

## **Bradley Buckley**

**Title:** *Genomics of Antarctic notothenioids, an extremely cold-tolerant group of perch-like fish*

### **Abstract:**

The investigator will use molecular tools study the reasons why antarctic fish are unable to tolerate water warmer than about 6oC. These fish are extreme stenotherms, having evolved in sub-zero degree waters for somewhere between 5-15 million years. It is not known at this time whether the inability of these fish to tolerate increases in temperature is reflected in an inability to shift gene expression in response to heat stress. The proposed experiments will create the first cDNA (complementary DNA) microarray from *Trematomus bernacchii*, a common species in McMurdo Sound. The tissues of fish acclimatized over varying time periods to 4oC will be used to construct a complex, multi-tissue cDNA library of genes expressed during heat exposure. This library will be used to fabricate a cDNA microarray that will allow us to monitor the simultaneous expression of thousands of genes. RNA from control and heat shocked individuals will be used to create fluorescently tagged cDNA probes to be hybridized to the microarray, thereby generating gene expression profiles for thermally responsive genes. The primary hypothesis is that the ability to shift gene expression in response to elevated temperature will be absent in *T. bernacchii* and two related Antarctic species. The gene expression patterns from the Antarctic species will be compared to their temperate relatives from New Zealand. This project will increase our understanding of the genomic mechanisms related to cold-adaptation, stenothermality, and the response of polar fauna to environmental change.