



## A century of teaching veterinary parasitology in South Africa – Lessons learnt

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### ABSTRACT

Finding a healthy balance between classical parasitology and clinical veterinary medicine remains a challenge. Veterinary Parasitology, of vital interest in sub-Saharan Africa, has always featured prominently at the Faculty of Veterinary Science, University of Pretoria (founded in 1920). The faculty was initially an integral part of the Onderstepoort Veterinary Institute (OVI), and parasitology was taught by specialist researchers from OVI – a cult of total coverage prevailed. Presenting three separate courses – ectoparasitology, helminthology and protozoology – continued for many decades. From 1949 to 1973 an attendance course in veterinary parasitology was presented in the final academic year. This was revived in 1995, with a “refresher” in parasitology for final-year students (during their clinic rotation), including diagnostic parasite identification and problem-solving group discussions (prepared and led by students). Student contact time (including practical classes and assessments), initially 80 h/discipline/year, was gradually reduced. A species-based approach (introduced in 1998) had a major impact - an introductory course in general parasitology was followed by fragmented lectures in the subsequent 2 years on key parasitic diseases in the species-based subjects. In 2013 the curriculum reverted to being discipline-based, i.e. all aspects of parasitology and parasitic diseases covered during one academic year. The 3 sub-disciplines are included in a 2-semester course, with a total contact time of 100 h, which barely meets the minimum recommended by the WAAVP. Various lessons learnt are discussed.

### 1. Introduction

The Faculty of Veterinary Science of the University of Pretoria at Onderstepoort, South Africa, will be celebrating its centenary in 2020. This seems an opportune time to review the events shaping the structure of its veterinary parasitology curriculum, to assess the current situation and to spell out lessons learnt.

Finding a healthy balance between classical parasitology and clinical veterinary medicine at the undergraduate level remains a challenge. As teachers of veterinary parasitology, our core function is delivering functional veterinarians and not specialist parasitologists. This requires a skilful balancing act. On the one hand, practising veterinarians need not be overburdened with details that really belong in classical parasitology. On the other hand, as applied scientists, veterinarians should grasp basic principles concerning parasitology; otherwise, the subject content will remain empiric knowledge probably acquired by rote learning. We have hopefully progressed beyond that approach!

Therefore, an ideal curriculum would be grounded in basic principles, e.g. understanding various basic lifecycles and having sufficient

knowledge of parasite morphology to be able to recognise a specific parasite, or at least delegate it to a specific group. The second arm would concern the veterinary importance, e.g. host-parasite interactions and resultant clinical signs, control and prevention of disease. Parasites covered in the curriculum should, in my opinion, only be those that are relevant to the geographic area that the veterinary faculty is serving. That in itself would be a built-in safeguard against overloading the curriculum. The ideal academic staff complement at a university where veterinary science is taught should be a healthy mix of veterinarians and classical parasitologists, i.e. zoologists, as well as immunologists and molecular biologists. This should automatically lead to a healthy synthesis, with checks and balances from all sides.

Teaching of veterinary parasitology has benefitted greatly from advances in digital imaging, animation and development of virtual microscopy. These tools do not replace basic microscopy, however. For diagnostic purposes, microscopic examination of faecal smears and blood films, for instance, remains the appropriate technology and Day-1 competency, as recommended by the American Association of Veterinary Parasitologists (Snowden et al., 2016). Practising veterinarians still frequently use microscopes, not only for parasite

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identification but also for general cytology, etc.; hands-on use of microscopes should, therefore, remain a core competency of newly graduated veterinarians (Stewart et al., 2014).

Personal interests and personality traits of academic staff as well as student behaviour can impact on curriculum, teaching and assessment in veterinary parasitology (and probably other subjects). How these factors shaped the veterinary science curriculum at the University of Pretoria is described in the following sections.

## 2. South Africa: a look at the past

The Faculty of Veterinary Science, founded in 1920 at Onderstepoort, Pretoria, South Africa, was the first of its kind in Africa. For academic purposes, it was linked to the University of Pretoria, at that stage still the Transvaal University College, which awarded a Bachelor of Veterinary Science (BVSc) degree with a five-year curriculum (Anon., 1960). At its founding, the faculty was considered an integral part of the Onderstepoort Veterinary Institute (OVI). The first Dean, Sir Arnold Theiler, was also Head of OVI and his official title was Director of Veterinary Education and Research. The OVI resorted under the National Department of Agriculture; teaching was part and parcel of the duties of certain researchers at OVI. This situation continued until 1973, when the University of Pretoria assumed full responsibility for the faculty and full-time academic staff members were appointed (Spies and Heydenrych, 1987).

Veterinary parasitology is of vital interest in sub-Saharan Africa and has always featured prominently in the curriculum at Onderstepoort. Since parasitology was initially taught by specialist researchers from OVI, it is easy to see why a “cult of coverage” prevailed.

### 2.1. Evolution of departmental structure

After the ravages of the Rinderpest epidemic, which reached South Africa in 1896, and the on-going campaign to eradicate East Coast fever (theileriosis), introduced to southern Africa in 1902, infectious diseases were obviously high on the agenda of the fledgling faculty (Penzhorn and Krecek, 1994). In 1920 parasitology was included within the topic of Infectious Diseases, taught by Theiler himself (Gutsche, 1979). Although regarding himself primarily as a pathologist, he was an accomplished parasitologist. The University of Bern, Switzerland, awarded him a doctorate for his pioneering study on equine piroplasmiasis (Theiler, 1901). The small tick-transmitted protozoan causing East Coast fever, initially regarded as immature *Babesia bigemina*, was named *Piroplasma parva* by Theiler (1904). The genus *Theileria* was established three years later and named in his honour (Bettencourt et al., 1907). Theiler (1910) identified, described and named the genus *Anaplasma* and, with a colleague, elucidated the life cycle of *Libyostongylus douglasi*, a nematode of great economic importance in the ostrich industry (Theiler and Robertson, 1915). Theiler arranged for E.V. Cowdry from the Rockefeller Institute for Medical Research in New York, who was the leading authority on rickettsias, to visit Onderstepoort, where he confirmed Theiler's suspicion that heartwater, a major scourge of cattle, sheep and goats in sub-Saharan Africa, was caused by a rickettsia, now known as *Ehrlichia ruminantium* (Cowdry, 1925a, 1925b).

The evolution of departmental structure concerning parasitology and infectious diseases is shown in Table 1. A separate Department of Helminthology was founded in 1923, under the leadership of the Italian-born Dr F. Veglia. He had been at Onderstepoort since 1911, where he did pioneering research on haemonchosis and nodular worms (Veglia, 1915, 1923). At that stage, ectoparasitology was also taught in the Department of Helminthology, but by a researcher from the Faculty of Agriculture, University of Pretoria. In 1927 Dr Veglia was succeeded by Dr. H.O. Mönning, a South African zoologist who had received a doctoral degree in parasitology from the University of Zürich in 1921 and, on Theiler's recommendation, had qualified as a veterinarian in

**Table 1**

Evolution of the Department of Veterinary Tropical Diseases at the Faculty of Veterinary Science, University of Pretoria.

Year	Name of department	
1920	Infectious Diseases <sup>a</sup>	
1923		Helminthology <sup>b</sup>
1928	Tropical Diseases and Protozoology	
1949	Protozoal and Viral Diseases	
1958	Infectious Diseases <sup>a</sup>	
1960		Parasitology
1974	Infectious Diseases	Parasitology and Protozoology
1976		Parasitology
1992	Veterinary Tropical Diseases	

<sup>a</sup> Including Protozoology.

<sup>b</sup> Including Entomology (= Ectoparasitology).

1926 (Anon., 1978). His textbook *Veterinary Helminthology and Entomology* (Mönning, 1934) gained world-wide recognition. The 4th edition was edited by Lapage (1956); protozoology was added in the 6th edition (Soulsby, 1968). A 7th edition was published in 1982, nearly 50 years after the first. Mönning's meticulous line drawings will be familiar to many parasitologists of a previous generation.

In 1925 the Department of Infectious Diseases gave rise to the Department of Tropical Diseases, which from 1928 was called the Department of Tropical Diseases and Protozoology, headed by Dr P.J. du Toit. Twenty years later (1949) Bacteriology was split off, and the department renamed Protozoal Diseases and Virology, reflecting the main research interests of Dr W.O. Neitz, who was Head of the department (e.g., Neitz, 1939, 1948, 1956). This situation lasted for 10 years; the name of the department then reverted to Infectious Diseases. These divisions reflected the composition of research groups at OVI rather than fulfilling specific academic needs. Research on heartwater was conducted by the Section Protozoology and Virology of OVI, which focused on vector-borne diseases. For reasons that are obscure today, but probably relate to personal interests, heartwater was retained in the virology course when protozoal and viral diseases were split in 1974. It remains a moot point: the causative organism, *E. ruminantium*, is a bacterium. From a functional perspective, however, it is more meaningful to include this disease, as well as anaplasmosis, with vector-transmitted protozoa. In contrast to “classical” bacterial diseases, diagnosis of these two diseases is not based on bacterial culture but rather on direct demonstration of the causative organism in blood films or brain-crush smears.

In 1960 the Department of Helminthology (which included ectoparasitology) was renamed Department of Parasitology. In 1974 it became the Department of Parasitology and Protozoology, but the latter part of the name was dropped two years later. So, for the first time, the three classical divisions of parasitology were included in a single department (even though heartwater remained embedded within virology for another decade or so). In 1992 the Departments of Parasitology and Infectious Diseases merged to form the Department of Veterinary Tropical Diseases.

## 3. Teaching the three parasitology disciplines

The various permutations in teaching the three parasitology disciplines, as well as the year of study during which they were presented, are shown in Table 2. The duration (in years) of the undergraduate programme at the faculty of Veterinary Science, University of Pretoria, is shown in Table 3.

### 3.1. A discipline-based curriculum

This was the norm from the inception of the Faculty (Table 2). Helminthology and ectoparasitology were regarded as separate entities, but protozoology was variously lumped with infectious diseases, in

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