HISTORY OF MEDICINE

Sir Ronald Ross
(Born 13 May 1857, died 16 Sep 1932)

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Most of us have read that the mystery about malaria transmission was solved by Surgeon-Major Ronald Ross while working in India but we know little else. Fortunately the 'Memoirs' by Ronald Ross (London: John Murray, 1923) tell us more.

Ronald Ross was born on 13 May 1857 at Almora (UP). His father, Campbell Claye Grant Ross (later General Ross) was an officer in the Indian Army. Ronald Ross was sent to England in 1865 for further eduction. He was a keen student of zoology and also loved music and verse. When he was 17 he wished to be an atrist. But his father was eager that Ronald Ross enter the Indian Medical Service (IMS) which was then well paid. So Ronald Ross found himself at St Bartholomew's Hospital. He had little interest in anatomy *"because it is only a kind of geography of the body to be learned by rote"*. Physiology, histology and microscope work were subjects that interested him more. His father was anxious that his son should qualify as soon as possible and enter the IMS. Hence Ronald Ross appeared and passed the Membership of the College of Surgeons in July 1879 after only 3 days of reading. Since it was necessary to have a medical qualification as well he decided to appear for the Licentiate of the Society of Apothecaries in London by studying only on the morning of the exam and failed. He finally cleared the Licentiate examination in 1881, entered the IMS the same year, and was sent off to India on 22 Sep 1881.

Service in India

He was initially given the medical charge of 10th Regiment Madras Infantry and then the 17th Regiment Madras Infantry. He later served as the Acting Garrison Surgeon of Bangalore. The chief ailments that he found prevalent in that garrison were typhoid and bowel complaints but no malaria. He expected to be given the permanent appointment at Bangalore but writes that in 1884 *"much-coveted permanent appointment (of Garrison Surgeon of Bangalore) was given to the son-in-law of the secretary to the Surgeon-General at Madras"*. Thereafter he was appointed to the medical charge of various battalions of the Madras Infantry including the 9th and 3rd. In 1888 he went on a years furlough leave to England. During this time he obtained a Diploma in Public Health and studied bacteriology and he says *"I believe I was the first member of the IMS to do so"*. On his return in 1889 to Madras he was sent on field service to Burma. His duties also took him to Secunderabad and Berhampur. At the end of another years furlough in England he returned to India in 1894. By this time he was 38, had 12 years service and had attained the rank of Surgeon-Major.

Malaria work

Malaria was then so rampant that out of 300,000 men in the Indian Army 100,000 men were admitted every year to hospital. Advances in the knowledge about malaria had started off in 1878 when Charles Louis Alphonse Laveran, a French Army Surgeon, was convinced that malaria was caused by minute parasites that live in or on human red corpuscles. Though the flagellated sexual forms of plasmodia had been noticed no one had deciphered their meaning. In 1877 Patrick Manson had shown that *Filaria bancrofti* had a portion of its life history in the mosquito. Laveran speculated whether mosquitoes also played a role in malaria as they did in filaria. Till 1894 it was

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not established how parasites pass from the sick to the healthy. The popular belief was that it was due to drinking contaminated water. This belief was also held by Manson. However as early as 1854 another Frenchman Louis Daniel Beauperthuy had given a detailed hypothesis. He had said that malaria is produced by a venomous fluid injected under the skin by mosquitoes. All this aroused Ronald Ross's interest. He met Dr Patrick Manson in 1894. This was the beginning of a long and professionally fruitful association between the two. Ronald Ross was in regular communication with Dr Manson and he wrote 110 letters to him between 1895 and 1899. The hypothesis that Ross had decided to test immediately on return to India was that the flagellated spores develop in the mosquito's stomach and then enter drinking water.

Ross' work started off in Secunderabad when he was with the 19th Madras Infantry then stationed at Begumpett. His letters to Manson provide a detailed account of his investigations. One of the several experiments he did was to drink water contaminated by mosquitoes and their larvae to see whether he could contract malaria - he didn't. After examining, by dissection, several mosquitoes he finally veered round to the view that it may be the bite of the mosquito which transmitted the disease. This he says in one of his letters in August 1895 to Manson. Ross' work was interrupted in several occasions. Once he was sent to Bangalore to investigate and contain a cholera epidemic. In this he was hugely successful. Finally, in September 1896 in Calcutta he showed that the bite of the mosquito caused malaria in birds. A year later, on his return to Secunderabad, he demonstrated that it was the 'dapple-winged mosquito' which transmitted malaria to human beings. 1898 saw Ross demonstrate the parasitic forms in the salivary glands of the mosquito. In July 1898 while writing from Calcutta he states "... *and I feel that I am almost entitled to lay down the law by direct observation and tracking the parasite step by step - malaria is conveyed from a diseased person or bird to a healthy one by the proper species of mosquito, and is inoculated by its bite*". Patrick Manson presented these findings to the Edinburgh meeting of the British Medical Association on Ross' behalf.

It was not smooth sailing all the way. He was often hampered by the attitude of his seniors. At times he suspected that some duties given to him were just to show him his place. Once he was ordered to go on duty to a small place called Kherwara under the Rajputana Medical Service. On another occasion he had requested the Surgeon-General that he be permitted to continue his malaria work but was refused as clearance was not forthcoming from higher authorities. He says *"In other words, this chief of a great service entrusted with the health of the three hundred millions of people was not free to continue one of his own officers in the investigation of a disease which killed over a million of those people annually - without going round begging to a layman for permission"*. At another point Ross' frustration expresses itself, in sarcasm, thus - *"It was absurd to expect such things then in India. I had a deal with an Army without an Intelligence Department, and with a General who took no interest in the enemy's movements and did not trouble to ascertain what I required"*. Due to this and the fact that he had had spent a considerable sum from his own pocket on his investigations he decided to resign from the IMS. Ronald Ross finally left India on 22 February 1899. In the meanwhile he had contemplated methods of stamping out malaria by a systematically dealing with breeding sites.

Recognition

Some years later he joined the Liverpool School of Tropical Medicine and was later Professor of Tropical Medicine at the University of Liverpool. In 1912 he became physician for tropical diseases at Kings College Hospital London and then Director of Ross Institute for Tropical Diseases which had been founded in his honour.

This then is the story of the discoverer of the mode of transmission of malaria. What comes across strongly in the life of Ronald Ross is his relentless pursuit of experiments despite several interruptions and with no support by way of money or material from the organization he served. Recognition came, even though not as early as he thought it should, and Ronald Ross received the Nobel Prize for Physiology and Medicine in 1902.