

During the last three decades we have been gaining a new perspective on the ubiquity and importance of the microbiota, i.e. all the microorganisms, mainly bacteria, but also fungi, viruses and parasitic worms, which inhabit animals body, for many aspects of hosts live. From the beginning, the main focus has been on the gut microbiome, which has proved not only to influence gastral system but also to have far reaching effects at the organism-level, e.g. on physiology, nervous and immune functions and behaviour. The interactions of microbiome with behaviour, including repeatable behaviours differing among individuals, i.e. personalities, have been since studied mainly in the context of human physical and psychical, behaviourally expressed deficits and disorders, e.g. schizophrenia and depression. Very promising, experimental microbiome transfers and other manipulations resulted in spectacular changes in personality traits, e.g. making bold mice shy and vice versa, opening perspective for therapeutic use of such manipulations in curing microbiome-related diseases and improving human health. However, how microbiome affects individual fitness, i.e. not the well-being but the effectiveness of spreading ones genes, a metric crucial from the perspective of individual, measured usually by the reproductive success, is little explored. Also, the role of personality in this context has not been studied, although other studies have shown that personality traits do affect fitness. In my previous project I showed that bold guppy males have higher reproductive success than their shy counterparts. Here, I will use the guppy model to test the intriguing possibility that the fitness benefit of personality is dependent on microbiome abundance and composition, by transferring microbiome of very bold or very shy males into two groups of individuals, and statistically testing the effect of this manipulation on change in their boldness level. A second key element of the puzzle will be the immune system, in particular, genetic variation in one of the important immune genes form so called major histocompatibility complex, responsible for recognising pathogens and suspected to play an important role in microbiome regulation by host. Genetic variants of this gene will be identified in experimental fish and any changes in personality attributable to this variation will be detected by statistical analyses. Summarizing, the present project will allow to check if microbiome, by determining personality, may be responsible for differentiation in fitness, which from the individual perspective is crucial for spreading own genes, and from the population perspective shapes the set of traits, the size and viability of population. In this respect, and taking into account that I will also check if animals possess genetic predispositions influencing their ability to establish the microbiome, the project may also contribute to finding new ways to help survive endangered populations and species.