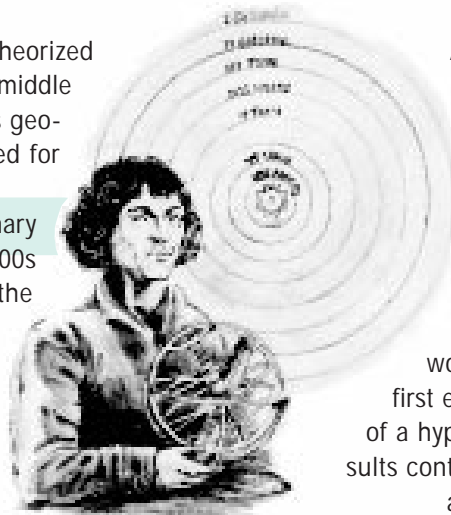


# Science and Pseudoscience Through the Ages

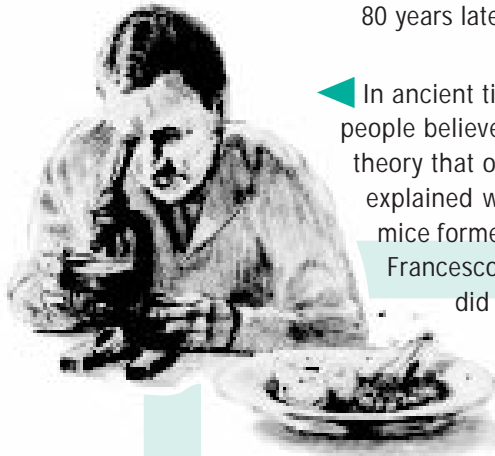
This episode of FRONTIERS investigates some of today's popular beliefs to see how they come out after scientific analysis and experimentation. Important aspects of science are careful observation, measurement and experimentation. Here's a brief look at some popular ideas and beliefs from earlier times, each of which was later abandoned after careful scientific investigation.

Around 350 BC, the Greek philosopher Aristotle theorized that Earth is the center of the universe. Around the middle of the second century AD, Ptolemy developed this geocentric theory of the universe, which was accepted for almost 1,400 years.

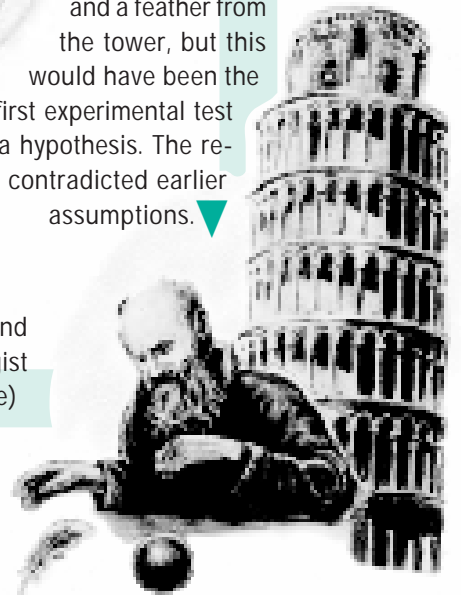
Then in 1543, Copernicus published a revolutionary theory: Earth orbits around the sun. In the early 1600s Galileo Galilei studied the sky with a telescope for the first time. His observations confirmed the heliocentric theory. Isaac Newton worked out the physics of the solar system about 80 years later. ▶



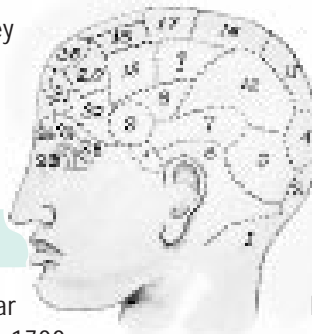
At the end of the 16th century, Galileo is reputed to have conducted the first scientific experiment at the Leaning Tower of Pisa to investigate the effects of gravity on different objects. No one knows if he really dropped a cannonball and a feather from the tower, but this would have been the first experimental test of a hypothesis. The results contradicted earlier assumptions. ▼



◀ In ancient times, people believed that spontaneous generation, the theory that organisms develop from nonliving matter, explained why flies developed from decaying meat and mice formed from piles of rags. In 1668, Italian biologist Francesco Redi demonstrated that maggots (fly larvae) did not appear in meat from which adult flies were excluded. But not until Pasteur's work with microorganisms in the mid-1800s did people completely abandon the idea of spontaneous generation.



◀ Alchemists believed they could change lead and other metals into gold. They also searched for an "elixir of life" that would prevent aging. Alchemy, a blend of magic and mystical philosophy, remained popular until about the 1700s. After many experiments it became clear that alchemy did not work.



◀ Popular in the early 1800s, phrenology was the belief that the shape and bumps of a person's skull determined character and personality. Different areas on the skull were said to correspond to different traits; special bumps could identify a poet or a criminal, for example. The science of psychology and the brain in the 20th century found no relationship between skull shapes and personality.