

**The immune response of the *Mytilus edulis* mussel to changing coastal ocean conditions on Quadra Island, British Columbia**

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Marine bivalves are vital coastal ecosystem engineers and many species are socio-economically important in shellfish aquaculture and fisheries industries worldwide. Mussels are globally used as bioindicator species to monitor the health of coastal ecosystems as sedentary and filter-feeding organisms, providing information on their changing environment. An increase in atmospheric carbon dioxide (CO<sub>2</sub>) since the Industrial Revolution has led to its increased levels in ocean waters, globally causing ocean acidification and warming. The decrease in pH and subsequent decrease in the saturation state of the soluble calcium carbonate minerals is threatening the health of shell-forming organisms like mussels. The purpose of this project was to determine how a cage-cultured population of *Mytilus edulis* mussels are responding to both anthropogenic and natural changes in coastal ocean conditions at a field site on Quadra Island, British Columbia. The immune response of mussels was monitored using haemocytes over the course of a one year study, by examining changes in the expression of specific immune-related genes using RT-qPCR analysis. Oceanographic data was collected at the same time and site of sampling to correlate with gene expression changes. Results showed that heat shock protein 70 and the antimicrobial genes myticin B, lysozyme and chitinase had significant up regulation in the summer and fall, and the antioxidant glutathione peroxidase showed no significant changes in expression over time. The expression of the shell-forming nacre protein, and the gamete membrane protein vitelline was highly variable among individuals, possibly indicating adaptive strategies in stressful conditions. Results of this project are the beginnings of an ongoing study.