The ecology and evolution of NZ marine molluscs

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Ecology and evolution of NZ marine molluscs

- **Ecology**

  Interactions and networks of living things, between each other and the environment

- **Evolution**

  How species are related and what are the processes that gave rise them

- **Whakapapa**

- The more we know about the **whakapapa** of ecosystems, the better we can exercise **kaitiakitanga**

Ecology and evolution of NZ marine **molluscs**

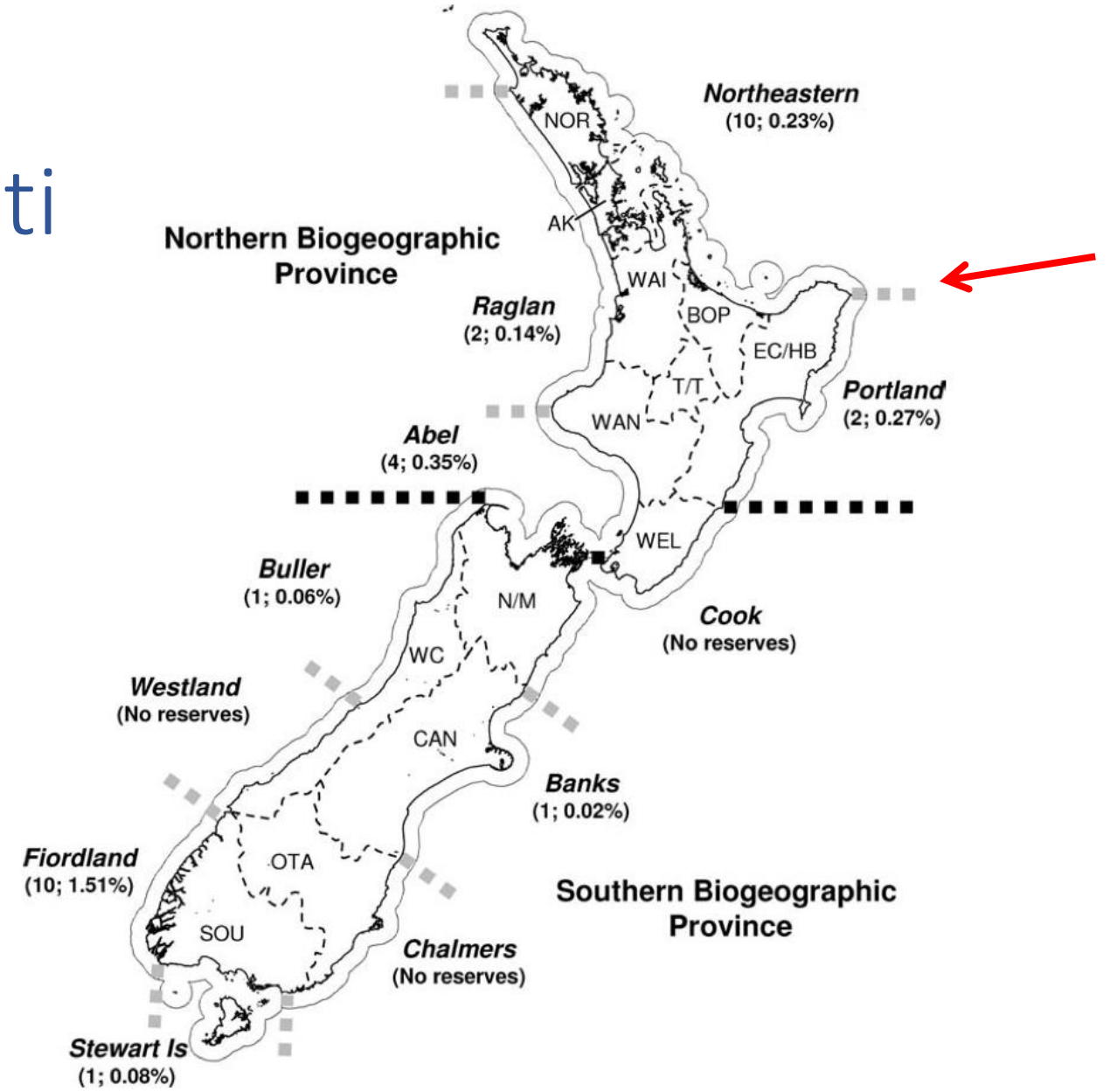
- **Snails**, **slugs**, chitons, **bivalves**, **squid**, **octopus**, scaphopoda, monoplacophora and solenogastres
- More than **5,486 species** in NZ (marine, freshwater and land)
- Approximately **85% endemic**
- Excellent **fossil record** for the last **65 million years**

- Generally, not well understood

Biogeography of molluscs in Tairawhiti

- What is out there?
- Where is it?
- Why is it where it is?

- How and why are things changing?



Evaluation of Biogeographic Classification Schemes for Conservation Planning: Application to New Zealand's Coastal Marine Environment.
Shears et al. 2008. Conservation Biology 22:2

Ecology and evolutionary biology for the developing blue economy: an example

- *Dicathias orbita*
- Hopetea, white rock shell, cart-rut shell

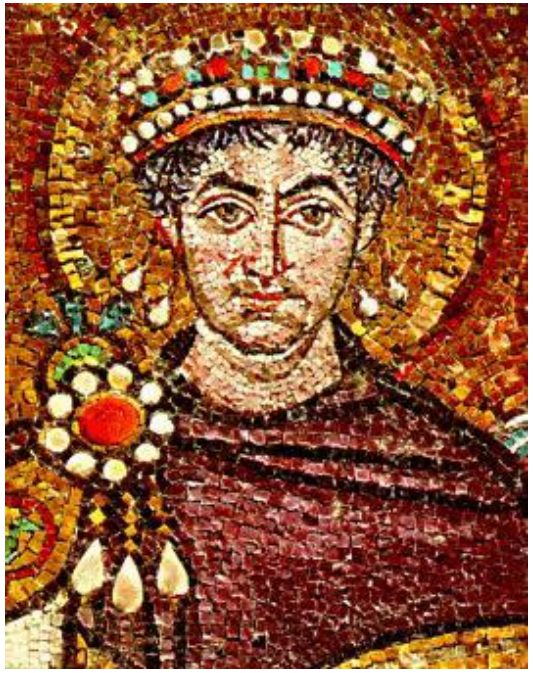
Dicathais orbita (Gmelin, 1791), collected 2 June 1969, Parengarenga Harbour, Te Hapua, New Zealand. Purchased 2007. CC BY-NC-ND 4.0. Te Papa (M.277656)

Dicathais orbita (Gmelin, 1791), collected November 1985, Parengarenga Harbour, Paua, under wharf, New Zealand. CC BY-NC-ND 4.0. Te Papa (M.305334)

*Dicathais orbita (*Gmelin, 1791), collected 6 March 2008, Tasman Bay, New Zealand. Gift of Rodney Asher, 2010. CC BY-NC-ND 4.0. Te Papa (M.279439)

Tyrian purple

- Phoenician purple, royal purple, imperial purple or imperial dye
- produced by several species of predatory sea snails in the family **Muricidae**
- In ancient times the dye was highly valued
- The main chemical is **6,6’-dibromoindigo**
- Current research shows that **pre-cursors** of this pigment chemical have important **bioactive properties**



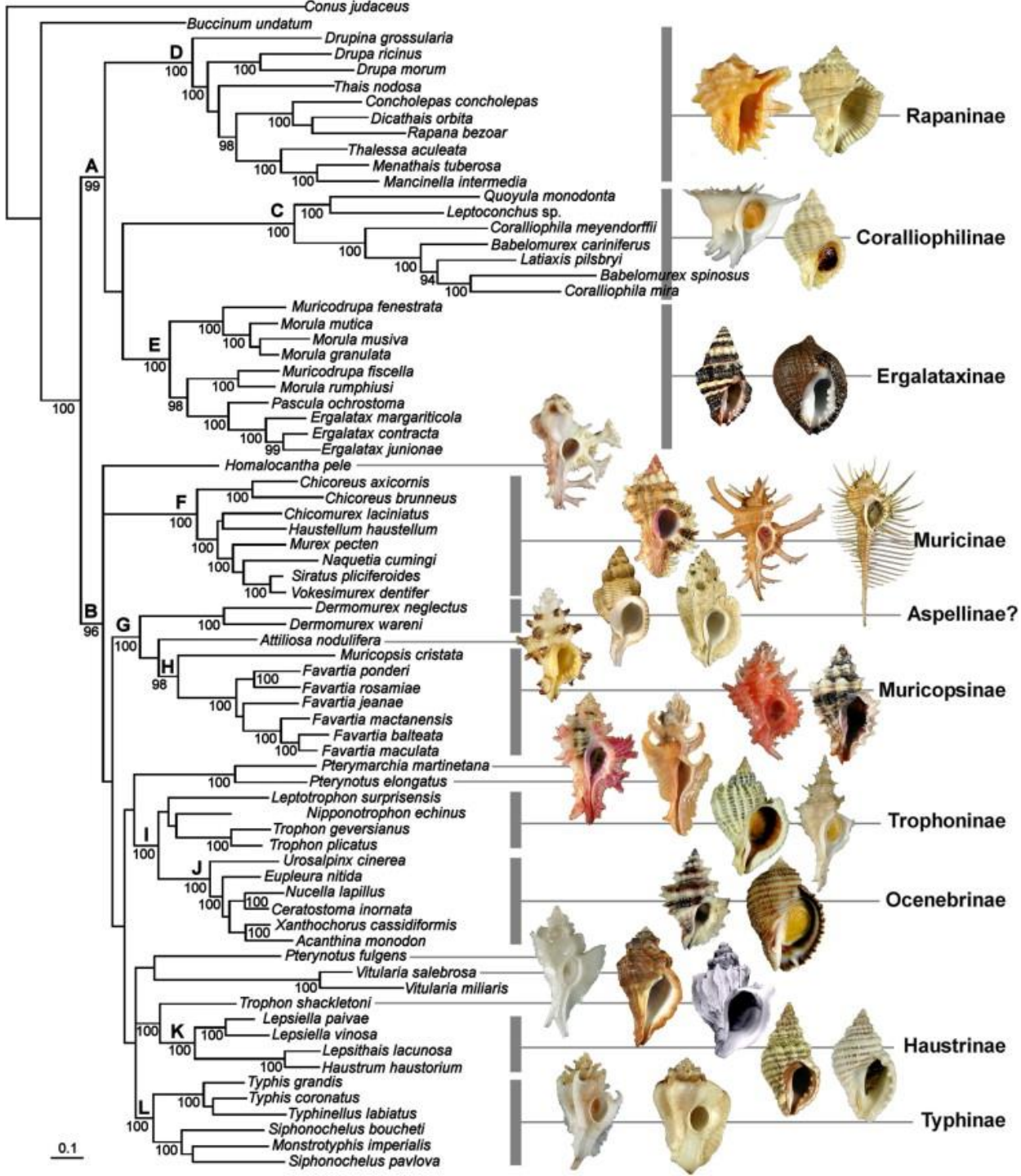
Bolinus brandaris
Purple Dye Murex

Ecological context

- Predator/scavenger
  - common, but not abundant
- Reproductive cycle
  - egg mass attached to substrate
  - planktonic larvae emerge,
  - larvae disperse in currents
  - juvenile snails settle after around 1 month
- Growth rate
  - how quickly do animals grow in the wild
  - how quickly do animals grow in ideal conditions

- What influences the expression of chemicals of interest?

Phylogeny of Muricidae - whakapapa



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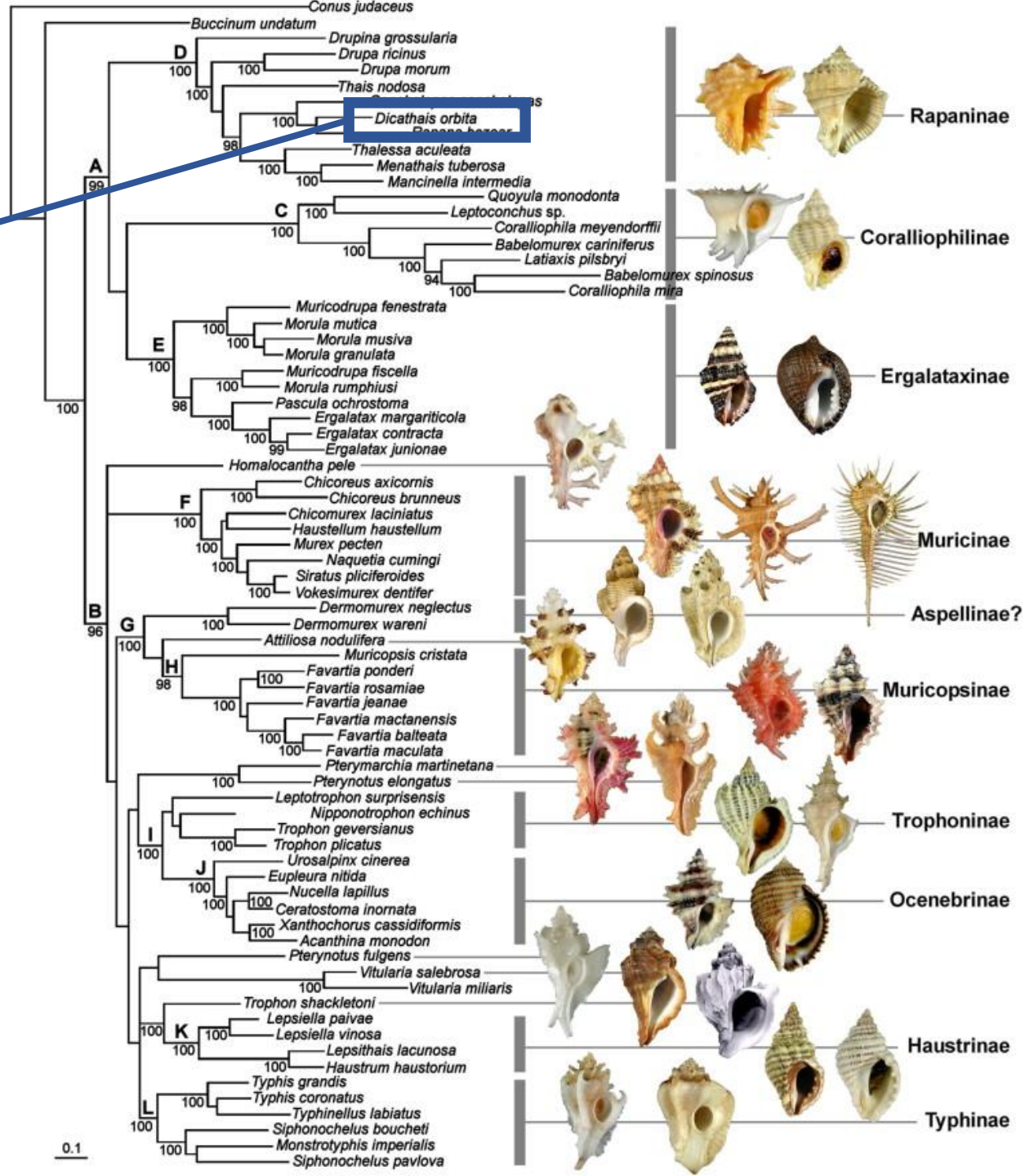

Phylogeny of Muricidae - whakapapa

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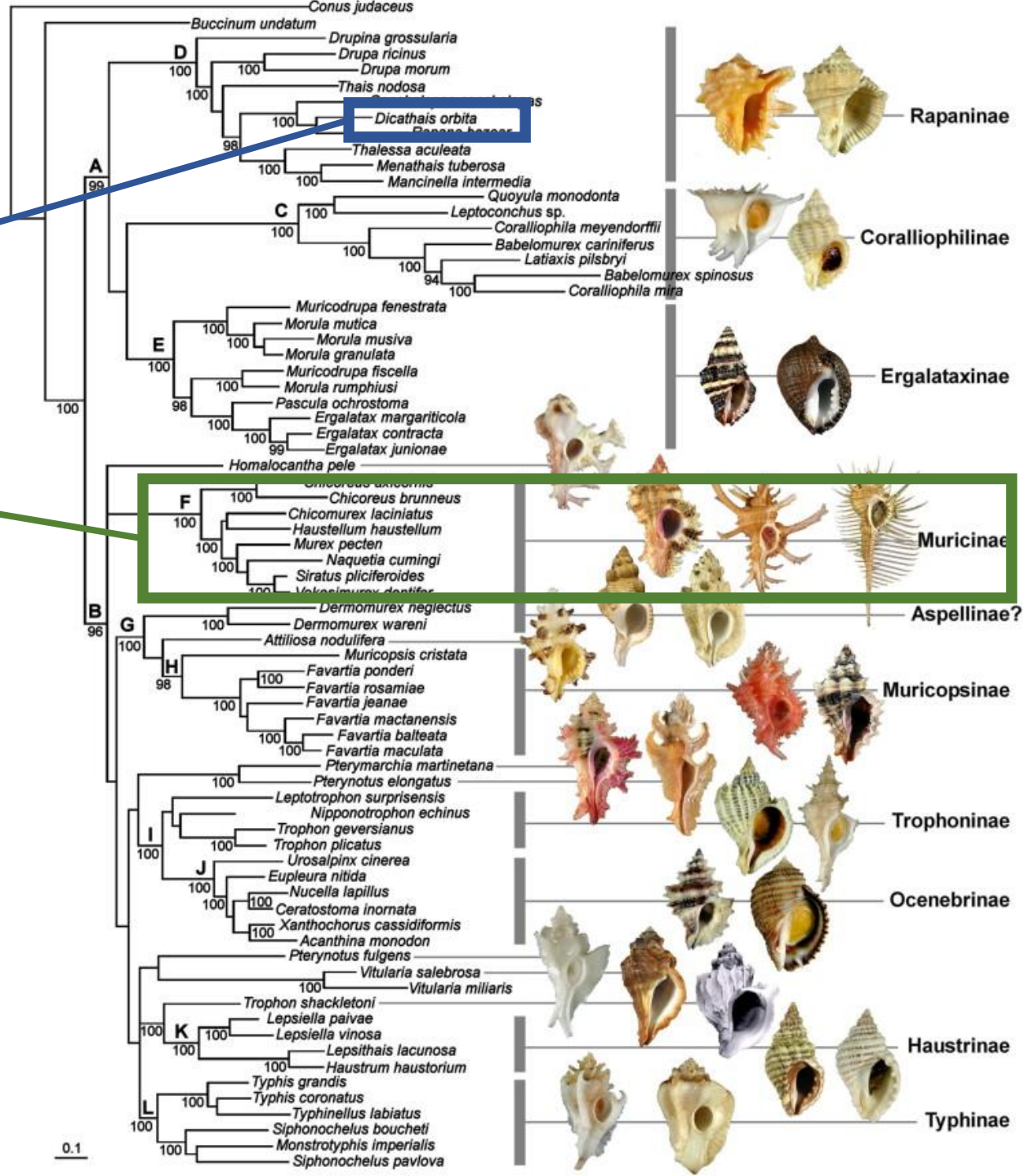
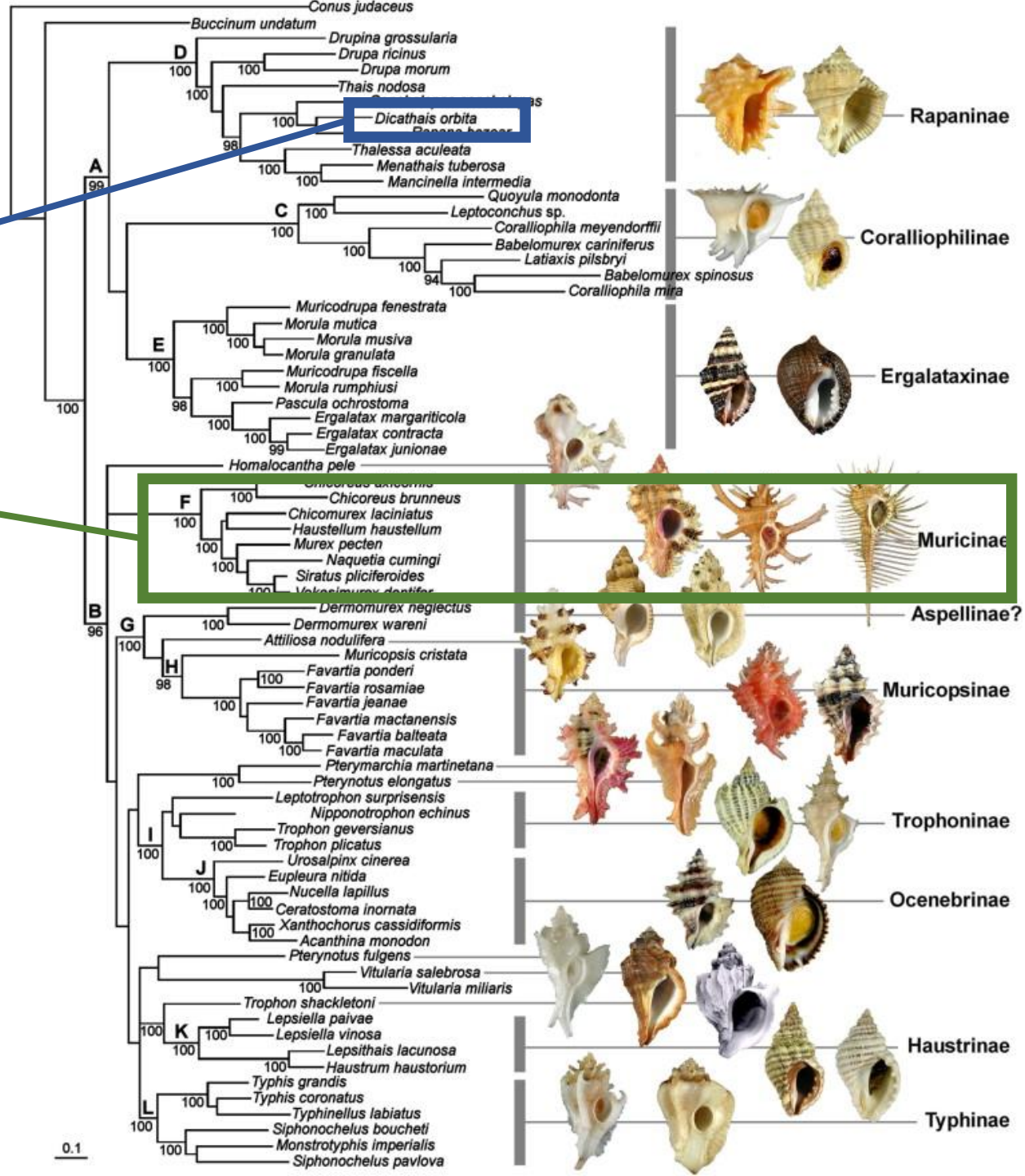


Phylogeny of Muricidae - whakapapa

- *Dicathias orbita*
- *Bolinus brandaris*

New Zealand Muricidae 90+ species

- Rapaninae ~ 3 species
- Coralliophilinae ~ 17 species
- Ergalataxinae ~ 6 species
- Muricinae ~ 3 species
- Muricopsinae ~ 6 species
- Trophoninae ~ 1
- Haustrinae ~ 4 species
- Typhinae ~ 4
- Pagodulinae ~ 43 species
- Tripterotyphinae ~ 3 species



Deep understanding of the **ecology** and **evolutionary biology** of species and ecosystems is not only critical for **conservation and management**, also key to identifying potential **opportunities**.

Sustainable development through deep understanding the natural world.