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**Inter-individual differences and parasites: effects of host behavior, space use, and physical traits on ectoparasite loads in the yellow-necked mouse (*Apodemus flavicollis*)**

ABSTRACT

Parasites often exhibit a pronounced aggregation among their hosts, but the mechanisms behind these patterns remain elusive. It is believed that inter-individual differences between the hosts – among them sex, body mass, and consistent behavioral differences referred to as ‘animal personalities’ – play a role in these host-parasite interactions. For instance, males have been observed to have higher parasite loads, possibly due to a testosterone-related immune handicap or a stronger tendency to roam in parasite-contaminated habitat than females. Moreover, animals that show higher levels of exploration in ‘open-field tests’ (which are thought to reflect their activity in natural habitat) might also be at greater risk of parasitism. To investigate this subject, we conducted live-trapping, repeated behavioral tests, parasite collection, and experimental parasite reduction in a wild population of yellow-necked mice, *Apodemus flavicollis*.

In the first part of my dissertation (Chapter I), I examined the tick and flea burdens of male and female mice, and investigated whether these burdens were influenced more by sex or body mass. I found that male mice had more ticks than females. However, this disparity was due to differences in host body mass rather than sex itself. We observed a significant positive correlation between host body mass and flea loads, but there was no indication of sex-based differences in flea abundance.

In the second part of the dissertation (Chapter II), I investigated the feedbacks between a host’s behavior, space use, and ectoparasite loads. The data revealed that the relationship between exploration in the open field and trapping-derived indices of space use was more complex than initially predicted. Specifically, while open field exploration was positively correlated with trap overlap (often used as an index of sociability), the relationship between exploration and trappability (used as an index of boldness) was not linear, but U-shaped, and there was no relationship with the average distance between captures (an index of mobility). The antiparasitic treatment effectively reduced ectoparasite abundance, but this reduction did not affect open field exploration. Among space use indices, only trappability increased in response to the antiparasitic treatment.

In summary, I explored the inter-individual traits of a wild population of yellow-necked mice, both physical – such as body mass and sex, and behavioral – personality and space use, to assess how they affect ectoparasite infestation. In addition, the complex interactions between mouse behavior, space use, and the level of ectoparasite infestation not only suggest the existence of a negative feedback loop, but also challenge the commonly proposed mechanism about how individual differences affect space use, and therefore host-parasite interactions.

Keywords: Ectoparasites, sex, body mass, animal personality, space use, negative feedback