

## DECLARATION

I, **Dina Mustafa Fagir**, declare that the thesis, which I hereby submit for the degree of PhD Zoology at the University of Pretoria, is my own work and has not been submitted by me for a degree at this or any other tertiary institution.

SIGNATURE: .....

DATE: .....

# DEDICATION

To my parents ..

Mama Zaza and Jedo Mustafa

To my brother ..

Mohammed

To my Godfather ..

El-Amin El-Rayah

## ACKNOWLEDGEMENTS

I would firstly like to thank my Almighty Allah for giving me strength, courage and wisdom to be able to do this project. Then I would like to thank my supervisors for all their encouragement, brainstorming, support and guidance for the duration of my PhD project, without their assistance and comments on this work my thesis would never have been a success. I would like to thank especially Dr. Heike Lutermann for moral and financial support, her patience, motivation, her comments and reading drafts, without her guidance my thesis would not exist. I am thankful to Professor Eddie Ueckermann for his help with the identification of mites. I would also to thank Professor Nigel Bennett for moral and financial support as well as careful reading through my drafts of chapters.

I would like to express my gratitude to the Third World Organization for Women in Science (TWOWS), SIDA, The DST-NRF SARCHI Chair of Behavioural Ecology and Physiology and the NRF for funding this project. I am also thankful to Mrs. Oppenheimer for her generous contribution to fund this project.

I am indebted to Professor Ivan Horak for his help with the identification of thousands of ticks. Thank you, Ivan, for all the hours spent looking under a microscope. I would also like to thank Professor Eddie Green for helping with the identification of fleas and lice, thank you Eddie for teaching me how to identify fleas and lice, without your help and insight I would still be lost.

I am also thankful to my mentorship student and best friend Chanél Minnaar for her help in counting ectoparasite samples, and her continued support.

I am grateful to the management and staff of the Ezemvelo Nature Reserve, especially Dr. Duncan MacFadyen, Elsabe Bosch and Maroti Tou for their support throughout my fieldwork trips.

I would also like to thank all my field assistants for their help with fieldwork and their patience and tolerance to my madness and all the time we spent chasing animals no matter what the weather conditions looked like, day and night. Thank you all for the great time and laughter, without your help this project would not have seen the light of day.

I am also thankful to my parents and family for their encouragement, support and continued prayers.

To my friends, Chanél Minnaar, Mohammed Jehad Hamad, Madeleen Minnaar, Amira Osman, Areij Abd El-Gadir Ibrahim, Ishtiag Hassan Abdalla and Nina Perry thank you for your time, support and listening to me complaining and going on and on about my project and analyses. Thank you for rescuing me from locking myself in my room whenever I feel stuck with writing. Thank you for dragging me out into the light of day and fresh air for a cup of coffee or just for a walk and birding – God bless you all.

Finally, a special thanks to Human Buirski for his help and coming to the rescue during time of crises whenever my laptop decided to die on me.

## SUMMARY

Patterns of ectoparasite burden among hosts can be linked to differences in abiotic (i.e. climatic conditions) and biotic (i.e. host characteristics) factors. Although this is well documented for small mammals in the northern hemisphere, similar data for southern Africa, particularly South Africa, is scant. In addition, interspecific interactions in parasite communities may contribute to the distribution of parasites across a host population, however, they are not fully understood due to a lack of studies investigating more than one parasite species. Also, by definition parasites are detrimental to their hosts, reducing host fitness either directly by feeding off the host or indirectly by causing the host to initiate energetically expensive behavioural or immune defences.

The Namaqua rock mouse (*Micaelamys namaquensis*) and the eastern rock sengi (*Elephantulus myurus*) are two sympatric small mammals widely distributed throughout southern Africa, however they have divergent life-history traits. Despite their large geographical distribution there are no systematic studies of the parasite community of *M. namaquensis* and those on *E. myurus* are largely limited to their ticks. The present study aimed to close this gap in our knowledge by firstly assessing the ectoparasite community of *M. namaquensis* and *E. myurus* and furthermore identifying the main parasite species exploiting each host. In addition, I evaluated the effects of abiotic and biotic factors on parasite burden for these two species. In order to assess the contributions of interspecific interactions within the ectoparasite community on parasite distribution I furthermore manipulated the ectoparasite community of sengis using Frontline® to reduce the abundance of fleas and ticks over a period of two years and documented the effect of this treatment on the ectoparasite population dynamic as well

as the body condition index (BCI) of sengis. During the initial assessment a total of 43,900 ectoparasites were collected from both hosts, however, the two hosts sustained very different ectoparasitic burdens. While Namaqua rock mice harboured 23 ectoparasite species, sengis only sustained ten. The ectoparasite community of rock mice was dominated by three species of flea (*Xenopsylla brasiliensis*, *Epirimia aganippes* and *Chiastopsylla godfreyi*) and two species of tick (*Rhipicephalus distinctus* and *Haemaphysalis* spp.) whereas in sengis it was four species of tick (*R. warburtoni/arnoldi*, *R. distinctus*, *Rhipicentor nuttalli* and *Ixodes* spp.). In addition, both hosts sustained large numbers of unidentified ectoparasites. All ectoparasite species exhibited seasonal peaks in abundance coinciding with the warm/wet season probably as a result of favourable climatic conditions during spring and summer. Direct host effects on parasite abundance were observed for the rodent, while there was only weak evidence of a sex bias in parasite burden probably as a result of the contrasting mating systems (promiscuous vs. monogamous).

I observed few direct effects of Frontline® on the parasite burden or BCI in sengis. However, over the study period the abundance of the *Rhipicephalus warburtoni/arnoldi* decreased significantly, while the opposite was true for chiggers suggesting that the treatment was indeed effective and that there might be a competitive interaction between these two species. The lack of similar effects in the other three common ectoparasites might be a result of their low abundances. Although I found no direct effects of any of the main parasite species on sengi BCI, the decrease in tick abundance coincided with an increase in the BCI in sengis suggesting that ticks may have substantial fitness costs for these afrotheres. The present study highlighted the complexity of interspecific interactions within a parasite community on small mammal

populations as well as the role such interactions may play in generating the patterns of parasite distribution across their host population.

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