

**ASPECTS OF THE EVOLUTIONARY HISTORY OF
A PAIR OF FISH SPECIES (ARRIPIDAE: *ARRIPIS*)
ON EITHER SIDE OF A BIOGEOGRAPHIC BARRIER
IN SOUTHERN AUSTRALIAN SEAS**

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BSc. (Hons.) MSc.

This thesis is presented for the degree of

Doctor of Philosophy
at
Murdoch University

2012

DECLARATION

I declare that all sources are acknowledged and that this thesis is my own account of my research and contains, as its main content, work that has not previously been submitted for a degree at any tertiary education institution. The thesis contains no material previously written by another person except where due reference is made in the thesis itself.

Glenn Moore

For Dad, Mum & Debra

Nothing in biology makes sense except in the light of evolution.

Theodosius Dobzhansky

**I am turned into a sort of machine for observing facts
and grinding out conclusions.**

Charles Darwin

Abstract

Pairs of closely related species on either side of a barrier provide an opportunity to test evolutionary hypotheses. In southern Australian seas, many species pairs occur on either side of the Bass Strait, which temporarily becomes an isthmus during glacial stages, yet few evolutionary questions have been explored using these species. This thesis used partial nucleotide sequences from mitochondrial cytochrome *b* and *COI* genes and length-polymorphism in several nuclear introns in one such species pair, *Arripis trutta* (east of Bass Strait) and *A. truttaceus* (west of Bass Strait), to address some evolutionary questions. Data from the two remaining members of the family Arripidae, *A. xylabion* and *A. georgianus*, were included to provide context for interpreting patterns in the focal species pair. This research found no evidence for population subdivision in each of *A. trutta*, *A. truttaceus* and *A. georgianus* across their Australian distributions. This likely reflects panmixia, maintained by highly migratory life cycles and restricted breeding distributions. The molecular data also supported the currently recognised four-species taxonomy of the family. Phylogenetic reconstructions did not support the view of a sister-species relationship between the east-west species pair of *A. trutta* and *A. truttaceus* but instead suggested that these two species, together with *A. xylabion*, likely arose as a trifurcation (some 700,000 years ago), and so can be considered as a trio of sibling-species. All *Arripis* species were characterised by low genetic diversity and there was evidence for a more recent and/or severe population contraction in *A. truttaceus* compared to *A. trutta*. These different demographic signals support the *a priori* hypothesis that environmental conditions to the west of the Bass Strait were more severe than to the east during glacial stages and, in particular, the last glacial maximum. The results are considered in the context of the historical marine biogeography of temperate Australia.

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Acknowledgements

Firstly, I thank my supervisor, Dr. Jennie Chaplin. Jennie's support, advice, guidance, encouragement and enthusiasm have been exceptional. Perhaps most importantly, Jennie has taught me to think, to learn and to persevere. Throughout, Professor Ian Potter has provided encouragement and financial support for my project. The Centre for Fish and Fisheries Research and all its members also gave me support and advice.

I enjoyed sharing the lab with my friends Nicole Philips, Ertuğ Sezmiş, Michelle Gardner and Bryn Farmer, and they all provided a great deal of support, advice, help, laughter and an understanding ear when things just weren't going to plan. I especially thank Ertuğ for suggesting EPIC-PCR as a way to include nuclear data in my project. I am indebted to Masaki Miya, Natural History Museum, Chiba, Japan for providing the complete mitochondrial genome of *Arripis trutta*. I thank Frances Brigg (State Agricultural Biotechnology Centre) who ran most of my sequences and fragment analyses. Frances' knowledge and problem solving skills rescued my project on many occasions. My friends Dr. Michael Craig, Drs. Roddy and Marie Hale kept me going with words of experience, encouragement and advice, and crucial moments of escape.

This project relied on the assistance and generosity of many people, primarily in providing and/or organising samples: Dumpy Wheatcroft (Albany Seafoods, Albany); Alan & Peta Miles (Selim Fisheries, Dunsborough); Steeg Hoeksema, Ben Chuwen, Dave Fairclough, George Young (Centre for Fish and Fisheries Research); Kyle and Yuki Armstrong (South Australia), Roddy Hale (Lincoln University), Marie Hale (University of Canterbury), Ian Kerr and Sallyann Gudge (Lord Howe Island Marine Park), Kevin Grickage, Rod Grickage and many anonymous recreational fishers. Fellow *Arripis* researchers, John Stewart and Julian Hughes (NSW Department of Primary Industries) kindly sourced all of the *A. trutta* from eastern Australia and prepared the tissue before sending to me.

Mum, Natalie, my extended family, and my dogs Basie and Duke have helped me through with constant love and support. Finally, my biggest support came from my wife Debra who endured the journey with me, pretended to understand my explanations of neutral theory, coalescence and Bayesian inference, and survived being a 'Ph.D. widow' with incredible patience and love.