

LIEUTENANT - GENERAL SIR WILLIAM
LEISHMAN, K.C.B., K.C.M.G., F.R.S., LL.D.

1865-1926

SIR WILLIAM LEISHMAN was the only son of a distinguished father, and a grandson "of the Manse," as the saying is in Scotland, for his grandfather, the Reverend Dr Leishman, was the Parish Minister of Govan in Glasgow. His father, also named William, after graduating with honours in medicine from Glasgow University in 1855, rose to an eminent position in his profession. He held the Chair of Medical Jurisprudence in Anderson's College, edited the *Glasgow Medical Journal*, and was appointed Professor of Midwifery in the University in 1868. His contemporaries speak of him as a "dignified and fluent speaker, lucid and interesting, with a distinct literary flavour in his language," and as a strong advocate of the influence of nature in the cure of disease. A member of the Senate, his counsel carried great weight in the affairs of the University and, as the representative of the University on the General Medical Council, he fulfilled the duties of a councillor with distinction. His only son William was therefore brought up in an Academic atmosphere.

Born in Glasgow on the 6th of November 1865, William Leishman received his education in London at Westminster School, returning to Glasgow for his medical course. He graduated in medicine and



Sir WILLIAM LEISHMAN
1865-1926

From a photograph, reproduced by permission of the Royal Society of Tropical Medicine and Hygiene.

surgery in 1886 and was gazetted Surgeon to the Royal Army Medical Corps a year later at the early age of twenty-one. India was destined to provide him with his first experience of the tropics, and an Indian and tropical disease, kala-azar, with his first scientific discovery. The fact that he took a microscope with him when he left England singled him out from the ordinary Army surgeon of that day, for it was an unusual proceeding, although the germ theory was by that time well established. The discovery of the typhoid fever bacillus by Eberth in 1880 had set the world's laboratories working on researches for a protective inoculation. In Germany, Koch inspired the anti-typhoid campaign, and in India, Leishman and W. S. Harrison set to work on the same problem, and they had ample opportunity of studying enteric fever, for it took a heavy toll of the lives of the British soldier before the days of protective inoculation. To this subject and to the study of kala-azar, a disease which interested him all his life, Leishman devoted special attention, although it was not until his return to England that a satisfactory vaccine against typhoid fever was brought out. Before he left India, he saw active service in the Waziristan Expedition of 1894-95, receiving the frontier medal with clasp in recognition of his services in that campaign.

On his return to England, he was sent to the Army Medical School at Netley, where a brilliant teacher, Sir Almroth Wright, held the Chair of Pathology, and under the influence of his stimulating lectures, Leishman's zeal for research received a new impulse. Almroth Wright was then working on the preparation of his anti-typhoid vaccine for which he became famous, and Leishman was actively associated with him in this

research. Anti-typhoid inoculations were inaugurated at Netley in 1896, and when in 1898 Sir Almroth Wright went to India to serve on the Indian Plague Commission, he took the opportunity to test his inoculations on the British troops at the stations which lay along the route of the Commission's inquiry. For this purpose he had to take out his vaccines from England, but as there was not much time to lay in a sufficient store before starting, his supply ran out. He had, therefore, to manufacture more vaccines on the journey under conditions that were very far from ideal for this important preparation. Nevertheless, the results obtained even on this early experiment showed, as calculated on the returns kept and compared with the number of cases of typhoid and the death-rate for the previous three years, that, if the whole British Army in India were inoculated, an annual saving of over 1000 cases and of nearly 200 lives would accrue. The report of anti-typhoid inoculations was published by Leishman and Wright in the *British Medical Journal* of the 20th January 1900, in a paper entitled "The Results which have been obtained by Anti-typhoid Inoculation," in which they gave a detailed description of the preparation of the vaccine and the technique employed, and from that date up till 1924 Leishman published numerous papers and reports on his work on this subject. "A Report on the Blood Changes following typhoid inoculation" appeared in the *Journal of the Royal Army Medical Corps* in 1906, followed by the "Progress of Anti-typhoid Inoculation in the Army" in the same journal in 1907, and in 1908 two more reports on further experiments were published. The Harben Lecture which he delivered in 1910 was devoted to the same subject;

and, right up to the end of his life, the medical journals testify to the amount of work he did in this connection.

In 1900, having been promoted to the rank of Major, Leishman became Assistant Professor of Pathology in the Army Medical School, and the results of his patient laboratory work soon began to be manifest. His skill in evolving the technique best suited to his researches was a never failing source of wonder to his assistants. A process in constant use in laboratory work is that of staining for microscopic examination, and consists in the injection of colouring matter which acts more powerfully on some parts of the material under examination than on others, thus enabling these parts to be distinguished from their surroundings. The reactions of micro-organisms to staining material vary, and these reactions are examined and recorded. After many months of laborious investigation, Leishman succeeded in preparing the stain which is now known everywhere as *Leishman's stain*. It is a modification of Romanowsky's stain, and he described the technique in papers published in the *British Medical Journal* of 16th March 1901, entitled "The Application of Romanowsky's Stain in Malaria," and in the *Journal of the Royal Army Medical Corps* of 1904, in "Notes on Romanowsky's Staining." The use of this stain led to the discovery of the parasite of kala-azar, a discovery which Leishman made at a *post-mortem* examination of a soldier who had died from this disease at Netley. By taking some material from the spleen and examining it under the microscope he was able to pick out by means of the stain the small parasite which is the cause of this disease and is

now known as the *Leishman-Donovan* body. Kala-azar is a tropical disease, characterised by prolonged fever, wasting, enlargement of the spleen and alteration in the colour of the skin. It is grouped with its Mediterranean form, caused by a parasite similar to the Leishman-Donovan body, and the kindred diseases known as the Delhi boil and tropical sore, under the name of *Leishmaniasis*.

In addition to this stain, Leishman evolved at Netley a most ingenious technique, which has since been extensively used in research work, for estimating the resisting power of the blood to the invasions of infection. The blood corpuscles called phagocytes, with which Mr Shaw makes play in *The Doctor's Dilemma* are those that absorb infectious microbes, thereby protecting the system against the inroads of disease. Leishman's paper on this subject, "Note on the Method of Quantitatively estimating the Phagocytic Power of Leucocytes of Blood," was published in the *British Medical Journal* of 11th January 1902.

In 1902 Leishman married Miss Gunter, the daughter of the late Lieutenant-Colonel E. Gunter of the 59th Regiment, and in 1903, when the Army Medical School was moved to London, he succeeded Sir Almroth Wright in the Chair of Pathology at the Royal Army Medical College. A great part of his time was then given up to teaching, and his lectures at the College were a source of inspiration to those who heard them, for he had inherited from his father a gift of clear and vivid powers of expression which not only held the interest of his audience, but awakened in his students an enthusiasm for the work that was amply reflected in the high standard attained in the

examinations for promotion during the ten years Leishman remained at the College.

In the laboratory he continued his researches in the preparation of anti-typhoid vaccine. The use of this protective measure had been only partially successful in the South African War, and was adversely criticised. But considering that in 1899, when the troops embarked, the treatment was only in its rudimentary stage, the results, as reported in Colonel Simpson's *History of the South African War*, showed a remarkable gain on previous records, for the mortality per thousand of those inoculated was only 10.0 compared with 32.3 of those not inoculated. After summarising the factors unfavourable to the success of the treatment, Leishman said: "It is noteworthy that, in spite of all these factors, the general analysis of the results should show that typhoid was twice as common in the non-inoculated as in the inoculated and, in my opinion, it is even more striking that, in every corps, without exception, the ratio should have been in favour of inoculation." As the result of long and patient investigations and many experiments at the laboratory of the Army Medical College, Leishman produced the vaccine which afforded such complete protection that, in 1914, when the War broke out, typhoid fever, the dreaded scourge of armies in the field, was well under control, and a triple vaccine against it and the paratyphoids had been prepared. Had it not been for this protection, it is estimated that, on a calculation based on the rate at which the troops were affected in the South African War, the total number of cases of typhoid would have reached in all theatres of war the enormous figure of 551,000 with over 77,000 deaths, whereas, during

the years 1914-1918, in all the theatres of war, the total number of cases was only 20,139 with 1191 deaths.

Another research carried out by Leishman at the College in London was concerned with the fate of the spirochætes of relapsing fever in the tick. Relapsing fever, a disease constantly met with in the tropics, is caused by very delicate coiled or spiral organisms, known by the name of spirochætes, which are found in the blood stream, and are conveyed by the bites of lice, or, as in Africa, where the disease is known as tick fever, by the bite of the tick. The technique which Leishman developed for his work on the spirochætes has been described as "at once the admiration and despair of his assistants and colleagues." By its means he was able to demonstrate one phase in the life-history of the spirochætes. He also proved that the infected female tick can transmit the infection through its eggs to the next generation, which in turn can pass it on to another generation without these ticks having fed on infected blood. As a tick is a long-lived insect, this fact adds greatly to the persistence of the disease in any particular place and therefore to the difficulty of eradicating it. Where lice and ticks thrive in conditions of poverty among a native population, relapsing fevers may take a terrible toll of life owing to the impossibility of controlling the means of infection.

In 1909, in recognition of his contributions to science, Leishman received the honour of knighthood. and in 1910 the Royal Society conferred upon him its much coveted distinction, by electing him a Fellow. He was President of the Royal Society of Tropical Medicine and Hygiene in 1911, promoted to the rank

of Brevet Colonel in 1912, and appointed Honorary Physician to the King. On the formation of the Medical Research Committee of the Privy Council, now the Medical Research Council, he was elected a member and served for ten years on this body, devoting much time and thought to the organisation of its research work. In 1913 he resigned the Chair of Pathology at the Royal Army Medical College and became expert adviser on tropical diseases on the Army Medical Advisory Board. His time was now so fully occupied that he could rarely be spared for laboratory work, a matter which he greatly regretted. In 1914 he was elected a Fellow of the Royal College of Physicians.

On the outbreak of war, it fell to Leishman to make provision for inoculating the first divisions of the Expeditionary Force against enteric fever in so short a period that it was not possible to give the two regulation vaccines. The General Officers commanding the Divisions were alarmed lest their troops should arrive at the front, where their services were urgently required, incapacitated for action by the effects of the vaccine. Leishman overcame the difficulty by giving a single dose of double strength, and fortunately no evil consequences ensued. When time allowed, later on, a return was made to the ordinary procedure of two inoculations with an interval between them.

In October 1914, Leishman went to France as Adviser in Pathology on the staff of the Director General of Medical Services with the Expeditionary Forces, and in this position he came in contact with all the research work carried on in the Army. He was Chairman of the Committee on Trench Fever, a

committee which was responsible for the discovery of the mode of transmission by lice of this not fatal but very distressing malady, and thereby opened the way to its prevention; identifying, too, the cause of the disease in the clusters of granules found in lice, related to the *rickettsia* which are suspected of being the cause of typhus fever. The International Allied Sanitary Commission and the Inter-Allied Surgical Conference which met in Paris, also claimed his services and the benefit of his advice. He was three times mentioned in despatches, and received the 1914 Star with clasp, the British War Medal, the Order of C.B., the Legion of Honour and the American Distinguished Service Medal, and in 1918 he was created K.C.M.G. Glasgow University conferred upon him the honorary degree of LL.D.

In 1918 he was appointed Adviser on Tropical Diseases to the Director General, Medical Services, and had to advise on all the pathological problems created by the War, and ultimately he was appointed Director of Pathology. He served in this capacity until 1923, when he succeeded Sir John Goodwin as Director General, Army Medical Services, with the rank of Lieutenant-General, a post which was rendered exceedingly onerous owing to the changes brought about by demobilisation and the necessary reductions in staff entailed by the economy campaign after the War, all of which created much disappointment and unrest in the Medical Corps. Leishman performed his duties with great tact, judgment and distinction in the difficult years following the Armistice, and was created a K.C.B. and promoted to the grade of Grand Officer of the Legion of Honour. He served on the Yellow Fever Commission of West Africa, and on

the Medical and Sanitary Advisory Committee for Tropical Africa at the Colonial Office. In the midst of these great activities, when his tasks were but half accomplished, death cut him off in his sixty-second year, on the 2nd of June 1926. He was buried with full military honours, the Grenadier Guards forming a guard of honour. The King and Queen were represented at his funeral, and tributes were received from all over the world. One which he would especially have valued was sent from the Pasteur Institute in Paris signed by the eminent scientists, Professors Roux, Calmette, and Martin.

Leishman was one of the greatest benefactors the Army had known. His services to the nation and the world at large are to be found in his great contributions to the science of modern tropical medicine, and his memory will be handed down to future generations of scientists by the discoveries which bear his name. But, because he did so much to further the cause of tropical and preventive medicine, he was fully alive to the ever-pressing need for more research. At the Linacre Lecture, delivered by him only the year before his death, he said, after reviewing the progress gained in our knowledge of the cause and treatment of some of the most important diseases which are a menace to life in the tropics, "On the whole, we are too much inclined to congratulate ourselves on the remarkable progress which has been made in tropical medicine during the last thirty years, and to lay stress on what has been done rather than upon what remains to be done. . . . Taking the case of the white resident first, there can be no question that conditions for the maintenance and safeguarding of his health in the tropics have of recent

years improved enormously. Accurate knowledge of the causation of the disease, the diffusion of that knowledge and its utilisation by an efficient health service have, in his case, made life in the tropics, at any rate in most places, almost as safe as at home. . . . Let us turn, however, to the other side, the case of the 300,000,000 of the native races for whom we are responsible. . . . Their condition in many countries is such as should give us cause for heart-searching and for the gravest disquietude. . . . To put it shortly, the native, from the health point of view, is in many countries little, if at all, better off than he was before we accumulated the mass of knowledge from which the white man has benefited and is benefiting so greatly. . . . The obvious causes for this state of affairs are, lack of men, lack of money, lack of knowledge." And of these three lacks, he had most hope for the future from the acquisition of more knowledge. "Tropical research has no reason to be ashamed of the amount of light which it has thrown on dark places, but . . . it is only here and there that this knowledge has proved to be of such a nature that it can be readily, and above all economically, applied to the control of the disease in question on the scale required in practice. . . . The lines of approach are innumerable, and each disease has its own unsolved problems and its own difficulties; but, as so many of them are concerned with insect hosts or transmitters, it is clear that closer and closer study of these and of their life-history is bound to be fruitful. One must get far closer down to the *vie intime* of these dangerous pests, and learn, ever in more detail, their hopes and fears, their tastes and dislikes, their loves and hates; one must get into the very soul of a louse, a flea or

a mosquito, if we are to wrest from it such secrets as we may hope to utilise."

So, with eyes still straining towards a brighter future, Leishman was called from his great work.

REFERENCES.—*Journ. Roy. Army Med. Corps*, July 1926, vol. xlvii., No. 1. Linacre Lecture, 1925, *Journ. Roy. Army Med. Corps*, 1925, vol. xlv. "Results Anti-typhoid Inoculation," *Brit. Med. Journ.*, 20th January 1900.