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# Percy George Shute (1894-1977)

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Percy George Shute, known as PG in later life, was born on 16 May 1894 in Honiton, Devon, England. He was the fifth child of a large Victorian family of eight. At the outbreak of the First World War he joined the Tenth Devonshire Regiment of the Army as a private and served in France. In 1916 the Regiment moved to Salonika, (Macedonia, Greece) where, the following year, he contracted dysentery and was invalided back to Britain. He became bored convalescing at Guildford Hospital and volunteered to help in the laboratory that was under the command of the mosquito-malaria pioneer Colonel Sir Ronald Ross. It was fortunate that Ross recognised Shute's enthusiasm and ability and gave him instruction in the recognition of the malarial parasites in blood films and the dissection and examination of mosquitoes for malarial parasites. This was Shute's lucky break in life.

During 1917 numerous relapsing cases of malaria among servicemen in Salonika, East Africa and elsewhere were sent home under the "Y" scheme and housed in special camps. One of these was in the Isle of Sheppey, just across the river from the Isle of Grain, where the Fort was manned by the Royal Garrison Artillery, many of whom had seen service in Salonika and elsewhere. This area supported large populations of *Anopheles maculipennis* complex mosquitoes, including what is now recognized as *An. atroparvus*, the principal northwest European malaria vector.

With this influx of parasite carriers, malaria transmission between servicemen and the local civilian population resulted in almost 500 cases of locally transmitted malaria before the outbreak was eliminated. Shute was soon involved here and in 1918 he transferred to the Royal Army Medical College and was provided with a wartime mobile laboratory, with which to carry out blood examinations and mosquito surveys in southern England. He left the army for the Ministry of Health in 1919, but retained the wartime mobile laboratory to continue his survey work.

The outbreak of indigenous malaria was virtually over by 1922 when the second factor came into play. This stemmed from the discovery in 1917 by Professor Julius Wagner-Jauregg in Vienna that high intermittent fevers killed the spirochete responsible for neuro-syphilis, then also known as General Paralysis of the Insane (GPI), a late destructive syphilitic effect on the central nervous system. Because of the situation in Europe it was not until 1922 that it was considered propitious for British scientists to visit Austria and learn from Wagner-Jauregg.

The use of induced malaria in the treatment of neuro-syphilis was advanced at the Manor War Hospital at Epsom under the direction of Lieutenant-Colonel S.P. James and the advantages of mosquito-induced rather than blood-induced malaria was soon recognised. Shute's expertise was crucial in managing this potentially dangerous therapy, firstly employing *Plasmodium vivax* and later the more malignant but more effective *P. falciparum*. Once the malarial parasite had eliminated the syphilis pathogen, the patient received anti-malarial treatment.

The first patient to be inoculated with the malarial parasite was at the Whittingham Mental Hospital in 1922 and in the following years many more hospitals adopted the treatment including, in 1925, a newly established Unit at the Horton Hospital in Epsom called the Mott Clinic, named after Sir Frederick Mott, Pathologist to the London Mental Hospitals. Here, during the next twelve years, over ten thousand patients underwent treatment by induced malaria with a 30-35% recovery rate and over a hundred thousand mosquitoes were used. As the selected malaria strain was distributed widely across the world, many times this number of patients were treated worldwide.

Shute came on to the scene less than twenty years after the involvement of mosquitoes in malaria transmission was demonstrated. His meticulous approach enabled him to establish and routinely maintain laboratory cultures of mosquitoes at a time when this was regarded as a most difficult procedure. Once his laboratory cultures were established he was in a position to investigate many puzzling aspects of parasite and vector as well as non-vector biology. He had an enquiring mind and his superiors were far-sighted enough to give him sufficient latitude to investigate many aspects not then seen as relevant to the study of malaria in Britain. Perusal of his extensive list of publications reveals how wide these interests were. They covered the development of techniques to estimate numbers of sporozoites in infective salivary glands, anticoagulant properties of the saliva, mosquito receptivity and refractoriness to infection with malaria parasites, mosquito morphology, bionomics, ecology, cold hardiness and control methods. As the subject matter of his publications shows, his interests ranged from parasite biology through malaria therapy, malaria epidemiology, its actual and potential vectors, to the British mosquito fauna in general.

He instructed visitors from other countries in his techniques and visited countries in central and eastern Europe at the request of the Malaria Commission of the League of Nations. During this period he collaborated with Dr Ernesto Ungureanu of the Romanian Malaria Institute in Iassi with joint publications on the morphology of *An. maculipennis* complex mosquitoes.

In 1921 the success of the anti-mosquito measures in Hayling Island led by John Marshall came to the attention of Lt.-Col. James. He viewed the work in progress and subsequently offered his support and the assistance of Percy Shute for a year. For the whole of the 1920s and 1930s Shute studied British mosquitoes and their control as well as the malarial parasite and malaria prophylaxis. He also assisted in the important discovery that part of the life cycle of the malaria parasite occurred in the liver of infected individuals.

During this time Shute became an expert on the British mosquito fauna and discovered a new species. In 1928 he first reported *Theobaldia* (now *Culiseta*) *litorea* as a variety of *Theobaldia morsitans.* He meticulously reared adults from larvae collected from brackish water on the coast of Essex in southern England and noted that larvae and adults showed morphological differences from both *Theobaldia fumipennis* and *Theobaldia. morsitans,* now both *Culiseta* species. Several years later, in 1933, John Marshall and John Staley examined further material of *Theobaldia litorea* and showed the male hypopygia to be distinct and characteristic and raised *litorea* to specific rank. During the Second World War he made extensive surveys for the War Office in North Africa and Italy. Percy Shute also wrote a number of articles on the biology and ecology of *Culex pipiens* biotype *molestus* (then known as *Culex molestus*), especially with regard to its establishment in the London Underground railway.

World supplies of the drug quinine were seriously compromised in the early 1940s and the Mott Clinic was given the task of testing new anti-malarial drugs. They successfully developed mepacrine, which was subsequently used widely but it is now considered to have undesirable side effects and is no longer used.

In 1947 the Medical Research Council sponsored a project for testing the vectorial role of *An. atroparvus* vis a vis *P. falciparum* under local endemic conditions at Lagos, with *An. gambiae* and *An. funestus* as controls. These results confirmed the validity of earlier work showing that English *atroparvus* is refractory to infection with at least four tropical strains of *P. falciparum,* of West and East African, Malayan and Indian origin.

The number of patients with GPI fell dramatically in the early 1950s with the advent of penicillin, which became the treatment of choice for the early stages of syphilis, and the practice of malaria therapy declined. At this time the Horton Unit, with Shute as Assistant Director, was taken over by the Medical Research Council and became additionally responsible for the collation of data on malaria in Britain during a period when the number of imported cases began to increase dramatically. With the launch of the global Malaria Eradication Programme in the 1960s, the Unit, an accepted centre of excellence, became the World Health Organization Reference Centre for Europe.

During his career he published well over a hundred research papers and was co-author of several books on malaria. From 1936 onward Percy Shute was very ably assisted by Marjorie Ethel (Mary) Maryon who worked with him until her retirement in 1969. With Percy Shute she trained many people from all over the world, including some at the London School of Hygiene and Tropical Medicine, and co-authored and co-edited work with him.

On 15 September 1920 Percy Shute married Edith Emily Maslin in Dorking, Surrey. They were to have one son, Gerald who carried on the parasitological interests of his father, firstly with the government of Tanganyika Territory (now Tanzania) and latterly with the World Health Organization. Percy was a Fellow of the Royal Entomological Society and an Honorary Fellow of the Royal Society of Tropical Medicine and Hygiene. He was also honoured with an MBE in 1948 and an OBE in 1971. He died after a brief illness on 28 January 1977, aged 82.

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