Variation in the gut microbiome is associated with multiple traits in mammals, ranging from behavioural and neurotypical traits to immunity, disease resistance and metabolism. There is also growing evidence that at least some mechanisms are causal, with poor health conditions caused by variation, or changes in the variation, of the gut microbiome. Gut microbiome variation is largely shaped by environmental factors, in particular social environment, and diet. Variation in food source, nutrient composition and nutrient quality, particularly in early life are likely to play a larger role in birds, where chicks hatching from eggs are not primed with the microbiome of their mother. Thus, we can predict variation in the gut microbiome of avian offspring born during periods of temporal fluctuation in prey availability.

Recently, changes in seasonal food availability have become more pronounced for organisms that experience a mismatch between own and prey phenology. Climate change can lead to advancing phenologies, in particular in temperate regions. However, this can mean animals need to rely on different food sources if phenology of prey does not follow the same advance, which might lead to potentially more diverse food items, and thus different gut microorganisms. As the early life gut microbiome likely determines the adult gut microbiome, a mismatch in the timing of breeding can have lasting consequences through variation in the gut microbiome, and consequences thereof.

However, not much is known about the role of the microbiome in birds. While we have shown that the early life environment plays an important role contrasting a relatively small role of genetic relatedness, studies on wild population remain rare.

In this project we will test the hypotheses that (a) differences in early life diet affect early life, and adult avian microbiome, that (b) the avian microbiome will vary with timing of breeding, and that (c) this can lead to long-lasting fitness consequences.

We will test this using an experimental approach in a wild population and in aviary birds.