in his work for the British Medical Association, into the affairs of which he threw himself with his accustomed vigour, and there his professional and scientific reputation gave great weight to his counsels. He was one of the founders of its new constitution, and Chairman of its Representative Body (1903-6). Muirhead Little in his *History of the British Medical Association* (1932) spoke of Horsley's radicalism tempered though it was by a strong belief in constitutional methods. But, he says, "whatever opinions he held, whether on experiments on animals, on total abstinence or medical reform, he held them very strongly, and it was difficult for him to realize that those who differed from him were actuated by as honourable motives as he was himself." Those who differed were ruffians, scoundrels; he did not mince words. The fact that Lloyd George turned to him for advice in drafting his Insurance Act did him great harm in the estimation of the more conservative members of our profession.

In his letters home after he had had time to look around as consulting surgeon to the Army in Mesopotamia, he wrote of the "drunken misdirection of our military affairs," of the "apathy and indifference of the whiskey drinkers." He was, he said, "trying to make the aged and incompetent realize that the British Soldier is a human being" (Paget, 1919, p. 305). Off he went to India to lay the state of medical affairs before the Viceroy, Lord Willingdon, and the Commander-in-Chief, who had already had disturbing reports and were now so impressed that inquiries and reforms were quickly set on foot. Nothing in Horsley's life does him greater credit than the tearing and characteristically unselfish energy of his work for the Army in the field in the last months of his life. It was superb. His disregard, his open contempt even, for bigwigs would have brought only derision had it not been for the force of his personality, his absolute integrity, and the passionate logic of his arguments.

There is a story, now traditional, that Horsley had an almost imbecile belief in the immunity of a total abstainer from heat or disease. It is time that that fable was destroyed. Dr. Anthony Feiling, who was a young medical officer in the hospital to which Horsley was admitted, there to die on July 16, 1916, has kindly given me his impressions of Horsley's last illness. It is true, he says, that he died of heatstroke, but the cause was an infection, probably paratyphoid, though that was never proved. The lack of proof was not very surprising, since their bacteriology was, Dr. Feiling says, by no means reliable. Nor did differentiation become so anywhere, I believe, until some years later. Horsley perhaps did not wear the regulation topee and spinal pad that was so wrongly supposed to prevent sunstroke. But Horsley did not die of sunstroke, but of heatstroke following an infection, the atmospheric temperature near Bagdad in July making body thermostasis difficult even for the young. His opposition to alcohol did not, by the way, prevent him, I am told by Sir Archibald Gray, from permitting his house-surgeons to give alcohol in emergencies to his patients at their discretion. It was a common constituent of the nutrient enema then in such use; Horsley's patients were not exempt.

It was perhaps not always easy to catch enough glimpses of nobility in this man's character. They were often obscured by the mantle of his "extracurricular" activities, in which he roused such passionate devotion or such dislike. Maybe he fished too much in troubled waters, but had he not followed his bent he would have denied his genetic inheritance. Time has shown, annoyingly for his opponents, that the causes to which he devoted his life were good causes—the creation of neurological surgery, the necessity for experiments on animals, temperance if not abstinence, universal women's suffrage, the liberalism of his political opinions, the need for some reforms in our profession, and Government provision of free treatment for the working-man. Such variety suggests a kaleidoscopically colourful personality and makes us feel pale and desiccated beside him. Violent in expression Victor Horsley might at times have been, but he was a fastidious man as well as generous and humorous too.

Well might he say now, "Praise me for virtues, excuse me for my faults, which were never mean."

I wish to acknowledge the help which has been generously given me by many people. My thanks are particularly due to Sir Victor's daughter Pamela (Mrs. Stanley Robinson), to Sir Arthur MacNalty, Dr. Ernest Sachs, Sir Archibald Gray, Professor Robin Pilcher, Mr. Morriston Davies, Dr. Anthony Feiling, Sir Gordon Holmes, Dr. Purdon Martin, Dr. Golla, Dr. Z. Mennell, and to Mr. Julien Taylor and Mr. John Hankinson, of Queen Square, who helped in the search for old case records. Lastly, my debt to Stephen Paget's biography of Sir Victor Horsley is immense.

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SIR VICTOR HORSLEY: HIS LIFE AND WORK*

BY

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Victor Alexander Haden Horsley was born at No. 1, High Row, Kensington, on April 14, 1857. His father was John Callcott Horsley, R.A., a famous artist of his day; his mother Miss Rosamund Haden, sister of Sir Francis Seymour Haden, surgeon and etcher. Horsley's first two names were given him by Queen Victoria, and we note how appropriate they were. Victor, "a conqueror," and he was to conquer in the battle against disease; Alexander, "a helper of men," and he was to be a benefactor of mankind.

Early Days and Education

Horsley was educated at Cranbrook Grammar School, and became a medical student at University College in 1874. In October, 1875, he entered University College Hospital. It was a vintage year, for several of his fellow students achieved distinction in later life. Of these may be mentioned: Francis Gotch, later professor of physiology at Oxford, who married Rosamund Horsley and became Victor's brother-in-law; Sir Frederick Mott, physician and neuropathologist; Sir Dawson Williams,

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Editor of the *British Medical Journal*; Sidney Martin, physician and professor of pathology; C. E. Beevor, the neurologist; Bilton Pollard, surgeon; C. J. Bond, surgeon, of Leicester; and J. E. Hine, afterwards Bishop of Northern Rhodesia. Most of these men remained Horsley's lifelong friends.

At the hospital his chief teachers were: Ringer, Bastian, Russell Reynolds, Gowers, and Wilson Fox in medicine; and John Marshall, Marcus Beck, R. J. Godlee, and A. E. Barker in surgery. Sir Leander Starr Jameson, the future prime minister of Cape Colony, was demonstrator of anatomy and subsequently resident medical officer. Sir Victor told me that Jameson in those early days was somewhat reserved and aloof, but that all the residents in the hospital valued his advice. He worked and read assiduously, and his only relaxation was whist in the evenings. In later years this led on to bridge, which proved a link of friendship between him and his former foe, General Botha.

Very early in Horsley's hospital career his teachers and contemporaries realized that he was a genius and had a brilliant future before him. They admired, too, his forthrightness, his integrity, and his readiness to help others. "He shunned delights and lived laborious days," and already was a vigorous advocate of total abstinence from wine, spirits, and tobacco.

In 1878 Horsley was awarded the Filliter Exhibition in Pathological Anatomy. In November, 1880, he qualified M.R.C.S., and in December became house-surgeon to John Marshall. In 1881 he became M.B. and B.S. London, securing the gold medal in surgery with a university scholarship, and during 1882-4 was surgical registrar to the hospital. He made a series of observations of the action of anaesthetics on his own brain at this time. In November, 1882, he put up his plate at 129, Gower Street, where he shared rooms with his friend and future brother-in-law, Whitelegge, who as Sir Arthur Whitelegge, K.C.B., H.M. Chief Inspector of Factories, was to do so much to advance industrial hygiene and to safeguard the health of the industrial worker. Outstanding events of the year 1883 were that Horsley took his F.R.C.S., became engaged to Miss Eldred Bramwell, a daughter of Sir Frederick Bramwell, the engineer, and made a communication to the Physiological Society, "On four cases of injury of the brain, illustrating the position of the motor centres."

Myxoedema

Horsley was appointed professor-superintendent of the Brown Institution, 149, Wandsworth Road, London, S.W., in 1884, and held the post until 1890. The University of London in 1871 had established this institution as a centre for advanced physiological and pathological research as well as a veterinary hospital for study and treatment of the diseases and injuries of animals. It was the first of its kind and did most important and valuable work in medical research, as will be apparent from the list of its professor-superintendents—Burdon-Sanderson, Greenfield, Roy, Horsley, Sherrington, Rose Bradford, Brodie, and Twort. Its financial resources were meagre, and Horsley repeatedly showed in his annual reports how difficult it was to maintain the institution. To-day research workers aided by endowments, benefactors, and an enlightened Medical Research Council live in better times.

During Horsley's six years of office at the Brown Institution the following researches were done by him:

(1) the localization of function in the brain, and the pathology of epilepsy and of canine chorea. The work on localization is dealt with below. (2) The thyroid gland and myxoedema and cretinism. (3) The protective treatment against rabies.

In 1873 Sir William Gull in a brief paper, "On a cretinoid state supervening in adult life in women," gave the first description of myxoedema. Curling and Fagge had previously noted cases of sporadic cretinism in which the thyroid gland was "atrophied" or even "absent." In 1877 Dr. Ord described further cases and gave the disease the name "myxoedema," for post-mortem evidence showed the thickening of the subcutaneous tissues by excessive formation of a gelatinous or mucinoid substance. The thyroid gland was markedly diminished, but Ord did not appreciate the true significance of this. Endemic cretinism in the Swiss valleys was known to be associated with goitre, but the function of the thyroid gland was unknown.

Reverdin, of Geneva, and Kocher, of Berne, in 1882-3 had been treating goitre by surgical operation (removal of the thyroid gland). In certain of their cases myxoedema had developed. On November 23, 1883, the Clinical Society of London discussed a case of myxoedema, and Sir Felix Semon suggested that cretinism, myxoedema, and "cachexia strumipriva" (Kocher's name for the condition) were allied conditions due to absence or degeneration of the thyroid gland. On December 14 the Clinical Society appointed a committee of investigation. Ord was chairman, W. B. Hadden, honorary secretary, and Horsley one of the members. Horsley, using monkeys, began experimental work on the thyroid with Rickman Godlee in Professor Schäfer's laboratory in October, 1884, continuing it single-handed at the Brown Institution. Removal of the thyroid was followed by muscular tremors and then by symptoms of myxoedema. He was able to record some of these findings in two lectures on the thyroid gland, which he gave at the University of London in December. He extended and continued his experiments in 1885 and 1886. In 1888 the Investigation Committee of the Clinical Society published the Report on Myxoedema. Horsley's report argued for the identity of myxoedema, cretinism, and cachexia strumipriva, and proved that these conditions were due to destruction of the thyroid gland.

As a surgeon Horsley now applied the results which he had obtained in the laboratory. On February 8, 1890, he published in the *British Medical Journal* (p. 287) a "Note on a possible means of arresting the progress of myxoedema, cachexia strumipriva and allied diseases." Schiff and von Eiselsberg had tried transplantation of thyroid gland in thyroidectomized animals. Horsley transplanted the thyroid gland into patients suffering from myxoedema and showed the treatment was specific although not always successful. In 1891 he contributed a critical and historical review of the subject to Virchow's *Festschrift*. In this year came George Murray's hypodermic injection of thyroid gland (*British Medical Journal*, 1891, 2, 796). Murray was also a U.C.H. man and had been Horsley's pupil. In 1892 Hector Mackenzie showed that feeding the patient with fresh thyroid gland was equally beneficial. Stephen Paget observed truly that Horsley founded in this country the modern study of the thyroid gland, and was the first in this country to suggest the rational method of treatment of myxoedema. I may mention here that in 1905 or 1906

Horsley introduced me to Kocher, and I was in the operating theatre of U.C.H. when Horsley performed a thyroidectomy in Kocher's presence, after which Kocher removed the thyroid in a second patient.

Rabies

Horsley had hardly finished his experimental work on the thyroid gland when he was summoned to a fresh field of research. In 1886 the Local Government Board appointed a commission to inquire into Pasteur's method for the treatment of rabies. The members of the commission were Sir James Paget (chairman), Sir Lauder Brunton, Dr. George Fleming, Lord Lister, Sir Richard Quain, Sir Henry Roscoe, and Sir John Burdon-Sanderson, with Horsley as secretary with a remuneration of £50! Horsley was not only the author of the report, but the active investigator and moving spirit of the investigation both in Paris and in London. The Report of the Commission was published in June, 1887, and was presented by Pasteur on July 4 to a meeting of the Académie des Sciences. It states that Horsley's experiments, begun in May, 1886, "entirely confirm M. Pasteur's discovery of a method by which animals may be protected from the infection of rabies. . . . It would be difficult to over-estimate the importance of the discovery whether for its practical utility or for its application in general pathology."

Horsley also investigated a serious outbreak of rabies among the deer in Richmond Park in 1886-7, when no fewer than 264 deer died, and he had some of the animals under observation at the Brown Institution. In 1886 he examined and showed the non-efficacy of the "Buisson bath treatment" for the prevention and cure of hydrophobia.

Rabies was formerly a menace in Great Britain. In 1881 it was responsible for 34 deaths and in 1885 for 60 deaths in England and Wales. As a result of the action taken by the Local Government Board under the presidency of Mr. Walter Long in rigidly enforcing the Muzzling Order of 1896 with the enforcement of a six-months quarantine for any dog introduced into Britain from abroad, human rabies has disappeared from the Registrar-General's statistics. It was Pasteur who suggested this method to Horsley.

In 1886, in recognition of his experimental studies, Victor Horsley had been elected a Fellow of the Royal Society.

The Physiologist

To-day the lessons of neurophysiology and neurology, the anatomy of nerve centres and nerve fibres, the localization of a cerebral tumour or abscess, and the results of cerebral or spinal paralysis are so much a part of medical teaching and practice that it is difficult for us to realize that at the time when Horsley began his experimental work on the subject at University College much of the anatomy and physiology of the brain was unknown territory. More wonderful still, not a few of us are still alive who have walked and talked with the founders of British neurophysiology, "the first who ever burst into that silent sea."

Progress of knowledge of the nervous system has been indissolubly linked with the determination of function in it, since Bell and Magendie discovered the difference of function in the two spinal roots and Flourens delimited the respiratory centre in the bulb.

Broca in 1861, by clinical and post-mortem evidence, localized speech in the third frontal convolution. Hughlings Jackson and Bastian supplied further clinical and pathological evidence of cerebral localization. In 1870 Fritsch and Hitzig, using a weak galvanic current, were able to map out certain centres in the cerebral cortex for movements of the neck, the limbs, and the face. Then in 1873-5 came the original research by Ferrier, which, as Sherrington observed, ranks among the classics of experimental neurology and physiology. Using the faradic current at minimal strength, Ferrier localized many more centres of movement and also of certain acts of perception and

charted them precisely. The suggestion of this work came to Ferrier from that great pioneer in neurological research Sir James Crichton-Browne, as both Sir David Ferrier and Sir James informed me.

In January, 1884, Horsley began with Professor Schäfer in the physiological department of University College a series of researches upon the brain of the monkey, with a view to testing and, if possible, extending the work of Ferrier and Yeo. This was continued for two and a half years, until July, 1886. For much of the time Horsley was also pursuing allied researches at the Brown Institution with Dr. Charles E. Beevor. It is only possible here to outline the results obtained. In experiments on the external surface Schäfer and Horsley confirmed Ferrier's results and added to them with a finer analysis of certain groups of movements. The work with Beevor was more specialized. Localization was studied in one species of monkey, not only at the level of the surface of the brain but at the level of the nerve fibres passing from the surface of the brain towards the spinal cord. Horsley and Beevor also made an intensive study of localization in the cerebral cortex of the orang-outang.

With Sir Felix Semon, Horsley studied and described the central motor innervation of the larynx. Semon (*Archives of Laryngology*, 1881) had noted that in cases of organic disease involving the motor nerves of the larynx the abductor muscles failed before the adductors; in cases of functional disease the adductors fail before the abductors. Ferrier had discovered the cortical centre for adduction, but Horsley and Semon defined it more exactly at the lower end of the ascending frontal convolution in the monkey. In contradistinction to the monkey and the dog they found abduction well represented in the cat, and also that abduction in all young animals had a much stronger cortical representation than adduction. "Thus, the central motor innervation of the larynx is adjusted not only for phonation, but also for respiration, and adapts itself, in each species of animal, to the change from early life to adult life."

In these localization experiments the area to be studied was mapped out into subdivisions of about 4 mm. square, and a very weak secondary current was employed to obviate the fallacy of diffusion. The investigators used electrodes 2 mm. apart. As in all Horsley's experimental work, the experiments were performed with strict antiseptic precautions. The wound, after being closely stitched, was dressed with antiseptic gauze, and this again overlaid and rendered firmly adherent to the scalp by a layer of thick collodion. All the operations were performed under anaesthesia, either chloroform or ether being used, and usually supplemented by hypodermic injection of one-half to one grain of the acetate of morphine.

These experiments advanced the knowledge of cerebral localization and are memorable. In certain points of anatomical detail regarding the localized areas, and, more especially, regarding the excitability of the post-central convolution and the existence of intermediate inexcitable zones, these results have been corrected or modified by subsequent work, in particular, by the more exact studies of Sherrington and Grünbaum. Horsley's work marks a great step forward, and his genius and industry made plain paths of research for those who came after him.

In 1890 Horsley and Walter Spencer read a paper to the Royal Society "On the Changes produced in the Circulation and Respiration by Increase of the Intra-cranial Pressure or Tension." In 1891 Horsley and Francis Gotch gave the Croonian Lecture to the Royal Society "On the Mammalian Nervous System, its Functions and their Localisation determined by an Electrical Method." The full text occupies 250 pages of the *Transactions*. Much of the work was done by the brothers-in-law in the physiological laboratory at Oxford. They used a capillary electrometer, and studied the passage of nerve impulses not only between the cortex and the cord but between many other levels of the nervous system.

Horsley's fame was now international, as was shown by the great reception he received at the International Medical Congress in Berlin in August, 1890, when he demonstrated the chief results of his work in cerebral localization. "Dem gehört die Zukunft," "To him belongs the future," said his Teutonic admirers.

In addition, a vast amount of experimental work on the tracts of the spinal cord was carried out by Horsley either alone or in collaboration with other investigators. All his experimental work after 1896 was done in his small laboratory behind the old anatomical theatre at University College. It was a Mecca to neurologists from all parts of the world, who came to see him there and to discuss his findings—for instance, Hughlings Jackson, William Gowers, William Macewen, Harvey Cushing, and L. F. Barker. Any keen resident at U.C.H. or Queen Square was sure of an invitation to the laboratory. As already observed, Sir Victor had many collaborators. I can mention only a few additional names—Risien Russell, Sir Francis Teale, Sir Gordon Holmes, Page May, Donald Armour, Wilfred Harris, Colin K. Russel, Otto May, and Ernest Sachs. Dr. Charles Beevor remained a devoted disciple, and he and I spent many hours side by side at the laboratory bench cutting and examining microscopical sections for Sir Victor.

Work on the Cerebellum

Although Horsley made the whole of the central nervous system his province, in the closing years of his scientific researches he devoted chief attention to work on the cerebellum, principally with R. H. Clarke. With special apparatus, devised by Clarke, they were able to produce a minimal electrolytic lesion of a cerebellar nucleus without involving the cerebral cortex. This was the first use of electrolysis in experimental physiology. Horsley and Clarke concluded that the cerebellar cortex is practically inexcitable, but this has been disproved by subsequent investigation with the use of a stronger electrical current. I remember one experiment in which I slightly increased the strength of the current and detected a cerebellar response, but Horsley attributed this to diffusion of stimulation to the cerebral cortex. I had the privilege of assisting Horsley in his researches from October, 1904, until 1909. The results of certain of these researches were incorporated in a joint paper published in *Brain* in 1909, with the somewhat lengthy title of "Cervico-Spinal-Bulbar and Spino-Cerebellar Tracts and On the Question of Topographical Representation in the Cerebellum."

So far as possible, Sir Victor set aside Thursday afternoons and Saturday mornings for experimental work. He sat at one end of the experimental table, arrayed in a long white coat and wearing a head mirror, which directed reflected light on to the exposed brain of the animal. Opposite him sat the anaesthetist, while I usually wrote notes from Sir Victor's dictation. Apart from these stated hours, at odd moments Sir Victor would appear in the laboratory, often in the early morning, and cut sections for about half an hour. I think the mere mechanical work of using the microtome rested him. At such times he would talk to one on all sorts of subjects, and at intervals whistle tunes out of the Gilbert and Sullivan operas.

At No. 25, Cavendish Square, the large skylighted room at the back of the ground floor was Sir Victor's workshop. It had been built as an anatomical theatre in the days when surgeons held private classes in anatomy, and Horsley said it was taken by R. L. Stevenson for his description of Dr. Jekyll's chemical laboratory in *The Strange Case of Dr. Jekyll and Mr. Hyde*, with which, indeed, it closely corresponded. Here in any spare time Horsley worked with tools, microscope, and camera, dissecting, cutting sections, photographing and developing, making drawings and diagrams. I went with him to purchase an excellent and costly apparatus for photomicrography (Zeiss); and we spent many Sunday afternoons and evenings in the workshop together taking photomicrographs, developing them, and trying the effect of different coloured solutions to act as filters for the light from a strong electric arc. Shelves lined

the walls of the workshop; they were stacked with lecture diagrams, photographs and negatives, lantern slides, trays of microscopical slides, and notes and papers. These last were the result of work which can never be put on record, for the master interpreter is gone. As Wilfred Trotter wrote (*British Journal of Surgery*, October, 1916): "Horsley was always more interested in the carrying out of his researches than in the record of them." He also looked forward to a period of leisure in which to garner up the fruit of past researches, but this was never granted to him.

It has been possible here to mention only the salient facts of Horsley's researches; to describe them fully and to indicate their material contribution to our knowledge of the anatomy, physiology, and pathology of the central nervous system would demand several volumes: furthermore, many of the publications under other names that issued from Horsley's laboratory represent investigations initiated and directed by him. Sir Victor Horsley was remarkable as a practising surgeon in London who maintained interest in pure scientific investigation in days when professional and other duties encroached considerably on his scanty leisure. His amount of scientific output in those precious hours snatched from other work would have amply sufficed for the whole time of many a research professor of physiology. Only a man of Sir Victor's exceptional enthusiasm and energy could have done it.

The Pathologist

Victor Horsley clerked for Dr. H. Charlton Bastian, one of the founders of our present knowledge of the diseases of the central nervous system. In 1880, while still a medical student, he published his first paper in *Brain* with Bastian on "Arrest of development in the left upper limb, in association with an extremely small right ascending parietal convolution." He also made two of the drawings for Bastian's book, *The Brain as an Organ of Mind*, published in 1880. At the same time he was working with F. W. Mott on bacteriology. In 1882 these two great sons of U.C.H. published their results in a paper in the *Journal of Physiology*, entitled: "On the existence of bacteria, or their antecedents in healthy tissues," then a controversial subject. Horsley was early associated with the research work of the Local Government Board, and in 1881 his paper "On Septic Bacteria and their Physiological Relations" appeared as an appendix to the 11th Annual Report of the Board. He wrote the articles on "Bacilli" and "Zyme" in Quain's *Dictionary of Medicine*, and also did work on the transplantation of tumours from man to animals, a subject of much interest to-day.

Thus early distinguished as a pathologist, Horsley was made assistant professor of pathology at University College in 1882, and in 1893 succeeded Bastian as professor. He rearranged the department for research work in pathology and bacteriology, with a subdepartment of pathological chemistry for Dr. Vaughan Harley. Under Horsley's direction the department became a definite and well-known centre for research in experimental pathology. As Dr. Charles Bolton, one of his pupils, observed: "He did not teach from the examination point of view in the very least; but his aim was to give an account of the processes of disease as ascertained by experimental inquiry: and he illustrated all his statements of fact by experiments on every possible occasion." He published excellent reports, and with Rubert Boyce, the assistant professor, he set the high standard of the department which has ever since been maintained. In January, 1893, Horsley and Boyce published in the *British Medical Journal* (p. 111) their "Preliminary Report on Oedema," which showed how complex was the condition—no mere oozing of blood serum into the tissues under mechanical conditions of pressure, but a result of actions and interactions of living tissues.

Owing to increasing pressure of work, in 1896 Horsley resigned the professorship and was succeeded by Dr. Sidney Martin. In the three years in which Horsley had held the chair he had accomplished great things, but it cost him more than it paid him, and the department, to fulfil his

aims, had to be run at a financial loss. He retained his private laboratory at University College under the aegis of the new department of chemical pathology. He was always ready to give advice to his colleagues and research students on pathological problems, and when the Medical School separated from the College a special "Department of Experimental Neurology" was instituted for him, a convention to link him with the College and to enable him to retain his laboratory.

The Surgeon

Horsley was soon known to the medical profession and the world at large as "the brain surgeon," and it was his experimental work on cerebral localization which led to his appointment at the National Hospital, Queen Square. Further, it was the fruit of these researches which he applied to the diagnosis of tumours of the brain and spinal cord, and which enabled him so quickly to evolve his masterly operative technique in cerebral and spinal surgery. He often regretted that the law prohibited students from learning their operative surgery on anaesthetized animals. He naturally saw and operated on many cases of thyroid disease. He did not restrict himself entirely to his special field. He had general surgical cases in his wards at University College Hospital. These he usually handed over to his assistant surgeon, but in private he did general as well as neurosurgery, "to keep my hand in," as he would remark. He was an assistant surgeon to University College Hospital from 1885 to 1893; a "full surgeon" from 1893 to 1900; and a "surgeon in charge of hospital beds" from 1900 to 1906; he then retired and was made a consulting surgeon.

Primitive man trephined. Horsley lectured in 1887 on "Brain-surgery in the Stone Age." Ambroise Paré operated on wounds of the head and laid down rules for their treatment. But the brain could not successfully be touched by the surgeon's scalpel until anaesthetics and antiseptic surgery were discovered and cerebral diagnosis was possible.

William Macewen, of Glasgow, operated on an abscess in the left temporo-sphenoidal lobe in 1881, but it had already infected the lateral ventricle and the patient died. The first successful operation in this country for temporo-sphenoidal abscess was by Arthur Barker, surgeon to University College Hospital, in 1886. The first operation for cerebral tumour in this country was performed by Sir Rickman Godlee, Lister's nephew, in University College Hospital in 1884. The diagnosis had been made by Dr. Hughes Bennett and was confirmed at the operation, the tumour being successfully removed. Lister and Hughlings Jackson were present at the operation. Unfortunately, septic complications occurred from which the patient died. Horsley practised antiseptic surgery and relied on perchloride of mercury rather than carbolic to prevent wound infection. He gave particular care to the anaesthesia of his brain cases. To stop bleeding from the cut edge of the bone he used his antiseptic wax. In operating he was bold and resolute, and his scalpel grazed the springs of life, the recesses of the brain where no other surgeon had dared to explore. At the same time his superb self-confidence never led him into rashness. On the historic occasion, June 9, 1887, when he removed an intradural tumour from the spinal cord (the first operation of its kind), the tumour was small and higher up in the spinal cord than had been diagnosed. Horsley hesitated at first to extend his incision, and did so only at the urgent request of Sir Charles Ballance, who was assisting him. The patient made an excellent recovery and died from another cause twenty years later.

At University College Hospital and at Queen Square Horsley soon had a lengthy list of successful operations for cerebral tumour and Jacksonian epilepsy, ranging from improvement to complete recovery. All the time he was pursuing his researches at the Brown Institution and at University College on the central nervous system, and made many experiments on epilepsy. He also studied "the

accurate use of such lines and angles of measurement as give the relations between the surface of the skull and the surface of the brain, and enable the surgeon to visualize the motor area of the brain in its exact position under the skull" (*International Journal of Medical Sciences*, April, 1887). This had never been done previously, and was a valuable guide for the cerebral surgeon. He found time also for researches in archaeology and anthropology, and lectured on his discoveries in this new field at the Royal Institution and the Anthropological Institute.

Private Practice

Horsley married Miss Bramwell at St. Margaret's, Westminster, on October 4, 1887. They lived at 80, Park Street, Grosvenor Square, where Victor Horsley already had a large and increasing private practice. Not only were head and spinal cases sent to him, or he was asked to see them in consultation all over the United Kingdom, but he often had to diagnose cases of obscure nervous disease, such as myasthenia gravis and progressive muscular atrophy, and to refer them to the neurologist. His name became one to conjure with. He gave equal care to his hospital as to his private patients, and as one of them in Queen Square said: "I do believe if one of us were to die, and Sir Victor got him within half an hour, he could bring him to life again."

From 1892 onwards No. 25, Cavendish Square, was the Horsleys' home. As pressure of work increased with growing fame—he was knighted in 1902—he devoted less time to ward work at his hospital and clinical teaching. This meant increased responsibility for his house-surgeons, but he chose them wisely and trusted them. In my day Sir Archibald Gray and Sir Thomas Lewis, for example, held that coveted post. Another former house-surgeon, Dr. Wirgman, said of Sir Victor: "I never knew one who was more careful to lessen suffering and to avoid causing pain. His dressers were soon taught that the dressings had to be soaked until they came away of themselves; or they got a sharp telling-off. To his patients he was kindness itself; and for those who went to him for advice there was always full and careful help in every way possible."

In private he was assisted by Mr. Rupert Bucknall, assistant surgeon, and later by Wilfred Trotter, already in those days bearing the stamp of greatness. As a rule, Horsley liked to do his first dressings of head wounds himself. Sir Archibald Gray often gave anaesthetics for him in private work.

Because Sir Victor had little time for teaching, some have doubted his ability as a lecturer. In reality he was a great teacher. I well remember his lucid exposition of the diagnosis of cerebral tumours in a clinical lecture he gave in University College Hospital. Writing scientific papers was always a burden to him. His communications were often brief to the extent of curttness. He was an excellent critic of other men's writings. In a paper I drafted for him he struck out five pages of historical introduction, saying truly that if the references alone were given they could be looked up.

His surgery went hand-in-hand with research. In 1893 he made a long series of experiments on the effect of bullet wounds in the brain which showed that the immediate cause of death in such cases is failure of the respiration, not of the heart. In 1906 his address on surgery at the Toronto meeting of the British Medical Association surveyed the whole field of cerebral surgery, and is regarded as one of his most important contributions to the subject.

Horsley had a curious contempt for the surgical technique of which he was so masterly an exponent. He would throw back his head and laugh, saying: "Anyone can be a surgeon; it is only a question of mechanical skill easily acquired." Watching him, for example, removing a cerebellar tumour, how his deft and steady hands refuted this statement. He made up his mind that he would not operate after 60 years of age, which he regarded as the limit of the surgeon's active life.

Sir Victor devoted particular attention to the subject of anaesthesia. He served on a committee of the British Medical Association to study chloroform anaesthesia with Waller, Sherrington, Vernon Harcourt, and Dudley Buxton. Horsley concluded that the percentage of chloroform vapour ought to be exactly controlled, and liked to have the Vernon Harcourt inhaler used in his operations. Other surgeons objected to the time it took to get the patient anaesthetized. I remember once beginning an anaesthetic for Trotter with this inhaler. He pointed to a lint mask and dropping-bottle beside me. "I think this would be a more expeditious method," he observed.

Horsley was a very rapid operator, in contradistinction to Harvey Cushing, who was a most deliberate one. In J. Fulton's *Harvey Cushing* an account is given of Horsley showing Cushing how to operate on the Gasserian ganglion in 1900. "Horsley dashed upstairs, had his patient under ether in five minutes, and was operating fifteen minutes after he entered the house; made a great hole in the woman's skull, pushed up the temporal lobe—blood everywhere—gauze packed into the middle fossa, the ganglion cut, the wound closed, and he was out of the house less than an hour after he had entered it." Such rapidity did not appeal to Cushing, yet Horsley obtained excellent results. Modern methods of cerebral surgery are different, but the successors of Horsley—Harvey Cushing, Hugh Cairns, and Geoffrey Jefferson—have acknowledged their debt to Horsley's pioneer work.

The Medical and Social Reformer

After becoming the greatest of all cranial surgeons, Horsley found himself impelled to sociological and political work in the years preceding the first world war. He strove to serve his profession and womanhood and childhood above all. When the Medical Defence Union was threatened with failure he became its president and threw himself heart and soul into its work. He attended every council and executive meeting, and gave many other hours of his valuable time to its service, making it a bulwark of defence for doctors exposed to attacks from unscrupulous people.

Throughout his professional life Horsley worked hard for the British Medical Association. "He wrote in its Journal, took a chief part in its Annual Meetings, was one of the founders of its new constitution, served on its Council and Committees, was Chairman of its Representative Meetings, and Chairman of the Marylebone Division of its Metropolitan Counties Branch." He strove to make the Association the one great power between the State and the medical profession, a power in which the doctors would be united to defend themselves against injustice, to provide a complete service for the nation, and to obtain proper rates of remuneration for their work. He led the way in forming the policy of the Association in regard to reform of Coroners' Laws and death registration, medical inspection and treatment of schoolchildren, the constitution of a future Ministry of Health, State registration of nurses, and suppression of unqualified practice and quack advertisements. He saw the advantages of the National Insurance Act, that it would give better service for the insured and more favourable conditions for the general practitioner. This excited unjust opposition from those whom he was trying to help. But he took praise and blame with equal serenity, except that he expressed his appreciation of his true friends' sympathy and concern in the bitter attacks made upon him.

Sir Victor served as a direct representative on the General Medical Council from 1897 for nearly ten years, and took an active and useful part in its work.

A campaign in which he was much maligned was his crusade against alcohol. Those were the days when 90% of the injuries admitted on Saturday nights to hospitals might be attributed to drink. Like Benjamin Ward Richardson, it was on scientific grounds that Horsley became a temperance reformer. He was a vice-president of the National Temperance League and president of the British

Medical Temperance Association. As he said in his Lees and Raper Memorial Lecture on "The Effect of Alcohol on the Human Brain," the practical argument for total abstinence is based on the irrefutable proof derived from physiological investigation. In 1907 he and Dr. Mary Sturge published their book, *Alcohol and the Human Body*, which is a great store of medical and scientific evidence on the subject. He gave numerous lectures and addresses in support of temperance, and he attacked the issue of the rum ration in the first world war. He opposed tobacco smoking both on medical and on aesthetic grounds.

Sir Victor gave a number of brotherhood addresses to a non-sectarian group which arose in the Free Churches. Many a Sunday afternoon was devoted to these talks. "There is something of the spirit of Kingsley in them, and of Ruskin," wrote Stephen Paget. They covered a wide field—Christian ethics and unity, public health and sociology.

He was a strong advocate in the cause of female suffrage, and Lady Horsley and he worked hard together to this end. He scathingly criticized the Temporary Discharge of Prisoners Act, the "Cat and Mouse" Act, and denounced the forcible feeding of the militant suffragettes. He foresaw a splendid future for the emancipation of women, but he only saw the Promised Land from afar.

Sir Victor felt so keenly upon these questions of medical and social reform that he desired to enter Parliament as a Liberal in order to extend his service to mankind.

In 1910 he contested the University of London seat and was defeated by his former tutor, Sir Philip Magnus, the Unionist candidate. In June, 1911, he was adopted by the North Islington Liberal and Radical Association; and during 1911–12 did much work in the constituency, as well as speaking on behalf of Liberal candidates elsewhere. From 1910 onwards politics claimed much of his time. In 1912 he resigned his candidature for North Islington, and in January, 1913, was adopted instead by the Liberal Council of the Market Harborough Division. His outspoken views, especially on female suffrage, frightened the Executive Committee, and in November he resigned. Between January, 1914, and May, 1915, he was "approached" on behalf of four constituencies, and, finally, the Huddersfield Liberals were about to adopt him as their candidate.

Many of Horsley's scientific friends regretted his absorption in political warfare when he still had so much to teach mankind in cerebral physiology and other branches of knowledge. They shrank from seeing his motives misjudged, his words misinterpreted, and himself exposed to the hurly-burly of the market-place. His advocacy of National Health Insurance and of female suffrage lost him friends and patients. In those later years his practice fell off, as William Harvey's did when he discovered the circulation of the blood. Horsley made sacrifices of time, leisure, and money for the betterment of mankind. But he could do no other. He was "a bonny fighter" in any cause he believed to be a righteous one. Whether, if elected to Parliament, he would have held high office is doubtful, for he was no trimmer. He detested the *via media*. Compromise was hateful to him, and he always said straight out what he thought. Worthy of Cabinet rank, a government might have been afraid of giving it to him. But he would have made his mark in the Councils of the Nation at Westminster.

The Last Crusade

Sir Victor as a boy had wished to be a soldier, and for many years was a devoted member of the Artists' Corps. He nevertheless hated the wastefulness and folly of war, but when war came in 1914 he put everything aside so that he could render service in the national cause. He had been a captain in the Territorial Force since 1910, and was on the staff of the 3rd London Hospital, where he immediately began work. His great longing was for active service overseas, where there would be scope for his cerebral surgery, and where he could do so much for the sick and wounded. His two sons, Siward and Oswald, were in the Territorials, and afterwards received commissions in the Gordon Highlanders. He besieged the War Office with

appeals for employment, and at length, early in 1915, he was appointed in charge of the Surgical Division of the 21st General Hospital. Pending this hospital's organization, for six weeks he was surgeon to the British Hospital established at Wimerex by Sir Henry and Lady Norman. In May Sir Victor was gazetted Major R.A.M.C.(T.), and on May 20, 1915, he left Southampton with the staff and nursing staff of the 21st General Hospital for Egypt, the hospital being located at Alexandria. Nothing was ready, and, as Horsley wrote: "We shall be frantically busy licking into shape the rotten old barracks which has been handed over to us to convert into a hospital. The Israelites in Egypt were not in it *re* making bricks." On July 14 he was appointed consultant to the Mediterranean Expeditionary Force with the rank of full Colonel, A.M.S. He was in Egypt from June, 1915, to March, 1916. In August, 1915, Lady Horsley joined him, and later their daughter Pamela (Mrs. Stanley Robinson). In October Horsley visited Mudros and Gallipoli, inspected field ambulances and casualty clearing stations, as well as dressing-posts in the trenches and firing-line, and reported on medical conditions. In Egypt, after operating and visiting patients all day, he would work through the hot evenings writing letters and notes of his cases.

There was much public concern about the inefficiency of the medical arrangements in Mesopotamia, and, when Horsley volunteered for the campaign, the authorities were only too glad to have a surgeon of his eminence and standing to report on the matter. He reached Bombay on March 25, 1916, and visited Delhi and Simla: he left Bombay on April 9 and reached Basra on April 16. Here again he worked indefatigably under a hot tropical sun, operating on head injuries, investigating the medical conditions, and collating and preparing notes for his report which he intended to write in India.

Colleagues who worked with Sir Victor at Amara—the late Professor Grey Turner, Sir Zachary Cope, and Dr. Feiling—have told me that he worked too hard for a man of his age in a hot climate. He was frequently urged to curb his extraordinary energy and not to put too severe a strain upon his physical capacity. But to Horsley the work was all, the man nothing.

Sir Victor was working on July 14, when the shade temperature was over 110° F. (43.3° C.), and his last call was on a sick officer whom he knew. On the 15th he became ill and was moved to No. 2 British General Hospital. On July 16 his temperature rose rapidly, he became unconscious, and died of heat-stroke that evening.

Palms were laid on his grave. Later, a cross of white marble was placed over it. He had fought the good fight, he had finished his course, and so Mr. Valiant-for-Truth "passed over and all the trumpets sounded for him on the other side."

I am indebted to the late Mr. Stephen Paget, the author, and to Messrs. Constable and Company, Limited, the publishers, for permission to use certain material in the preparation of this lecture contained in *Sir Victor Horsley: A Study of His Life and Work*, Stephen Paget, London, 1919.

A short pamphlet entitled "The Doctor and his Patients, the Parish Priest and his People" has been published by the Guild of St. Raphael. The Guild consists of clerical and lay members of the Anglican Communion who are anxious to "restore the Ministry of Healing as part of the normal functions of the Church." The pamphlet discusses "the Christian view of Medicine, the Church's Ministry to the Sick, and the practical issues that stem from these considerations." The practical issues include the ways in which doctors and priests can co-operate to provide "a service to the sick which will be truly adequate to all their needs." Three doctors and three priests have jointly written the pamphlet, which is obtainable from the Guild of St. Raphael, 77, Kinnerton Street, London, S.W.1, price 6d., post free.

REMINISCENCES OF AN AMERICAN STUDENT

BY

ERNEST SACHS, M.D., F.A.C.S., F.I.C.S. (Hon.)

It is a great pleasure as well as a very great privilege to have this opportunity to pay tribute to Sir Victor Horsley. Unquestionably he was the father of neurological surgery, for, although sporadic attempts at brain surgery had been made before him, he was the first man to devote himself exclusively to this work.

It is my good fortune to have received my training with him. In 1907 no one in the United States was doing this work. While I was a student at Johns Hopkins, Harvey Cushing was just beginning his first efforts in neurological surgery, but the only place to obtain training was with Sir Victor. I applied to him and was given an opportunity to work in his laboratory in University College. He immediately took me under his wing and very promptly gave me every opportunity to learn his methods and follow his work from every angle. He withheld nothing and gave me most generously of his time. He treated me like a son in his home, and Lady Horsley was equally cordial.

Horsley at Work

I had been trained in surgery under Dr. Halsted at Johns Hopkins and was thoroughly imbued with the methods he taught; therefore it was something of a shock when I first saw Sir Victor operate. He practised antiseptic surgery while I had been trained in aseptic surgery. He worked under a stream of antiseptic solution with which the wound was constantly irrigated by an assistant. His opening of the skull was crude. He always sacrificed his bone flap, but I soon learned that this was unimportant, and that what really counted was his superb knowledge of anatomy and physiology. As soon as the brain was exposed, his handling of the tissues was exquisite and very delicate, and his knowledge of brain anatomy with all its possible variations was outstanding. I recall one occasion when he exposed the occipital lobe and remarked he would make an incision, avoiding Genari's streak. I doubt whether there are many neurosurgeons to-day who know their brain anatomy so thoroughly that they could do that.

Sir Victor spent every afternoon in his laboratory, and the only time I ever knew him to give up that session was when he had an opportunity to deliver an address on the subject of alcohol. He was an uncompromising teetotaler, and I have seen an audience spellbound by his wonderfully well documented discussion of the harmful effects of alcohol. He was convinced of this, and I frequently heard him say that no one could have heat-stroke who did not take alcohol. It is, of course, well known that this conviction of his was responsible for his death from heat-stroke while serving with the troops in the first expedition in Mesopotamia. A medical officer who was with him told me that Sir Victor absolutely refused to wear the helmet or spine pad required of all personnel, and as a result died of a heat-stroke.

Sir Victor was in his element when he was with a group of physiologists. I recall a meeting of the Physiological Society at which were Sherrington, Bayliss, Starling, Page May, and Gotch. Someone brought in a chicken that was ataxic, and Horsley, who with Clarke had just completed his experimental work on the cerebellum, upheld the thesis that the attacks were cerebellar in origin. There was considerable animated discussion and some difference of opinion. What the final outcome was I never learned, but the way Sir Victor stood his ground I shall never forget.