

New Technologies and Industries

With the evolution of modern automobiles with their inflated rubber tires, the need for better roads became increasingly obvious. Yet the process of improving Europe's and America's roads (America took to the new autos faster than any other country) had already begun before automobiles ever became popular. This was due to the popularity of the new invention known as the bicycle.

Representing one of the most popular modes of transportation in the late nineteenth century, the bicycle began to appear in significant numbers in the early 1870s—first in Europe, then in America. By the turn of the century, Great Britain and France each boasted five million bicycle owners, Germany had four million, and Italy two million. Bicycles, in a way, democratized

mobility in Europe. Even the lowliest clerk or factory worker could afford a bicycle by the 1890s, giving all a cheap way of traveling. Bicycles were ideal for larks in the country, or for dodging around an urban landscape. Suddenly, one did not have to have wealth to have the power to move about freely.

While Gottlieb Daimler was busy inventing his internal combustion engine in 1885, he placed a gasoline-powered model on a bicycle, creating one of the earliest motorcycles. (Motorcycles did not become popular, however, until after 1900.)

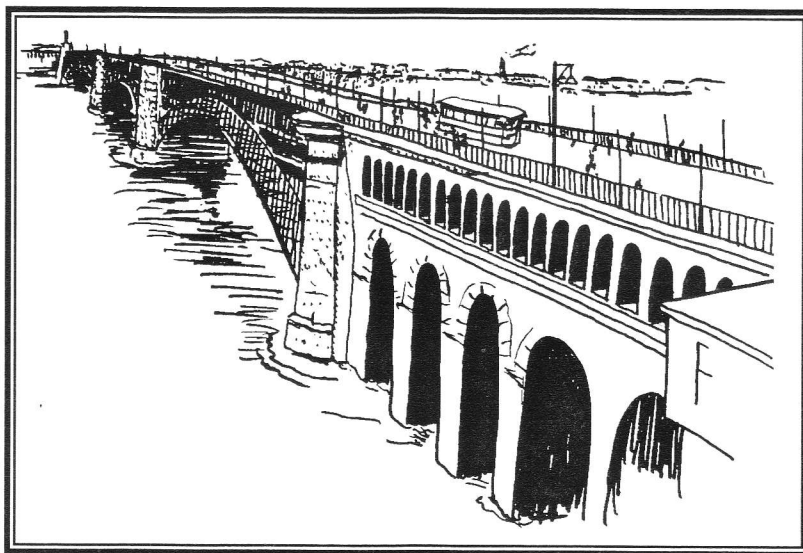
It was the bicycle, then, that stimulated the development of better roads in Europe and in the United States. Two important engineering inventions helped facilitate the new roadbuilding—the stone crusher (1858) and the steamroller (1859). These mechanical devices made simple road construction even simpler.

With new roads and the advancement of the iron and steel industry came new engineering techniques in bridge construction. Several key engineers built a

number of now-famous bridges, such as the great steel Eads Bridge in St. Louis, Missouri, built in 1874, which still stretches across the Mississippi River today—each of its three spans measuring five hundred feet in length. Others included the Brooklyn Bridge (completed in 1883) covering a total span of 1595 feet, connecting New York's Manhattan Island with the borough of Brooklyn. And one other, the

Firth of Forth Bridge in Scotland, finished in 1890, a great iron construction featuring two spans, each over seventeen hundred feet in length.

While iron was still in use in significant quantities in the late nineteenth century, the new building material of the modern age was definitely steel. Steel was vastly superior to



Eads Bridge, St. Louis, Missouri

iron because of its flexibility and strength. Steel went into the construction of nearly every significant building project of the late nineteenth century.

Whole industries were being created from steel. And great fortunes, too. One of the richest men at the turn of the century was a Scotsman named Andrew Carnegie (1835–1919). Having immigrated with his parents to the United States in 1847, he worked as a bobbin boy in a textile mill at age twelve. Through hard work and determination, Carnegie moved up the ladder, making shrewd investments.

By middle age, Carnegie found himself in the young American steel business. He was one of the first steel manufacturers in the U.S to adopt the Bessemer process to steel production. By using this manufacturing technique, Carnegie was able to reduce the price of steel rails (for building train tracks) from \$160 a ton in 1875 to \$17 a ton in 1900. By that year, steel production was greater in America than in any other nation.

Creating New Images

The inventiveness of the Second Industrial Revolution was not limited to new means of production, transportation, and communication. Remarkable inventions made possible a new age of entertainment and new pastimes. Nothing made this possible more than the development of photography and, later, motion pictures. These technologies offered new methods for creating visual memories.

For hundreds of years prior to the 1800s, curious observers realized that light, when passed through a tiny hole in a dark box or chamber, could produce an upside-down image of a scene on the opposite wall or side. Such a device, called a *camera obscura*, was used by artists in creating a sketch of a landscape.

While these contraptions projected images, they did not produce permanent copies. The first person to accomplish this was a French physicist, Joseph Nicéphore Niepce (1765–1833). In the 1820s, he exposed a light-sensitive pewter plate to light in a box similar to a camera obscura. But instead of a small hole, Niepce passed the light through a simple glass lens, which focused the light-projected image. The result—after eight hours of exposure—was the creation of the first photograph in history. (Another of his images created in 1826 still exists today, rediscovered in 1952 inside a storage trunk in London.)

Other early “photographers” followed. During the 1830s, a Frenchman, Louis J. M. Daguerre (1787–1851), produced images that were later named for him—daguerreotypes. He, too, exposed light-sensitive metal plates and then “fixed” the image permanently with salts.

Photos produced on paper were first created in 1839 when a British scientist, William H. F. Talbot (1800–1877) invented a paper treated with salt and silver nitrate. A friend, Sir John F. W. Herschel, coined the name for the new image-producing technology: photography.

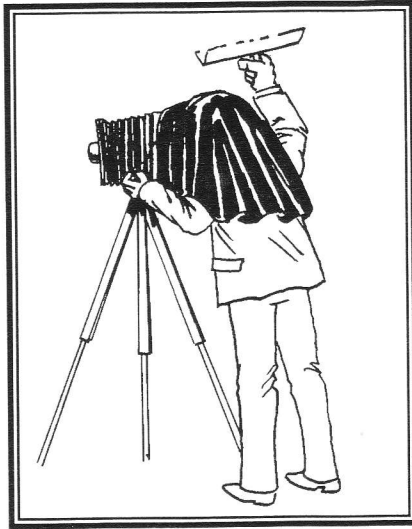
From the 1850s through the end of the century,

inventors perfected the production of photographs through better lenses and chemicals. In 1851, wet plate photography was invented by an Englishman, Frederick Scott Archer (1813–1857). Images were made on glass plates coated with a sticky material called *collodion*, a solution of gun cotton in ether, then dipped in silver salts to “fix” the image permanently. Dry plate photography came along in the 1870s, the invention of an Englishman, Richard L. Maddox (1816–1902). This process made smaller, hand-held cameras possible. In 1888, an American manufacturer of dry-plate, George Eastman (1854–1932), changed photography forever by inventing a simple snapshot camera, called a Kodak, which could be used by amateur photographers. A would-be shutterbug could purchase a Kodak camera loaded with a one hundred-exposure roll of film. When the film was

fully shot, the customer sent to Eastman the entire camera and then received back the photographs. Soon, photography was everywhere.

By the 1890s, photography had been adapted even further. In 1894, Thomas Alva Edison, the great American inventor, developed a machine called a *kinetoscope*, which featured a series of photos that when flipped over in succession created the illusion of motion. Such devices, sometimes called *peep shows*, became popular attractions in amusement arcades.

Two French brothers, Louis (1864–1948) and Auguste (1862–1954) Lumiere, produced one of the first projected motion pictures, a pair of two-minute films shown in Paris at the Grand Cafe in 1895. By 1896, Edison had created 35-millimeter motion picture film and later that year presented the first public presentation of motion pictures in New York City. This first movie show included projected images of a boxing match, a dancer, and waves crashing onto a beach. (When the waves broke on the projected shore, startled women in the audience raised their skirts to keep from getting wet!) By the turn of the century, motion pictures were becoming a popular form of entertainment.



Progress and Population

The inventions of the Second Industrial Revolution helped to create a revolution in transportation, communications, entertainment, and consumerism. The introduction of new energies, of electricity and petroleum, added to the Continent's industrial base. As a result, Europeans, in general, experienced a new standard of living that continued to improve well into the next century.

Commerce, trade, and industry grew by leaps and bounds during the nineteenth century. With a few exceptions—most notably during the mid-1870s and 1880s—all these economic elements grew rapidly through this period. Between 1830 and 1914, world trade (with Europe and the United States leading the way) doubled every twenty years.

Europe became so industrialized that the numbers of farms and farmers dramatically declined. The nations of Europe began to rely increasingly on food imports, such as wheat and other grains from the U.S. and Canada, as well as meat from Australia, the U.S., and New Zealand. Ironically, such imported foods were cheaper to purchase in some European centers than the same foods produced domestically.

The new technologies and inventions—powerful steamships and faster trains with refrigerator cars—helped to deliver perishable commodities all over the world. This created a worldwide trade like none other before it in the history of the world.

All these changes helped to create a whole new way of life for many Europeans. And there were more of them than ever before. The period from 1815 to 1914 was one of extraordinary population growth. Overall, the inhabitants of the European continent increased in numbers from two hundred million in 1815 to an incredible four hundred fifty million by the beginning of World War I. This growth represents a 250 percent increase in the Continent's population. However, these numbers do not take into account the fact that approximately forty million Europeans left the Continent during this same period, taking up new lives in the United States and other foreign

locales. By 1914, approximately six hundred fifty million people (including two hundred million outside the European continent) could claim European heritage, a figure representing one out of three people in the world.

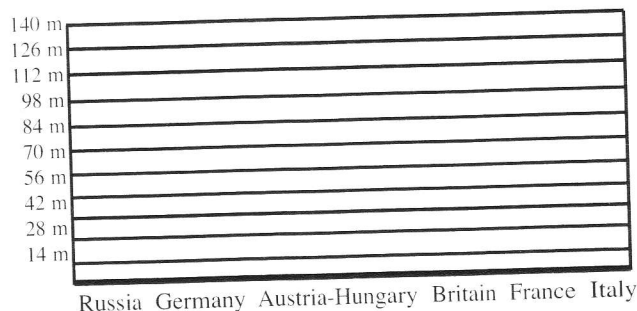
The 1914 population figures rank the leading nations in the following order: Russia (one hundred forty million), Germany (sixty-seven million), Austria-Hungary (forty-five million), Great Britain (forty-three million), France (forty million), and Italy (thirty-six million). Outside the Continent, the largest population of ethnic Europeans lived in the United States, representing nearly one hundred million. (The United States was also the second most populous country in the Western world, after Russia.)

The growth in the populations of the leading European nations was not equally distributed, however. In 1870, France and Germany could boast nearly equal populations (36 vs. 41 million). But by 1914, Germany had experienced a sixty percent growth in its population since 1870, causing Germany to outnumber France in population by three to two.

Review and Write

Create a graph comparing the populations of Russia, Germany, Austria-Hungary, Great Britain, France, and Italy.

Leading European States and 1914 Populations



A New Imperialism

During the period from 1870 until the outbreak of World War I in 1914, several of the European powers—most notably France, England, and Germany—engaged in an enthusiastic race to establish vast colonial systems overseas.

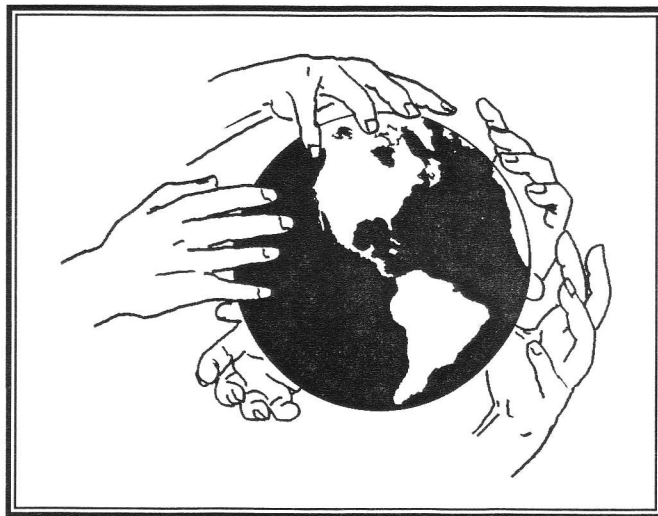
This was not the beginning of European colonialism, of course. In earlier centuries, European ships had sailed around the globe in search of new markets and new trading colonies. The Spanish, Portuguese, English, French, Dutch, and others had built up worldwide colonial systems, especially in the western hemisphere. The thirteen English colonies in North America, Spanish-dominated Mexico, French Canada, and Portuguese Brazil were all important colonial outposts of these powerful European nation-states.

However, by the early nineteenth century, the drive for European colonies overseas had nearly dried up. In some respects, colonizing proved a thankless task. Colonies were expensive to protect, maintain, and govern. Colonial rivalries often led to wars between European powers, wars which sometimes resulted in one power losing its colonies to another rival power. And from time to time, colonial subjects rebelled.

There were plenty of examples of such events. The French had lost Canada by losing the Seven Years War (1756–1763). The American Revolution brought an end to British control of the thirteen colonies in the 1780s. By 1824, nearly all the Portuguese and Spanish colonies of Latin America had gained their independence. Early in the nineteenth century, the lure of establishing European colonies had almost vanished.

But by 1870, the drive was on again. Various reasons served as motives in this scramble for colonies. Perhaps the most significant cause for colonization between 1870 and 1914 was

economic. As the great powers of Europe furthered their industrialization, they developed a need for increased markets overseas. Also, with more industrial output, the need for more and more raw materials developed. Colonies in Africa, Asia, and elsewhere produced such raw materials as tin, rubber, hardwoods, tea, cotton, and coffee, items which could not be produced in Europe.



Another factor leading to the new colonization was a strong sense of nationalism spreading across the European continent. European powers wished to dominate outside of their national borders, intending to spread the interests and values of their nation-state and its people. With the rise of a united Germany after 1870, Britain and other powers felt a need to expand into empire building

overseas. In fact, empire building became the new political order of the age.

Europe's sense of superiority contributed to new colonization. Christian missionaries migrated by the thousands to foreign lands during the final third of the nineteenth century, seeking to convert the natives of Africa, India, and other underdeveloped nations whom they considered to be lost heathens. Racism also played a role, as Europeans considered their race, culture, and social systems to be superior to those of the "backward" peoples of less technologically advanced states. Many thought it the duty of white Europeans to bring the primitive peoples of the world out of their dark existence into the dazzling, progressive, modern world of railroads, telephones, advanced medicine, and literacy.

There was also a sense of adventure, of taking civilization to remote, exotic locales. It was the sense of national pride felt by the British as the empire of Victoria extended itself around the world, so that, as was often said, "the sun never sets on the British Empire."

The Early British Drive

The British proved to be one of the most extensive colonizers of the 1800s. Although the Napoleonic Wars between 1799 and 1815 had kept Britain and other European powers busy, after the wars ended with Napoleon's defeat in 1815, Great Britain emerged as the most powerful seafaring nation of the Continent. In the same year, the British added to their colonial empire.

In the western hemisphere, England held a colonial empire left over from earlier centuries. Canada, some Caribbean isles, and the mainland colonies of British Honduras and British Guiana flew the British flag in 1815.

The British also had a toehold in Africa, with trading stations located along the west coast and in the Cape Colony, today known as South Africa, where the Dutch were already the dominant European power. In India, the British controlled important trading ports and dominated the tea trade. Australia had become British property after a claim was laid by Captain James Cook in 1770. (The British established a prison colony there in 1788.) British sailing vessels could find friendly British-controlled ports around the globe: Gibraltar, Malta, Ceylon, Mauritius, and St. Helena. (It was there that Napoleon faced his second exile.)

In the 1820s, Britain moved into Africa. British colonists swarmed over the Cape Colony, challenging the Dutch settlers known as the Boers. Britain also began establishing its control over eastern Africa in the same decade. In 1843, Britain annexed the lands east of Cape Colony, known as Natal.

India had been a colonial interest of the British for a century prior to the 1800s. In the nineteenth century, the British further extended their control of the subcontinent. Gradually the Indian army came under British control. In 1857, Indian troops (both Muslim and Hindu) known as *sepoys* attempted a

revolt against the British, angered that they were required to use rifle cartridges greased with beef and pig fat. (Hindu religious practices forbade contact with beef and Muslim law prohibited pork.) The violent Sepoy Mutiny was an attempt by the Indians to gain their independence. However, British forces retaliated harshly and overthrew the Indian government of the Mogul empire.



The 1840s witnessed Britain going to war with China when the British attempted to force the Chinese to import Indian-produced opium, a legal drug at the time. The Opium War produced a British victory and a settlement known as the Treaty of Nanking (1842), which gave ownership of Hong Kong to Britain and opened several key Chinese ports to British trade. A later treaty, signed in 1858, opened eleven other Chinese ports to British shippers and merchants.

During the 1840s and 1850s, Britain further consolidated its control over Australia and annexed another south Pacific locale—New Zealand. Despite all these colonial efforts between 1815 and 1870, the government of Great Britain did not actively, purposefully expand its colonial empire. It did so almost without thinking. The days of fierce colonial competition with rival European powers was yet to come.

Review and Write

From your reading of this page, list the methods the British used to further their colonial empire between 1815 and 1870.

Worldwide Colonization

European colonial expansion efforts from the end of the Napoleonic Wars (1815) until 1870 were minor. The French empire expanded slightly, with an invasion of North African Algeria in 1830 and the taking of a few islands in the South Pacific. The Germans were not at all imperialistic until after 1884. Britain and France were colonial powers during those years, but only one other European power held significant overseas colonies prior to 1870—the Netherlands. But Dutch imperialism occurred in an unorganized fashion, and they spent much of their time solidifying their power over a few colonies, rather than expanding their influence on new ones.

Yet from 1870 to 1914, European powers engaged in an ongoing and intense rivalry for colonization from Asia to Africa. All the major powers of the Continent—except the Austrian-Hungarian Empire—dashed all over the globe, creating new colonies, coaling stations for their navies and merchant ships, and protectorates and other strategic spheres of influence.

One continent which was nearly exempt from this mad scramble to carve up the world was the Western Hemisphere. The American policy of protectionism embodied in the Monroe Doctrine of the 1820s kept nearly all European powers from attempting further colonization in Central and South America.

This intense imperialist competition occurred in Africa, the Pacific region, and Asia. Before the end of the century, European nations took control of over ten million square miles of foreign lands, an amount equal to twenty percent of the world's land surface. Within the borders of these newly annexed and conquered lands lived 120 million people—ten percent of the world's population—many of them considered subjects of the reigning monarch of the imperial nation which controlled them.

Africa proved to be one of the most greedily sought after continents. So fierce was the competition and

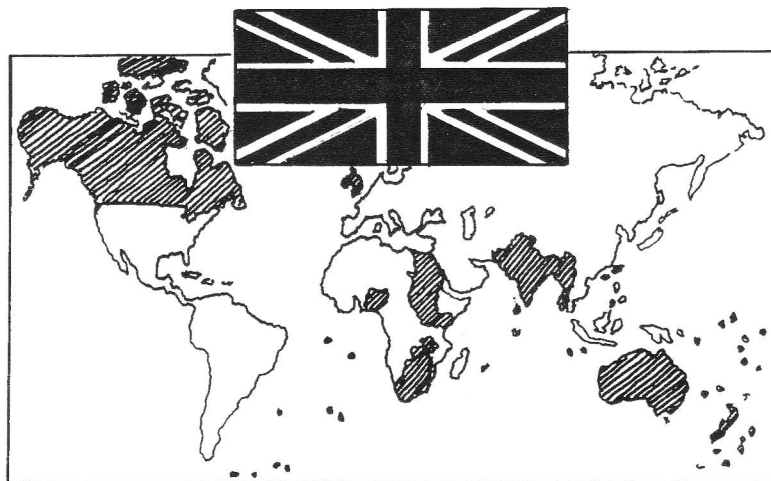
drive for African colonies that, by 1895, only one-tenth of Africa remained out of European hands. Great Britain led the pack, gaining control of three million square miles of territory—one-third of the continent—by 1914. Britain eventually controlled Gambia, the Gold Coast, Sierra Leone, and Nigeria in the west, Nyasaland, Uganda, Kenya, and British Somaliland in the east, and South Africa. In the north, Britain

extended its rule over Egypt and the Sudan, and purchased the Suez Canal by purchasing forty-four percent of the Suez Canal stock from the native ruler of Egypt.

One of the great British motivators and imperialist schemers was promoter Cecil Rhodes (1853–1902). When diamonds were

discovered in 1869 at Kimberley, Cape Colony (South Africa), Rhodes emerged a wealthy man. His dream was to consolidate control over the entire eastern half of Africa, creating a vast British empire stretching from Egypt to South Africa. This led to conflict between the British and the Dutch Boers (settlers) in the Boer Transvaal when gold was discovered there in 1886. By 1899, Dutch settlers and political leaders in two Boer republics—Transvaal and the Orange Free State—which neighbored the British-controlled Cape Colony, went to war with the British.

The Boer War proved to be costly for the British. The war dragged on until 1902, and brought a victory for the British, leading them to annex both Boer republics. Many observers of the war decried the harshness of the British against the Boers. The human cost of the war was astounding. Great Britain lost twenty-two thousand men in the course of of pursuing the Boer War. The economic cost was equally staggering, topping nearly two hundred million pounds. For many of the British at home, the Boer War left a bad taste. The ferocity and death toll brought on by the British-Dutch conflict took much of the glamour out of British imperialism.



Further Colonization

While Britain was busy adding to its colonial power, other European nations were establishing imperial outposts of their own. The French represented the most significant rival of the British in the decades between 1870 and 1914.

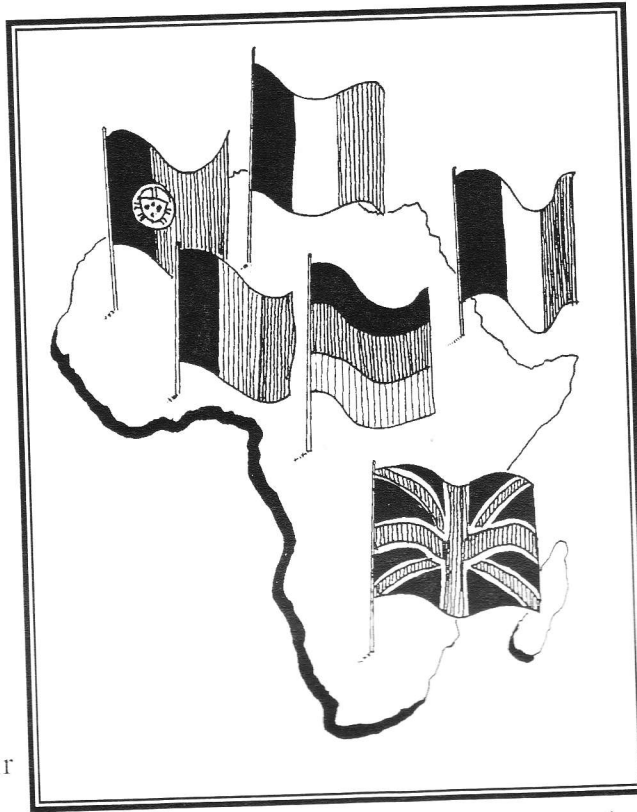
By the end of that period, France controlled nearly as much African territory as the British. In northern Africa, France held colonial power in Algeria, Tunisia, and Morocco in the north, French West Africa and the French Congo along the west coast, the large island of Madagascar off the southeast coast of the continent, and French Somaliland where the Red Sea emptied into the Gulf of Aden.

The French colonial model differed greatly from the English form. The French kept tight, centralized control over their colonies, while the British encouraged autonomy in their subjects. The French took serious steps to make their subjects more French by assimilating them into the ways of French culture and social structures.

Although most of French North Africa consisted of endless deserts of sand dunes, these colonies were strategically located along the southern Mediterranean. From time to time, the French and the Germans fought for control of the region, a rivalry which led to near war in both 1905 and 1911.

The Germans became serious colonizers in the final years of the nineteenth century. They were late in the game, however, as nearly all their colonies were established after 1884. Africa was the scene of German colonial efforts in Togoland and the Cameroons in the west, and Damaraland and Namaqualand, which became German southwest Africa (the modern nation of Angola today). In

1885, the Germans were present in German East Africa. Between 1884 and 1886, the Germans took control of over nine hundred square miles of African soil, becoming the third largest European competitor in Africa, after Great Britain and France.



Other European powers were also involved in colonizing in Africa. Leopold II (1865–1909), the Belgian king, hired the famous British journalist and African explorer, Henry Morton Stanley (1841–1904), to establish an outpost in the Congo. By 1885, Leopold personally controlled the Congo Free State (today the Democratic Republic of Congo, formerly Zaire). He reaped huge profits from the exploitation of native populations, who produced ivory, rubber, and mineral wealth. Leopold became recognized as such a greedy exploiter that he was forced to surrender control of the region

to Belgium directly.

African territory fell into Italian hands in 1889–1890, including Somaliland and Eritrea. In 1911, the Italians wrested control of Tripoli from the Turks through war. Portugal also colonized on the African continent in Portuguese East and West Africa and Guinea. Spain, too, had small colonial holdings in Africa.

Asia saw further colonization late in the century. In 1884, Germany and England divided New Guinea and, by the next year, Germany took over the Marshall and Solomon Islands. England and the Netherlands divided Borneo in 1891.

Rivalry among European countries for control of colonies in Africa, Asia, and the Pacific frequently brought these nations to the brink of war. When war could not be avoided, conflicts erupted. In 1914, World War I began.

The New Imperialism: A Map Study

During the period from 1870 to 1914, the year marking the beginning of World War I, many of the leading European nation-states competed in a global race for colonial domination. These powers established imperial rule in nations, islands, and regions on several continents, including Africa, Asia, South America, and the Pacific. From such colonial conquests, the European nations gained access to raw materials and new markets that were needed to maintain the new industrial capitalism at home.

Review and Write: A Map Study

Using the information presented on the previous four pages, the map below, and an outside source, locate any twelve places where a European power established rule between 1870 and 1914. Write the name of the colonizer in one of the boxes shown below, list any important dates, and name the newly established colony. Then draw a line connecting each box with the appropriate map location.

