



Less explorative mice have more endoparasites

linking behavior, co-infection patterns and viral infection risk with the whole gastrointestinal helminth community structure in *Mastomys natalensis*



Bram Vanden Broecke¹, Lisse Bernaerts¹, Alexis Ribas², Vincent Sluydts¹, Ladslaus Mnyone³, Erik Matthysen¹, Herwig Leirs

Correspondence: bram.vandenbroecke@uantwerpen.be

twitter: @BroeckeBram

¹Evolutionary Ecology Group, University of Antwerp, Belgium

²Parasitology section, department of Biology, University of Barcelona, Spain

³Pest Management Center, Sokoine University of Agriculture, Morogoro, Tanzania

Introduction

Parasitic community structures can vary within populations, where some individuals are infected with a wider diversity of parasites than others. These variations can arise through differences in the host's behavior (or personality) and/or due to interactions among the different parasites inside the host. Nonetheless, few studies have investigated how **both the hosts' personality and co-infection patterns jointly shape the variation in parasite communities of helminths and viruses among-individuals** in a wild mammal species.

Material & methods

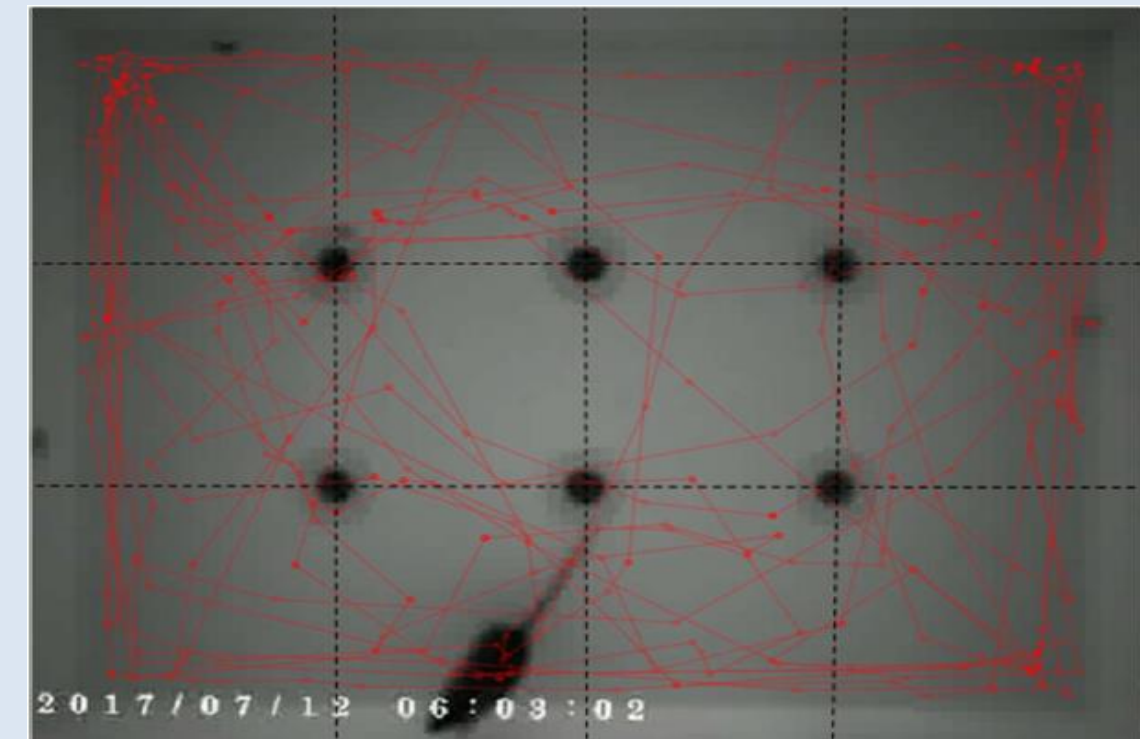
We used *Mastomys natalensis* as a model system. Fieldwork was conducted on the Sokoine university of Agriculture (Tanzania; July – September 2019). We recorded the exploration behaviour of **214 individuals** using a hole-board, after which we collected the **helminths inside their gastrointestinal tract**. We investigate **the effect exploration behaviour on the infection probability and community structure of helminths and the Morogoro virus (MORV)** using a recently developed statistical approach: the hierarchical modelling of species communities.

Conclusion

Three helminths (*P. muricola*, *T. mastomysi* and *Trichostrongylidae*) co-occurred, within an individual, more frequently together than expected by random. This **co-infection pattern could result from the same risk behavior**, since less explorative individuals were more likely to become infected with *P. muricola*, *T. mastomysi* and *Davaineidae*, which resulted in a **negative correlation between exploration behavior and helminth richness**. An alternative explanation is that chronic helminth infection reduces the availability of resources for the host, making them less explorative and more vulnerable to additional helminth and viral infections. Indeed, we have found that **individuals with antibodies against the Morogoro virus were significantly more likely to be infected with *P. muricola***. These results suggest that the **whole parasitic community**, and their interactions among each other, **should be taken into account in further studies** in order to understand individual variations in parasitic infection risks.

Results

↔ (+) Positive correlation
↔ (-) Negative correlation



Helminth	Prevalence	Mean load
Hymenolepis sp.	45.33%	5.56 (1 - 98)
Protospirura muricola	35.05%	14.69 (1 - 131)
Syphacia sp.	21.03%	33.24 (1 - 283)
Trichuris mastomysi	14.02%	5.30 (1 - 30)
Gongylonema sp.	0.93%	4 (3 - 5)
Pterygodermatites sp.	0.50%	2
Davaineidae	28.04%	4 (1 - 15)
Trichostrongylidae	14.02%	18.90 (1 - 124)

