



**British
Antarctic Survey**
NATURAL ENVIRONMENT RESEARCH COUNCIL

British Antarctic Survey

Madingley Road
High Cross
Cambridge
CB3 0ET
UK

Glenn Lurman

☎ 0471 4831 2011
E-mail: glm@bas.ac.uk
Fax: (0471) 4831-1149

Datum: 26. März 2008

**ESF Short Visit Grant to visit Dr. Miles Lamare, University of Otago, Dunedin, NZL
11-18 March 2008**

Thermal Adaptation in Ectotherms: Linking life history, physiology, behaviour and genetics.

Purpose of Visit:

The purpose of the visit was to gather a number of biological samples. A number of previously published data sets have shown quite conclusively that as temperature is reduced on evolutionary or seasonal time scales the muscle mitochondrial volume density in fishes increases. Working within the context of my current project, which examines the metabolic capabilities on an evolutionary time scale in marine invertebrates from different thermal regimes (i.e. tropical, temperate and polar), it was also necessary to look at the effects of seasonal temperature change on the same temperate organisms. More specifically I am looking at the relationship between the mitochondrial volume density, cristae surface area and temperature. While attending the ISEPEP 2007 conference in Dunedin, British Antarctic Survey colleagues (Simon Morley and Lloyd Peck) working in collaboration with Miles Lamare at the University of Otago, Dunedin, New Zealand, were able to collect and prepare a number of different brachiopods and limpets in winter. The ESF ThermAdapt short visit grant allowed me to go to Dunedin/Doubtful Sound and collect and prepare the same animals during summer.

Work Carried Out:

While in New Zealand, Miles Lamare and Mike Barker from the University of Otago, dived in Doubtful Sound and collected three species of brachiopod: *Liothyrella neozealandica*, *Magasella sanguinea* and *Notosaria nigricans*. In addition to these, three species of limpets were collected from rocks in the Otago harbour, *Cellana radians*, *C. ornata* and *Siphonaria zelandica*. All samples were removed from their shells and primary fixed for 24hrs in buffered glutaraldehyde. Following this, they were then placed in a buffered solution and sent back to Germany where they will be analysed. Due to the extensive preparation and analysis time required to determine the mitochondrial volume density, no results are available to date. All evidence, however, suggests that the density will not vary as a function of seasonal temperature, a finding that will stand in stark contrast to previous findings in fish, and may suggest that other mechanisms are employed in marine invertebrates to maintain metabolic capacity during acclimatization. To reveal these mechanisms more research is required. Already plans have been made for a continued collaboration with Miles Lamare, with aforementioned British Antarctic Survey colleagues returning to New Zealand and also visiting New Zealand's Scott Base in the 2008/09 season.

Projected Publication(s):

1. Lurman, G. J, Morley, S. A., Lamare, M., Poertner, H. O. & Peck, L. S.
Seasonal Effects on Mitochondrial Volume Density, Cristae Density and Muscle Fibre Morphology in Brachiopods and Limpets.
2. Lurman, G. J, Morley, S. A., Lamare, M., Tan, K. S., Poertner, H. O. & Peck, L. S.
Mitochondrial Capacity and Muscle Cell Morphology along a Thermal Cline in Limpets, Mud Clams and Brachiopods.