

Dynamics of the association between dung beetles
(Coleoptera: Scarabaeidae) and the dog parasite
Spirocerca lupi (Nematoda: Spiruromorpha: Spirocercidae)

by

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This work is dedicated to my parents, Louw and Henriëtte du Toit

DECLARATION

I, Cornelius Andries du Toit declare that the thesis, which I hereby submit for the degree Philosophae Doctor in Entomology at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution

SIGNATURE_____

DATE_____

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Abstract

Spirocercosis is a canine disease caused by the nematode parasite *Spirocerca lupi* (Rudolphi, 1809) (Spirurida: Spirocercidae) and is a potentially fatal condition in domestic dogs (*Canis familiaris*). The larval life cycle of this parasite involves intermediate and paratenic (transport) hosts. Various species of coprophagous dung beetles (Scarabaeidae: Scarabaeinae) serve as the principle intermediate hosts. Despite extraordinary advances in biomedical research, it is unlikely that these alone will alleviate the burden of this parasitic disease in dogs.

Recently, there has been growing concern over the upsurge in incidence and reported cases of spirocercosis in domestic dogs in South Africa. There is a plethora of literature on the clinical, diagnostic and epidemiological aspects of this disease in dogs, yet no study has aimed at fully understanding the dynamic interactions between the various hosts and *S. lupi*, governed by the consequences of their behaviour under different and ever-changing environmental conditions. It is most likely that the impact of this disease is accentuated by constant changes in human demographics and behaviour.

Studies on spirocercosis in dogs have considered the consumption of the various paratenic hosts or the deliberate ingestion of dung beetles to be the main cause of

the transmission of *S. lupi* to dogs. However this study suggests that the coprophagous behaviour of dogs and the subsequent accidental ingestion of coprophagous dung beetles in or on faeces are mainly responsible for the transmission of this parasitic nematode to dogs. Changes in urban land use and subsequent changes along urban-rural gradients influence the nature of biological interactions partly due to changes in species assemblage structure and composition. Such alterations in assemblage structure of species pose a particular risk to altered rates of parasitism and disease transmission.

It is concluded that these changes in landscape use coupled to altered dung beetle species assemblage structure have influenced the pattern of events observed in this host – parasite relationship. Furthermore, the social organization of domestic dogs (pets versus feral animals) and the availability of exposed excrement as a direct or indirect consequence of human behaviour played a pivotal role in the rate these parasites are transmitted to dogs.



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