

In Memoriam



Max Theiler 1899—1972

On the first anniversary of the passing away of Max Theiler on August 11th, 1972, it is fitting to pause for a moment to reflect on the life and work of this eminent scientist. It is not the intention to review the many and varied scientific publications which recorded the results of his investigations over the years. In the memory of his contemporaries and of future generations his contribution to the study of yellow fever virus and in particular to that of arthropod-borne viruses in general will remain indelibly engraved.

Born on 30th January, 1899, at Daspoort in the District of Pretoria, Transvaal, Max Theiler was the youngest child of Arnold Theiler and Emma Jegge. During their early childhood, both at Daspoort and later at Onderstepoort, the Theiler children were encouraged to spend their time out of doors as field naturalists. They were taught, *inter alia* by Professor Jansen and Austin Roberts, to preserve and study the various specimens which they collected and by example of their astute father they were encouraged to develop their powers of observation.

As a scholar Max Theiler was considered bright but suffered from the dubious advantage of always being the youngest member of his class. His junior schooldays were spent at Loreto Convent, later, in senior school, he was a pupil at the Pretoria Boy's High School. He commenced his university career by attending first Rhodes University, Grahamstown and later the South African College, Cape Town, where he completed his two year premedical course.

During the 1918 epidemic of influenza, all registered medical students, if not ill themselves, were called upon to assist the few remaining healthy doctors to minister the sick in the poorer areas of Cape Town. In those days the full course in medicine was not available in this country and so it was that after the termination of World War I he entered St. Thomas London, where he qualified as a licensed practitioner.

The association between poverty and disease was again to make an impression on him for many of the patients of St. Thomas Hospital were residents of the poorer areas of London. Whether it was this association of poverty and disease or perhaps some unanswered problem in his enquiring mind which made him decide to change his studies, is not known; however, the decision to take a four months course in tropical medicine and hygiene at the London School of Tropical Medicine no doubt opened the door to his future career. It was fortunate that Dr. O. Teague of the Harvard Medical School at Boston, U.S.A., also attended the course. He offered Max Theiler an appointment as an assistant. In 1922 Max set sail for the United States and joined the staff of the bacteriologist, Dr. Andrew Sellards, to form an association that was to last until 1930. It was not long before Sellards and Theiler found themselves involved in the study of yellow fever.

There is little doubt that the work and interests of Max Theiler were influenced by his experience of tropical disease in Africa. During the period from 1926 to 1927, under the leadership of

R. Strong, Harvard sponsored an African expedition to the Republic of Liberia, the Belgian Congo, Uganda and Kenya. Although yellow fever was not encountered by the expedition, Theiler gained valuable experience in his particular assignment, which was the study of protozoal parasites of small mammals, as well as human trypanosomiasis. He returned via South Africa, where, unfortunately, there were no prospects for an appointment. Back in Boston Theiler resumed work on the nature of yellow fever on the few strains available.

In 1928 Max Theiler married Lillian Graham; their son, Arnold, was born in 1929. Tragedy unfortunately struck the family through the untimely death of young Arnold in a motor accident in 1937. A daughter, Elizabeth, was born in 1939.

In 1928 Sellards returned from a visit to West Africa with the French strain of yellow fever from Dakar in a sample of infected, frozen monkey liver. Believing that yellow fever was of a bacterial aetiology, he carried on with his investigations and left Theiler to follow up his own theory that the disease was caused by a virus. Not only did Theiler succeed, but he was able to adapt the virus to brain tissue of the Swiss strain of white mice by means of serial passage. This finding led to the development of the mouse-protection test for identification of yellow fever antibodies in human serum.

In 1930 Theiler was offered a post under William Sawyer at the Rockefeller Foundation where he continued his work on yellow fever and other viruses. By this time the Foundation was well established, with teams of scientists working in the field in various parts of the world; the prospects of new spheres of activity for Theiler were good.

As result of his efforts the now famous 17D strain was developed and in March 1937 Theiler and Smith reported that they had produced an attenuated virus which was an efficient immunizing agent. During the years 1937 to 1940 the vaccine was tested under field conditions in Brazil with great success.

In July, 1936, Max Theiler attended the Second International Biological Congress in London, where he reported on his studies on yellow fever. He was looking forward to this occasion and to hear his father's comments on his achievements, for Sir Arnold was to have been present; unfortunately this was not to be, for Sir Arnold passed away while in London, before he had presented his paper.

A few years later an opportunity arose for Theiler to study the epidemiology of the disease in the field, during a period spent in Columbia, at the

laboratory in Bogota and later in the foothills of the Andes.

During the war years Theiler published his studies on many aspects of human poliomyelitis carried out on mice, including the discovery of mouse encephalomyelitis virus, and on experimental studies on the treatment of malaria, including avian malaria.

Public recognition of the work and success which had been obtained with the control of yellow fever came in 1951 with the award of the Nobel Prize for Physiology and Medicine. The citation stated that the award took into account the attenuation of the virus and the subsequent development of a vaccine. The committee making the award emphasized that the award was based not on originality but an recognition of a service to mankind. To this quiet-spoken, unassuming man perhaps one of the most enjoyable days of his life was on August, 1955, when he received the honorary citizenship of the Theiler ancestral town of Hasle in Switzerland.

With the realization of their responsibilities towards international health, member states of the United Nations established the World Health Organization in 1958, which meant that privately sponsored philanthropy in international problems fell away. Gradually the Rockefeller International Health Board was phased out and eventually ceased to operate in 1958. The Foundation, however, continued its investigations, placing emphasis on the study of viruses in general and the arthropod-borne viruses in particular. Sawyer had retired in 1944 and in the course of time the directorship fell to Theiler. In 1950 he visited South and East Africa to see what progress had been made. The result of this exploratory visit was that Theiler presented to the Foundation a project which aimed at a world-wide study of the arthropod-borne virus diseases of man and his domestic animals. This project was accepted, but because it was so vast, the Foundation could not be expected to undertake all the investigatory work itself; it was proposed to enlist the co-operation of interested countries.

In the years that followed Theiler was to make a number of visits to Africa, India and South America in order to establish laboratories and review the progress made by the teams of scientists working in the tropics. A great deal of time was taken up by administrative matters, yet Theiler found much satisfaction in his work. He is quoted as saying "our virus programme is still flourishing. It is the most stimulating and worthwhile undertaking with which I have ever been associated, never a dull moment and always something new to keep us stimulated."

“The arthropod-borne viruses of vertebrates, being an account of the Rockefeller Foundation work between 1952-1970,” with Theiler as author and W.G. Downs as co-author, finally went to press in February, 1971.

In pursuance of its phasing out policy, the Rockefeller Foundation was looking for an established university laboratory to continue its work. Yale University was in need of a building for its School of Epidemiology and Public Health, a situation which led to the transfer of the responsibility for the administration of this organization to the University. This move also suited Theiler, who became Professor of Epidemiology until 1967, when upon reaching the mandatory retiring age he was appointed Professor Emeritus.

In 1969 Theiler was still actively engaged, but by the end of 1970 he was obliged to content

himself with shortened visits to the laboratory in order to keep his virus strains in order. Towards the end of 1971 he suffered a heart attack which weakened him considerably and brought to an end his enthusiastic and vigorous activities in the study of the viruses of insects and man.

Besides the Nobel Prize and Honorary Citizenship of the town of Hasle, Max Theiler had received the Chalmers Medal of the Royal Society of Tropical Medicine and Hygiene in 1939, the Harvard University Flattery Medal in 1945 and the Lasker Award of the Lasker Foundation in 1949.

Theiler's work must be evaluated firstly in the light of his discoveries concerning yellow fever at a time when techniques, which are now practised as a routine in virology, were in their infancy, secondly for his pioneer efforts to understand the arthropod-borne viruses.