Travel grant: Laboratory visit to be trained to analyse oyster (Sydney Rock Oyster) histology sections

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AUSTRALIAN SEAFOOD COOPERATIVE RESEARCH CENTRE

Project No. 2012/752

This project was conducted by the University of the Sunshine Coast [Sippy Downs Drive, Sippy Downs, QLD 4556] and the Elizabeth Macarthur Agricultural Institute [Woodbridge Road, Menangle, NSW 2568]

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NON-TECHNICAL SUMMARY

2012/752: Laboratory visit to be trained to analyse oyster (Sydney Rock Oyster) histology sections

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(PROJECT) OBJECTIVES OF RESEARCH TRAVEL GRANT

To learn how to analyse stained oyster (Sydney Rock Oyster) histology sections, in order to assess the impact of salinity on the oysters (gill and mantle tissue).

NON TECHNICAL SUMMARY:

Mantle and gill are two important tissues for oysters, with some sections in the mantle producing the shell, and the gill being the site of pre-filtration and oxygen uptake. The skills to histologically analyse oyster tissue, learnt during the visit of the Elizabeth Macarthur Agricultural Institute (EMAI) in NSW will allow me to examine mantle and gill histology sections of Sydney Rock Oysters that were either non-stressed or stressed with different salinity levels. This will allow us to identify what types of gross anatomical/histological changes occur in these oyster tissues due to changes in salinity. Furthermore, we will be able to make inferences as to how it might affect the gill and mantle tissue of these oysters in their respective functions they provide for the animal.

OUTCOMES ACHIEVED TO DATE

The salinity stress exposure trial has been carried out, histology slides prepared from the gill and mantle tissue of the experimental animals, slides stained with hematoxylin and eosin and analysis of these stained slides started.

(PROJECT) OUTPUTS DEVELOPED AS RESULT OF TRAVEL GRANT:

Currently the University of the Sunshine Coast is waiting for the arrival of photography equipment that is needed to take high quality photos of the stained histology sections under different magnifications. Once the equipment arrives, the histology sections can be examined for changes in the tissue anatomy. Photos produced during the analysis can be used for the thesis and also potentially for publications, posters or presentations.

Furthermore, as a result of the EMAI laboratory visit, I learnt how to analyse my stained Sydney Rock Oyster gill and mantle histology sections by being shown what to look out for in tissues affected by stressors, for instance, disease.

ABOUT THE PROJECT/ACTIVITY

BACKGROUND AND NEED

Histology is an important technique that has a wide variety of applications in aquaculture research. For instance, histological techniques have been used to study the development of the larval digestive system of the commercially important Nieuhofii's walking catfish [1]. They have also been used to examine the intestinal histologic effects of mannan oligosaccharides, a prebiotic, on gilthead sea bream, when incorporated into a variety of different diets [2]. In addition, histological techniques were examined and are suggested to be employed as a mean to monitor the effect of insecticides and herbicides on prawns reared in an aquaculture environment [3].

While histology and its meaningful analysis are important skills to possess, most histological work conducted at the University of the Sunshine Coast heavily focuses on human histology, with some vertebrate histology, whereas knowledge about the analysis of oyster histology slides is lacking.

1. Saelee T, Kiriratnikon S, Suwanjarat J, Thongboon L, Pongsuwan K. The development of the digestive system in *Clarias nieuhofii* larvae: histology and histochemical studies. Journal of the Microscopy Society of Thailand 2011; 4(1):16-19.

2. Dimitroglou A, Merrifield DL, Spring P, Sweetman J, Moate R, Davies SJ. Effects of mannan oligosaccharide (MOS) supplementation on growth performance, feed utilisation, intestinal histology and gut microbiota of gilthead sea bream (*Sparus aurata*). Aquaculture 2010; 300:182-188.

3. Vogt G. Monitoring of environmental pollutants such as pesticides in prawn aquaculture by histological diagnosis. Aquaculture 1987; 67(1-2):157-164.

RESULTS

The skills learnt during the EMAI laboratory visit will be used to meaningfully analyse the stained histology sections of Sydney Rock Oyster gill and mantle tissue of animals exposed to different salinities.

Itinerary:

Travel to EMAI laboratory

Meeting with Dr Zoe Spiers from EMAI:

- examined EMAI slides of healthy oyster tissue to get a general understanding of what “healthy” looks like
- examined some of the pre-prepared and stained histology sections of Sydney Rock Oyster gill and mantle tissue exposed to different salinities to learn the make-up of the two tissues
- obtained advice on what to look out for in an “unhealthy” tissue

Return travel from EMAI laboratory

INDUSTRY IMPACT

PROJECT OUTCOMES (THAT INITIATED CHANGE IN INDUSTRY)

NA

SUMMARY OF CHANGE IN INDUSTRY
(What immediate changes might be expected for business/industry?)

NA

WHAT FUTURE AND ONGOING CHANGES ARE EXPECTED?
(What will be the impact?)

NA

WHAT BARRIERS ARE THERE FOR CHANGES TO OCCUR?

NA

IF NOT ALREADY HAPPENING, WHEN WILL THE CHANGES OCCUR?
(e.g. 2 businesses will adopt project findings and two more are expected to adopt findings within 12 months)

NA

WHAT IS THE LIKELIHOOD THAT THESE CHANGES WILL OCCUR?
(e.g. 50% chance that four businesses will adopt project findings)?

NA

WHAT BARRIERS ARE THERE TO ADOPTION OF THESE CHANGES AND WHAT ACTION COULD BE TAKEN TO OVERCOME THESE?

(e.g. to adopt project findings will require group training/sharing equipment/invest additional capital etc.)

NA

COMMUNICATION OF PROJECT/EXTENSION ACTIVITIES

WHAT IS THE OUTPUT THAT NEEDS TO BE COMMUNICATED?

The EMAI laboratory visit that was supported with this travel grant will allow the meaningful analysis of histology sections prepared from gill and mantle tissue of Sydney Rock Oysters exposed to different salinities. This exposure trial, where wild oysters were exposed to three different salinities is part of the PhD aimed to look at the molecular effects caused by a variety of environmental stressors (e.g. variations in salinity). Once the molecular component of the PhD study is finished, the results of the study will be communicated to the industry and the wider scientific community.

WHO IS/ARE THE TARGET AUDIENCE/S?

Industry and wider scientific community

WHAT ARE THE KEY MESSAGES?

Information about the molecular changes that occur in Sydney Rock Oysters in response to environmental stressors.

WHAT IS THE CALL TO ACTION?

(What is it you want people to do once you communicate the key message to them –i.e. what change of behaviour or action do you want them to take?)

NA

COMMUNICATION CHANNELS

(How can these messages be communicated and by who?):

Channel	*Who by*	*When*
Publications	***(International) peer reviewed journals***	***2013/2014***
Conference	***Australasian Aquaculture Society***	***2014***

LESSONS LEARNED AND RECOMMENDED IMPROVEMENTS

WHAT IS YOUR FEEDBACK?

(e.g. *What difficulties were experienced in undertaking this research and how did this affect the project, what improvements and/or considerations can be recommended for future projects in this area* and *what barriers are there to undertaking further research in this area and how could these be overcome?)*

NA

FURTHER ACTION REQUIRED IN REGARDS TO COMMERCIALISATION?

No further action is required.

ACKNOWLEDGEMENTS

My thanks goes to Dr Zoe Spiers from the Elizabeth Macarthur Agricultural Institute (EMAI), NSW that showed me what to look out for and how to analyse Sydney Rock Oyster tissue (gill and mantle) sections.