

Society for Marine Mammalogy - Small Grant in Aid for Research

Final report.

Persistent Organic Pollutants measured in pinniped keratinous tissues: Influence of physiology on measured pollutant concentrations

Nico Lübcker, PhD candidate.

Mammal Research Institute, Department of Zoology & Entomology, University of Pretoria, Private Bag X20, Hatfield 0028, South Africa.

https://www.researchgate.net/profile/Nico_Luebcker

nlubcker@zoology.up.ac.za.

Measuring pollutant concentrations in keratinous integument structures, such as feathers, hair, and whiskers, can potentially provide a useful matrix in marine ecotoxicology studies. Yet, the measurement of pollutant concentrations in keratinous tissues requires deliberation on when, and from which resource pool, tissue synthesis occurred. In this study, we postulated that the remobilization of adipose tissue during fasting amplifies the concentration of lipophilic pollutants measured in keratinous tissues that were synthesized while fasting. This funding instrument enabled us to obtain additional amino acid-specific nitrogen ($\delta^{15}\text{N}$) values measured in hair and chronologically along the length of whiskers sampled from southern elephant seals (SES; *Mirounga leonina*), which was combined with bulk tissue (whole sample) nitrogen ($\delta^{15}\text{N}$) and carbon ($\delta^{13}\text{C}$) values ($n = \text{ca. } 1696$ samples). Fast-associated bulk tissue $\delta^{15}\text{N}$ values enriched significantly (1.8‰) from the onset of whisker growth during the annual pelage molt until the end of the molt. The effects of fasting on the amino acid values are detailed elsewhere (Lübcker et al. 2020, *Oecologia*). Using the compound-specific isotope approach as a nutritional biomarker, we can now accurately identify if a portion of whiskers or hair (Lübcker et al. (*in Revision*), *MEPS*) was synthesized from remobilized endogenous stores while fasting. With this knowledge, we can now accurately compare pollutant concentrations deposited while foraging versus fasting, to determine if fasting causes a physiologically-driven increase in circulating pollutant concentrations. Although

advances were made i.e. of the stable isotope analyses, we were unable to obtain permits and export samples to Norway to measure the pollutant concentrations due to Covid-19. Sample analyses of pollutant concentrations in the whisker samples are being analyzed by the Central Analytical Facility, the University of Stellenbosch, in South Africa instead. We are committed to seeing this project through until its completion. This project forms part of the broader objectives of the long-term (1983–ongoing) Marion Island Marine Mammal mark-recapture Program (MIMMP) in the Southern Ocean (<http://www.marionseals.com/>). We are grateful for the support provided by the Society for Marine Mammalogy.