

The Scientific Revolution

The Roots of Modern Science

How did modern science begin?

During the Middle Ages, few scholars questioned beliefs that had been long held. Europeans based their ideas on what ancient Greeks and Romans believed or on the Bible. People still thought that the earth was the center of the universe. They believed that the sun, moon, other planets, and stars moved around it.

In the mid-1500s, attitudes began to change. Scholars started what is called the Scientific Revolution. It was a new way of thinking about the natural world. It was based on careful observation and the willingness to question old beliefs. European voyages of exploration helped to bring about the Scientific Revolution. When Europeans explored new lands, they saw plants and animals that ancient writers had never seen. These discoveries led to new courses of study in the universities of Europe.

A Revolution Model of the Universe

How did new ideas change accepted thinking in astrology?

The first challenge to accepted thinking in science came in astronomy. In early 1500s, Nicolaus Copernicus, a Polish astronomer, studied the stars and planets. He developed a heliocentric theory. Heliocentric meant sun-centered. It said that earth, like all the other planets, revolved around the sun. Copernicus did not publish his findings until just before his death. He had been afraid that his ideas would be attacked. They went against the long accepted geocentric theory. This theory held that the earth was at the center of the universe. In the early 1600s, Johannes Kepler used mathematics to prove that Copernicus's basic idea was correct.

An Italian scientist – Galileo Galilei – made several discoveries that also undercut ancient ideas. He made one of the first telescopes and used it to study the planets. He found that Jupiter had moons, the sun had spots, and Earth's moon was rough. Some of his ideas about the earth, the sun, and the planets went against the teaching of the Catholic Church. Church authorities forced Galileo to take back his statements. Still, his ideas spread.

The Scientific Method

Why was the scientific method an important development?

Interest in science led to a new approach, the scientific method. With this method, scientists ask a question based on something they have seen in the physical world. They form a hypothesis, or an attempt to answer the question. Then they test their hypothesis by making experiments or checking other facts. Finally, they change the hypothesis if needed.

The English writer Francis Bacon helped create this new approach to knowledge. He said scientists should base their thinking on what they can observe and test. The French mathematician Rene Descartes also influenced the use of the scientific method. His thinking was based on logic and mathematics.

Newton Explains the Law of Gravity; The Scientific Revolution Spreads

What scientific discoveries were made?

In the mid-1600s, the English scientist Isaac Newton described the law of gravity. Using mathematics, Newton showed that the same force ruled both the motion of planets and the action of bodies on the earth.

Other scientists made new tools to study the world around them. One invented the microscope. Others invented tools for understanding weather.

Doctors also made advances. One made drawings that showed the different parts of the human body. Another learned how the heart pumped blood through the body. In the late 1700s, Edward Jenner first used the process called vaccination to prevent disease. By giving a person the germs from a cattle disease called cowpox, he helped that person avoid getting a more serious human disease of smallpox.

Scientists made progress in chemistry as well. One questioned the old idea that things were made of only four elements – earth, air, fire, and water. He and other scientists were able to separate oxygen from air.

Reading Questions

1. What was the Scientific Revolution?

2. What old belief about the universe did the new discoveries destroy?

3. What thinkers helped advance the use of the scientific method?

4. How did the science of medicine change?

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