Robert W. Strayer

Ways of the World: A Brief Global History

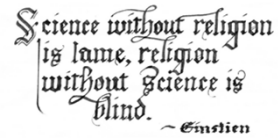
First Edition

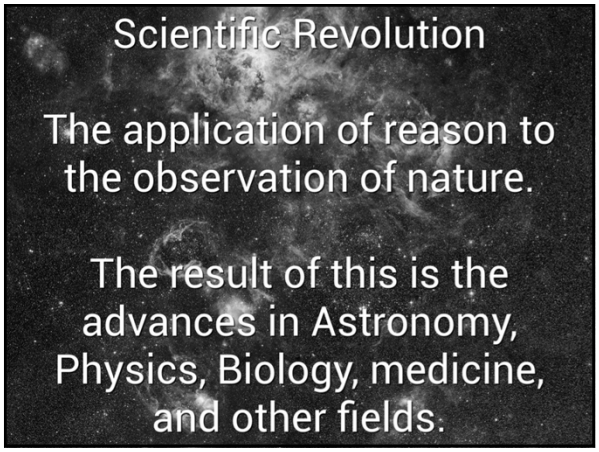
CHAPTER XVI

Religion and Science

1450–1750

Scientific Revolution





A New Way of Thinking: The Birth of Modern Science

The Scientific Revolution was an intellectual and cultural transformation that occurred between the mid-sixteenth century and the early eighteenth century.

1.

2.

A New Way of Thinking: The Birth of Modern Science

3. Scientific Revolution was vastly significant

   a.

   b.

A New Way of Thinking: The Birth of Modern Science

c. Challenged ancient social hierarchies and political systems

d. Used to legitimize racial and gender inequality

e. By the twentieth century, science had become the chief symbol of modernity around the world

The Question of Origins: Why Europe?

1. The Islamic world was the most scientifically advanced realm in period 800–1400

2. China's technological accomplishments and economic growth were unmatched for several centuries after the millennium

The Question of Origins: Why Europe?

3. But European conditions were uniquely favorable to rise of science

   a.

   b.

   c.

The Question of Origins: Why Europe?

4. In the Islamic world, science remained mostly outside of the system of higher education

5. Chinese authorities did not permit independent institutions of higher learning

   a. Chinese education focused on preparing for civil service exams

   b. Emphasis was on classical Confucian texts

The Question of Origins: Why Europe?

6. Western Europe could draw on the knowledge of other cultures, especially that of the Arab world

7. 16th–18th centuries: Europeans were at the center of a massive new information exchange

   a.

   b.

Science as Cultural Revolution

1. Dominant educated-European view of the world before the Scientific Revolution, derived from Aristotle and Ptolemy:

   a.

   b.

Science as Cultural Revolution

2. Initial breakthrough was by Nicolaus Copernicus

   a.

   b.

Science as Cultural Revolution

3. Other scientists built on Copernicus's insight

   a. Some argued that there were other inhabited worlds

   b. Johannes Kepler demonstrated elliptical orbits of the planets

   c. Galileo Galilei developed an improved telescope

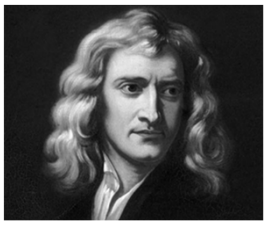
Science as Cultural Revolution

4. Sir Isaac Newton was the apogee of the Scientific Revolution

a.

b.

c.



Science as Cultural Revolution

5. By Newton's death, educated Europeans had a fundamentally different view of the physical universe

a. Not propelled by angels and spirits but functioned according to mathematical principles

b.

c.

6. The human body also became less mysterious

Science as Cultural Revolution

7. Catholic Church strenuously opposed much of this thinking

a. Burning of Giordano Bruno in 1600 for proclaiming an infinite universe

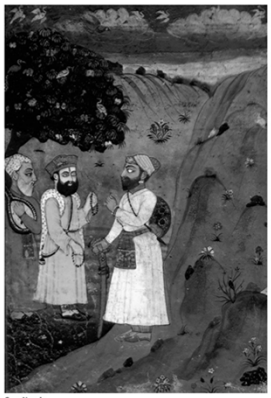
Science as Cultural Revolution

b. Galileo was forced to renounce his belief that the earth moved around an orbit and rotated on its axis

c. But no early scientists rejected Christianity

Science as Cultural Revolution

- **Copernicus – heliocentric theory.**
- **Kepler – mathematically proved Copernicus' theory of planetary motion.**
- **Galileo – suffered at hands of Catholic Church for preaching the theory.**
- **Leeuwenhoek – Microscope/ discovered bacteria**
- **Hooke – cell theory**
- **Boyle – Father of Modern Chemistry.**
- **Priestly – discovered oxygen as an element**
- **Newton – laws of physics and gravity.**



Guru Nanak
Ways of the World, First Edition
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Uncovering the Human Skeleton
Ways of the World, First Edition
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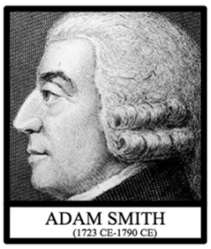
Science and Enlightenment

1. Ideas of the Scientific Revolution gradually reached a wider European audience
2. Scientific approach to knowledge was applied to human affairs
   a. Adam Smith (1723–1790) formulated economic laws
   b. People believed that scientific development would bring "enlightenment" to humankind



ADAM SMITH
(1723 CE-1790 CE)

Science and Enlightenment

3. Immanuel Kant (1724–1804) defined Enlightenment as a "daring to know"

Science and Enlightenment

4. Enlightenment thinkers believed that knowledge could transform human society

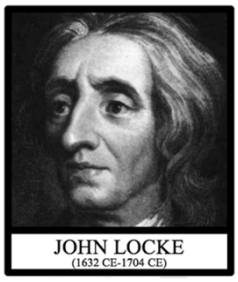
a.

b.

Science and Enlightenment

c. John Locke (1632–1704) articulated ideas of constitutional government

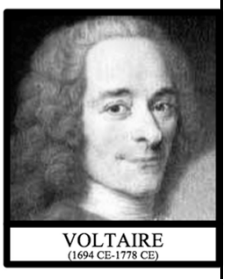
d. Many writers advocated education for women



Science and Enlightenment

5. Much Enlightenment thought attacked established religion

a. In his *Treatise on Toleration,* Voltaire (1694–1778) attacked the narrow particularism of organized religion



Science and Enlightenment

b. Many Enlightenment thinkers were deists, believing in a remote deity who created the world but doesn't intervene

c. Some were pantheists

d.

e. Example of Confucianism—supposedly secular, moral, rational and tolerant—encouraged Enlightenment thinkers to imagine a future for European civilization without the kind of supernatural religion they found so offensive in the Christian West

Science and Enlightenment

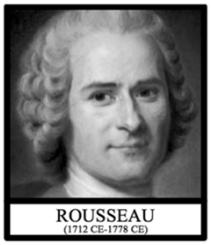
6. Enlightenment thought was influenced by growing global awareness

7. Central theme of Enlightenment:

the idea of progress

Science and Enlightenment

8. Some thinkers reacted against too much reliance on human reason



a. Jean-Jacques Rousseau (1712–1778) argued for immersion in nature rather than book learning

Science and Enlightenment

b. The Romantic movement appealed to emotion and imagination

c. Religious awakenings made an immense emotional appeal

Looking Ahead: Science in the Nineteenth Century

1. Science became the most widely desired product of European culture

2. Chinese had selective interest in Jesuits' teaching

   a.

   b.

Looking Ahead: Science in the Nineteenth Century

3. Japan kept up some European contact via trade with the Dutch

   a. Import of Western books allowed

   b.

Looking Ahead: Science in the Nineteenth Century

4. Ottoman Empire chose not to translate major European scientific works

   a. Ottoman scholars were only interested in ideas of practical utility (e.g., maps, calendars)

   b. Islamic educational system was conservative, made it hard for theoretical science to do well

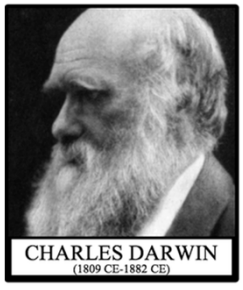
European Science beyond the West

1. Modern science was cumulative and self-critical

2. In the nineteenth century, science was applied to new sorts of inquiry; in some ways, it undermined Enlightenment assumptions

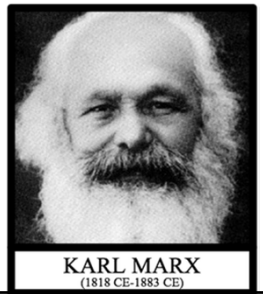
European Science beyond the West

3. Charles Darwin (1809–1882) argued that all of life was in flux



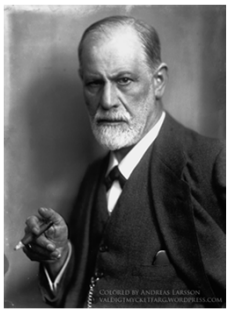
European Science beyond the West

4. Karl Marx (1818–1883) presented human history as a process of change and struggle



European Science beyond the West

5. Sigmund Freud (1856–1939) cast doubt on human rationality



Why did the Scientific Revolution occur in Europe rather than in China or the Islamic world?

Europe	Islamic World	China

Why did the Scientific Revolution occur in Europe rather than in China or the Islamic world?

Europe	Islamic World	China
• Europe's historical development as a reinvigorated and fragmented civilization gave rise to conditions favorable to scientific enterprise. • Europeans had evolved including a legal system that guaranteed a measure of independence from the Church, universities, and other professional associations. They didn't have to operate under the dictates of the Church • Western Europe was in a position to draw extensively upon the knowledge of other cultures, especially that of the Islamic world. • In the 16th-18th centuries, Europeans had engaged in the Columbian Exchange and found themselves at the center of a massive new exchange of information of lands, peoples, animals, societies, and religions from around the world. These new	• Science was patronized by a variety of local authorities, but it occurred outside the formal system of higher education. Quranic studies and religious law held the central place, whereas philosophy and natural science were viewed with great suspicion.	• Chinese education focused on preparing for a rigidly defined set of civil service examinations and emphasized the humanistic and moral texts of classical Confucianism. Scientific subjects were relegated to the margins of the Chinese educational system.

Change

The Scientific Revolution in the early modern era

a. Was largely conducted by men who had already rejected basic beliefs of the Christian faith.

b. Confirmed the teaching and the authority of the Church and therefore was sponsored by it.

c. Fundamentally altered ideas about the place of humankind within the cosmos.

d. Drew nearly all its leading figures from England.