



**MASTS PECRE Final Report:  
Development of Assays to Detect Rainbow Trout IL-22,  
A Key Regulator of Antimicrobial Responses**

**Fellow:**

Dr Yamila Carpio,  
Head of Veterinary Immunology Project,  
Animal Biotechnology Department,  
Center of Genetic Engineering and Biotechnology,  
Havana, Cuba.

**Host Institution:**

School of Biological Sciences  
University of Aberdeen.

**Hosting Faculty:**

Prof. Chris Secombes  
Scottish Fish Immunology Research Centre (SFIRC)  
University of Aberdeen.

**Background:**

Disease issues impact on aquaculture productivity. Whilst many effective treatments exist, such as vaccines and immunostimulants, we know little of what mechanisms underlie disease resistance in fish and this hinders development of new treatments. The goal of this project was to study one of the key regulators of antimicrobial responses, interleukin (IL)-22, which has been shown to be associated with mucosal responses and is one of the few immune genes for which increased transcript levels (in gills) have been associated with vaccine-induced protection. The project took advantage of recently developed monoclonal antibody against rainbow trout IL-22 that were available at SFIRC, with the aim to optimize analytical methods for IL-22 detection. I visited SFIRC to undertake this work for two-months, from September to October 2017 inclusive. During this time I helped develop these methods, and in addition was trained in approaches to study immune responses in fish following stimulation with immune modulators and infection. This exchange has enhanced international collaboration between the MASTS community, Aberdeen University and the Center of Genetic Engineering and Biotechnology (CIGB), and has helped establish new collaborative links between Scotland and Cuba.

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

During the visit to Scotland I was an active member of the School of Biological Sciences at the University of Aberdeen, a MASTS institution. I interacted with many of the fish immunology “team”, and in addition to Prof Secombes, I collaborated with Dr Tiehui Wang (a past MASTS fellow), Dr Jun Zou, Dr Jason Holland, Dr Dawn Shewring, and many of the PhD students in the group.

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

During the visit I undertook three aspects of method development to detect IL-22:

- 1) Western blotting
- 2) Immunohistochemistry
- 3) FACS analysis

Immunomodulation of in vitro cultured cell suspensions and tissue explants was undertaken initially, in order to increase the number of IL-22 producing cells and IL-22 protein, to determine optimal conditions for detecting IL-22 expression. Subsequently tissues from infected fish were also used. FACS analysis in particular proved to be a sensitive means to assess the number of IL-22 producing cells. Two antibodies (L7, L8) were tested, and L8 proved to be the most useful. In addition to training in the above methods I was also training in the biosecurity requirements needed for aquatic pathogen work, in addition to discussion of the regulations governing animal work in the UK more generally, which was very informative.

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

Professor Secombes visited CIGB in December and gave a talk at the International Biotechnology conference we hosted. He has agreed to be involved in the Organizing Committee of the next International Conference we will hold, “BioAqua2018: from basic to applied science”. This will be a great opportunity to keep the links strong between CIGB and SFIRC, to introduce Professor Secombes to the staff and students at CIGB interested in aquatic health research and to discuss future opportunities for joint funding.

I also established the first steps of collaboration with Vertebrates Antibodies Ltd and the School of Biological Sciences to develop and characterize monoclonal antibodies against different tilapia cytokines.

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

Total award:	£4,500
Travel	£1,200
Subsistence	£3,300

### **Acknowledgements:**

I would like to thank MASTS for the PECRE award and the opportunity to visit Scotland and establish links to the fish health community there. A particular thanks to Prof Secombes and Dr Wang for their support and discussions, to Drs Shewring and Holland for keeping me on the right track and to Yehfang Hu for an introduction to FACS analysis. Also thanks to PhD students in Prof Secombes’ lab for hosting me so well and to Dr Alnabulsi and Dr Cash from Vertebrates Antibodies Ltd for their support with their experience in antibody work.