



18.2 Nicolas Steno

Nicolas Steno was a keen observer of nature at a time when many scientists were content to learn about the world by reading books. Through dissection, Steno made important advances in the field of medicine. Later he applied his observational skills to the field of geology, identifying three important principles that geologists still use to determine the order in which geological events occurred.

Steno's childhood



Nicolas Steno was born in 1638 in Copenhagen, Denmark. He became ill at age three and spent most of his time indoors until age six. He saw few children, but spent time listening to adults discuss religion. Religion later became an important part of his life.

Steno, the son of a goldsmith, had skillful hands like his father. However, his skill was not in making jewelry. He was an expert in dissecting animals to learn about anatomy. He was fascinated by the structure of living things.

The young scientist

When Nicolas was not yet ten years old, his father died. He spent his teen years living in Copenhagen with a half-sister and her husband. Steno was smart, curious, and a good listener. He gained the attention of two scholars in Copenhagen.

The first scholar, Ole Borch, welcomed Steno into his alchemy laboratory. There, Steno watched as sediments settled out of liquid solutions. He thought it was interesting that even when the bottom of the jar was bumpy, the sediments formed a smooth horizontal layer on top of the bumpy surface.

Thomas Bartholin, a famous anatomist from the University of Copenhagen, also mentored Steno. Perhaps through this friendship, Steno developed a keen interest in dissection and anatomy. In 1660, he left Denmark to study medicine at the University of Leiden in the Netherlands. There, through careful dissection of mammals, he made discoveries related to glands, ducts, the heart, brain, and muscles.

A shark's tooth unlocks a mystery

In 1665, Steno moved to Italy. The following year, fishermen there captured a great white shark. The

Italian Duke Ferdinand sent the head to Steno for dissection. Steno carefully observed the shark's teeth. They looked like glossopetrae or "tongue stones," common stony items found inside rocks.

While we now know that these tongue stones are fossilized remains of living things, in Steno's time many people believed tongue stones either grew inside rocks, fell from the sky, or even fell from the Moon.

Steno suggested a different explanation for the tongue stones. He said they had once been actual shark teeth! Then Steno started to think about how a solid object, like a shark tooth, could get inside another solid object, like a rock.

Three important principles

Based on his work, Steno came up with three important principles of geology.

- The principle of superposition says that layers of sediment settle on top of each other. The oldest layers are on the bottom and the more recent layers are on top.
- The principle of original horizontality says that sedimentary rock layers form in horizontal patterns, even if they form on a bumpy surface.
- The principle of lateral continuity says that sediment layers spread out until they reach something that stops the spreading.

Steno explained that the shark teeth had been in soft sediment that eventually hardened into a layer of rock. Steno used his principles to write a book about the geology of a region of Italy called Tuscany. Even today, geologists use Steno's principles to determine the order in which geologic events occurred.

Father Steno

In 1675, Steno gave up science to become a priest. He died in 1686 at the age of 48. In 1988, Pope John Paul II beatified Steno, the first step in the process of naming someone a saint. Today, the Steno Museum in Denmark and craters on both Mars and the Moon bear his name.



Reading reflection

1. Name and briefly describe the three important principles of geology developed by Steno.
2. How did most people in the 1600s explain the origin of fossils?
3. How did Steno explain the existence of tongue stones or shark teeth in rocks?
4. How did Steno's medical background and skills help him with his geological discoveries?
5. Observing is very important in science. What things do you like to observe? What have you learned through observation?
6. **Research:** Steno's father was a goldsmith and one of his teachers was interested in alchemy. What does a goldsmith do? What is alchemy? How could these two fields have been helpful to Steno's work?