



## **MASTS PECRE Final Report: How to improve gill health in aquaculture?**

### **Fellow:**

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### **Host Institution:**

School of Biological Sciences  
University of Aberdeen.

### **Hosting Faculty:**

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### **Background:**

Fish health management with effective control of diseases is a crucial process for sustainable aquaculture. A major current problem faced by Atlantic salmon farming in Scotland relates to gill health issues with high impacts on fish performance at sea. Currently there is limited knowledge underlying pathology of gill disease as well as immune responses in gills towards different pathogens. Gill health issues are also gradually affecting Indian aquaculture and so can be viewed as a global concern. Improvement of gill health in aquaculture carries importance in this scenario. As a part of the project, I visited The Centre for Genome-Enabled Biology and Medicine (CGEBM) and got introduced to next generation sequencing (NGS) by Sophie Shaw and Ewan Campbell. NGS of Atlantic salmon gills from fishes experimentally infected with amoebic gill diseases has taken place at CGEBM recently. During the tenure I also got trained in qPCR analysis of individual (immune) gene expression which will enable me to analyse gill health issues in Indian aquaculture. This exchange will help to enhance the collaboration between MASTS, University of Aberdeen and Kerala University of Fisheries and Ocean Studies.

### **Interaction with MASTS community:**

I feel honoured to work in an internationally recognised fish immunology laboratory at the School of Biological Sciences, University of Aberdeen, a MASTS institution. I had a nice time of companionship with the group of Prof. Chris Secombes, who helped me to gain a background in the scientific approaches they put forward for the identification of pathogenic agents as well as diagnostic strategies in diseased fishes, like amoebic gill disease in Atlantic salmon and proliferative kidney disease in rainbow trout. I had productive discussions with Prof. Sam Martin, Dr Tiehui Wang, Dr. Dawn Shewring, Dr. Fuguo Liu, Dr Ting-Yu Wang, Anna Harte and Marc Faber in the team. A visit was also made to the Institute of Medical

Sciences, where Prof Pieter van West introduced the on-going work on saprolegniosis in salmon, and gave a tour of the facilities there. Lastly, at the Marine Scotland Science marine laboratory in Aberdeen Eann Munro went over the current processes for disease diagnostics in the aquaculture industry in Scotland, with discussion of the timelines from receipt of samples to reporting.

### **Outputs completed and expected:**

During the MASTS tenure, I was involved in analysis of immune gene transcripts in fish with gill health problems. This ranged from primer designing, RNA isolation and cDNA synthesis, through to qPCR measurement to analyse the individual expression of genes (such as IL-1B, IL-8 and CXCL11\_L1/rIP). Infected fishes were compared with the control fishes. In addition, I was also involved in training on ELISA to determine the antibody response to parasite antigens using fish sera. Apart from the method trainings acquired, it was also very informative to understand the regulations related to animal work research in the UK and essential biosecurity safety requirements needed for pathogen work with aquatic animals.

### **Future Plans for building on the PECRE support:**

The training undertaken during the MASTS fellowship period was very productive in understanding the pathogenic infections associated with health issues of farmed fish. The techniques used here will be applied to Indian aquaculture where I hope to help overcome the same issues we face in related aspects (ie different fish species and causative agents). Above all, this visit has paved the way to a great opportunity to open up scientific collaborations and future exchange visits between University of Aberdeen and Kerala University of Fisheries and Ocean Studies, Kerala with help from the MASTS scheme of fellowships.

### **Award size and expenditure:**

Total award:	£5,200
Travel	£1,000
Subsistence	£4,200

### **Acknowledgements:**

I am thankful to MASTS for the PECRE award and the opportunity to visit Scotland which helped to initiate healthy collaborations with the marine sector here. I am indebted to Prof Chris Secombes for his constant support to make this opportunity possible. I deeply thank Dr. Fuguo Liu and Dr Ting-Yu Wang for their support and discussions regarding transcript analysis. Dr. Dawn Shewring is warmly acknowledged for making my time fruitful and Dr. Tiehui Wang for constructive discussions. I am thankful to Anna Harte for all her time and support, and Marc Faber for ELISA training. Abdo Alnabulsi and Dr. Ayham Alnabulsi are also acknowledged for their support with antibodies.