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Short Communication

A Note on the Fundamental and Developmental Biology Neuroscience

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DESCRIPTION

The study of the nervous system is known as neuroscience (or neurobiology). 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 computational analysis. The "ultimate task" of the biological sciences, according to Eric Kandel, is to understand the biological basis of learning, memory, behaviour, 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 improved greatly [1].

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 [2]. The heart was thought to be the seat of intelligence at the time. The first phase in mummification, according to Herodotus, was to "pull out the brain *via* the nostrils with a crooked piece of iron, thereby getting rid of a portion, while the skull is cleaned of the rest by rinsing with medicines".

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 (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 [3].

In the Medieval Muslim world, Abulcasis, Averroes, Avicenna, Avenzoar, and Maimonides described a variety of medical disorders relating to the brain. Vesalius, René Descartes, Thomas Willis, and Jan Swammerdam all contributed to neurology in Renaissance Europe.

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 behaviour 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.

Similar observations of spontaneous electrical activity in the brains of rabbits and dogs were published by Adolf Beck in 1890. After the discovery of the microscope and the creation of a staining method by Camillo Golgi in the late 1890s, brain studies became increasingly advanced. The approach revealed the detailed architecture of individual neurons using a silver chromate salt. Santiago Ramón y Cajal employed his technique, which led to the development of the neuron doctrine, which states that the neuron is the functional unit of the brain [4].

For their detailed observations, descriptions, and categorizations of neurons throughout the brain, Golgi and Ramón y Cajal won the Nobel Prize in Physiology or Medicine. Parallel to this research, Paul Broca's work with brain-damaged patients revealed that certain brain regions were responsible for specific functions. Broca's findings were seen at the time as proof of Franz Joseph Gall's theory that language and certain psychological functions were concentrated in specific parts of the cerebral cortex [5].

The notion of localization of function was backed by John Hughlings Jackson's observations of epileptic patients, who

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correctly inferred the architecture of the motor cortex by following the passage of convulsions across the body. Carl Wernicke expanded on the hypothesis of separate brain regions specializing in language comprehension and production. The Brodmann cerebral cytoarchitectonic map (relating to the study of cell structure) anatomical definitions from this era are still used in modern research using neuroimaging techniques to show that diverse sections of the cortex are active in the performance of specific activities.

Neuroscience became recognized as a distinct academic discipline in its own right during the 20th century, rather than as studies of the nervous system within other sciences. David Rioch, Francis O. Schmitt, and Stephen Kuffler were all instrumental in developing the field, according to Eric Kandel and associates. In the beginning Rioch pioneered the combination of fundamental anatomical and physiological research with clinical psychiatry at the Walter Reed Army Institute of Research.

Schmitt founded a neuroscience research group at the Massachusetts Institute of Technology's Biology Department during the same time period, bringing together biology, chemistry, physics, and mathematics. James Mc Gaugh established the first freestanding neuroscience department (then called Psychobiology) at the University of California, Irvine [6]. The Department of Neurobiology at Harvard Medical School, founded by Stephen Kuffler, will be the next to establish.

During the 20th century, our understanding of neurons and nervous system function got more accurate and molecular. The Hodgkin–Huxley model, for example, was introduced in 1952 by Alan Lloyd Hodgkin and Andrew Huxley as a mathematical model for the transmission of electrical signals in neurons of the giant axon of a squid, which they dubbed "action potentials," and how they are originated and propagated [4-6]. In 196-1962, Richard FitzHugh and J. Nagumo developed the Fitz Hugh-Nagumo model, which simplified Hodgkin-Huxley.

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