

Antarctic Science Bursary Progress Report

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Are fluorescent yellow penguin feathers reliable indicators of fitness and health?

Project Collaborators: Dr. Phil Trathan (British Antarctic Survey), Dr. Glenn Crossin (formerly British Antarctic Survey) and Dr. Kevin McGraw (Arizona State University).

The overall aim of this project was to test whether fluorescent yellow crest feathers in penguins reflect an individual's body condition, fitness and health.

Achievements:

1. Data collection in the field

Drs. Glenn Crossin and Phil Trathan collected data from Macaroni penguins (*Endiptes chrysolophus*) on South Georgia during three breeding seasons (2007/2008, 2008/2009, 2009/2010). Besides collecting 3-5 crest feathers from studied Macaroni penguins, they also measured body mass of penguins, took bill measurements, measured egg sizes and took a blood sample.

2. Lab analyses

Analyses of penguin blood samples were conducted by Dr. Glenn Crossin. Hematocrit, hemoglobin and plasma yolk-precursors concentrations (vitellogenin, VLDL_y) were measured for each blood sample.

Feather samples were sent to Arizona State University, where Dr. Melanie Massaro (in Dr. McGraw's lab) analysed colouration and pigment content of each feather sample during a 3-week visit in 2009 and a 4-week visit in 2011. Length of each feather was measured and photographs of each feather were taken under standardised conditions to assess hue, saturation and brightness. Feather reflectance was measured with a Miniature Fibre Optic Spectrometer. Finally, feathers were ground up in a NaOH solution, and pigment concentration was measured using a UV/Vis Spectrophotometer.

To be completed:

1. Estradiol measurements

Estradiol levels in blood plasma samples are still currently being measured. Difficulties encountered during establishment of processing have delayed estradiol measurements. Dr. Glenn Crossin is overseeing this process and we hope to receive estradiol data soon.

2. Collating of data and final data analyses

Field data, data on blood and plasma measurements (hematocrit, hemoglobin, vitellogenin, VLDL_y) and feather data need to be collated and analysed. Dr. Melanie Massaro will complete these tasks over the next 2 months.

3. Preparation of a manuscript and publication

Once data are analysed, we will prepare a manuscript for publication in *Antarctic Science*.

4. Science communication

Dr. Melanie Massaro is currently employed as a lecturer for Gateway Antarctica, an interdisciplinary department teaching Antarctic Science courses at the University of Canterbury. Results of this study will be taught to 1st- and 2nd-year undergraduate students at the University of Canterbury.

Finally, I would like to take this opportunity to thank the directors and members of Antarctic Science Ltd. for their support of this research project.

Yours sincerely,
Melanie Massaro