

## The Role of Oral and Intestinal Microbiota in European Badgers

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**Abstract :** This study investigates the oral and intestinal microbiomes of wild-living European badgers (*Meles meles*) and will relate inter-individual differences to social contact networks, somatic and reproductive fitness, varying susceptibility to bovine tuberculosis (bTB) and to the olfactory advertisement. Badgers are an interesting model for this research, as they have great variation in body condition, despite living in complex social networks and having access to the same resources. This variation in somatic fitness, in turn, affects breeding success, particularly in females. We postulate that microbiota have a central role to play in determining the successfulness of an individual. Our preliminary results, characterising the microbiota of individual badgers, indicate unique compositions of microbiota communities within social groups of badgers. This basal information will inform further questions related to the extent microbiota influence fitness. Hitherto, the potential role of microbiota has not been considered in determining host condition, but also other key fitness variables, namely; communication and resistance to disease. Badgers deposit their faeces in communal latrines, which play an important role in olfactory communication. Odour profiles of anal and subcaudal gland secretions are highly individual-specific and encode information about group-membership and fitness-relevant parameters, and their chemical composition is strongly dependent on symbiotic microbiota. As badgers sniff/ lick (using their Vomeronasal organ) and over-mark faecal deposits of conspecifics, these microbial communities can be expected to vary with social contact networks. However, this is particularly important in the context of bTB, where badgers are assumed to transmit bTB to cattle as well as conspecifics. Interestingly, we have found that some individuals are more susceptible to bTB than are others. As acquired immunity and thus potential susceptibility to infectious diseases are known to depend also on symbiotic microbiota in other members of the mustelids, a role of particularly oral microbiota can currently not be ruled out as a potential explanation for inter-individual differences in infection susceptibility of bTB in badgers. Tri annually badgers are caught in the context of a long-term population study that began in 1987. As all badgers receive an individual tattoo upon first capture, age, natal as well as previous and current social group-membership and other life history parameters are known for all animals. Swabs (subcaudal 'scent gland', anal, genital, nose, mouth and ear) and fecal samples will be taken from all individuals, stored at -80oC until processing. Microbial samples will be processed and identified at Wayne State University's Theis (Host-Microbe Interactions) Lab, using High Throughput Sequencing (16S rRNA-encoding gene amplification and sequencing). Acknowledgments: Gas-Chromatography/ Mass-spectrometry (in the context of olfactory communication) analyses will be performed through an established collaboration with Dr. Veronica Tinnesand at Telemark University, Norway.

**Keywords :** communication, energetics, fitness, free-ranging animals, immunology

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