

Mapping immune genes in salmon

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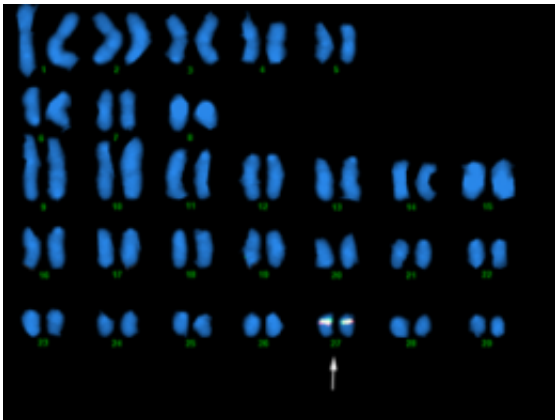


Morten F. Lukacs' doctoral research at The Norwegian School of Veterinary Science has identified and mapped a group of immune genes that are the key to warding off infectious agents such as viruses and bacteria in salmon.

The Norwegian fish farming industry is continually growing and the production of Atlantic salmon is one of the country's flagships. One of the problems facing the industry is the threat from viral diseases and parasites, and it is difficult to find effective vaccines against these. But by increasing our knowledge of how salmon defend themselves against bacteria and viruses, we can develop better vaccines and breeding tools.

Salmon have an [immune defence](#) system designed to combat both bacterial and viral diseases, but we still do not know exactly how it

works. One group of genes, called MHC, which can be found in everything from sharks to humans, is known to affect the development of diseases, such as diabetes in humans and [viral infections](#) in chickens. Earlier studies have also shown that in salmon, these genes affect the ability of the fish to withstand [viruses and bacteria](#). In order to discover whether these effects are due to MHC or to closely linked genes, Lukacs carried out a characterization of the areas of DNA where [MHC genes](#) are localised in Atlantic salmon.



Fluorescence in situ hybridization (FISH), BAC clones, showing MHC genes location in two duplicated regions in Atlantic salmon: Location of MHC class IA region on chromosome 27, MHC class IB region on chromosome 14. Photo: Ruth Phillips

Through his research, Lukacs has shown that most of the MHC class I genes are to be found in two duplicated areas which have undergone an extensive reshuffling, compared to those of the [rainbow trout](#). These two species of fish are very closely related in their development, but they react differently to, for example, various kinds of viruses.

By mapping the genes, Lukacs found 16 MHC genes, of which many

may have new and interesting functions. The overall results of this doctoral research provide a solid platform for the understanding of MHC genes in salmon and for further studies of how these genes affect the fish's defence system against infectious agents.

Morten F. Lukacs defended his doctoral thesis on 29th September 2011 at The Norwegian School of Veterinary Science. The thesis is entitled: "Characterization of Major Histocompatibility Complex Class I and II Regions in [Atlantic Salmon](#)".

Provided by Norwegian School of Veterinary Science

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