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Molecular detection and characterization of tick-borne pathogens of dogs

By

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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.