

## A Brief Introduction to Neuroscience

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### About the Study

Neuroscience is the study of the nervous system from a scientific point. To study the fundamental and emergent features of neurons, glia, and neural circuits, it is a multidisciplinary discipline that incorporates physiology, anatomy, molecular biology, developmental biology, cytology, computer science, and mathematical modeling. The "epic challenge" of the biological sciences, according to Eric Kandel, is to comprehend the biological basis of learning, memory, behavior, perception, and consciousness. The field of neuroscience has evolved over time to include a variety of methods for studying the nervous system at various scales. From molecular and cellular investigations of individual neurons to imaging of sensory, motor, and cognitive functions in the brain, neuroscientists' tools have vastly improved. Ancient Egypt was the first place where the neurological system was studied. Trepanation, or the medical procedure of drilling or scraping a hole in the skull to treat head injuries, mental problems, or relieve cranial pressure, was first documented in the Neolithic period. The Egyptians had some knowledge of the symptoms of brain injury, according to manuscripts going back to 1700 BC. The brain was once thought to serve as a sort of "cranial stuffing," according to early theories. The brain was commonly taken in Egypt from the late Middle Kingdom forward in preparation for mummification. The heart was thought to be the seat of intelligence at the time. The first step in mummification, according to Herodotus, was to "pick a crooked piece of wood." It wasn't until Hippocrates, a Greek physician, that the idea that the heart was the source of consciousness was challenged. Since most specialized organs (e.g., eyes, ears, and tongue) are

positioned in the head near the brain, he believed the brain was not just involved with sensation, but also the seat of intellect. Plato also believed that the rational element of the soul was housed in the brain. Aristotle, on the other hand, believed that the heart was the seat of intelligence and that the brain was in charge of regulating the quantity of heat emitted by the heart. This belief was widely held until the Roman physician Galen, a student of Hippocrates and physician to Roman gladiators, noticed that his patients' mental faculties were lost when their brains were damaged.

In the Medieval Muslim world, Abulcasis, Averroes, Avicenna, Avenzoar, and Maimonides documented a variety of medical disorders relating to the brain. Vesalius (1514–1564), René Descartes (1596–1650), Thomas Willis (1621–1675), and Jan Swammerdam (1637–1680) all contributed to neurology in Renaissance Europe. Individual neurons were originally visualized using the Golgi stain. Luigi Galvani's seminal work on the electrical excitability of muscles and neurons in the late 1700s paved the way for future research. Jean Pierre Flourens pioneered the experimental approach of performing targeted brain lesions in living animals and reporting their consequences on motility, sensitivity, and behavior in the first part of the nineteenth century. Emil du Bois-Reymond demonstrated the electrical character of the nerve signal in 1843, which Hermann von Helmholtz went on to test, and Richard Caton discovered electrical phenomena in rabbits and monkeys' brain hemispheres in 1875. Similar observations of spontaneous electrical activity in the brains of rabbits and dogs were published by Adolf Beck in 1890.