The design and testing of mini-barcode markers in marine lobsters.

Authors: Ashrenee Govender[1,2], Johan Groeneveld[1,2], Sohana Singh[2] and Sandi Willows-Munro[1]

[1] School of Life Sciences, University of KwaZulu-Natal, Pietermaritzburg, South Africa

[2] Oceanographic Research Institute, Durban, KwaZulu-Natal, South Africa

Miss Ashrenee Govender (Presenting author – PhD student): govenderashrenee0@gmail.com

Prof Johan Groeneveld: jgroeneveld@ori.org.za

Dr Sohana Singh: ssingh@ori.org.za

Dr Sandi Willows-Munro: willows-munro@ukzn.ac.za

Preferred mode of presentation: Oral presentation - Student

Submission theme: Genetic diversity and connectivity

Abstract

Background: Marine lobsters have a drifting larval phase (phyllosoma) which disperses as a part of the zooplankton before settling on the seafloor. Phyllosomas moult through a series of developmental phases during the planktonic stage, which are difficult to identify to species level based on morphology. DNA barcoding may resolve species identification difficulties, but DNA extracted from larval samples is often degraded or fragmented, reducing successful identification based on full-length (650 bp) COI barcode markers. Primers that amplify smaller, yet still informative sections of barcode markers (mini-barcodes, ~200-300 bp) can increase identification rates and are also useful for mass-amplification of DNA barcodes from bulk collections, such as plankton or environmental DNA samples. Advances in next-generation sequencing and DNA metabarcoding encourages the development of taxon-specific primers for barcoding, to improve the efficiency and accuracy of taxon discovery and identification.

Methods: We developed and tested a method to design a taxon-specific mini-barcode primer set for marine lobsters. *In silico* methods were used to identify the shortest, most informative portion of the COI gene region. A taxon-specific mini-barcode primer set was designed, and cross-species amplification was tested *in situ* on DNA extracted from a range of spiny-, clawed-, slipper- and blind lobster species.

Results: The mini-barcode primers successfully amplified both adult and phyllosoma COI fragments, and were able to successfully delimit all species analyzed, with higher identification rates than published universal primer sets.

Conclusion: We demonstrate that the newly designed marine lobster mini-barcode primers will increase the success rate of species identification in bulk environmental samples.

Keywords: Lobster phyllosoma, marine lobsters, mini-barcode, DNA metabarcoding, species identification.