学 位 論 文 内 容 の 要 旨

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学 位 論 文 題 名

Effects of dietary shift and altered helminth infection on the gut microbiota of two sympatric rodents in urban environments
（都市化にともなう食性と寄生虫相の改変が同所的に生息する齧歯類の腸内細菌叢に及ぼす影響）

Urban areas represent the most extreme form of anthropogenic ecosystem modification and have a pro found effect on the wildlife that inhabit them. One area of recent but rapidly increasing interest is ho w urbanization affects the gut microbial communities of wild animals. The gut microbiota is pivotal fo r proper development, nutritional upta0-ke, and immune system function and therefore essential to main taining overall health. Plasticity in what constitutes a healthy gut microbial community may aid in the successful adaption to rapidly changing environments. Although studies have shown distinct changes in the gut microbiome of urban animals as compared to conspecifics in less disturbed habitats, few studi es have investigated the underlying causes. Furthermore, differences in among species life histories suc h as dietary niche should impact how the gut microbiome is altered within urban environments due to host species-specific requirements in functionality, yet no study has investigated changes in multiple s pecies experiencing the same degree of urbanization. The focus of this thesis is to understand how the gut microbiome of two sympatric species of rodents, the large Japanese field mouse (*Apodemus speci osus*) and the grey red-backed vole (*Myodes rufocanus*), is altered within urban ecosystems and what f actors may be affecting those changes. First, I evaluated the heterogeneity in the gut microbial commu nity along the gastrointestinal tract (i.e. small intestine, cecum, colon, and rectum) of each species as well as between species differences in individuals from a more natural environment (i.e. national fores t). I found distinct differences between the small intestine and the cecum, colon, and feces in both spe

cies as well as host species-specific gut microbial communities in all gut regions. Next, I examined differences in dietary niche between urban and natural populations using stable isotope analysis and how it affects the gut microbiome of urban populations. I found that both rodent species experienced a dietary niche expansion as well as a shift towards different dietary items in concordance with their life histories within the urban environment that may be related to novel anthropogenic food resources. These dietary changes were associated with specific changes in the gut microbial community structure; however, the relationship was not always clear. Finally, I analyzed differences in the intestinal helminth communities between ecosystems and if their interactions with the gut microbial community is altered by urbanization. I found that urbanization had a negative impact on most species of helminths in both rodent. Furthermore, I found that both helminth prevalence and abundances were associated with changes in alpha diversity and community structure of the gut microbiome, but there was little consistency among gut region or ecosystem type suggesting a complex host-microbe-helminth-environmental interaction. Together, these results suggest that alteration of the gut microbiome in urban areas is species specific but determining the source of alteration is complex.