

Historical Origins of Physiology

Physiology from the Greek, physis “nature, origin” and logos “speech”, that is “**to talk about the nature of things**”.

The modern meaning (since 16th century) is “**The study of the workings, both structural and functional of all living things**”. The modern term also has more of a quantitative spin to it in contrast to most other biological disciplines, particularly cell and molecular biology.

Physiology encompasses:

Molecules, Cells, Tissues, Organs, Organ Systems, Organisms

Origins:

BC 1600-1550:

Two ancient Egyptian papyri distinguish organs such as the heart, liver, spleen, kidney, uterus, and bladder as well as blood vessels. The practice of mummification left the Egyptians intimately familiar with some aspects of human anatomy.

BC 500:

The first recorded medical dissection of a human body is by the ancient Greek philosopher and medical theorist **Alcmaeon** of Croton who is credited with identifying the Eustachian tubes (auditory canals). He also classifies the brain as the seat of intellectual activity.

BC 400:

Hippocrates founds the Asclepiades, a school of medicine. He is the author of the medical oath of ethics and the earliest medical scientist who has a significant amount of work which exhibits an understanding of the musculoskeletal structure and human organs.

BC 384-322:

The philosopher **Aristotle** distinguishes between arteries and veins. He relies on teaching anatomy through “paradigms, schemata and diagrams” as well as animal dissection rather than the use of human cadavers.

BC 280:

During the Ptolemaic era, cadaver dissection is allowed at the anatomy school in Alexandria on the coast of northern Africa. **Herophilus** of Chalcedon, a Greek physician and early “Father of Anatomy,” studies the nervous system, reproductive organs, and blood vessels. His work was complemented by **Erasistratus** of Chios, the leader of the school who revealed more about the cardiovascular system.

AD 30:

The Roman physician **Aulus Cornelius Celsus** publishes On Medicine (De re medicina), a collection of Greek medical writings featuring anatomy and surgeries.

AD 162:

The Greek scientist **Galen** moves to Rome and becomes a physician at the imperial court. He gained valuable experience as the attending physician at a gladiator school and was known for his brain and eye surgeries. His works form the basis of medical knowledge for the next 13 centuries, due in large part to the ban on cadaver dissection in medieval Europe.

AD 1243

Ibn al-Nafis in Cairo while only 29 years of age starts to write one of the most extensive books (even by today's standards) on Anatomy and medicine. The complete work runs to over 80 volumes. Discovers pulmonary (heart/lung) and coronary circulation and corrected many misconceptions from Greek Anatomy and Physiology. He wrote 300 volumes in total but only 80 were published.

AD 1489:

Leonardo da Vinci begins creating a series of over 700 anatomical drawings. Although often relying on assumptions based on animal anatomy, da Vinci dissected dozens of cadavers to learn more about the inner workings of the human body.

AD 1628:

William Harvey writes *The Anatomical Function of the Movement of the Heart and Blood in Animals* (Exercitatio anatomica de motu cordis et sanguinis in animalibus) in which he correctly explains the circulatory system (see **Ibn al-Nafis, AD 1243**)

AD 1827/28

Burke and Hare in Edinburgh made a good business selling corpses to the Edinburgh Medical College for dissection. Bodies for dissection could only be obtained from executed criminals; therefore it was difficult to get material with the rise in demand from Medical Schools.

AD 1832:

As the interest in anatomy grows, England passes the **Anatomy Act** to offer an adequate and legitimate supply of bodies and prevent body-snatching, grave-robbing, and murdering as means of providing anatomists with cadavers.

AD 1839:

Theodor **Schwann** and Matthias Jakob **Schleiden** accurately explain the cell theory, stating that the cell is the general unit of all life.

AD 1855:

Claude Bernard describes what become known as hormones: special substances liberated by organs into the tissue fluids which assist in maintaining the constancy of the internal environment. He coined the name homeostasis.

AD 1858:

Henry Gray's Anatomy, Descriptive and Surgical is first published. It soon becomes the foremost anatomical reference text and its descendant is still widely used today.

AD 1887:

The **National Institutes of Health** is established in the USA.

AD 1952

Hodgkin, Katz and Huxley uses the voltage clamp to understand the nerve impulse, first significant use of mathematical modeling to help explain function.