BOOK REVIEW
Neuroscience: A Historical Introduction
By Mitchell Glickstein
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"Neuroscience, like other sciences, and like art and like music, is a human creation. It is fallible, but it is no less a valuable part of our heritage." *Neuroscience: A Historical Introduction,* pg. 350

The quote above is the last paragraph from *Neuroscience: A Historical Introduction* by Dr. Mitchell Glickstein and if this book were a work of fiction I might be in danger of ruining the story. Luckily, I expect that the vast majority of those reading this review will find the aforementioned statement both veridical and unremarkable. However, to those college students and members of the general public whom we are charged with educating this may come as a surprise. This may be because most formal science education focuses on teaching the facts and concepts as they are currently known while neglecting the (sometimes controversial and/or wrong) paths scientists walked to discover them. Sure, every science student learns a little about Charles Darwin and his adventures in the Galapagos Islands, Sir Isaac Newton's observations of apples falling in his garden at Woolsthorpe, and Niels Bohr's proposal for the structure of a hydrogen atom. These stories are part of the lore that biologists, physicists, and chemists are almost required to pass down to the next generation of scientists. Who were the scientists that made fundamental discoveries in neuroscience? As neuroscience matures as a field, whose stories should we pass down from generation to generation?

Neuroscience: A Historical Introduction attempts to answer these questions systematically and succinctly using a writing style that assumes the reader has no background in neuroscience and only minimal background in biology. The chapters are arranged in a manner similar to most introductory textbooks in the field. After a brief introduction that outlines the goals of the book, Glickstein provides the reader with a useful overview of the mammalian neuroanatomy (Chapter 2 & 3) necessary for understanding the stories relayed in the remainder of the text. In these, and subsequent chapters, the author consistently reminds the reader of the etymology of common neuroscientific terms while also peppering each chapter with large figures that illustrate either key concepts of anatomy, physiology, or behavior and pictures of the scientists who discovered them. Chapters 4 ("Electrical Transmission of the Nervous System") and 5 ("Chemical Transmission and the Mechanism of Drug Action") describe the discovery of animal electricity in frogs by Luigi Galvani; the first experiments describing the conduction velocity of nerves by Hermann von Helmholtz; the development of the cathode ray oscilloscope by Joseph Erlanger and Herbert Gasser and its use by Alan Hodgkin and Andrew Huxley in their description of the biophysical principles underlying action potential generation; and the "war of the soups and the sparks" between Henry Dale and Otto Loewi as these gentlemen strove to discover the mechanisms underlying neuron to neuron communication. This dynamic conversation between prominent scientists is one of several used by the author to illustrate the point that science is truly the result of human creativity and that even those scientists whose names we praise in textbooks made several mistakes before making the discoveries for which we give them their due praise.

Chapters 6 through 11 weave together stories in anatomy (e.g., Filippo Pacini's 19th discovery of the onion-like pressure receptors that now bare his name), physiology (e.g., David Hubel & Torsten Wiesel's mapping of the primary visual cortex) and neurology (e.g., Tatsuji Inouye and Gordon Holmes' description of visual deficits in soldiers who suffered occipital lobe injuries) to provide insight into the structure-function relationships in the sensory systems. While describing the logic behind pairing psychophysical observations with empirical observations of physiology and anatomy several giants in the fields of anatomy (e.g., Santiago Ramon y Cajal), physics/mathematics (e.g., Isaac Newton), and philosophy (e.g., Rene Descartes) make their appearance. Chapters 12-13 briefly detail the 19th century debate between Wilhelm Heinrich Erb and Karl Friedrick Otto Wesphal on the role of the nervous system (if any) in the generation of the knee jerk reflex, the definitive electrophysiological experiments by Charles Sherrington in decerebrate cats that ended this debate, the stimulation experiments of Eduard Hitzig and Gustave Fritsch that solidified the frontal cortex's involvement in the generation of bodily movement.

Chapters 14 -16 focus on cognitive functions such as motivation, learning, memory, and language whereas chapters 17-19 focus on the pathophysiology and treatment of neurological disease. In these chapters we are treated to the clinical observations, often in their own words, of Hippocraties, Sergi Korsakoff, Pierre Paul Broca, Carl Wernicke, John Hughling-Jackson, and James Parkinson interdigitated with the experiments of Karl Lashley, Carlyle Jacobsen, Claude Bernard, and many others.

Although I found this text enjoyable to read, I would be remiss if I didn't point out that the wide range of topics and the timeframe (roughly five centuries!) that Glickstein has chosen to cover in this short book, as well as the simplicity of the prose he has chosen to write with, leaves the reader who is already versed in neuroscience or scientific history

wanting more depth. Furthermore, although he does describe the contributions of several animal models (drosophila, aplysia, murine, cat, and rhesus monkey) the text can generally be considered mammalian centric. This is not completely the author's fault given that much of the field's history has been mammalian centric. Lastly, there seems to be a paucity of links to more modern techniques (though, to the author's credit there is brief mention of viral tract tracing and the use of magnetic resonance imaging at various points in the text) and discoveries. Given the molecular revolution of the mid-twentieth century, the use of unique animal models (e.g., songbirds and their contribution to our understanding of human language; *C.elegans* and its use in experiments meant to enhance our understanding of the neural substrates underlying behavior), and the influence of technological contributions (e.g., computing) to the modern day-to-day discoveries in the field of neuroscience one might expect some description of these discoveries and the people that applied them to neuroscience in this book.

Regardless of these criticisms, if you are looking for an easy to read historical reference for your lectures, a supplementary historical text to your introductory neuroscience course or are looking for a first pass at the history of neuroscience for a history of science, philosophy of science, or non-majors course, *Neuroscience: A Historical Introduction* is the book for you. Should your historical appetite be left unsatisfied by this text, Glickstein has included a long list of primary references and scholarly texts that will allow you and/or your students to explore the experiments or scientist of your choosing in greater depth. I hope you enjoy this journey through time and that it helps you get a better grip on how (and who helped) the field of neuroscience to get to where it is today.

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