting events: European soccer and American baseball both became popular sports during the industrial era. They also gambled, socialized at bars and pubs, and staged fights between dogs or roosters. The middle and upper classes tried to suppress these activities and established urban police forces to control workers’ public behavior. But efforts at regulation had limited success, and workers persistently pursued their own interests.

Like men, women had worked long hours in preindustrial times. Agriculture and domestic manufacturing could easily accommodate women’s dual role as mothers and workers, since the workplace was either at home or nearby. Industrialization dramatically changed the terms of work for women. When industry moved production from the home to the factory, married women were unable to work unless they left their homes and children in someone else’s care. By the late nineteenth century industrial society neither expected nor wanted women to engage in labor but, instead, encouraged women to devote themselves to traditional pursuits such as the raising of children, the management of the home, and the preservation of traditional family values. Rather than thrusting women wholesale into the workplace, industrialization effectively seated middle-class women in the domestic sphere.

Middle-class women generally did not work outside the home. For them, industrialization brought stringent confinement to the domestic sphere and pressure to conform to new models of behavior revolving around their roles as mothers and wives. In a book entitled *Woman in Her Social and Domestic Character* (1833), Mrs. John Sandford—who referred to herself by her husband’s name rather than her own—described the ideal British woman. “Domestic life is the chief source of her influence,” Sandford proclaimed, adding that “there is, indeed, something unfeminine in independence.” (By *independence* Sandford meant taking a job or “acting the Amazon.”) The model woman “knows that she is the weaker vessel” and takes pride in her ability to make the home a happy place for her husband and children.

Industrialization increased the demand for domestic servants as the middle class grew in both numbers and wealth. One of every three European women became a domestic servant at some point in her life. Rural women sometimes had to move long distances to take positions in middle-class homes in cities, where they experienced adventure and independence from family control. Their employers replaced their parents as guardians, but high demand for servants ensured that women could switch jobs readily in search of more attractive positions. Young women servants often sent some of their earnings home, but many also saved wages for personal goals: amassing a dowry, for example, or building funds to start careers as clerks or secretaries.

Industrialization profoundly influenced the childhood experience. Like their elders, children in preindustrial societies had always worked in and around the family home. Industrial work, which took children away from home and parents for long hours with few breaks, made child labor seem especially pitiable and exploitative. Early reports from British textile mills described sensational abuses by overseers who forced children to work from dawn until dark and beat them to keep them awake. Yet many families needed their children’s wages to survive, so they continued to send their offspring to the factories and mines. By the 1840s the British Parliament began to pass laws regulating child labor and ultimately restricted or removed children from the industrial workforce. In the long term, industrial society was responsible for removing

*Women at Home
and Work*

Child Labor



Unlike working-class children, offspring of middle-class and upper-class families enjoyed leisure and luxury. Here the children of U.S. railroad executive George Jay Gould ride in miniature cars in Paris.

children from the labor process altogether, even in the home. Whereas agricultural settings continued to demand that children make a contribution to the family income, urban industrial societies redefined the role of children. Motivated in part by moral concerns and in part by the recognition that modern society demanded a highly skilled and educated labor force, governments established the legal requirement that education, and not work for monetary gain, was the principal task of childhood. In England, for instance, education for children age five to ten became mandatory by 1881.

The Socialist Challenge

Among the most vocal and influential critics of early industrial society were the socialists, who worked to alleviate the social and economic problems generated by capitalism and industrialization. Socialists deplored economic inequalities, as represented by the vast difference in wealth between a captain of industry and a factory laborer, and they condemned the system that permitted the exploitation of laborers, especially women and children. Early socialists sought to expand the Enlightenment understanding of equality: they understood equality to have an economic as well as a political, legal, and social dimension, and they looked to the future establishment of a just and equitable society. Although most socialists shared this general vision, they held very different views on the best way to establish and maintain an ideal socialist society.

The term *socialism* first appeared around 1830, when it referred to the thought of social critics such as Charles Fourier (1772–1837) and Robert Owen (1771–1858). Often called utopian socialists, Fourier, Owen, and their followers worked to establish ideal communities that would point the way to an equitable society. Fourier spent most of his life as a salesman, but he loathed the competition of the market system and called for social transformations that would better serve the needs of humankind. He painstakingly planned model communities held together by love rather than coercion in which everyone performed work in accordance with personal temperament and inclination. Owen, a successful businessman, transformed a squalid Scottish cotton mill town called New Lanark into a model industrial community. At New Lanark, Owen raised wages, reduced the workday from seventeen to ten hours, built spacious housing, and opened a store that sold goods at fair prices. Despite the costs of those reforms, the mills of New Lanark generated profits. Out of the two thousand residents of the community, five hundred were young children from the poorhouses of Glasgow and Edinburgh, and Owen devoted special attention to their education. He kept young children out of the factories and sent them to a school that he opened in 1816. Owen's indictment of competitive capitalism, his stress on cooperative control of industry, and his advocacy of improved educational standards for children left a lasting imprint on the socialist tradition.

Utopian Socialists

The ideas of the utopian socialists resonated widely in the nineteenth century, and their disciples established experimental communities from the United States to Romania. Despite the enthusiasm of the founders, most of the communities soon encountered economic difficulties and political problems that forced them to fold. By the mid-nineteenth century, most socialists looked not to utopian communities but to large-scale organization of working people as the best means to bring about a just and equitable society.

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Once held almost exclusively by men, clerical jobs increasingly went to women as industrial society matured. Men assumed positions as managers who supervised their female employees.

Most prominent of the nineteenth-century socialists were the German theorists Karl Marx (1818–1883) and Friedrich Engels (1820–1895). They scorned the utopian socialists as unrealistic dabblers whose ideal communities had no hope of resolving the problems of the early industrial era. Marx and Engels believed that social problems of the nineteenth century were inevitable results of a capitalist economy. They held that capitalism divided people into two main classes, each with its own economic interests and social status: the capitalists, who owned industrial machinery and factories (which Marx and Engels called the means of production), and the proletariat, consisting of wageworkers who had only their labor to sell. Intense competition between capitalists trying to realize a profit resulted in ruthless exploitation of the working class. To make matters worse, according to Marx and Engels, the state and its coercive institutions, such as police forces and courts of law, were agencies of the capitalist ruling class. Their function was to maintain capitalists in power and enable them to continue their exploitation of the proletariat. Even music, art, literature, and religion served the purposes of capitalists, according to Marx and Engels, since they amused the working classes and diverted attention from their misery. Marx once referred to religion as “the opiate of the masses” because it encouraged workers to focus on a hypothetical realm of existence beyond this world rather than trying to improve their lot in society.

Marx developed those views fully in a long, theoretical work called *Capital*. Together with Engels, Marx also wrote a short, spirited tract entitled *Manifesto of the Communist Party* (1848). In the *Manifesto* Marx and Engels aligned themselves with the communists, who worked toward the abolition of private property and the institution

Marx and Engels

The Communist Manifesto

Sources from the Past

Marx and Engels on Bourgeoisie and Proletarians

Karl Marx and Friedrich Engels were the most scathing critics of early industrial society. Indeed, their critique extended to industrial capitalism in general. In their view, contemporary society pitted capitalists (whom they called the bourgeoisie in their Manifesto of the Communist Party) against proletarians. Marx and Engels argued that in the short term capitalists would exploit the proletarians, but that over the longer term proletarians would become aware of their misery, rise up, and destroy capitalist society.

The history of all hitherto existing society is the history of class struggles.

Freeman and slave, patrician and plebeian, lord and serf, guild-master and journeyman, in a word, oppressor and oppressed, stood in constant opposition to one another, carried on an uninterrupted, now hidden, now open fight, a fight that each time ended, either in a revolutionary reconstitution of society at large, or in the common ruin of the contending classes. . . .

The modern bourgeois society that has sprouted from the ruins of feudal society has not done away with class antagonisms. It has but established new classes, new conditions of oppression, new forms of struggle in place of the old ones.

Our epoch, the epoch of the bourgeoisie, possesses, however, this distinctive feature: it has simplified the class antagonisms. Society as a whole is more and more splitting up into two great hostile camps, into two great classes directly facing each other: Bourgeoisie and Proletariat. . . .

The bourgeoisie has stripped of its halo every occupation hitherto honoured and looked up to with reverent awe. It has converted the physician, the lawyer, the priest, the poet, the man of science, into its paid wage-labourers. . . .

The need for a constantly expanding market for its products chases the bourgeoisie over the whole surface of the globe. It must nestle everywhere, settle everywhere, establish connexions everywhere. . . .

The weapons with which the bourgeoisie felled feudalism to the ground are now turned against the bourgeoisie itself.

But not only has the bourgeoisie forged the weapons that bring death to itself; it has also called into existence the men who are to wield those weapons—the modern working class—the proletarians.

In proportion as the bourgeoisie, i.e., capital, is developed, in the same proportion is the proletariat, the modern working class, developed—a class of labourers, who live only so long as they find work, and who find work only so long as their labour increases capital. These labourers, who must sell themselves piecemeal, are a commodity, like every other article of commerce, and are consequently exposed to all the vicissitudes of competition, to all the fluctuations of the market. . . .

The advance of industry, whose involuntary promoter is the bourgeoisie, replaces the isolation of the labourers, due to competition, by their revolutionary combination, due to association. The development of Modern Industry, therefore, cuts from under its feet the very foundation on which the bourgeoisie produces and appropriates products. What the bourgeoisie, therefore, produces, above all, is its own grave-diggers. Its fall and the victory of the proletariat are equally inevitable.

FOR FURTHER REFLECTION

How did Marx and Engels's historical embrace of the concept of class struggle shape their understanding of the great forces clashing during this industrial age?

SOURCE: Karl Marx and Friedrich Engels. *Manifesto of the Communist Party*. Trans. by Samuel Moore. London: W. Reeves, 1888.

of a radically egalitarian society. The *Manifesto* asserted that all human history has been the history of struggle between social classes. It argued that the future lay with the working class because the laws of history dictated that capitalism would inexorably grind to a halt. Crises of overproduction, underconsumption, and diminishing profits would shake the foundations of the capitalist order. Meanwhile, members of the constantly growing and thoroughly exploited proletariat would come to view the forcible overthrow of the existing system as the only alternative available to them. Marx and Engels believed that a socialist revolution would result in a “dictatorship of the proletariat,” which would abolish private property and destroy the capitalist order. After the revolution was secure, the state would wither away. Coercive institutions would also disappear, since there would no longer be an exploiting class. Thus socialism would lead to a fair, just, and egalitarian society infinitely more humane than the capitalist order.

The doctrines of Marx and Engels came to dominate European and international socialism, and socialist parties grew rapidly throughout the nineteenth century. Political parties, trade unions, newspapers, and educational associations all worked to advance the socialist cause. Yet socialists disagreed strongly on the best means to reform society. Revolutionary socialists such as Marx, Engels, and other communists urged workers to seize control of the state, confiscate the means of production, and distribute wealth equitably throughout society. Doubting that a revolution could succeed, evolutionary socialists placed their hopes in representative governments and called for the election of legislators who supported socialist reforms.

Although socialists did not win control of any government until the Russian revolution of 1917, their critiques—along with those of conservatives and liberals—persuaded government authorities to attack the abuses of early industrialization and provide security for the working classes. Parliament prohibited underground employment for women, like the drawer Betty Harris, as well as for boys and girls under age ten and stipulated that children under age nine not work more than nine hours a day. In the wake of social reform came political reform. Beginning in 1832, a series of parliamentary acts expanded the franchise for men by reducing property qualifications, preparing the way for universal male suffrage. The same reform acts also removed the glaring inequalities in representation between rural areas and the growing cities of industrial society. For example, in the mid-nineteenth century, the sparsely populated rural county of Cornwall sent forty-four members to Parliament, whereas the city of London returned only four members. In the 1880s, under the leadership of Otto von Bismarck, Germany introduced medical insurance, unemployment compensation, and retirement pensions to provide social security for working people in industrial society.

Trade unions also sought to advance the quest for a just and equitable society. As governments regulated businesses and enhanced social security, trade unions struggled to eliminate abuses of early industrial society and improve workers’ lives by seeking higher wages and better working conditions for their members. Through most of the nineteenth century, both employers and governments considered trade unions illegal associations whose purpose was to restrain trade. Tensions ran high when union members went on strike, especially when employers sought to keep their businesses going by hiring replacement workers. In those cases violence frequently broke out, prompting government authorities to send in police or military forces to maintain order. Over the longer run, though, trade unions gradually improved the lives of working people and reduced the likelihood that a disgruntled proletariat would mount a revolution to overthrow industrial capitalist society. Indeed, trade unions became an integral part of industrial society because they did not seek to destroy capitalism but rather to make employers more responsive to their employees’ needs and interests.

Social Reform

Trade Unions

Global Effects of Industrialization

Early industrialization was a British, western European, and North American affair. By the late nineteenth century, Russia and Japan were beginning to industrialize. Quite apart from its spread beyond western Europe, industrialization had deep global implications because industrial powers used their tools, technologies, business organization, financial influence, and transportation networks to obtain raw materials from preindustrial societies around the world. Many lands that possessed natural resources became increasingly oriented to exporting raw materials but maintained little control over them because representatives of industrial countries dominated the commercial and financial institutions associated with the trade. Some societies saw their home markets flooded with inexpensive manufactured products from industrial lands, which devastated traditional industries and damaged local economies.

The Continuing Spread of Industrialization

By the mid-nineteenth century, industrialization processes were well under way in western Europe and North America as well as Britain. Industry brought economic and military power, and leaders in other lands began to seek paths to industrialization. After 1870 Russia and Japan embarked on campaigns of rapid industrialization. Government authorities took the lead in sponsoring industrialization in both lands, largely to strengthen their societies and enable them to resist military and economic pressures from western Europe and the United States.



Robert Koehler's painting *The Strike* depicts a situation verging toward violence as workers mill about in a confrontation with factory owners and one angry laborer crouches to pick up a stone.

In Russia the tsarist government promoted industrialization by encouraging the construction of railroads to link the distant regions of the far-flung empire. In 1860 Russia had less than 1,100 kilometers (700 miles) of railroads, but by 1900 there were more than 58,000 kilometers (36,000 miles). Most impressive of the Russian railroads was the trans-Siberian line, constructed between 1891 and 1904, which stretched more than 9,000 kilometers (5,600 miles) and linked Moscow with the port of Vladivostok on the Pacific Ocean. Apart from drawing the regions of the Russian empire together, railroads stimulated the development of coal, iron, and steel industries and enabled Russia to serve as a commercial link between western Europe and east Asia.

Russian industry experienced explosive growth when Count Sergei Witte served as finance minister (1892–1903). Witte oversaw construction of the trans-Siberian railroad, and he worked to push Russian industrialization by reforming commercial law, protecting infant industries, supporting steamship companies, and promoting nautical and engineering schools. He invited foreign investors to bring their capital and expertise to Russia, and he encouraged the establishment of savings banks to raise additional investment funds at home. By 1900 Russia produced half the world's oil, and Russian steel production ranked fourth in the world, behind the United States, Germany, and Britain. As a result of Witte's efforts, Russia also had enormous coal and iron industries, and government demand for weapons also supported a vast armaments industry.

In Japan, too, imperial authorities pushed industrialization. The government hired thousands of foreign experts to instruct Japanese workers and managers in the techniques of modern industry. The government also took the initiative by modernizing iron foundries and dockyards established during the Tokugawa shogunate, founding new businesses, and opening schools and universities specializing in scientific and technical fields. Government support was responsible for the construction of railroads, the opening of mines, the organization of a banking system, and the establishment of mechanized industries producing ships, armaments, silk, cotton, chemicals, and glass.

When businesses were able to operate on their own, the government sold them to private entrepreneurs, who often built huge industrial empires known as *zaibatsu* (“wealthy cliques”). *Zaibatsu* were similar to the trusts and cartels that emerged in nineteenth-century Europe and the United States but most commonly organized around a single family. *Zaibatsu* usually operated and controlled companies in several industries. The Mitsui combine, for example, owned or had large investments in a multitude of enterprises engaged in banking, trade, mining, food processing, and textile manufacturing. By 1900, as a result of active government encouragement and the organization of large-scale enterprises that operated efficiently, Japan was the most industrialized land in Asia, and it was poised for dramatic economic and industrial expansion in the twentieth century.

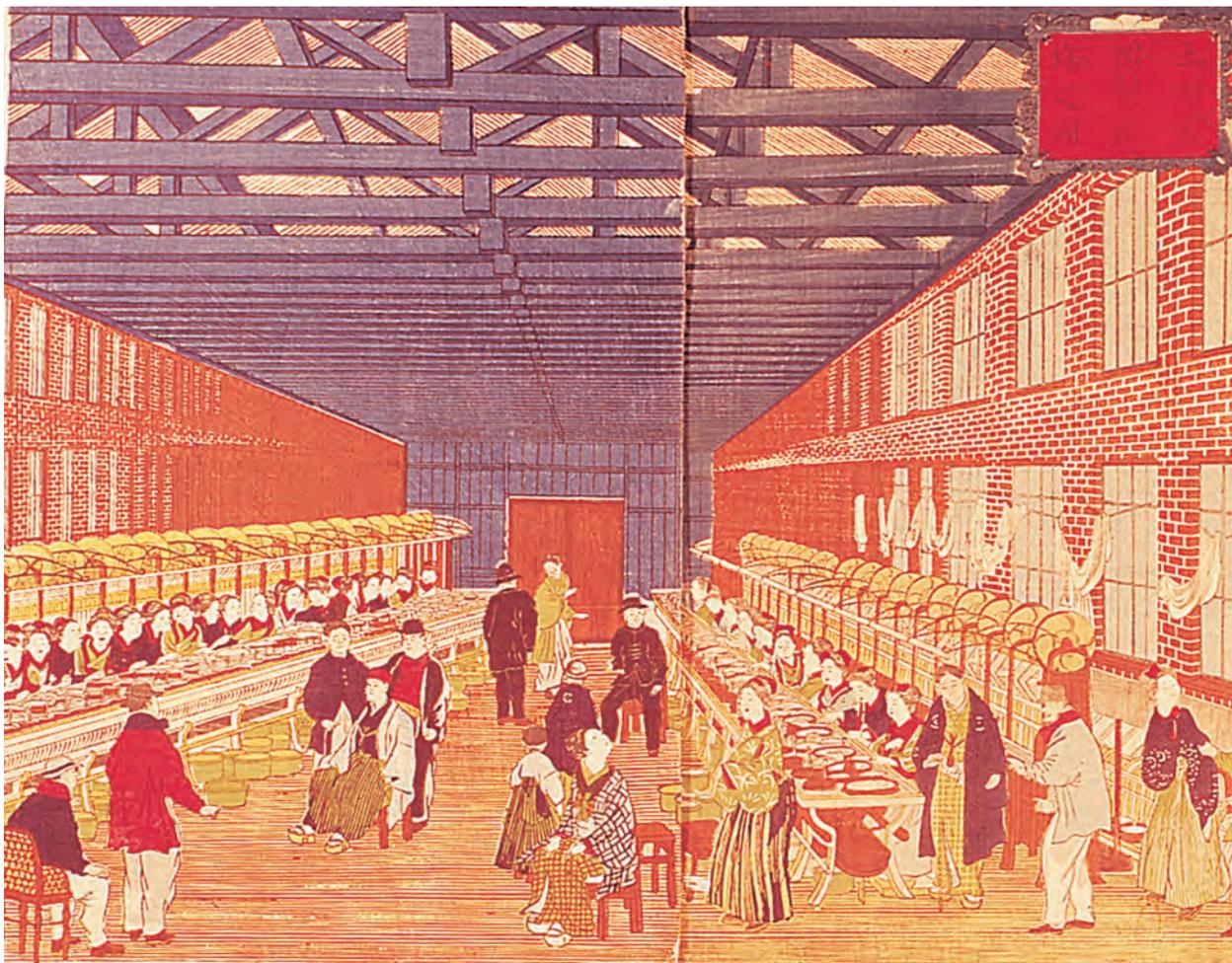
The International Division of Labor

Industrialization brought great economic and military strength to societies that reconfigured themselves and relied on mechanized production. Their power encouraged other societies to work toward industrialization. Before the mid-twentieth century, however, those efforts had limited results outside Europe, North America, and Japan. In India, for example, entrepreneurs established a thriving industry in the production of jute—a natural, hemplike fiber used for making carpets, upholstery, and burlap bags—as well as a small domestic steel industry. But fledgling Indian industries lacked government support, and private investment capital was insufficient to bankroll industrialization on a large scale.

Industrialization in Russia

Industrialization in Japan

Witte, Sergei (VIHT-tee, SAYR-gay)
zaibatsu (zeye-BAHT-soo)



The Tomioka silk factory, established in the 1870s, was one of the earliest mechanized textile factories in Japan. In this factory, as in many textile mills in Europe and North America, male managers oversaw female factory workers.

Demand for Raw Materials

Nevertheless, industrialization had deep global ramifications. The industrialization process influenced the economic and social development of many societies because it promoted a new international division of labor. Industrial societies needed minerals, agricultural products, and other raw materials from sometimes distant regions of the world. Representatives of industrial societies searched the globe for raw materials to supply their factories.

Large-scale global trade in agricultural products was nothing new. From the sixteenth through the eighteenth centuries, European countries had imported sugar, spices, tobacco, tea, coffee, cotton, and other products grown mostly on plantations. In the nineteenth century, demand for these products increased sharply because of population growth. But industrial society fueled the demand for additional products as British, European, and U.S. industrialists sought the natural resources and agricultural products of Africa, the Americas, Asia, Australia, and eastern Europe. The mechanization of the textile industry, for example, produced a demand for large quantities of raw cotton, which came mostly from India, Egypt, and the southern rim of the United

States. Similarly, new industrial technologies increased demand for products such as rubber, the principal ingredient of belts and tires that were essential to industrial machinery, which came from Brazil, Malaya, and the Congo River basin.

In some lands, specialization in the production and export of primary goods paved the way for economic development and eventual industrialization. This pattern was especially noticeable in lands settled by European colonists, including Canada, Argentina, Uruguay, South Africa, Australia, and New Zealand, each of which experienced economic growth through the export of primary products and the infusion of foreign capital and labor. The same societies had an additional advantage in that they were high-wage economies. High incomes fostered economic development in two ways: they created flourishing markets, and they encouraged entrepreneurs to counteract high wages and labor scarcity by inventing labor-saving technologies.

Other lands were less fortunate. The peoples of Latin America, sub-Saharan Africa, south Asia, and southeast Asia also exported primary products but attracted little foreign investment and developed little mechanical industry. Export-oriented agriculture dominated these lands, where the major cash crops were sugar, cotton, and rubber. Foreign owners controlled the plantations that produced these crops, and most of the profits went abroad, depriving domestic economies of funds that might otherwise have contributed to the building of markets and industries. The low wages of plantation workers made the situation worse by dampening demand for manufactured goods. The result was a concentration of wealth in the hands of small groups that contributed little to economic development through consumption or investment. To compound the problem, the dominant financial interests adopted free-trade policies allowing unrestricted entry of foreign manufactures, which supported continuing industrialization in foreign lands but sharply limited opportunities for indigenous industrialization.

*Economic
Development*

*Economic
Interdependence*



An *Eastern Steamboat*, a watercolor by Pavel Petrovich Svinin, depicted Robert Fulton's steamboat the *Paragon*. Steamboats transported passengers and cargo and helped spread industrialization around the world.

The new geographic division of labor, in which some of the world's peoples provided raw materials while others processed and consumed them, increased the volume of world trade and led to increased transportation on both sea and land. Bigger ships, larger docks, and deeper canals facilitated trade and transport. The benefits of this new system flowed primarily to Europe, North America, and Japan. Other lands realized few benefits from the process of industrialization, but the process nevertheless increasingly linked the fortunes of all the world's peoples.

The process of industrialization involved the harnessing of inanimate sources of energy, the replacement of handicraft production with machine-based manufacturing, and the generation of new forms of business and labor organization. Along with industrialization came demographic growth, large-scale migration, and rapid urbanization, which increased the demand for manufactured goods by the masses of working people. Societies that underwent industrialization enjoyed sharp increases in economic productivity: they produced large quantities of high-quality goods at low prices, and their increased productivity translated into higher material standards of living. Yet industrialization brought costs, in the form of unsettling social problems, as well as benefits. Family life changed dramatically in the industrial age as men, women, and children increasingly left their homes to work in factories and mines, often under appalling conditions. Socialist critics sought to bring about a more just and equitable society, and government authorities curtailed the worst abuses of the early industrial era. Governments and labor unions both worked to raise living standards and provide security for working people. Meanwhile, industrialization increasingly touched the lives of peoples around the world. Western European, North American, and Japanese societies followed Britain's lead into industrialization, while many African, Asian, and Latin American lands became dependent on the export of raw materials to industrial societies.

C H R O N O L O G Y	
1730–1795	Life of Josiah Wedgwood
1733	John Kay develops the flying shuttle
1765	James Watt patents an improved steam engine
1765–1825	Life of Eli Whitney
1779	Samuel Crompton develops the spinning mule
1785	Edmund Cartwright develops the power loom
1797	Eli Whitney introduces interchangeable parts to the manufacturing process
1829	George Stephenson's locomotive, the Rocket, attains a speed of 45 kilometers (28 miles) per hour
1832	Reform Bill expands electorate to House of Commons
1833	Factory Act restricts employment of women and children in textile factories
1842	Mines Act restricts employment of women and children in mines
1848	Karl Marx and Friedrich Engels publish <i>Manifesto of the Communist Party</i>
1849–1915	Life of Sergei Witte
1851	Crystal Palace exhibition in London
1856	Bessemer converter developed
1913	Henry Ford introduces the assembly line to the manufacture of automobiles

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