

Theiler and the ‘Spirit of Onderstepoort’

RD Bigalke*

Abstract

Although Theiler became internationally known for his pioneering veterinary research a distant century ago, there are probably few veterinary researchers today who have not heard of him. Onderstepoort, the research institute he created, is equally well, if not even better, known. Moreover, the name Onderstepoort is not only associated with his institute but also with the only South African faculty of veterinary science, another Theiler ‘baby’. The purpose of this presentation is to determine why this was so, and to what extent the fame was justified. Was it due to the ‘Spirit of Onderstepoort’ sometimes referred to by Theiler in the early as well as later stages of his career, or was there perhaps more to it, and what was Theiler’s share in the development of that spirit, that fame?

Introduction

“Church Street is the longest straight street in the world. It is situated in Pretoria, a small town near Onderstepoort.”

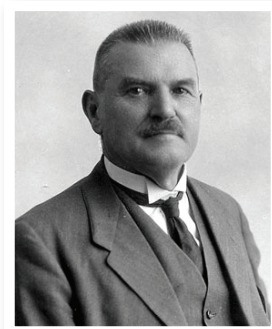
This was reputedly said by an American visitor in the 1910s. It is possibly anecdotal but I heard it for the first time more than 60 years ago when I was at school contemplating studying veterinary science. I am using it to illustrate that Onderstepoort is not only nationally famous. And Onderstepoort and Theiler are ‘synonymous’. I shall try to explain why this is so. I shall also try to capture the so-called ‘Spirit of Onderstepoort’, referred to by Theiler on more than one occasion to motivate his staff when their morale, or perhaps even his own, was low. In 1936 P.J. du Toit & Cecil Jackson, in their lengthy obituary of Theiler, defined it as: “that ideal of service, that conscientiousness of endeavour, that pride in a task, that confidence of success in the face of difficulties”.

What they clearly had in mind was the legacy of the example set by Theiler that became the unwritten code of ethics of the Institute. Theiler was therefore that ‘Spirit’.

There were pre-Onderstepoort and Onderstepoort phases in Theiler’s career, both lasting ± 2 decades. All that it really involved as far as my theme is concerned was a change in address – from the lower town to the upper town – and I shall therefore consider them in the same breath.

Early career

Theiler suffered an appalling physical mishap a few weeks after his arrival in this country from Switzerland in 1891. Virtually penniless, he took



Sir Arnold Theiler

on a job as a farmhand on the farm of the businessman and Kruger-concessionary, Nellmapius, situated where Irene is now. In an unguarded moment, while cutting fodder in a steam-driven chaff cutter, his left hand was accidentally severed at the wrist. He barely survived, psychologically broken, his career in tatters. It also shaped his destiny. He slowly recovered and had a wooden prosthesis made in Germany which was subsequently always gloved.

Theiler soon developed two major career objectives:

- an ‘own’ research institute
- an ‘own’ faculty

Both objectives were amazingly achieved in due course by this dynamic man.

Already famous and having befriended powerful senior officials and some politicians of the Zuid-Afrikaansche Republiek (ZAR), he used persistent coercion to have a tin shanty building, which he converted into a laboratory, allocated to him in 1898. Theiler was conscripted into the Boer forces when the Anglo-Boer War broke out in 1899, serving as the only veterinarian on the ZAR



Sir A Theiler en route for lunch at home. His ‘Extravagant Palace of Science’ in the background.

side compared to dozens in the British army. He saw service mostly on the Natal front but returned to his laboratory after the conventional part of the War was over. He was appointed as government veterinary bacteriologist by the Milner regime in 1903.

But Theiler aimed much higher than that. He wanted a proper bacteriological institute like the ones he had seen overseas. Again he sought the assistance of senior officials and powerful politicians. In this case Lord Selborne, who replaced Lord Milner as High Commissioner in 1905, was particularly supportive. He was a horse breeder and lover and held Theiler in high esteem, particularly because of his research on African horsesickness. Theiler had also managed to catch the eye of General Louis Botha, Prime Minister of Transvaal and Minister of Agriculture. The massive budget for acquiring the land and erecting the laboratory was therefore readily passed by the legislature. The product was the 'Extravagant Palace of Science', as it was dubbed by the politicians, which cost a staggering £60 000. It was built on the farm De Onderstepoort in 1908 and its official name was the Veterinary Bacteriological Laboratories of Transvaal, but soon became known just as Onderstepoort.

A visionary scientist

True to his mission-orientated vision, Theiler had provided state of the art facilities for:

- Diagnostic work to identify the host of economically important diseases of livestock
- Research aimed at finding a solution for these diseases
- Vaccine production (four viral vaccines – one of which was small pox that he had been contracted to produce because his vaccine was better than anyone else's in the country, two bacteriological vaccines and two diagnostic agents)
- A lecture room and hostel for students, although there were none and would not be any for the next 15 years. He had clearly pulled the wool over somebody's eyes.

Theiler's dream of an 'own' faculty on his own campus was only realised in 1920. He once again played a pivotal role in influencing the decisions made by the bureaucrats. He gave evidence to two commissions of enquiry, providing the latter with a comprehensive business plan in which he outlined what was already available at Onderstepoort because he wanted the faculty on his own campus. Of course he held the trump cards in the form of an existing institute and appropriately trained scientists who could be used as teachers on a part-time basis. He also had the support of the Prime Minister, General J.C. Smuts. In 1920 he was appointed in the newly created, exalted position of Dean and Director of Veterinary Education and Research at the age of 51. The existing facilities were used, only three new buildings being required. His first students

graduated in 1924.

Research achievements

Research aimed at providing solutions for the many serious diseases of livestock in southern Africa (R&D) was Theiler's other obsession. He had many successes. He was a multi-disciplinarian and scored amazing breakthroughs in many of the subjects. I have selected five highlights that had major implications, both locally and internationally, on animal health and production.

Rinderpest

Remember that when rinderpest (RP) hit the ZAR and Cape Colony in 1896, the pandemic had already swept unchecked through the entire Africa. Theiler and Hutcheon's attempts (the latter in the Cape Colony) at stamping out, which had been used with fair success in Europe, were a failure. There was no vaccine, although an international prize had been offered for its development.

Theiler had been appointed as government veterinarian by the ZAR government specifically to combat RP. He and Watkins-Pitchford of the Natal Colony opted for a serum-virus type vaccine, for which models certainly existed. In a tin

shanty laboratory in the Marico bushveld, close to Christmas in 1896, they developed a successful vaccine in less than 6 weeks. The 'publish or perish' concept was as yet foreign to them and the great and experienced Robert Koch, who had been hired by the Cape Colony, pipped them at the post with his primitive, often fatal, bile 'vaccine'. Theiler never again made that mistake.

East Coast fever

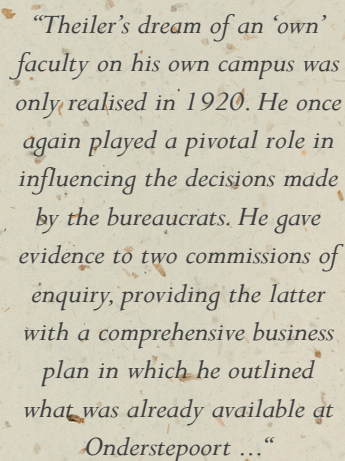
Theiler's second research triumph occurred in 1903 with East Coast fever when he concluded that Rhodesian redwater was not a form of redwater at all but an entirely different disease. He based his findings on the work done by Lounsbury in 1902, in which he established that the three-host tick

Rhipicephalus appendiculatus was an excellent vector, and on his own observations on the morphology of the parasite and the pathology of the disease. Koch came to the same conclusion in 1903 but still clung to his *Boophilus decoloratus* transmission hypothesis.

This time Theiler got the accolade, the parasite being named *Theileria* in due course. It was Watkins-Pitchford, however, who discovered the most effective early control method for East Coast fever, i.e. very short interval dipping.

Anaplasmosis

Anaplasmosis was Theiler's next conquest. The great Theobald Smith, working on Texas fever in the USA in the late 1890s, was happy to regard the marginal points that he observed in anaemic cattle as a sequel to redwater. However, by 1908 Theiler had enough evidence to describe the points as micro-



"Theiler's dream of an 'own' faculty on his own campus was only realised in 1920. He once again played a pivotal role in influencing the decisions made by the bureaucrats. He gave evidence to two commissions of enquiry, providing the latter with a comprehensive business plan in which he outlined what was already available at Onderstepoort ..."

organisms in their own right. He used the generic name *Anaplasma* because he could not see any cytoplasm – *marginale* for the highly pathogenic one and *centrale* for the more benign one. The latter he immediately turned into a very useful vaccine that is still being used in this country today. The strain was also given to several countries where anaplasmosis is also a problem, such as Australia, Israel and some South American countries.

Lamsiekte (botulism)

Two things have always intrigued me about lamsiekte:

- Why it took Theiler so long to unravel the riddle of its aetiology.
- Whether Viljoen's life-long grudge against Theiler for receiving insufficient credit for his research contribution was justified.

When I read Gutsche's biography on Theiler, I was inclined to agree that Viljoen had been bamboozled by Theiler, which did not surprise me. However, on studying the original literature I completely changed my mind. I say it took a long time, because by 1912 (remember that he only had the 'flash of lightning' in 1919) Theiler knew that:

- Hutcheon had advocated the use of bonemeal as a prophylactic in the early 1880s.
- Hutcheon's colleague, Borthwick, had shown, in a well-controlled field experiment in 1895, that lamsiekte did not occur in cattle fed a liberal allowance of bonemeal.
- Bone-craving had been identified by Hutcheon and several farmers as being associated with the occurrence of the disease (a 'premonitory' sign, he called it).
- Hutcheon regarded an aphosphorosis of the grazing as the primary cause of the disease.
- Walker (1909) and Mitchell (1911), the latter a bit more convincingly, had produced a few cases of lamsiekte by feeding cattle on rotten bones.

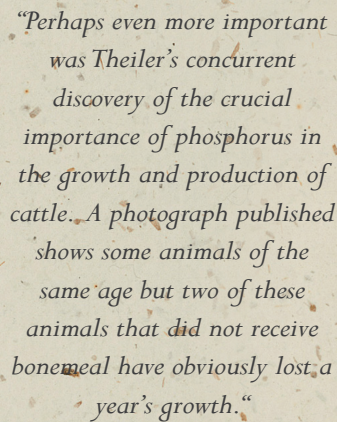
The only explanation I can offer is that Theiler got stuck on his pet 'grass toxin' theory and that he misinterpreted Hutcheon's views on aphosphorosis. When he walked with the cattle on the farm Armoedsvlakte in the autumn of 1919 – at this stage I want to go back a year to P.H. de Kock, President of the Vryburg Farmers Association, who said, to which Theiler took great umbrage, that 'it would do no harm if some experts became cattle herds' to find the cause of the disease – and saw osteophagia (bone-craving) with his own eyes, the penny immediately dropped.

Viljoen (1918) also latched onto the grass toxin theory. He stated categorically in his 1918 publication that he had not observed osteophagia on Armoedsvlakte during the 4 years that he had been there and that he did not believe that it was a 'premonitory' sign. But he had personally seen and studied almost 200 cases of lamsiekte on the farm during this period.

Therefore, osteophagia must have occurred frequently while he was there. How is it possible that he had not observed it? The only possible explanation is that he had never walked with the cattle! He did not even attempt to produce lamsiekte by feeding rotten bones. He did produce two cases with blowfly pupae from a rotten carcass but failed to recognise the condition as lamsiekte. I don't think he deserved more credit than he got.

Theiler had actually done nothing more than confirm a hypothesis that was about 30 years old – even 'Spirits' can sometimes miss the boat. But he confirmed it with a vengeance. Within a year he had chemical proof that the grazing was definitely phosphorus-deficient and had followed the phosphorus cycle over the seasons; studied bone-craving in all its manifestations; produced lamsiekte by feeding cattle on rotten bones; developed a prophylactic dosage programme for lamsiekte with bonemeal; and produced the bacterial toxin concerned in culture – at this stage it was a mixed culture of anaerobes, but he could produce lamsiekte by injecting the supernatant fluid into cattle.

Perhaps even more important was Theiler's concurrent discovery of the crucial importance of phosphorus in the growth and production of cattle. A photograph published shows some animals of the same age but two of these animals that did not receive bonemeal have obviously lost a year's growth.



“Perhaps even more important was Theiler's concurrent discovery of the crucial importance of phosphorus in the growth and production of cattle. A photograph published shows some animals of the same age but two of these animals that did not receive bonemeal have obviously lost a year's growth.”

What was Theiler like as a person?

He knew that he had become indispensable to the ZAR and post-Anglo-Boer War governments and used this knowledge to befriend powerful people, especially politicians such as Lord Selborne, General Louis Botha and later even General Smuts. If he did not get what he thought he needed badly or was criticised in Parliament, as

happened a few times with lamsiekte, his strategy was to threaten to resign. Botha fell for this 'blackmail' time and again.

This was perhaps not so strange. At that stage Theiler was almost synonymous with the Department of Agriculture, Botha having little else to brag about in Parliament than the achievements of this incredibly successful scientist. He just could not afford to lose the services of such a dynamic person. Theiler obtained all sorts of concessions like lengthy sabbatical leave on three occasions to study in Switzerland.

How he managed to be so productive despite all these visits is a miracle. When other divisions had their budgets cut, Theiler got what he had asked for or even more. He sometimes even used this tactic to improve his own employment position.

Theiler also used his fame to network with the top veterinary scientists overseas, who soon recognised him as one of their peers, the expert on African tropical diseases. He

attended three international veterinary conferences in succession, the first in Baden-Baden in 1898, only 2 years after his appointment as government veterinarian in the ZAR. People like Laveran (France), Bang (Denmark), Hutyra (Hungary), Nocard (France), Peroncetto (Italy), Dschunkowsky (Russia) and Theobald Smith (USA) and others became his close colleagues.

Theiler was almost 'obsessed' with continuing education for himself, especially at Swiss universities. Why? The most likely explanation is that, as a multidisciplinary who personally directed every research project at his institute, he thought it was essential to know as much of the discipline as the scientist(s) concerned did. When he later appointed non-veterinary scientists, like the excellent biochemist Harry Green, this need became even greater. Theiler was in awe of the basic or 'mother' sciences such as botany, chemistry, biochemistry and zoology: 'Foster by all means the pure sciences. They are, in the hands of experts, the medium of solving the many economic problems of South Africa', he said. But he ensured that his handpicked successor, P.J. du Toit (Ph.D.), also obtained a veterinary degree before he appointed him!

Theiler may have been a spirit, but he was no angel. His leadership style was very autocratic and he consequently lost some excellent researchers, foremost being his compatriot K.F. Meyer who left in 1910 and became a very eminent scientist in the USA. Another was Watkins-Pitchford. Theiler had more than 200 publications to his credit. However, there is not a single one of which he is not the senior author, if not the sole author. I strongly doubt whether he always gave sufficient credit to his co-workers. On the other hand, he seemed to have no qualms when his researchers published under their own names, as long as he had vetted their articles.

Theiler detested bureaucracy. His open lines of communication with Botha and Smuts functioned well and he won his 'battles' by 'blackmailing' them. But when General Kemp appeared on the scene as Minister of Agriculture in 1924, in the new government of General Hertzog, 'blackmail' backfired. Kemp wanted to get rid of him – probably Theiler's 1914 knighthood and the Sir Arnold title rankled with this ex Boer general. Had it not been for the undoubted intercession of his deputy, P.J. du Toit, Theiler would have been pensioned off at the age of 57. Theiler then withdrew from the fray leaving P.J. du Toit in charge of the administration of Onderstepoort while he concentrated on his research, his students and his famous annual reports.

Theiler's 'bitterness burst its bounds', according to his biographer Gutsche, when he was retired at 60 in 1927 'on the grounds of superannuation' without even being offered the emeritus appointment he had expected. He left South Africa on a world trip, was feted wherever he went and offered some tempting appointments, for example in Australia, and at various universities, which he refused, settling down in Switzerland with his bones and

other pathological specimens to do research and study at universities, and going on the personal holidays he had never taken while at Onderstepoort. He returned to South Africa in 1934, when Denys Reitz replaced Kemp as Minister of Agriculture, to work (unpaid) at Onderstepoort. He went to London in 1936 to attend a conference at which his son Max – a medical doctor employed in the USA – was due to speak on his research on the development of a vaccine against yellow fever, for which Max was later awarded a Nobel prize, but died from a heart attack shortly before the conference was due to begin.

Is the 'spirit' still alive today?

To the elements of Theiler's legacy I would add:

- R&D aimed at serving farmers, large as well as small
- A devotion to research
- Workaholic (if there is such a word).

When I was at Onderstepoort (1956–1988) all these elements were still very much in place. Being paid by the government to work at a research institute where idealism prevailed over materialism was a rare privilege. My contact with Onderstepoort is limited these days. However, when I have the opportunity to wander on the beloved, peaceful old campus, particularly late in the day, if not at night, I get a distinct feeling that that 'Spirit' is still around.

Acknowledgements

My sincere gratitude is due to Ms H. Heyne of the Onderstepoort Veterinary Institute for assistance with the preparation of a PowerPoint presentation. I also wish to acknowledge the use of material from the book *There was a man. The life and times of Sir Arnold Theiler K.C.M.G. of Onderstepoort*, published by Howard Timmins, Cape Town and from the archives of the Onderstepoort Veterinary Institute.

This paper was presented at the Onderstepoort Centenary Conference in 2008 and published in the *Onderstepoort Journal of Veterinary Research* (2009), 76, , 3-7.

References

- BIGALKE, R.D. & VERWOERD, D.W. 2008. A century of research achievements by the Onderstepoort Veterinary Institute. *Transactions of the Royal Society of South Africa*, 63: 31–51.
- DU TOIT, P.J. & JACKSON, C. 1936. The life and work of Sir Arnold Theiler. *Journal of the South African Veterinary Medical Association*, 7:134–186.
- GUTSCHE, T. 1979. *There was a man. The life and times of Sir Arnold Theiler K.C.M.G. of Onderstepoort*. Cape Town: Howard Timmins.
- HENNING, M.W. 1956. *Animal diseases in South Africa* (3rd ed.). South Africa: Central News Agency.
- JANSEN, B.C. 1977. *The growth of veterinary research in South Africa, in A history of scientific endeavour in South Africa*, edited by A.C. Brown. Cape Town: The Royal Society of S.A.
- NEITZ, W.O. 1957. Theileriosis, gonderiosis and cytauxzoonosis:

- a review. *Onderstepoort Journal of Veterinary Research*, 27:275–430.
- THEILER, A. 1903. Rhodesian tick fever. *Transvaal Agricultural Journal*, 1:93–110.
- THEILER, A. 1909. A contribution to our knowledge of gall-sickness. *Transvaal Agricultural Journal*, 8:423–435.
- THEILER, A. 1911. Further investigations into anaplasmosis of South African cattle. *First Report of the Director of Veterinary Research*: 7–46.
- THEILER, A., VILJOEN, P.R., DU TOIT, P.J., MEIER, H. & ROBINSON, E.M. 1926. Lamsiekte (Parabotulism) in cattle in South Africa. *Eleventh and twelfth reports of the Director of Veterinary Education and Research*: 822–1361.
- VILJOEN, P.R. 1918. Investigations into lamsiekte in cattle. *Fifth and sixth reports of the Director of Veterinary Research*: 255–320.