



# SCIENTISTS TIMELINE

**Eratosthenes** measures the **earth's circumference** (240 BC)

**Galileo Galilei** uses a telescope to observe that the **moons of Jupiter** appear to circle Jupiter. This evidence **supports the heliocentric model**, and weakens the geocentric model of the cosmos (1609)

Robert **Boyle**, author of the *Skeptical Chemist*, uses an air pump to determine the **inverse relationship** between the **pressure and volume of a gas**. This relationship came to be known as **Boyle's Law** (1660-1662).

Robert **Hooke**, using a microscope, **observes cells**, which he describes in his book *Micrographia* (1665)

Anton van **Leeuwenhoek**, the “Father of Microbiology” discovers microorganisms, which he originally named “**animalcules**” (1674-1676)

Ole **Rømer** makes the first quantitative estimate of the **speed of light** by timing the motions of Jupiter's satellite Io with a telescope (1676)

Joseph **Priestley** suspends a bowl of water above a beer vat at a brewery and synthesizes carbonated water. Priestley is better known for discovering **dephlogisticated air** (oxygen) (1767).

Antoine **Lavoisier** determines that oxygen combines with materials upon combustion, thus **disproving phlogiston theory** (1783).

Antoine **Lavoisier** determines that chemical reactions in a closed container do not alter total mass. From these observations he establishes the **law of conservation of mass** (1789).

Edward **Jenner** tests his hypothesis for the protective action of mild cowpox infection for **smallpox, the first vaccine** (1796)

Henry Cavendish uses a **torsion bar** experiment to measure the **density of the earth**. Cavendish is also known as the **discoverer of hydrogen**. (1798)

Thomas Young uses the **double-slit experiment** to demonstrate the **wave-particle duality** of light. (1801)

Humphry **Davy** uses electrolysis to isolate elemental potassium, sodium, calcium, strontium, barium, magnesium, and chlorine (1807-1810).

Joseph Louis **Gay-Lussac** studies reactions among gases and determines that their volumes **combine** chemically in **simple integer ratios** (1809).

Hans Christian **Ørsted** discovers the connection of electricity and magnetism by experiments involving a compass and electric circuits. This is later termed **electromagnetism** (1820)

Robert **Brown** studies very small pollen particles in water under the microscope and observes **Brownian motion** which was later named in his honor (1827).

Friedrich **Wöhler** **synthesizes** the organic compound **urea** using inorganic reactants, disproving the application of vitalism to chemical processes (1828).

Thomas **Graham** measures the rates of effusion for different gases and establishes Graham's **law of effusion and diffusion** (1833).

Christian **Doppler** arranges to have trumpets played from a passing train. The ground-observed pitch was higher than that played when the train was approaching then lower than that played as the train passed and moved away, demonstrating the **Doppler Effect** (1845)

Léon **Foucault**'s namesake Foucault **pendulum** is first exhibited. It demonstrates the **Coriolis effect** and the rotation of the Earth (1851)

Gregor **Mendel**'s experiments with the garden pea led him to surmise many of the fundamental laws of genetics (dominant vs recessive genes, the 1-2-1 ratio, etc). His work is best summarized with the **Law of Segregation** and the **Law of Independent Assortment** (1856-1863)

Louis **Pasteur** uses S-shaped flasks to prevent spores from contaminating broth, disproving the theory of **Spontaneous Generation** (also known as abiogenesis). This experiment was an extension of the rancid meat experiment of Francesco **Redi**. (1861)

Edwin **Hall** discovers a **voltage across a conductor** with a transverse applied magnetic field, the **Hall Effect** (1879)

Louis **Pasteur** inoculates Joseph Meister after the nine year old was bitten by a rabid dog. This is the first successful vaccine against **rabies**. (1885)

**Michelson-Morley** experiment exposes weaknesses in the then-accepted theory of **luminiferous ether**. (1887)

Svante **Arrhenius** determines the impact of temperature on reaction rates and formulates the concept of **activation energy**. (1889)

William **Ramsay** and Lord **Rayleigh** (John Strutt) isolate the **noble gases** (1894-1898).

Henri **Becquerel**, Marie **Curie**, and Pierre **Curie** discover **radioactivity** and describe its properties. (1896)

Joseph John **Thomson's** cathode ray tube experiments (**discovers the electron** and its negative charge) (1897)

Robert **Millikan's oil-drop experiment**, suggests that electric charge occurs as quanta (whole units), (1909)

Heike Kamerlingh **Onnes** demonstrates **superconductivity** (1911)

Ernest **Rutherford's gold foil experiment** demonstrates that the positive charge and mass of an atom is concentrated in a small, **central atomic nucleus**, disproving the then-popular plum pudding model of the atom (1911)

Glenn Theodore **Seaborg** creates and isolates five **transuranium elements**. He **reorganizes the periodic table** to its current form. (1941-1950).

Alexander **Fleming** isolates **penicillin** from bread mold, winning him the Nobel Prize for Medicine (1944)

Barbara **McClintock** breeds **maize** plants for color, which leads to the discovery of **transposons** or **jumping genes**. (1944)

John **Bardeen**, William **Shockley**, and Walter **Brattain** fabricate the first working **transistor** at Bell Labs(1947)

Melvin **Calvin** and Andrew **Benson** delineate the path of carbon in **photosynthesis** using Chlorella and carbon dioxide labeled with carbon-14, winning the **1961 Nobel Prize in Medicine**. (1961)

Arno **Penzias** and Robert **Wilson** detect the **cosmic microwave background radiation**, giving support to the theory of the Big Bang (1964)