Topic Page: Hooke, Robert (1635 - 1703)

Definition: **Hooke, Robert** from *Philip's Encyclopedia*

English philosopher, physicist, and inventor. Interested in astronomy, Hooke claimed to have stated the laws of planetary motion before Isaac Newton. He studied elasticity of solids, which led to Hooke's law. Among his inventions were a practical telegraph system and the Gregorian (reflecting) microscope.

Image from: **The first illustration of plant cells: Hooke's...** in *The Cambridge Dictionary of Scientists*

Summary Article: **Hooke, Robert (1635-1703)**
From *The Hutchinson Dictionary of Scientific Biography*

Place: United Kingdom, England

Subject: biography, physics

English physicist who was also active in many other branches of science. He is remembered mainly for the derivation of Hooke's law of elasticity, for coining the term 'cell' as used in biology, and for the invention of the hairspring regulator in timepieces and the air pump.

Hooke was born in Freshwater, Isle of Wight, on 18 July 1635. He was sickly as a child, which prevented him from studying for the church as his father had intended. Left on his own, Hooke constructed all kinds of ingenious toys, developing the great mechanical skill that he later applied to instrumentmaking. Upon the death of his father in 1648, Hooke went to London and was educated at Westminster School. There he was introduced to mathematics, mastering Euclid in only a week. In 1653 he went on to Oxford University as a chorister and there became one of a group of brilliant young scientists, among them Robert Boyle, to whom Hooke became an assistant.

Hooke eventually obtained his MA from Oxford in 1663, but the group broke up in 1659-60 and he and most of his colleagues moved to London, where they established the Royal Society in 1662. Hooke was appointed curator of the society, a post that entailed the demonstration of several new experiments at every weekly meeting. In 1664 he also became a lecturer in mechanics at the Royal Society, and in the following year he took up the additional post of professor of geometry at Gresham College, London. Hooke retained these positions for the rest of his life, and was also secretary of the Royal Society 1677-83. He died in London on 3 March 1703.

Hooke's post of curator at the Royal Society required him to provide a continual stream of new ideas to demonstrate before the members, and he consequently examined all fields of experimental science but made no deep or thorough investigations in any of them. His main contributions were in four main areas - mechanics, optics, geology, and instrumentmaking.

In mechanics, Hooke was the first to realize that the stress placed upon an elastic body is proportional to the strain produced. This relationship, discovered in 1678, is known as Hooke's law. But Hooke was active in mechanics long before this, and in 1658 he found that a spiral spring vibrates with a regular period in the same way as a pendulum. He began to develop this discovery to produce a watch with a spring-controlled balance wheel, but it is uncertain whether he made a working model before Christiaan Huygens did so in 1674. Hooke can thus be credited with the discovery of the principle of the watch if

not the invention of the device itself. Hooke himself claimed priority, however - one of many such disputes that were a feature of his life. His main antagonist in this respect was Isaac Newton, with whom Hooke argued over credit for the discovery of gravitation. The idea that gravity exists between bodies was prevalent at the time, and in 1664, Hooke suggested that a body is continually pulled into an orbit around a larger body by a force of gravity directed towards the centre of the larger body. This was an important step towards an understanding of gravity, and Hooke also suggested in 1679 that the force of gravity obeys an inverse square law. Both these ideas helped Newton, with his immense analytical powers, to build on Hooke's insight and arrive at his law of universal gravitation in 1687.

Another area of contention between Hooke and Newton was in optics. In 1665 Hooke published a book called *Micrographia*. It contained superb accounts of observations that Hooke had made with the microscope and was the first important work on microscopy. From his description of the empty spaces in the structure of cork as cells came our use of the word ‘cell’ to mean a living unit of protoplasm. The *Micrographia* also contained Hooke's work on optics. This included the idea that light might consist of waves, which Hooke developed from his observations of spectral colours and patterns in thin films. Newton was again able to build on Hooke's work here, examining the optical effects of thin films in detail.

In geology, Hooke made an important contribution by insisting that fossils are the remains of plants and animals that existed long ago, a daring view in an age dominated by the biblical account of creation. Hooke furthermore held that the history of the Earth would be revealed by a close study of fossils.

As an instrumentmaker, Hooke made several important inventions and advances. In 1658, while working for Robert Boyle at Oxford, Hooke perfected the air pump, a development that led directly to the derivation of Boyle's law in 1662. He also made considerable advances to the microscope, and invented the wheel barometer, which registered air pressure with a moving pointer; a weather clock, which recorded such factors as air pressure and temperature on a revolving drum; and the universal joint.

Hooke is an unusual figure in the history of science. Although he made no major discoveries himself, his wide-ranging intuition and great experimental prowess sparked off important contributions in others, notably Newton and Huygens.

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Hooke, Robert (1635-1703). (2018). In Helicon (Ed.), *The Hutchinson dictionary of scientific biography*. Abington, UK: Helicon. Retrieved from https://search.credoreference.com/content/topic/hooke_robert_1635_1703

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