

The Birth of Modern Science

By Anita Ravi, Big History Project, adapted by Newsela staff on 07.30.16

Word Count **886**

Level **620L**



The spread of learning across the world. Big History Project.

The world was connected in new ways starting in the 1300s. People were now trading across the globe and sharing new scientific ideas.

Europe during the 1500s and 1600s became a center of learning and knowledge. The Europeans were at the center of many trade networks.

Historian David Christian writes that Western Europe benefited from the goods and ideas flowing around the world. European countries absorbed new ideas as they traded with other cultures.

People began to question traditions. Some things were thought of as "just true." People began to ask "what makes this true?"

Around this time, printing was invented. Printing helped information to spread more easily in Europe through books.

Europeans did not invent science, but they did move it forward and started the Scientific Revolution. At the end of the 1500s, Europeans collected a lot of knowledge. They studied it in new

ways. They sent it across the continent. This knowledge allowed the Europeans to gain wealth and power.

New ideas, new ways of thinking

During the Scientific Revolution, European thinkers found new ways of looking at the world by studying many sources.

These sources contained many different ideas about how the world worked. Many of these ideas did not agree with the Bible. People who developed new ideas sometimes got into trouble with religious leaders and governments.

Galileo was one. During his time, it was believed that the Earth was the center of the Universe. Galileo thought the Sun was at the center. His belief got him sent to prison and he was eventually put under house arrest for life.

What were these scientists saying and doing that angered the Church and government so much?

The scientific method explained

Galileo and others were using what we now call the scientific method. Here are its four steps.

Step 1: Ask a question about something you have seen. Read and discuss many different theories about it.

Step 2: Make your own theory based on what you have learned.

Step 3: Do experiments. Observe more. Keep track of the new information.

Step 4: Make conclusions based on the evidence you have collected.

At the time, this way of solving problems was controversial. It meant anyone could look at the world and make their own conclusions. Before this, the Bible was seen as the source of all human knowledge.

Step by step

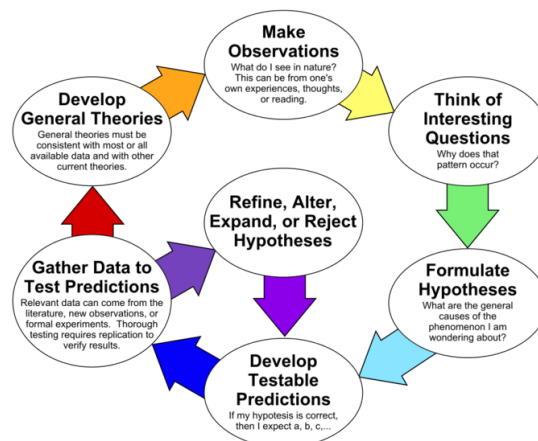
Copernicus was one scientist who used the scientific method. He describes it in his 1543 book: On the Revolutions of Heavenly Orbs.

First, he asked a question: how does the Universe work? What is the Earth's place? He decided to read what other scientists had written on this topic.

Nicetas, a Byzantine bishop, had written that the Earth moves. Plutarch, a Greek historian wrote that "some others also had been of this opinion."

Next, Copernicus studied the skies carefully for years. He used math to track what he had seen. He started with a theory. He thought the Earth and other planets moved according to a logical system.

The Scientific Method as an Ongoing Process



Finally, Copernicus made a conclusion that the Universe is shaped like a sphere. He said the sphere is a natural shape.

Copernicus had to observe the skies for years before he could make this conclusion. His conclusion was based on evidence.

That is the heart of the Scientific Revolution. Thinkers used multiple sources of evidence as they tried to answer big questions about life, the universe, and everything.

Today, the scientific method may seem obvious. It is a logical way to look at the world. But this system was only created about 500 years ago.

Dead snakes and flies

Francisco Redi was another early scientist who used this method. We can see it in his 1668 book, The Generation of Insects.

Before Redi, people believed worms were created by things that were dead and decaying. People had seen worms on dead animals. Redi wanted to know if that was true. He wanted to find out if the worms came from the dead animals, or from outside.

Let's examine Redi's way of thinking. How does he use the four steps?

First, Redi asked a question: where do the worms come from?

He then designed experiments to make observations. He put dead snakes in a box. They were soon covered in worms. He closed the box, and the worms stopped moving. They changed shape, into eggs. Soon, flies came out.

Redi experimented with many animals, including ox, deer, buffalo, lion, tiger, dog, goat, lamb, rabbit, ducks, geese, hens, swallows, and fish.

Redi developed a theory. He thought the worms came from fly eggs, not from the meat itself. Still, he needed proof.

He put dead animals in closed jars. No worms appeared. He had proved that worms did not come from the dead animals - they came from eggs laid by flies.

To prove this, he had to do many, many experiments. When they all showed the same thing, he formed conclusions.

Logic, evidence, and proof

Copernicus and Redi were both scientists trying to explain what they saw in the world. They each published books that showed their work in great detail and they both used logic, evidence, and proof.

Early scientists watched carefully and experimented. They did not rely on tradition. They helped bring about the Age of Enlightenment.