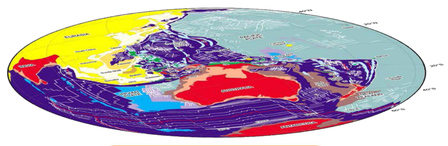
Exploring Australia's Fish diversity

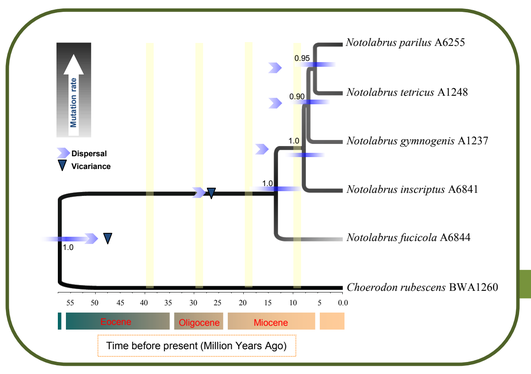
www.nerpmarine.edu.au

Genomes contain a record of the history of the species shaped by natural selection & random genetic drift. DNA regions in an organism can be examined as well as its morphology to reveal large scale geological episodes such as continental drift (slow, millions of years) & human-mediated changes such as heavy industry, rural development, landscape transformation & recent global warming (rapid, tens of years), all accounting for species diversification. Species genetic variability is always open to change. Gene variants, once lost, cannot be recovered.

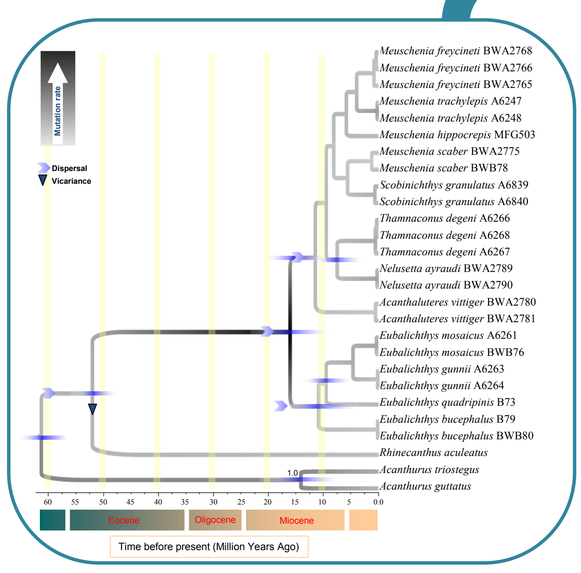
Congruence in biogeographic patterns among endemic species & consistent rates of diversification suggest similarities in the geological, historical & evolutionary processes responsible for synchronic speciation within even unrelated groups of taxa. Multi-gene molecular phylogenies, fossil-calibrated molecular clocks & diversification analyses are useful tools to explore the impact of geological changes and climatic shifts in the speciation processes & the current distribution patterns of Australia's marine endemisms



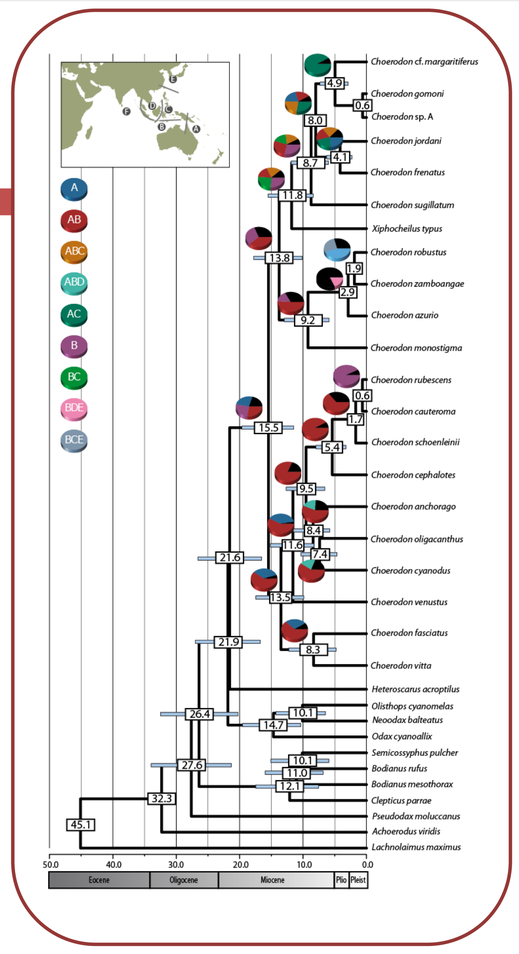
Wrasses

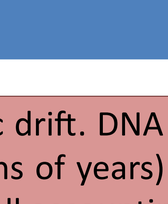


Leatherjackets

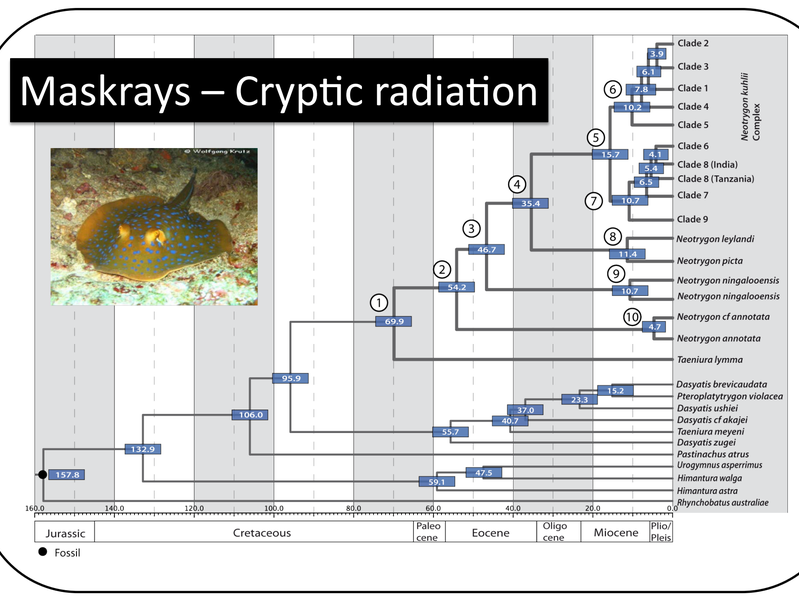


Tuskfishes – Centrifugal speciation



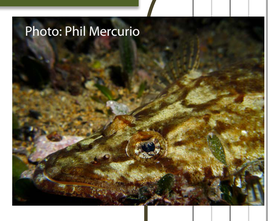


Maskrays – Cryptic radiation

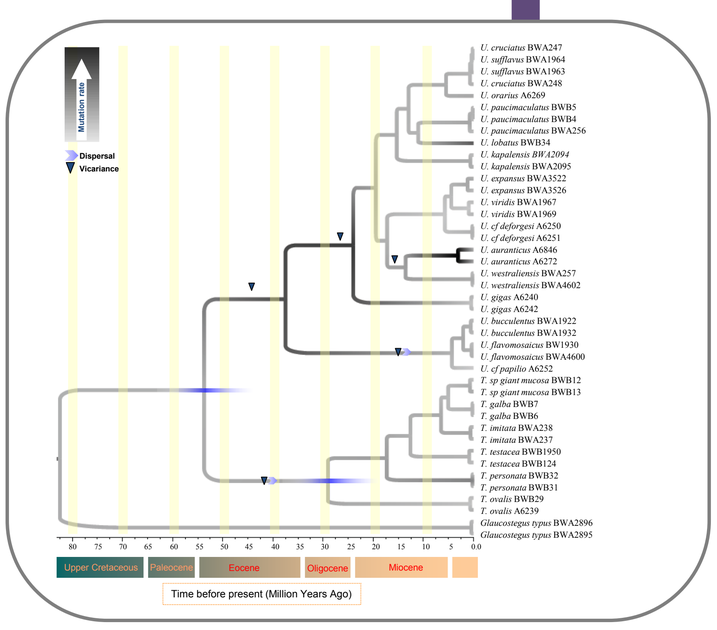


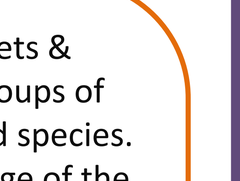
Australian endemisms of wrasses, leatherjackets & stingarees represent genealogically disparate groups of genetically & morphologically highly differentiated species. Fossil-calibrated molecular clocks suggested the age of the southern Australian labrids to be ca. 6 MY. While stem taxa of Monacanthidae diverged as early as ca. 16 MY, crown lineages diverged contemporaneously with labrid species of exclusively Australian distribution, suggesting synchronic speciation & parallel evolutionary trajectories in these two families. Diversification in Urolophidae on the other hand commenced in the Oligocene, followed by the formation of ancient taxa during the Miocene & modern derivative lineages, such as *Urolophus bucculentus* & *U. flavomosaicus*, as early as ca. 2 MY.

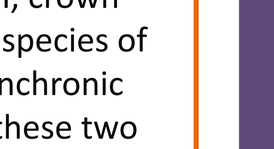
Flatheads

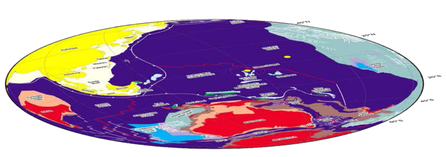


Stingarees









Contrasting latitudinal diversity gradients

Contact: Nikos Andreakis

AIMS PMB No. 3 TSV, QLD, 4810

n.andreakis@aims.gov.au

www.geographia-and-genesis.com

References

- Puckridge M, Last PR, Gledhill D and N Andreakis. Contrasting patterns of latitudinal diversity gradients in the Indo-West Pacific: Phylogeography of the flathead fishes (Platycephalidae). *Journal of Biogeography.*
- Puckridge M, Last PR, White WT & N Andreakis. Phylogeography of the Indo-West Pacific maskrays (Dasyatidae, Neotrygon): a complex example of chondrichthyan radiation in the Cenozoic. *Ecology and Evolution.*
- Puckridge M, Andreakis N, Appleyard SA & RD Ward. Cryptic diversity in flathead fishes (Scorpaeniformes: Platycephalidae) across the Indo-West Pacific uncovered by DNA barcoding. *Molecular Ecology Resources.*
- Andreakis N, Gledhill D, White WT, Rowe DL, Puckridge M, Butler A, Bax N, van Oppen M & PR Last. Historical biogeography, diversification and range expansion of wrasses, leatherjackets and stingarees (Labridae, Monacanthidae, Urolophidae) endemic to Australia. *In preparation.*
- Puckridge M, Last PR & N Andreakis. Centrifugal speciation promotes species diversity in the Indo-West Pacific. A case study of the tuskfishes (Labridae: *Choerodon*). *In preparation.*