

**Antarctic Science Bursary project: Discovering the genetic identity of historic baleen whale populations on a southern hemisphere breeding ground during the early whaling period.**

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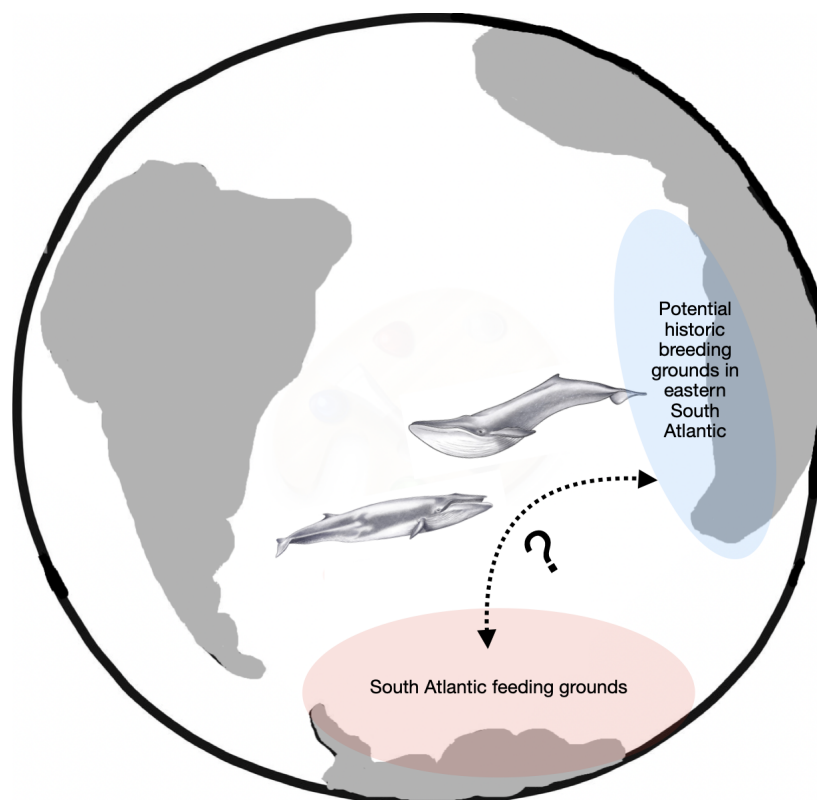
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**Figure 1.** Graphical abstract of Antarctic Science Bursary project to determine the genetic identity of 20th century bone specimens of baleen whales curated by South African museums.

**Project summary:**

Many species of baleen whales use lower latitude waters as breeding grounds and nurseries during the winter months and then migrate to Southern Ocean waters to forage between Spring and Autumn. There is limited genetic information on breeding populations of blue, fin and sei whales in the eastern South Atlantic. This aim of the project was to provide genetic information for southern hemisphere blue, fin, sei and humpback whales on a potential breeding ground during the 20th century; a period of time when commercial whaling was rife. DNA extracted from these samples would provide the first genetic information on historic populations of *Balaenoptera* (a genus of baleen whales) in South Africa. This information is vital in order to understand historic southern ocean feeding ground assemblages for many baleen whale species in the eastern South Atlantic.

To date, DNA has been extracted from 19 and 12 whalebone samples from the Iziko museum in Cape Town and the Bayworld Museum in Port Elizabeth, respectively. Additionally, to increase sample sizes, 3 out of 55 samples have successfully been included in collaboration with researchers at the University of Pretoria Whale Unit, totalling 34. These samples were donated from a variety of private collectors in South Africa.

DNA amplicons of between 200 and 500 base pairs (bp) of the mitochondrial control region were used to identify samples to the species-level. As is often the nature with historic often fragmented faunal bones, species identifications from museum catalogues differed to those obtained from genetic-based identifications. To date, 1 blue, 5 Bryde's, 1 fin, 2 minke, 2 sei, 13 southern right, and 7 humpback whales have been identified among the collections.

Alongside taxonomic identifications, additional laboratory analysis are on-going trialling a novel assay to identify the biological sex of historic baleen whales using short loci. The aim of this assay is to increase the likelihood of identifying biological sex across multiple baleen whale taxa using historic samples. Confirmed taxonomic identifications and sex for all specimens will be contributed to museum catalogues later this year.

Comparison of the obtained genetic sequences with existing sequences from the Southern Hemisphere to infer evidence of maternal population structuring are ongoing. Although, published manuscripts for this project are still in prep, the samples from this project provide downstream opportunities for future projects, for example, the application of next-generation sequencing methods could be used to: (i) measure genetic diversity within South African populations at a genomic level; (ii) further understand Southern Ocean feeding assemblages; and (iii) accurately estimate historic effective population size and simulate past demographic processes.

This project formed part of an international collaboration between the British Antarctic Survey (BAS), the University of Cambridge (UoC), the University of Cape Town (UCT) and the University of Pretoria (UoP). We would like to thank the Antarctic Science Bursary for granting our bursary of £5944 and providing this opportunity to increase knowledge on baleen whale populations in the eastern South Atlantic, many of which are still recovering from whaling, without this grant, this project would not have been possible.



**Figure 2:** Images of Ms Lampert sampling a whale skull at Bayworld (top right) and Dr Ingle sampling at the Iziko South African museum (top left) and Dr Buss performing QC checks of genetic sequences (bottom right).

### Acknowledgements

We would like to thank Jofred Opperman from Iziko Museums of South Africa for allowing us to sample baleen whale specimens from their collections. We would also like to thank Greg Hofmeyr from the Port Elizabeth Museum at Bayworld for permission to sample a number of specimens from their baleen whale collection. Additionally, we would like to thank Christopher Wilkinson and Giden van den Berg for sampling whale bone in private

collections around the Cape, and to all the people who opened their homes to allow sampling of their collected whale bones.