

Chapter 1

SIR CHARLES SHERRINGTON, O. M., P. R. S. (1857–1952)

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In a life extending over ninety-five years, Sherrington (Fig. 1) was a major influence in the development of the neurological sciences in many countries, though mainly in Britain.



Fig. 1. Sir Charles Scott Sherrington
(portrait by R.S. Eves, 1997).

Even before he received his medical degree from Cambridge, he was drawn into the fierce neurological debate concerning Professor Goltz's demonstration, to the International Medical Congress in London in 1881, of the performance of a dog in which he had removed part of its brain. In true British fashion a committee was set up, under J.N. Langley the Cambridge physiologist. His student, Sherrington, reported on the precise anatomical structures involved, thus launching his career in the realm of scientific publications, a career in which he produced 320 papers.

At the same boisterous meeting David Ferrier demonstrated the contralateral effect, on a monkey, of removing part of its brain. (Ferrier was Sherrington's hero, to whom 20 years later he dedicated his *Integrative Action of the Nervous System*). Thus began in 1881 Sherrington's interest in cerebral localisation of function.

A growing interest in pathology next took Sherrington to study with Rudolf Virchow in Berlin. There he had the additional education of seeing Virchow's enemy Bismarck berating the Reichstag (Virchow believed that the ruling family of Prussia consisted of the father who had softening of the brain, the grandfather had hardening of the brain, and the grandson who had no brain at all!) On returning to London, Sherrington was made a lecturer in physiology at St. Thomas' Hospital Medical School. The nerve cells of the mammalian spinal cord occupied much of his research time, along with studies on cerebral circulation, still highly regarded. In four years at St. Thomas', he published a dozen papers. At the same time he served as Honorary Secretary to the Physiological Society. In 1893, he was awarded for his research the Fellowship of the Royal Society. He little realised then that he would be President, in the years 1920–1925, of that prestigious body. His histological work developed in concert with his physiological and he showed in 1894 that the "muscle spindles" of his friend Ruffini were sensory informants of the neuromuscular system. The Purkinje cells of the cerebellum were demonstrated by Golgi Stain.

As Foreign Secretary of the Royal Society he invited the rising star of the histology of the nervous system, Santiago Ramón y Cajal of Madrid, to give the Croonian Lecture in London in 1894. There the *boutons terminaux*, the axonal endings on nerve cell bodies next in the circuit, were superbly

shown through silver stains. Cajal had applied these techniques developed in his unsung laboratories in his homeland, cut off by language and the Pyrennees from world science. Some years later, Sherrington was to give the Croonian lecture himself on “The mammalian spinal cord as an organ of reflex action.”

The Cambridge professor of physiology, Sir Michael Foster, asked Sherrington to take on Part III of the “Textbook of Physiology,” on the nervous system. Sherrington wrote of this enormous burden: “I felt the need of some name to call the junction between nerve cell and nerve cell (because the place of junction now entered physiology as carrying functional importance). ...I suggested using “syndesm.” He consulted his Trinity friend Verrall, the Euripidean scholar... and Verrall suggested “synapse” (from the Greek “clasp”) and as that yields a better adjectival form it was adopted for the book.”

His appointment to the Chair of Physiology at Liverpool in 1895 gave him an opportunity not only to teach students, but also allowed him to branch out from spinal cord physiology to his early field of cerebral localisation. In this, he was joined for a short period by the rising neurosurgeon from America, Harvey Cushing, who contributed drawings, of high calibre, of the cerebral cortex exposed in primates.

Sherrington’s major contributions were brought together in his Silliman Lectures at Yale University in 1904, from which his remarkable volume *The Integrative Action of the Nervous System* was published. Its reception was overwhelming.

This volume became the touchstone of neurologists and psychologists for many years. The British clinician, F.M.R. Walshe, said of the volume: “In physiology it holds a position similar to that of Newton’s *Principia* in physics. Here is the imprint of scientific genius.” Russell Brain was later to ask: “Is it altogether inappropriate to compare *The Integrative Action* to *De Motu Cordis* of Harvey?”

On the strength of these lectures, Sherrington was invited to the chair of physiology at the University of Toronto and to that of Columbia University in New York. He elected to stay at Liverpool however. In the nine years following the Yale lectures, he published 77 papers, including his Croonian lecture of 1913.

His invitation to Oxford in 1913 was assured when the Regius Professor, the Canadian Sir William Osler, assembled the Board of Electors to the Waynflete Chair. Then began a parade of Medical Rhodes Scholars — Penfield and Davison from Princeton, Holman from Stanford and Kluver and Krige from South Africa. The three Americans' kymograph tracings were used to illustrate Sherrington's "Mammalian Physiology; A Course of Practical Exercises."

One reviewer of this entirely new approach faulted the author for using illustrations from British workers only. The workers were his American students! All went on to be professors; Penfield at McGill, Davison at Duke, and Holman at Stanford.

In 1920, Sherrington became President of the Royal Society of London and for five years carried this demanding post to great heights, while continuing to inspire his Oxford students, several being Rhodes Scholars: Florey and Eccles from Australia, Miller from Canada, Denny-Brown from New Zealand, and Fulton from America. Of these, Florey and Eccles were to become Nobel laureates, following by some years Sherrington's Nobel Prize of 1932. A Swedish neurophysiologist in the Oxford laboratory, Ragnar Granit, also achieved the Nobel Prize.

With Royal Society duties in London and lectures and laboratories in Oxford, his days were hectic. His visitors were legion; some came to talk about his poetry — much of which he wrote while punting on the river. His conversations varied from the financing of the Universities of Oxford and Cambridge to that of the Medical Research Council of Britain on which he was asked by the Prime Minister to serve for two terms.

One of his visitors had been a medical student researcher with Alexander Forbes at Harvard; Forbes had been a Sherrington pupil at Liverpool. This visitor to Oxford was Dr. Alan Gregg, the "wise man" of the Rockefeller Foundation. Gregg asked Sir Charles what he saw as Oxford's future. The quiet, diminutive professor replied: "After some hundreds of years of experience we think that we have learned here in Oxford how to teach what is known. But now with the undeniable upsurge of scientific research... we must learn how to teach *the best attitude* to what is *not* yet known. We cannot escape this new challenge, nor do we want to."

Sherrington's neurological contemporaries, and those more senior, kept in close touch with him. Thus, we find him dining with Charles Ballance in London and there meeting his aging friend, David Ferrier. He reported that Ferrier was "reading Thucydides in the original to enjoy a few months' stay in Sicily the more. I got an interesting account out of him of his original brain experiments that started the modern physiology of the cortex. He was so modest about all that first-rate work, done in a little private room in a Yorkshire asylum, by himself and very little to guide or help him; and the results so clearly and simply set forth in those early papers by him." Ballance later wrote: "It was Ferrier, not any surgeon who was the originator and founder of modern cerebral surgery."

A much needed break in Sherrington's too busy life came when he and Cushing were invited to participate in the opening, in 1922, of new buildings for the biological sciences of McGill University in Montreal. The Oxford professor ended his address with the charge "Do not, O my brothers, forget research. Science calls us all to it — and the call is from humanity as well."

The 1920s saw the concentration, in Sherrington's laboratory, upon synaptic mechanisms, muscle reflexes and muscle relaxation. At first his equipment was minimal, but the Nobelist A.V. Hill built for him, and delivered to Oxford, a modern stimulator and recording system. He wrote to Hill: "All yesterday we were working with your "stimulator"... . We had power enough for a whole room full of cats."

In 1930, the Clarendon Press invited Sherrington to write a book on his laboratory's recent work. So with Eccles, Liddell, Creed, and Denny-Brown, he produced, for publication in 1932, "The Reflex Activity of the Spinal Cord." The final one third of the volume was written by the professor.

No sooner had this book appeared than Sherrington was awarded the Nobel Prize, an honour shared with his close friend Edgar Adrian of Cambridge. Since 1902, Sherrington had been recommended for the prize, by 134 scientists, but the nomination was annually blocked by the same committee member until 1932. His Nobel lecture was on "Inhibition as a coordinative factor," going back even to the views of Descartes.

Three years later, at the age of 78, he retired from his professorship and built a delightful house near his boyhood town of Ipswich. There he

maintained his large correspondence with pupils and others around the world. His writing of poetry continued and he concentrated on his historical and philosophical interests. He had given the Rede lecture at Cambridge on “The Brain and Its Mechanism,” at age 76. In 1937 and 1938, he gave his Gifford lectures — 12 in all — at the University of Edinburgh, entitled “Man on His Nature.” The pent-up biliary drainage of the professional philosopher was soon to be displayed, but 60 years later, “Man on His Nature” still claims readers, whether they be scientists, theologians or the laity. There are few examples of the English language which surpass Sherrington’s wonderful prose in these lectures. The seventh was entitled “The Brain and Its Work,” in which he writes of the waking brain: “Swiftly the head mass becomes an enchanted loom where millions of flashing shuttles weave a dissolving pattern... a shifting harmony of subpatterns”. A second edition brought forth fewer critics and many more readers.

In 1946, Cambridge University Press published his small volume “The Endeavour of Jean Fernel”, the early French physiologist and pathologist — the most notable physician-philosopher of the early 16th century in Paris.

Before concluding, I might be permitted to inject a personal note. When in October 1935, I arrived at Oxford to be a Demonstrator in Physiology, Sir Charles invited me to tea. He said with gusto, “Yours is the last illegal appointment I have made!”; he talked of Ramón of Cajal’s histological techniques which I had come, on Wilder Penfield’s recommendation, to apply to Jack Eccles’ synaptic studies.

Over the ensuing three years, I had opportunities to meet Sir Charles for tea at his favorite library in London at the Royal College of Surgeons. At other times, I visited him at his home overlooking the Valley at Ipswich. There he carried on his correspondence and historical writings in the garden in a wonderful little glass house which rotated with the sun. On the occasion when I drove the refugee Professor Rio-Hortega over to see him, Sir Charles, the ever charming host, produced some Spanish phrases which he had learned in Spain in 1885!

In 1951, I visited Sir Charles who by then was in a nursing home on the South Coast at Eastbourne. Despite his arthritis, he was as jovial as ever. When I told him I had been at the International Poliomyelitis Congress in

Copenhagen with 600 doctors he smiled and asked, “Now Gibson, did any good ever come from 600 doctors getting together?” He wanted to know if we, in Vancouver, were keeping green the memory of his great friend of his Cambridge days, Frank Wesbrook, our founding President at the University of British Columbia. I assured Sir Charles I was trying to do that by writing Wesbrook's biography. With that he gave a cheery “good journey home.” He died a year later, aged 95, one of the most decorated scientists in history, the recipient of 90 honorary degrees and fellowships.