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LETTER TO EDITOR

A brief history of neuroscience

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The study of neuroanatomy dates back to the Egyptian era in early 3000 BC. Edwin Smith Papyrus is one of the oldest medical scripts written in this period and is often referred to as the first treatise on surgery. There are references to the "brain" throughout the papyrus, and it is evident that these surgeons were aware of connection between traumatic brain injuries and accompanying motor weaknesses. In 500 BC, Croton in Greece, a contemporary of Pythagoras studied brain development in chick embryos. Furthermore, he believed that sensory perception was linked to the brain. However, the art of dissection of animals was pioneered by Herophilus of Alexandria (325-255 BC), hence was named the father of Anatomy. He identified the nerves that emerged from the brain as motor and sensory cranial nerves and the fact that paralysis of muscles would follow if the former are damaged. His younger contemporary Erasistratus continued Herophilus' legacy and conducted the first ever comprehensive scientific dissection of the human body, including "vivisections" on criminals. He differentiated cerebrum and cerebellum based on external features. He attributed the increased number of gyri and sulci in human brain to the greater cognitive capacity in humans when compared with other non-human vertebrates.

Alexandria and Egypt were conquered by the Caesar of Imperial Rome and many Alexandrian anatomists were persecuted. Following the era of Herophilus and Erasistratus, anatomical dissections were abandoned for almost 350 years until the time of the celebrated physician Claudius Galen (131-201 AD). During his time, human dissections were banned in Rome. Therefore, he extensively dissected non-human primates and published two treatises which gained an enormous publicity among regional scholars for many years and even after his death. These treatises were considered the gold standard in anatomy until his writings were challenged by Vesalius in the 16th century. He identified all the cranial nerves except olfactory and trochlear nerves, nevertheless he erroneously described almost all of them to be sensory nerves in contrast to the spinal nerves, which he believed to be motor in origin. Furthermore, Vesalius extensively studied the anatomy of non-human primate brain and described the ventricular system, corpus callosum, septum pellucidum, pineal gland and fornix in great detail. Human dissections were recommenced only after the dawn of renaissance in

1530 AD. It is not clear whether Leonardo Da Vinci conducted human dissections himself, however his sketches reflect the detailed understanding of the complexity of human brain. Moreover, he conducted seminal experiments on the spinal reflex in frogs and demonstrated that the reflex could be eliminated by damaging the spinal cord. Subsequently, Thomas Willis (1625-1725) made a remarkable contribution to the field of neuroscience. He is famous for describing the arterial circle located at the base of the brain, which is known as the "Circle of Willis". Having completed dissections across numerous species of animals including both vertebrates and invertebrates, he pioneered the field of comparative neuroanatomy.

While these scholars were studying the gross anatomical features of the human nervous system, Robert Hooke described crude features of cells using a prototype microscope in 1665. Following invention of the modern microscope by Leeuwenhoek in 1670s, anatomists were interested in exploring the complexity of structure of the human nervous system. In early nineteenth century, the scientists recognized the cell as the structural unit of the human body. The Italian biologist Golgi initiated the concept of "reticular theory" in which he stated that nervous tissue was formed by a fundamental structural unit of "nerves" connected to each other by numerus processes forming a network. Spanish neuroscientist Santiago Raymon Y Cajal was the principal opponent of this reticular theory. Cajal often debated that there should be discrete nerve cells as opposed to a reticulum and was able to stain isolated neurons using silver staining technique, which was pioneered by Golgi himself. Nevertheless, for their enormous contribution to the field of neuroscience, both Golgi and Cajal were awarded with the Nobel Prize in Physiology and Medicine in 1906. With the discovery of neurone, Cajal paved the path for the discoveries made in modern neuroscience.

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