A New Kind of Revolution

Industrial Revolution: Human Legacy
Chapter 21.1
A Revolution in Great Britain
Factors for Success

- **Power Sources Shift**
  - From Human & Animal to water & Steam

- **Exploration & Colonialism**
  - Source of raw materials
  - Provided new markets

- **Sea power**
  - Had merchant fleet to ship & Navy to protect

- **Political Stability**
  - Allowed commerce to thrive & no drain on resources

- **Governmental Support**
  - Laws favored Business

- **Growth of Private Investment**
  - Funded experiments to create better products
  - R & D

*Source: Beers, *World History: Patterns of Civilization*, 1983 (adapted)*
Agricultural Factors

- **Seed Drill**
  - 1701 Jethro Tull invents efficient way to plant seeds

- **Livestock Breeding**
  - Healthier livelier animals

- **Improved Produce**
  - Foods from the Columbian exchange such as the potato increased food supply and population

- **Enclosure Movement**
  - Wealthier farmers bought out smaller farmers, enclosing large amounts of land in efficient farmers
  - Small landowners went to cities and became workforce for factories
Britain’s Big Advantage

• Factors of Production
  – Land
    • Natural resources including coal & iron
    • Streams & Rivers to provide water power and transportation
    • Britain increased its canals from 1,000-4,000 miles from 1700-1800
    • Good harbors for shipping
  – Labor
    • Growing population who needed jobs
  – Capital
    • Funds for investment
    • Human capital = people with skills and ideas
During the 18th century, weaving changed from a cottage industry done at home, to a factory-based industry done by machines.
A New Way of Making Cloth

• Increased Supply
  – Cotton from India & North America
  – Wool because more land was used for pastures

• Technological Inventions
  – Eli Whitney – Cotton Gin
  – James Hargreaves – Spinning Jenny (spins fibers into thread)
  – Richard Arkwright - Spinning Frame
  – John Kay - Flying Shuttle
  – Edmund Cartwright – Power Loom (1785) (Weaves thread into cloth)
Spinning Jenny & Spinning Frame
Flying Shuttle & Power Loom
Cloth-Making in Factories

- New machines too big & expensive for a single home
- Factories by streams provided ready source of Power
- From 1770-1800 England increased cloth production from 50,000-400,000 bolts
STEAM POWERS THE REVOLUTION
Development of the Steam Engine

• **James Watt (1736-1819)**
  – Invents first practical Steam engine in 1765 (About 500 in operation by 1800)

• **Advantages of Steam Power**
  – Factories no longer had to be near rivers for power
  – Located where workers & fuel were readily available
  – Built closer to roads & other transportation

• **Uses of Steam Engines**
  – Pumps & drills in mines
  – Locomotives (1802)
  – Steam Ships: 1807 Robert Fulton operates the Ship Clermont on Hudson River
Coal for British Steam Engines

• North & Western England has large supplies of coal
  – 1800 Great Britain supplies 80% of Europe’s coal

• Factories built near coal supplies

• Hazards of Mining
  – Quiet landscapes transformed into noisy boomtowns
  – Mine Explosions
  – Coal Dust
  – Collapsing Shafts
  – Hard labor
  – Child Exploitation
Industry and the West

• Why did Industrialization spread more quickly in Western Europe?

• Individual Freedom
  – People could make more decisions to compete or improve products

• Competition viewed as good
  – John Locke & natural law

• Wealth & Fame were rewards
  – Laws did not control wealth or prevent people from making money
Spread of Industrial Revolution Throughout Europe
Industry Comes to America

• 1760-1830 Industrial Revolution largely remains in Britain
  – Britain outlaws exportation of technology
  – Forbids skilled workers from leaving the country
• 1791 Alexander Hamilton encourages U.S. Industrialization for economic independence
• Samuel Slater brings British mill technology to America in 1793 (Pawtucket Rhode Island)
• Francis Cabot Lowell (MA)
  – First all-in-one cotton to cloth mill
  – Employs 10,000 workers by 1850
Industry Spreads to Europe

- William Cockerill Brings textile industry to Belgium 1807
- 1848 France become Industrial power
- 1850’s German states begin to build railroads and industrialize
Industry In Asia

• Japan begins to Industrialize in 1868
  – Meiji restoration modernizes Japan’s economy
  – Iwakura mission (1871) to the US to learn techniques

• Russia, China & India do not industrialize until 1900’s