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AREA OF EXPERTISE: Comparative immunology and adaptive evolution
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DISSERTATION TITLE: *Evolutionary and functional insight into the teleost immune system – lessons learned from Atlantic cod and other teleosts*

The general view has been that the immune system of fish is directly comparable with that of mammals. Solbakken demonstrates in her thesis that this is not the case. By a detailed characterization of the Atlantic cod immune system, Solbakken shows that Atlantic cod has evolved different genetic prerequisites for disease prevention and defense compared to other investigated model species. Furthermore, Solbakken has similarly characterized additional 66 species, both closely and distantly related to Atlantic cod, showing great diversity in their genetic basis for immunity. Collectively, this demonstrates that bony fish overall use different immunological strategies to fight infection. In her thesis, Solbakken finds that the immunological diversity in Atlantic cod and other cod-like fish correlate with significant changes in the adaptive immune system. Furthermore, for fish in general, Solbakken shows that the immune system has been shaped by past changes in climate and oceanography.

Solbakken has also performed gene expression studies in Atlantic cod. In particular she has studied the potential changes in the generation of proteins from certain genes as a response towards infection or vaccination. She found clear interactions between the host and the pathogen, triggering the innate immune system through classic patterns of gene expression. Intriguingly, Solbakken discovers alternative signaling pathways possibly contributing to the defense as the infection progresses. In support of this, Solbakken also finds that vaccination in Atlantic cod does not lead to a classic establishment of adaptive immunity and immunological memory. Collectively, this suggests that Atlantic cod and other cod-like fishes are less amenable to classic vaccination procedures due to their usage of alternative defense strategies.