ABSTRACT

Symbiotic bacteria living with the host in so-called microbiomes have been one of the significant pillars of all aspects of animal evolution, chemical communication included. However, the phenotype, genotype, and microbiome of laboratory animals kept for generations in sterile conditions changed from their wild ancestors leading to profound differences in the laboratory results and the reality of wild animals. To describe the chemical communication in neglected wild rodents, this thesis focuses on the body parts involved in chemical communication (i.e. mouth, vagina, and intestines) and are also inhabited by microbiomes that produce metabolites with the capability of transmitting chemical signals. Using next-generation sequencing and state-of-the-art proteome and metabolome chromatography-mass spectrometry, this thesis covers the analysis of changes in the microbiome, proteome, and metabolome of wild mice in the context of transferring the wild individuals into the captivity, cohousing wild, and laboratory animals and hormonal changes during the estrous cycles. Moreover, this thesis describes and discusses the differences and similarities in the microbiome, proteome, and metabolome on the level of different species (*Apodemus sp.*), subspecies (*Mus musculus domesticus* vs. *musculus*), and environment (wild vs. laboratory origin). Results show that the core microbiome stays almost intact during the captivity in the case of oral microbiota while vaginal microbiota is less stable. For the first time, we showed that proteome and metabolome of urine transfer information about sex, the environment of origin, and the genetic background of mice. Finally, the results highlighted the high probability of functional interconnection among the vaginal proteome, metabolome, and microbiome. Our research brings comprehensive data that integrates proteome, metabolome, and microbiome results into the multi-omics picture of chemical communication among wild rodents.

Keywords: microbiome, metabolome, proteome, wild rodents, chemical communication, olfaction, mouse