HENRY DALE (1875–1968)

Sir Henry Dale, past-president of the Royal Society and of the British Association for the Advancement of Science, and pioneering director of England’s National Institute for Medical Research, was probably the most influential physiologist-pharmacologist of the twentieth century. His development of the concept that nervous impulses are chemically transmitted makes him not only a great neurologist, but also one of those rare geniuses who can demonstrate the unity of science by showing the interdependence of the sciences. His discovery and analysis of the action of histamine is of great neurological importance since this chemical agent and the allergy which may release it are intimately associated with nervous disorder.

Henry Hallett Dale was born in London. During his early education he was a Scholar at Leys School, and then Coutts-Trotter Student at Trinity College, Cambridge. Here, in 1898, he worked under Langley, who so thoroughly demonstrated the details of the autonomic nervous system. Dale reported well on the neuroanatomy of infusoria, but failed to get the fellowship he wanted. In 1900 he went to finish his medical training at St. Bartholomew’s Hospital in London. After qualifying in 1903, he obtained the George Henry Lewes studentship at University College, with the great cardiologist-physiologist Ernest Henry Starling (1856–1927). The following year he married, and was chosen by Sir Henry Wellcome to be director of the Wellcome physiological research laboratories. From here came his studies on ergot and the isolation of ergotoxine, which he found would reverse the pressor action of adrenaline. In studying this effect, and using post-pituitary extracts as controls, he discovered the uterus-contracting action of such extracts, which led to their wide use in obstetrical practice.

From the same laboratory came Dale’s great report in 1910 on “Chemical structure and sympathomimetic action of amines” (J. Physiol., 41:19–59) with the chemist, George Barger (1878–1939), who synthesized the many compounds studied. In their actions, these agents mimic the effects of stimulation of the sympa-
thetic system. This study later resulted in bringing into clinical medicine many useful drugs, including the amphetamines. As the first director of the National Institute for Medical Research he studied histamine in relation to anaphylaxis, and began work on nerve transmission.

Portrait, courtesy of Dr. Chauncey Leake, San Francisco, California.
The theory of neurohumoral transmission was developed by the joint efforts of Otto Loewi (1873–1961) and Henry Dale, who accordingly shared the Nobel prize in 1936. According to this theory, the electrical impulse (probably reflecting underlying chemical phenomena), on reaching the nerve ending, discharges pharmacologically active compounds, such as acetylcholine and noradrenaline which activate the next excitable neuron. While Loewi made the crucial experiments, using the vagus nerve, Dale showed that the actions of acetylcholine are both muscarinic and nicotinic, and that at different synapses there are different effects which can be differently antagonized. This led to work on curarines, which block acetylcholine, and from there to the clinical use of curarine derivatives to give muscle relaxation in surgery. Another application came in the recognition of drugs such as physostigmine, drugs that block the enzymatic destruction of acetylcholine, and so allow this substance to accumulate in cases of deficiency, as in myasthenia gravis. Again, Dale’s ideas led to the clinical use of adrenergic blocking agents, such as guanethidine.

Dale was knighted in 1932. He gave many distinguished lectures in England and in the United States, and received many special honors. He was president of the Royal Society from 1940 to 1945, and during these bitter war years his unfailing good cheer served as a beacon of hope to his scientific colleagues. He was Fullerian professor and director of the Davy-Faraday Laboratory of the Royal Institution from 1942 to 1946. Busy though he was during the war years, Dale always found it possible to take special pains to be hospitable to visiting scientists, especially those from the United States. He became chairman of the Wellcome Trust in 1938, and continued to guide the growth of the great Wellcome Medical History Museum and Library until 1960.

Dale was a charming gentleman. After his witty and wise manner remarks at the Zurich International Physiology Congress in 1938, I couldn’t help dubbing him “benedictorian,” and so he was: kindly, yet firm, a brilliant and popular speaker, often featured at the dedication of significant new research laboratories both in England and in the United States. His writings are lucid and extremely well organized, with a wealth of detail to support the points being made. They contain much thought about logical development of
his ideas, and the chain of physiological adventures they recall will long be studied with intellectual profit.

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References