Sir Ian McGregor

Ian Alexander McGregor, was born in Cambuslang, Lanarkshire on 26th August 1922 into a family of modest means. His father was a respected tailor, his mother a thrifty housewife who ensured that, despite their modest means, the years of economic depression in the late 1920s and 1930s impacted little on the family who were always well fed and well dressed. His parents had a deep respect for education and it was no surprise that following a happy but undistinguished schooling at Rutherglen Academy, Ian aspired to follow his older stepbrothers into University. His schooldays had engendered a dislike of mathematics that, surprisingly for such an able scientist, remained with him throughout his career. He entered his final year at grammar school at the outbreak of the Second World War in 1939 and, while conscription seemed likely at the end of his schooling, he was persuaded by his family to consider further education. For a time he was unsure whether he should pursue a career in human or veterinary medicine, and by the time he had made up his mind in the summer of 1940 it was too late to secure a place at the University of Glasgow. One of his stepbrothers, a specialist surgeon, persuaded him to apply for one of the extra-mural colleges and so Ian attended his first classes at the St Mungo College and the Glasgow Royal Infirmary in October 1940. Determined to be as good and knowledgeable a doctor as he could, Ian secured the class medals in Anatomy, Physiology, Surgery, Obstetrics and Gynaecology and Public Health with Certificates of Merit in seven other subjects.

Final examinations in 1945 were followed by house jobs in surgery and obstetrics, at £1 per week, less 8 pence for laundry charges. In September 1946, Ian was conscripted into the Army and posted to the RAMC base in Surrey for training as a Lieutenant on Probation. Before the end of the year he was posted to a Field Ambulance at Suez, by the side of the Canal, relocating after only a few weeks to Sarafand in Palestine.

Ordered to report to the Deputy, then Acting Director of Medical Services in Jerusalem, Ian discovered that Lieutenant Colonel Alistair Young, who had issued the summons, was from Cambuslang, and that their families knew each other. Ian's own account of that meeting records that he laughed when he was told that he was to be trained as a malariologist, and then was severely reprimanded. Following training he was to assume the post of Command Malariologist, with responsibility for malaria control in Palestine and Transjordan.

Ian was trained in malariology at the Middle East School of Hygiene at Dimra, near Gaza and then spent his time travelling through Palestine and Transjordan inspecting the seven malaria control units that were under his control, and organising training courses for other regimental medical officers. These experiences would shape his future, and when he completed his military service towards the end of 1948, he enrolled to study, at his own expense, for the Diploma in Tropical Medicine and Hygiene at the London School of Hygiene and Tropical Medicine.

On 6th October 1949, Ian left London on his way to the Medical Research Council's Fajara Station in The Gambia, having been persuaded by Professor BS Platt to join the Nutrition Research Cadre. His task was to investigate the possible contributory role of parasitic infections on protein malnutrition. This proved to be more difficult than he had imagined. When he arrived in The Gambia there were no available data on the prevalence of diseases like malaria, filariasis, intestinal helminth infections or trypanosomiasis. And nothing was known about the vectors of malaria or filariasis, or their susceptibility to control by residual insecticides. So, Ian set about the task and, based on the incidence of splenic enlargement and anaemia in children under 10 years of age, coupled with its remoteness and a lack of medical services of any kind, he selected Keneba in West Kiang with the nearby villages of Jali and Manduar as the potential control villages. Armed with a medical phrase book prepared by David Gamble, a social anthropologist in the Government Service, Ian was conveyed by lorry from Fajara and deposited in Keneba in May 1950, to be collected some five months later, as the roads in West Kiang were impassable in two-wheel drive vehicles during the rains. His isolation encouraged him to focus all his energies on the diagnosis and treatment of diseases, and on efforts to control malaria through house-spraying using a residual insecticide, benzene hexachloride. His dedication left little time for anything else. An early distraction was having to descend 15ft in a modified breeches buoy he had rigged himself in order to deepen the Keneba well. On one occasion, Ian was discovered down the well by Sir Eric Pridie, the Senior Medical Officer of the Colonial Office, who was visiting The Gambia at the time, and who had expressed an interest in Ian's work. I suspect that Ian was quizzed on his well-digging expertise when he was interviewed at MRC Headquarters.

While working in Keneba his lifelong interest in acquired malarial immunity, the mechanism(s) responsible for it and the effects of pregnancy on that immunity, was stimulated. The use of insecticide and periodic drug treatment reduced the incidence of malaria in Keneba but did not eliminate it. Many children, severely ill from malaria, were brought to Ian from surrounding villages, reinforcing his awareness of the serious impact of malaria in the children of West Kiang. However, he was intrigued by the relatively infrequent episodes of

clinical illness in the adults. His observations were at odds with the view that acquired immunity to malaria was ineffective and tenuous, as he noted that adults maintained their resistance to clinical malaria even through the wet season when food was short and physical exertion on agricultural work was at a peak.

Following a visit of an MRC delegation, Ian was invited to develop a research programme, building on his early work and focusing on the diseases that appeared to be important in The Gambia. In 1954 he was appointed Director of the Gambian Unit, now termed the MRC Laboratories, and in January of that year married Joan (Small). By providing essential support to Ian on research administration and logistics, Joan shares in the credit for helping to establish the MRC Laboratories in The Gambia as one of the leading research centres in tropical medicine.

As Director, Ian embarked on the seminal field studies on malaria immunity that demonstrated the association of malaria with enhanced levels of serum gamma globulin. Initially though, he had no proof that the raised levels reflected a specific antibody response, or that the response was protective and responsible for the acquisition of an effective immunity.

The definitive experiments emerged from collaboration with Sydney Cohen at the National Institute for Medical Research at Mill Hill. Ian collected a pool of serum from healthy Gambian volunteers. Sydney fractionated the serum, providing Ian with the 7S gamma globulin fraction from adult Gambian serum and adult Gambian serum minus the 7S gamma globulin. In addition, 7S fraction of gamma globulin from the serum of UK blood donors was prepared as a control. The therapeutic effects of these fractions was assessed in young Gambian children suffering acute clinical *P. falciparum* or *P. malariae* malaria, and compared with the progress of malaria in similarly infected untreated children. Unlike the other two fractions, the 7S gamma globulin fraction reduced both the levels of parasitaemia (the asexual but not the sexual stages), and clinical illness in the recipients. This was the first reliable experimental data to support the view that humans repeatedly exposed to malaria infection could develop an immunity that was capable of restricting clinical illness and parasite blood density, and that this acquired immunity could be transferred to non-immunes in the 7S gamma globulin fraction of immune serum. Thus, vaccination against malaria was at least theoretically possible.

Ian had also demonstrated that the 7S gamma globulin fraction from adult Gambian serum had the same therapeutic effect in Tanzanian children with *P. falciparum* malaria suggesting that West and East African strains had antigenic similarities, and that a vaccine against parasites from one region of Africa may be effective against parasites from other regions.

Many other important contributions followed and Ian's work at the MRC Laboratories, The Gambia, on malaria immunology and epidemiology, still serves as the foundation for much of the current global research effort on malaria. The quest for an effective vaccine, essentially triggered by Ian's passive transfers of gamma globulin, continues today.

Ian served as chair or rapporteur on several important World Health Organisation Committees on malaria. He contributed generously of his time, and his encyclopaedic knowledge of malaria, gleaned from his many years of practical experience in the field, ensured that the epidemiological features of malaria immunity were paramount when decisions on policy and planning of malaria research and control activities were being made in Geneva.

The McGregors finally left The Gambia in 1980, with Ian becoming a Professorial Fellow at the Liverpool School of Tropical Medicine. He continued to write about malaria and was particularly supportive of younger researchers at the school until he retired in 1994.

We owe much to Lieutenant Colonel Alistair Young who decided in 1947 to have the young Dr McGregor trained as a malariologist. We owe an even greater debt to Ian himself.

Paul Hagan

(Ian left detailed autobiographical notes that I have quoted from extensively.)

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