A brief history of botulism in South Africa

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ABSTRACT

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When looking back into the history of botulism and contemplating the final understanding of the syndrome and the ultimate solutions, there are four facets that stand out clearly. The first is that much of the solution was guided by astute observations, curious travellers, committed veterinarians and particularly farmers themselves who were able to relate the occurrence of the condition to climatic and grazing conditions. Secondly, there was the identification of the osteophagia and pica syndrome which led to the feeding of bone-meal as a successful mitigating measure as well as the establishment that botulism was not due to a plant poisoning. Thirdly, the solution of the problem depended on the integration of experience and knowledge from diverse disciplines such as soil science, animal behaviour and husbandry, nutrition, botany and ultimately advanced bacteriology and the science of immunology. Finally it required the technical advancement to produce toxoids in large quantities and formulate effective aluminium hydroxide precipitated and oil emulsion vaccines.

INTRODUCTION

When contemplating the history of botulism (lamsiekte) in South Africa, one of the first realizations is that the initial observations were not done by scientists or veterinarians but by travellers such as Le Vaillant in 1881 (Le Vaillant 1896). This was followed by the visits and reports by Lichtenstein (1812), a medical doctor, James Bleckhouse, an evangelist and Professor Ferdinand Strauss from Stuttgart, who all noted peculiar grazing behaviour (Gutsche 1979). They must have been shocked by the revelation of the hot, dusty and dry climate as well as the prevailing poverty in the north-western parts of South Africa. The important concept to learn and remember from this phase is that all research starts by observation astute and deductive—and this led the government of the time to realise that lamsiekte was not only a disease or aberration but a serious community problem. This in turn led to a more formal approach by the Cape Government who obtained the services of Brentford and Hollier-Little and appointed Duncan Hutcheon at Port Elizabeth in 1880. In cooperation with Gammack and Jotello Soga, working in Kimberley, it was established that lamsiekte and stiffsickness were the same condition; both associated with malnutrition.

EARLY RESEARCH

Further research was subsequently done by Spreull at Koopmansfontein and Borthwick in Grahamstown. Progress was, however, impeded by the disruption caused by the Anglo-Boer war (1899–1902). The complexity of the condition was nevertheless realized. Frei was of the opinion that the condition was caused by an infectious agent whereas Burtt-Davey believed that a toxic plant was involved, a theory that was initially shared by Theiler. In the meantime the disease continued to cause cattle losses in the Vryburg area and Bechuanaland (now Botswana). A turning point came in 1911 that was instigated by Charles Butler. He revived the Bechuanaland farm-

ers association and persuaded the authorities to take action. A meeting was held at Vryburg on 8 June 1911 where J. Burtt-Davey (Government Botanist) gave a lecture, Arnold Theiler addressed the farmers and they in turn made the farm "Armoedsvlakte" as well as cattle available for feeding experiments. This new initiative gave rise to further intensive research *inter alia* by the Swiss botanist Marguerite Henrici in 1914. P.R. Viljoen, previously from the Allerton Laboratory in Natal, was also transferred to "Armoedsvlakte" in 1914. But once again, progress was impeded by human conflict—both collectively and individually. The major element was the outbreak of the First World War and the reticence of government to purchase "Armoedsvlakte". This situation was compounded by the resignation of Arnold Theiler but he fortunately reassumed duty after negotiations and was assigned to "Armoedsvlakte" in 1919. Concomitantly PH de Kock became president of the farmers union and actively propagated the employment of a chemist and botanist.

THE FINAL SOLUTION

Within days of being posted to "Armoedsvlakte" Theiler, through astute and intensive observations, conceived his theory which he recorded as follows:

> *"Soil and vegetation deficient in phosphorus (remediable with phosphatic manuring) produced pica or osteophagia in cattle compelling them to find phosphorous in putrid bones and carcase material (remediable by feeding bone meal and other phosphor-rich material).*
>
> *The position in carrion of all sorts (dead meerkats, spring-hares, ostriches, tortoises, household refuse, etc.)—a toxiogenic saprophyte (later identified as the cause of a form of botulism) could be eliminated by clearing pasturage of all such material"* (Gutsche 1979)".

Based on this perception, initial solutions were developed of which feeding of bone-meal and phosphate was the most important. The transfer of Robinson to Onderstepoort from Allerton would herald the research that ultimately established the relationship between consumption of carrion and intoxication by the *Clostridium botulinum* exotoxin. In his 12th report, Theiler highlights the contributions by P.R. Viljoen, H.H. Green, P.J. du Toit and E.M. Robinson (Theiler 1927). The first isolation of *Clostridium botulinum* was accomplished by Du Toit and Robinson in 1928 and the final identification was achieved by Robinson in 1930. An effective vaccine was produced by Mason (Mason, Steyn & Bisschop 1938) and refined by Jansen (1971a, b) and Jansen, Knoetze & Visser (1976).

A fundamental truth emanating from this review is that a final solution required integration of indigenous knowledge, experience and observations of farmers with disciplines such as epidemiology, botany, toxicology, pathology and bacteriology.

This observation is ultimately in harmony with the current philosophical perspective of:

> "*One world, one medicine, one health*".

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