



SCIENTIFIC THEORIES DEBUNKED!

Why we test, tweak and sometimes throw out brilliant ideas of science.

FOR centuries, people based their beliefs on what they saw going on around them. For example, when the Nile River flooded Egypt in springtime, large numbers of frogs would appear in the muddy soil, and it became “common knowledge” to the ancient Egyptians that frogs came from mud.

The ancients were no scientists. They didn’t use what today’s scientists call the Scientific Method, a process by which, over time, an accurate picture of the natural world is constructed.

The Scientific Method has four steps:

- (i) **OBSERVATION:** Observe something that happens and describe it.
- (ii) **HYPOTHESIS:** Propose an explanation for the observation – a hypothesis. (This is just a starting point for further investigation, so it must be possible to test the hypothesis.)
- (iii) **PREDICTION:** Use the hypothesis to predict the results of new observations.
- (iv) **EXPERIMENT:** Test the predictions by performing experiments.

When the Scientific Method is followed correctly and many repeated experiments performed by different scientists agree with the hypothesis, the hypothesis becomes known as a scientific theory or law.

To be a good scientist, you must be:

- **Observant** – notice interesting things happening around you
- **Smart** – come up with clever possible explanations and predictions
- **Methodical** – perform experiments carefully
- **Honest** – accept your results, even if they don’t agree with your hypothesis

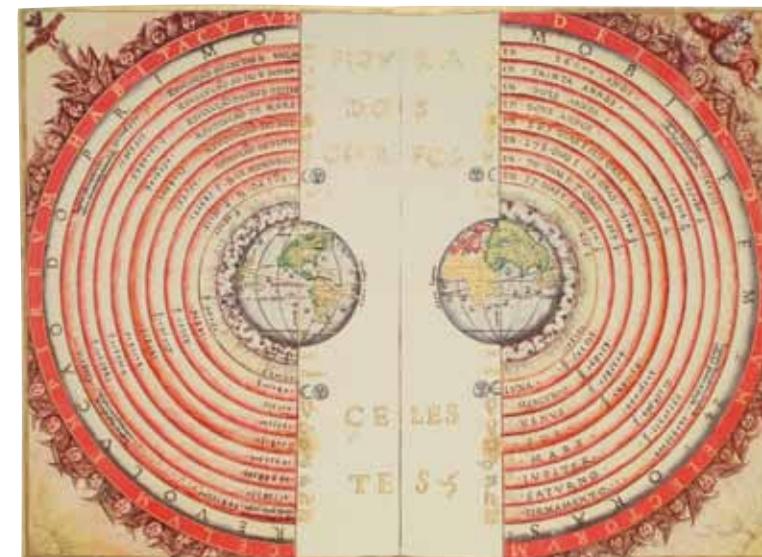
The history of science is full of theories that turned out to be wrong – because the Scientific Method wasn’t properly followed or because new observations (often using new technology) didn’t fit the theory. Here are three of the biggest theories that were proven wrong, or **debunked**.

GEOCENTRICITY

The Idea That the Earth is the centre of the universe and that all other objects move around it.

For Up until about 300 years ago, the observed fact that the Sun and stars (and the “naked eye” planets) revolved around the motionless Earth was absolutely clear. Philosophy and religion also strongly supported the idea that we, and Earth, were at the centre of everything.

Against In the 17th century, Galileo, inventor of the telescope, used his instrument to observe that the planet Venus had **phases**, like the Moon. This, with the work of astronomers Copernicus and Kepler, supported the correct idea that the planets, including Earth, move around the Sun.



A geocentric model of the Universe from the 16th century

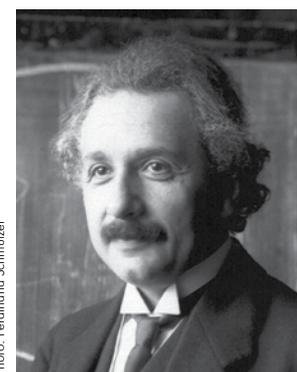


Photo: Ferdinand Schmutzer

The great Albert Einstein. Even he makes mistakes!

THE STATIC UNIVERSE

The Idea That our universe is unchanging and will remain a fixed size forever.

For In 1917, Albert Einstein used complicated mathematics to describe how gravity works for large, heavy objects like stars and planets. His famous equations showed that the universe must be either expanding or shrinking. But Einstein couldn’t accept this and he “fudged” the equations to keep the universe **static**.

Against American astronomer Edwin Hubble studied galaxies using the world’s largest telescope at the time. In 1929, he published work showing that galaxies were all moving away from us, which agreed with the idea of an expanding universe. Realising the mistake he had made by fiddling with his equations, Einstein later called it “the biggest blunder of my life”.

COLD FUSION

The Idea That atoms can be fused at room temperatures, producing almost limitless cheap energy and no harmful waste. Nuclear fusion normally only happens at very high temperatures inside stars like the Sun.

For In 1989, two chemists published scientific results showing that they had achieved “cold fusion” in their laboratory. It was a scientific revolution reported by the world’s newspapers.

Against Using the Scientific Method, other scientists simply couldn’t reproduce the two chemists’ experiments. It was eventually shown that the scientists performed sloppy experiments and made up some of their results. **AGJ**



If cold fusion had worked, we’d have no need for dangerous nuclear power plants.

