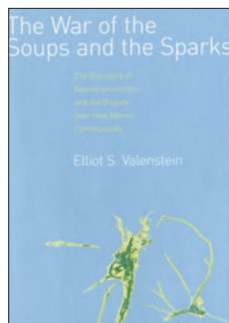


## Chemicals do the talking



### The War of the Soups and the Sparks

Elliot S. Valenstein

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Reviewed by Eva Chmielnicki

Fifteen years ago, George H.W. Bush proclaimed that the 1990s would be called 'The Decade of the Brain.' Since then, there has been an explosion of knowledge about nervous system function and dysfunction, including key findings regarding neural control of emotions, learning and memory. Yet these recent scientific achievements would not have been possible without a basic understanding of neurotransmission. It is not surprising, then, that one of the most significant scientific breakthroughs of the early years of the twentieth century was the discovery that neurons communicate with each other, and with their target organs, using chemical neurotransmitters. In *The War of the Soups and the Sparks*, Elliot S. Valenstein explores the fascinating personalities that brought these findings to light and, in the process, reminds us how captivating scientific discovery can be.

At the turn of the twentieth century, many scientists believed that neurons were directly connected to each other. Because there were no microscopes in which separations between neurons could be visualized, and because of the speed of the responses to nerve stimulation, the nervous system was thought to be composed of a syncytium of nerve cells that communicated with each other using electrical signals. But a handful of scientists felt that electrical communication between neurons and their target organs was not the whole story, as chemicals extracted from plants and animals were able to elicit the same responses as nerve stimulation. For example, the effects of sympathetic nerve stimulation were often identical to administration of adrenal gland extracts onto a target organ, such as the heart or pancreas.

These early findings set the stage for Henry Dale, Otto Loewi and Walter Cannon, the scientists whose life and work is the main focus of *The War of the Soups and the Sparks*. Dale and Loewi were awarded the Nobel Prize in 1936 for their identification of acetylcholine as the chemical neurotransmitter released by neurons of the parasympathetic nervous system. Cannon agreed that chemicals mediate communication between neurons and their target organs, but his erroneous belief in a controversial theory about adrenaline prevented him from being considered for the Nobel Prize.

*The War of the Soups and the Sparks* is often lacking in the details of the key experiments that altered the scientific thinking about how

neurons communicate with each other. But the author does not claim that this is a protocol reference book. Valenstein's choice to focus instead on the personalities of the scientists makes this book a lively read for novices and specialists alike.

For example, Valenstein does a remarkable job of describing how the unique personalities of Dale and Loewi influenced their views of how scientific thought should progress. Dale, a very cautious scientist, had a plethora of experimental evidence suggesting that parasympathetic neurons release acetylcholine, but he did not make that conceptual leap himself. In contrast, the passionate Loewi was quick to formulate conclusions if he felt sure that they were correct. For example, one night, in a dream, Loewi came up with a critical experiment that he believed would prove that neurotransmission was chemical. Immediately upon awakening, he performed the experiment. Loewi then published the results, along with their controversial conclusions, as quickly as he could. The author's choice to tell the stories of Loewi and Dale in back-to-back chapters serves to emphasize the differences between these two scientists, and to encourage the reader to reflect on which method of scientific inquiry is more worthwhile. At the same time, Valenstein seems to suggest that both ways of 'doing science' are equally valuable and equally correct.

Books about scientific history may be especially appealing if they illuminate the political and social context in which discoveries take place. Cannon, Dale and Loewi were scientifically active during the first half of the twentieth century and Valenstein vividly portrays the issues inherent in working as a scientist during times of war. During World War I, both Dale and Cannon dropped other lines of investigation in their respective labs to focus on trying to understand what caused shock, a common condition in soldiers at the front. In the years leading up to World War II, many Jewish scientists, including Loewi, were forced to leave their university posts and flee their countries when the Nazis gained control. During this period, scientists worldwide worked tirelessly to help their colleagues get new positions and start new lives. The author often reminds us that this was a key responsibility of the scientific community during those troubled times.

At the close of the book, Valenstein puts Loewi and Dale's findings in the context of more modern discoveries about neurotransmission. For example, we are told about the structural characterization of the synaptic cleft, and the more recent identification of other neurotransmitters, including gases like nitric oxide. But these descriptions are rather cursory and could have been either more fully fleshed out or eliminated. The author also adds an epilogue, in which he discusses the importance of understanding scientific history. Although some issues raised seem extraneous, such as the difference between pharmaceutical and academic science, others are quite provocative, and are an appropriate ending to the story being told. For instance, Valenstein discusses the richness of a life of scientific thought, suggesting how meaningful it is to make a personal contribution to further human understanding. The applicability of this message to all types of scientific inquiry, and the success of the author in conveying the message to the reader, makes this book a rewarding read for anyone who marvels at the wonders of scientific discovery.

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