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AREA OF EXPERTISE:	Metagenomics and microbial ecology
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DISSERTATION TITLE: *Spilling the guts: Investigations of the Atlantic cod intestinal microbiome*

The community of microorganisms living on the inner and outer surfaces of humans, animals, plants and fungi is called the *microbiome*. In human and animals, the highest abundance of microbes is found in the intestines, where many are involved in important functions in the host, some live in "neutral" partnerships, while others may cause disease. The ecologically, economically and culturally important Atlantic cod represents a unique study system of the intestinal microbiome for fundamental as well as applied purposes. The cod lacks the *MHC II-complex* of the adaptive immune system, which plays a role in administering the bacterial content of the body. This likely affects how the cod interacts with its intestinal microbiome. Further, attempts on cod aquaculture has failed due to poor fish health, while we know that gut bacteria may play an important role in protective immunity. Studies of the Atlantic cod intestinal microbiome may therefore provide valuable information on the interplay between the gut microbial community, the host organism and external factors, while also providing baseline data important for further improvement of Atlantic cod aquaculture.

In his doctoral thesis, Riiser has investigated the gut microbiome in wild Atlantic cod by extracting and reading (sequencing) the total pool of DNA in intestinal samples, the so-called *metagenome*. He has also studied how genetic and environmental factors may affect the microbiome composition. Riiser finds that the Atlantic cod gut microbiome is dominated by a small number of highly abundant bacteria belonging to the genus *Photobacterium,* regardless of geographical

location. One of these species holds the *lux*-genes responsible for "bioluminescence", the production and emission of visible light. The roles of *Photobacterium* and bioluminescence in the Atlantic cod gut is currently unclear. Further, he finds that exposure to crude oil induces a less diverse intestinal microbiome, where the relative abundance of only a single bacterial species (belonging to order *Deferribacterales*) increases. Hence, this bacterium is a potential biomarker for crude oil exposure in fish. Finally, by comparing the gut bacterial communities in Norwegian coastal cod, Northeast Atlantic cod ("skrei") and related codfishes, Riiser finds that environmental rather than genetic factors are the main drivers in determining the gut microbiome composition. The findings in Riisers' doctoral thesis serve as an important platform for further studies of the valuable Atlantic cod.