Molecular detection and characterization of tick-borne pathogens of dogs

By

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Submitted in fulfillment of the requirements for the degree Doctor of Philosophy in the Faculty of Veterinary Science, University of Pretoria

June 2008
Acknowledgements

My sincerest gratitude goes to Prof Banie Penzhorn, for taking me under his wing, from day one, helping, mentoring, guiding and nurturing my development in the art of science.

My supervisor, Prof Banie Penzhorn and co-supervisors, Profs Frans Jongejan and Andrew Leisewitz, for their hands-on approach, scientific inputs and building of this thesis to completion.

My HOD, Prof Koos Coetzer, for his unwavering support, patience and valuable advice throughout the years.

My colleagues and friends in the department of Veterinary Tropical Diseases for their immeasurable contributions: Raksha Bhoora, for her friendship, assistance and advice in the laboratory; Ard Nijhof, for his friendship, making my stay in the Netherlands as pleasantly possible and for all the scientific inputs; Prof “Oom” Horak, Marinda Oosthuizen, Darshana Morar, Kgomotso Sibeko, Milana Troskie, Nicola Collins and AnnaMarie Bosman for their expert advice during research difficulties. I thank Prof Peter Thompson for the statistical analysis and Rhulani Nkuna for running the Trypanosoma PCR/RFLP.

Special thanks to all the clinicians, Dr M Böhm, Dr E Scheepers and Dr A Goddard, who generously made their clinical reports available for our use. Thanks to Sr Riani de Kock
for uploading the clinical reports. The staff at the SPCAs, OVAH and private clinics, who helped with the collection of blood samples.

My beautiful soul mate and partner Mmabatho Moeketsi, for your love, encouragement, patience, and being my pillar of strength.

My sisters and brothers: ausi Poppy, June, Thabo and Beni, for their unfaltering friendship and support.

My mother, for your sacrifices, love and pride in knowing that education is the key.

Dedicated to the memory of my grandmother, Morongwa Ellen Mdluli.

This work was financially supported by the Utrecht/Delta scholarship, Thuthuka NRF fund and the institutional collaboration agreement (95401) between the Institute of Tropical Medicine, Antwerp, Belgium, and the Department of Veterinary Tropical Diseases, University of Pretoria.
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Thesis summary

This thesis focuses on the molecular characterization of tick-borne parasites of dogs in South Africa. Emphasis is placed on *Babesia*, *Ehrlichia*, incidental and novel parasite infections that may cause morbidity or mortality in infected dogs. An outbreak of canine babesiosis in the Netherlands is also reported in this thesis. Molecular techniques were employed to isolate, amplify and characterize genomic DNA of these parasites to species level. During preliminary screening of blood samples collected from various sites in the country, that included the Onderstepoort Veterinary Academic Hospital, SPCAs and private clinics throughout seven provinces in South Africa, it was discovered that domestic dogs harboured a wide variety of tick-borne pathogens.

The most frequently encountered parasites in South Africa were *Babesia rossi*, a novel *Theileria* species of dogs, *B. vogeli* and *Ehrlichia canis* respectively. The parasites occurred as single or mixed infections. Incidental infections that included *B. gibsoni* and *Trypanosoma congolense* were also detected using PCR. Although it was anticipated that zoonotic Ehrlichial infections of dogs would be detected, none were found. *Babesia vogeli* was reported for the first time in South Africa although, without any clinical significance. An outbreak of autochthonous canine babesiosis in the Netherlands was confirmed to have been caused by *Babesia canis*. *Dermacentor reticulatus* was implicated in the transmission of the parasite to naïve dogs. Clinical significance of *B. rossi* and the novel *Theileria* sp. of dogs was evaluated. *Babesia rossi* was found to be of significant clinical importance. Genotyping of *B. rossi* isolates revealed that parasite
genotypes could be correlated to disease phenotype. Additionally, specific genotypes could also be associated with fatalities. Although the characterization of the *Theileria* sp. in dogs was a first report in South Africa, the clinical significance of this infection in dogs appeared to be poorly resolved. The dangers of having non-endemic species becoming established in South Africa was highlighted with the incidental finding of a *B. gibsoni* infection in an imported dog.

The results of this thesis have shown therefore that populations of dogs that live in tick-endemic areas are exposed to single or multiple tick-borne pathogens. These pathogens continue to cause morbidity and mortality in susceptible dogs. Correct diagnosis (supported by molecular diagnostic tools) followed by appropriate treatment offers a better understanding and management of these tick-borne pathogens. Preventative measures should be fully evaluated and applied to prevent these tick-borne pathogens from adversely affecting the canine population in South Africa and elsewhere.