

South
Australian
Museum

Cryptic diversity and evolution of Australian *Pseudotetracha* tiger beetles

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Introduction: who?

Megacephala (Grammognatha) euphratica



Coleoptera

Carabidae

Cicindelinae ("tiger beetles")

Megacephalini

Introduction: who?



Sample 695
(*P. castelnaui*)

Megacephala (Pseudotetracha)

McCairns 1997: 16 species

Sumlin 1997: 19 species

Introduction: who?

- Habitat: salt lakes.
- Predators of smaller animals.
- Active at night. In burrows during the day.



Introduction: why?

- Previous works

- Zerm *et al* (2007)

- Phylogeny of Megacephalini

- López-López *et al* (2012)

- *blackburni/murchisona* species complex
- *P. blackburni* divided in two clades: Cryptic species?

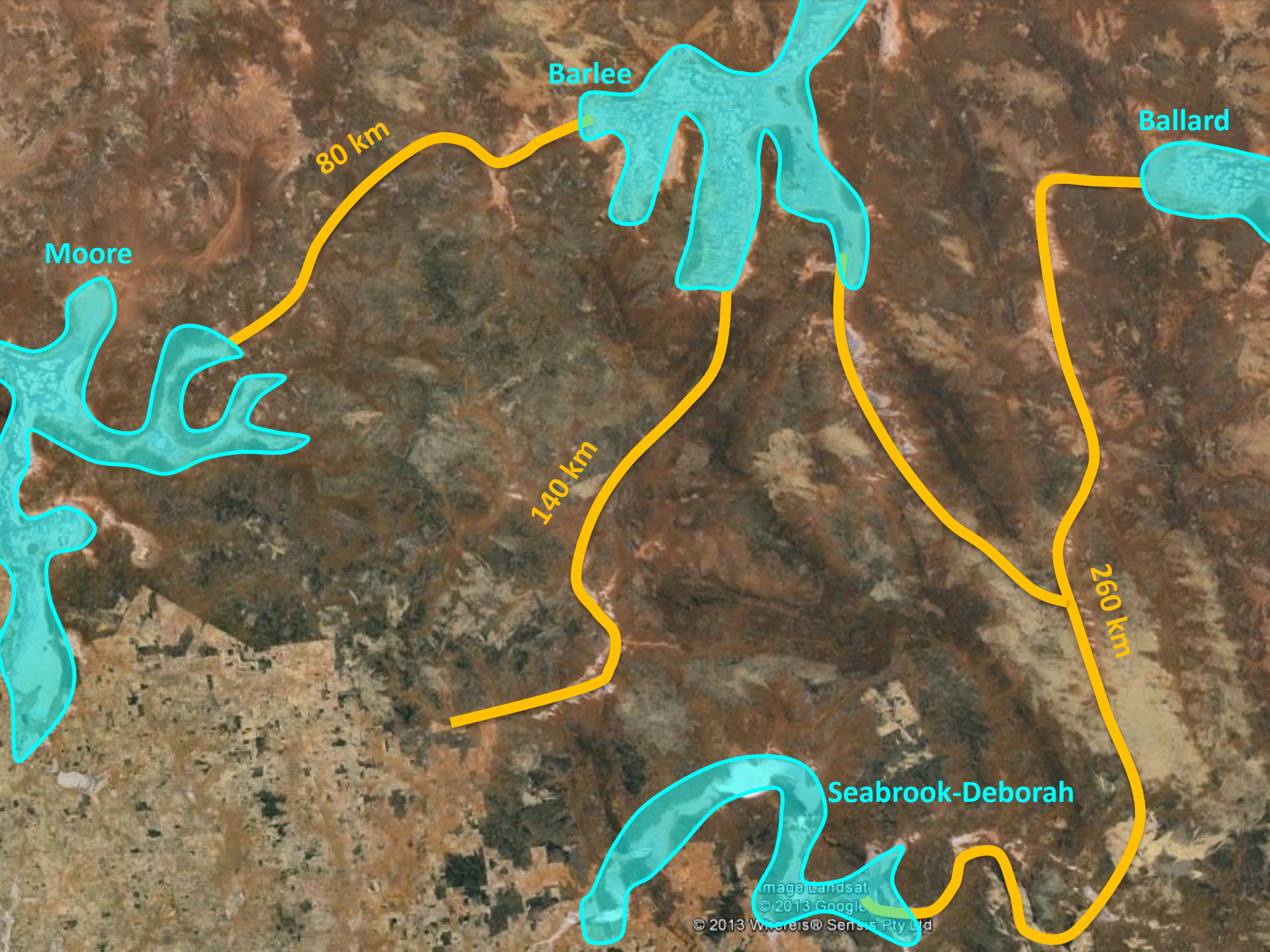
- López-López *et al* (2013)

- Recent trivalent: X_1X_2Y



Introduction: where?





Moore

Barlee

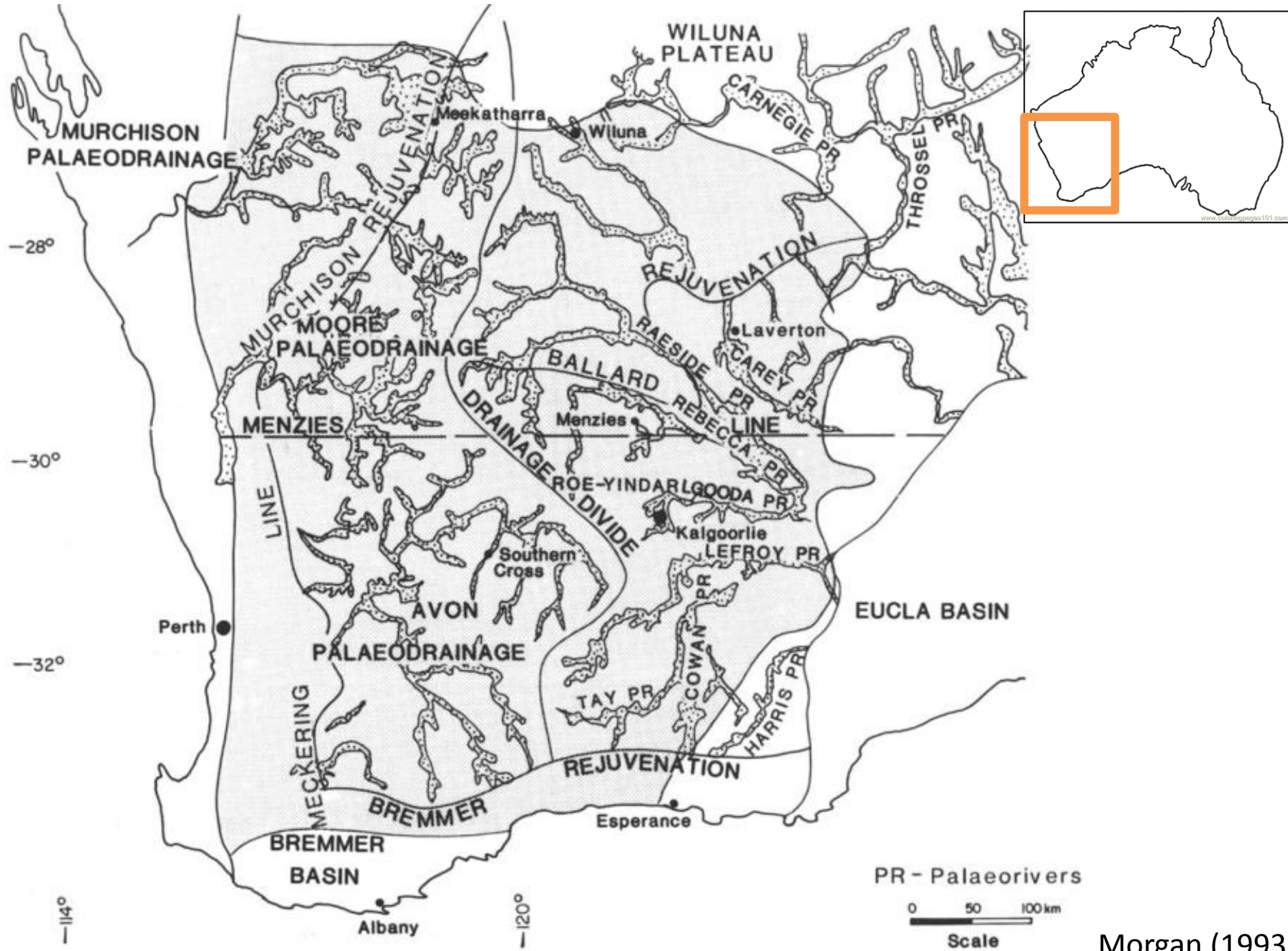
Ballard

80 km

140 km

260 km

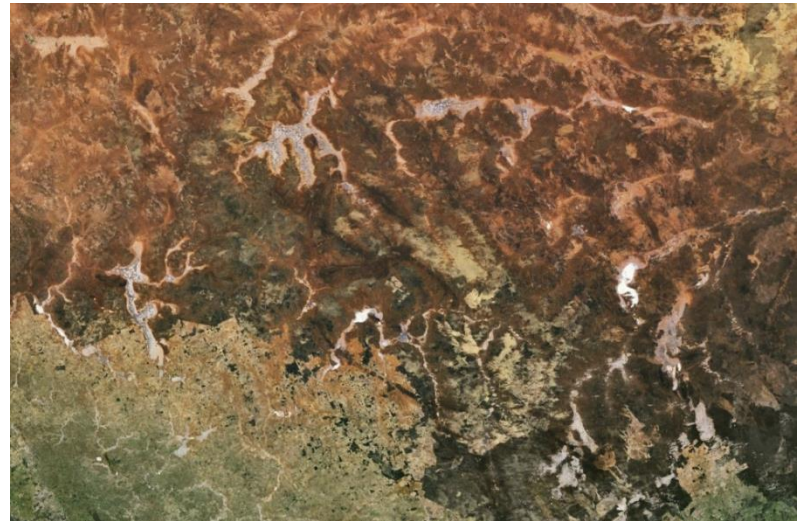
Seabrook-Deborah



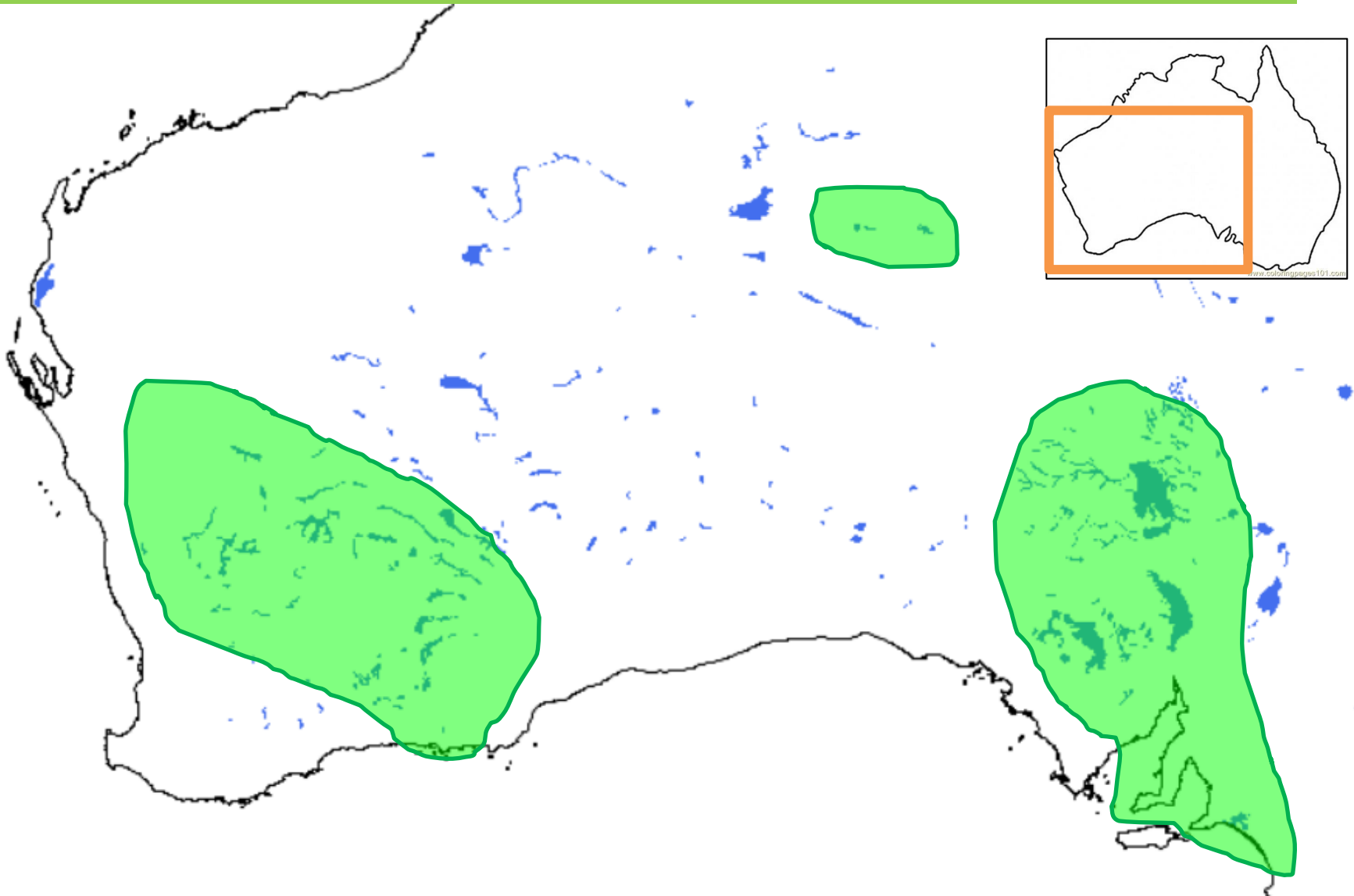
Morgan (1993)

Introduction: why?

- More samples, more localities
 - Species delimitation
- Cryptic diversity
 - How many species?
- Lakes = islands
 - History?
 - Processes?

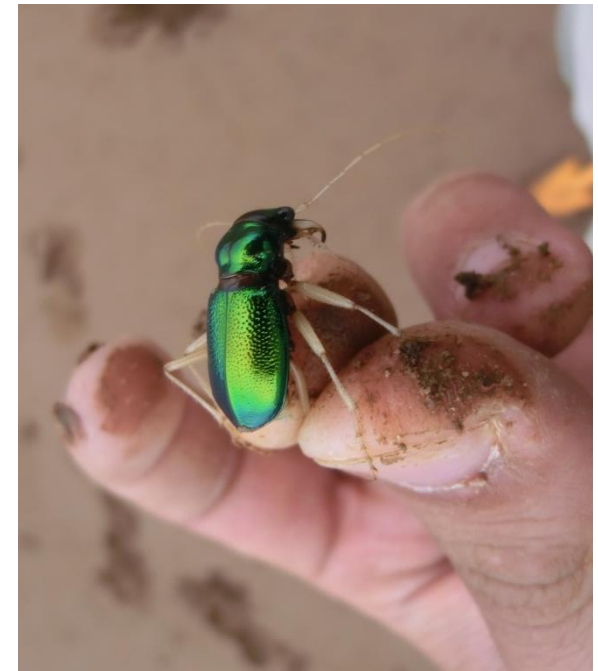
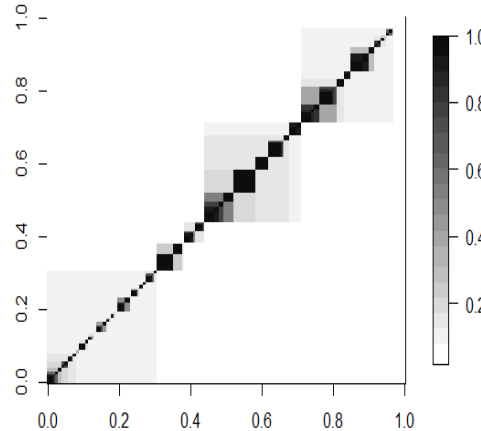


M&M: where?

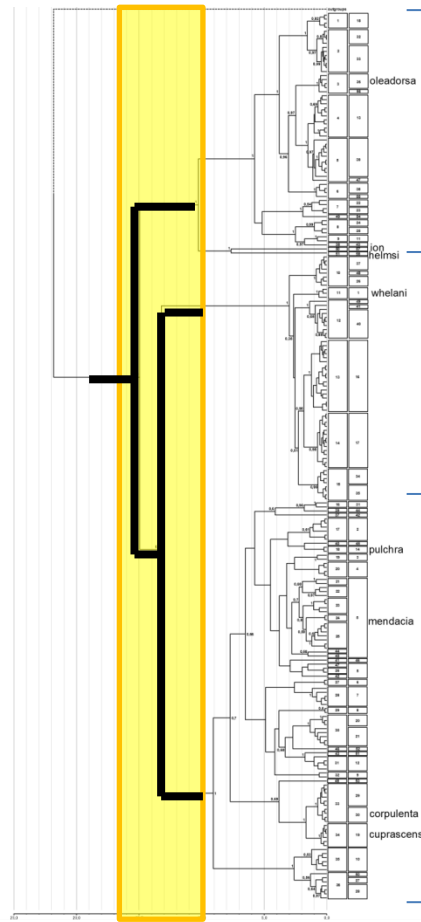


M&M: how?

- 490 beetles (Zerm + old work + new)
 - Tentative species: *P. blackburni*, *P. whelani*, *P. australis*, *P. mendacia*, *P. pulchra*, *P. corpulenta*, *P. cuprascens*
- coxIII + 16S
- 220 haplotypes
- BEAST
- GMYC



Results & discussion



***oleadorsa* species complex**

***whelani* species complex**

***blackburni/murchisona* s.c.**

15-10 Mya

Results & discussion



Australia 10 Mya. Credit: Dorothy Dunphy



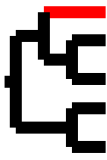
Australia today

Results & discussion

oleadorsa species complex

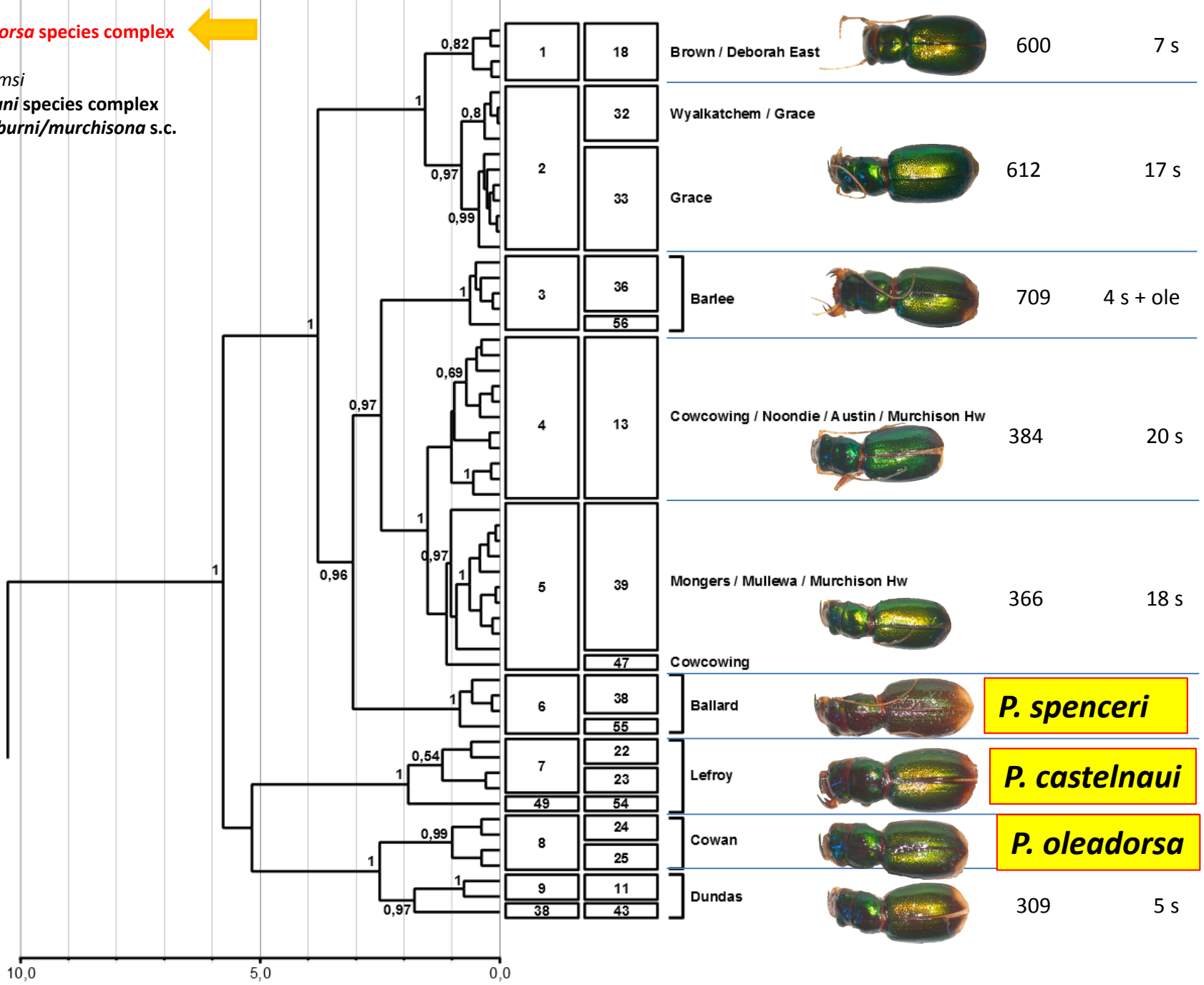
- Western Australia
- GMYC:
 - Simple: 11 entities
 - Multiple: 17 entities
 - GMYC + Morphology + Distribution:
 - 9 phylogenetic species



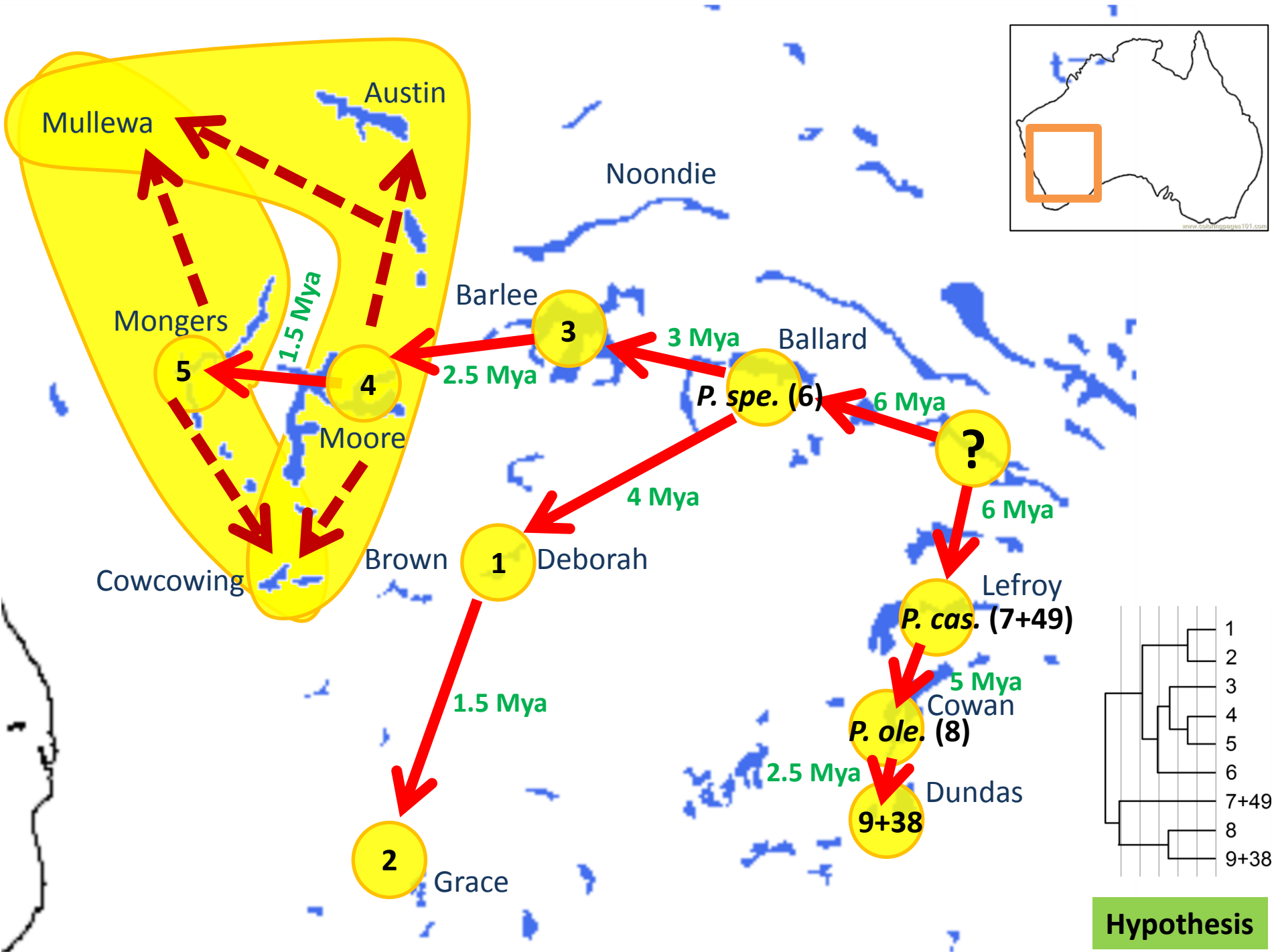


oleadorsa species complex ←

P. ion
P. helmsi
whelani species complex
blackburni/murchisona s.c.

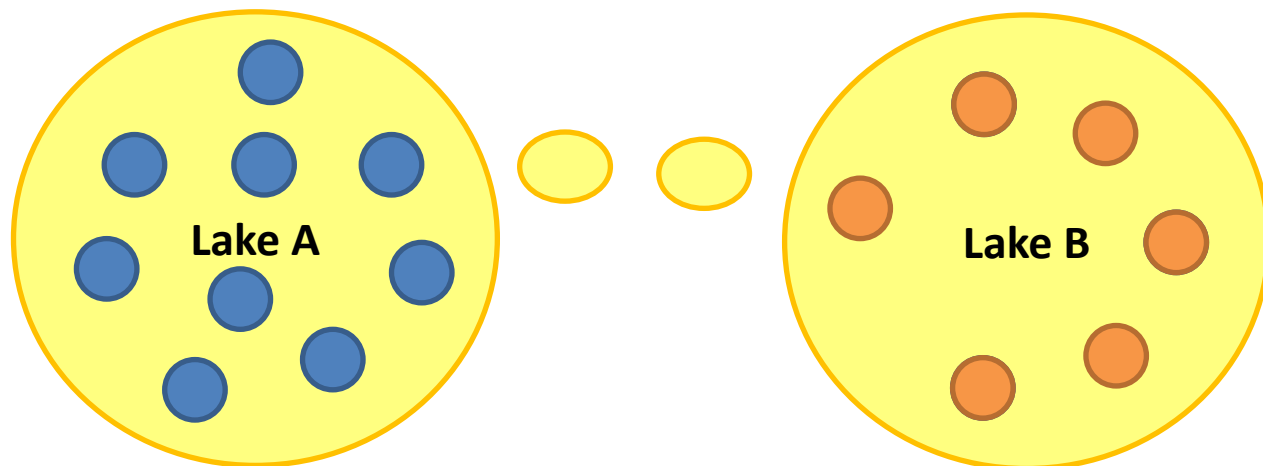






Results & discussion

Stepping stone speciation





Results & discussion

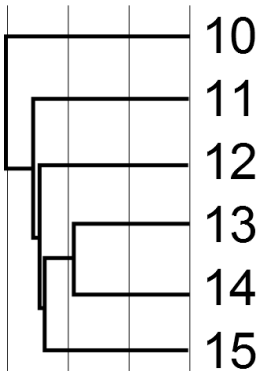
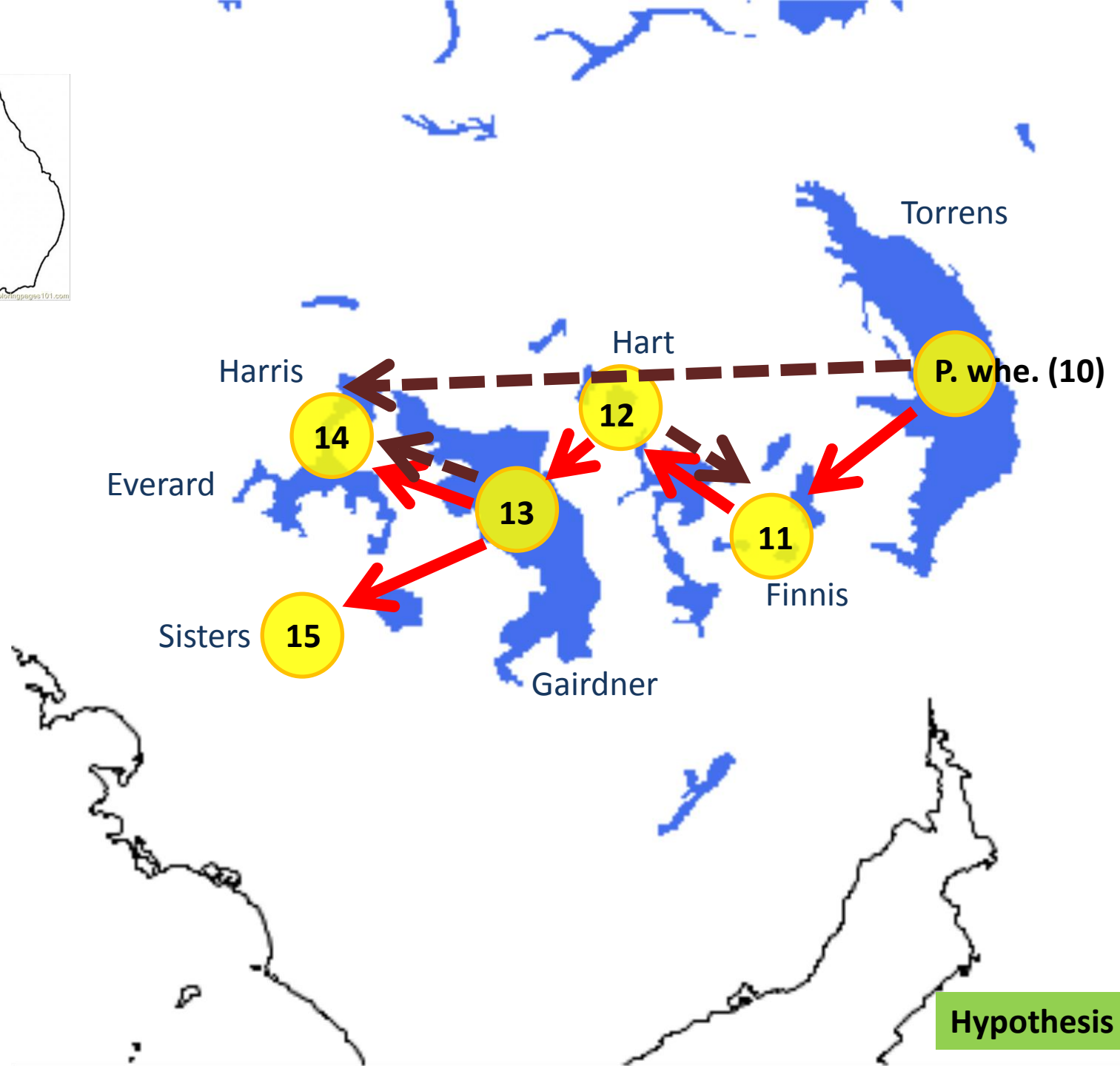
whelani species complex

- South Australia
- GMYC:
 - Simple: 6 entities
 - Multiple: 11 entities
 - GMYC + Morphology + Distribution:
 - 6 phylogenetic species





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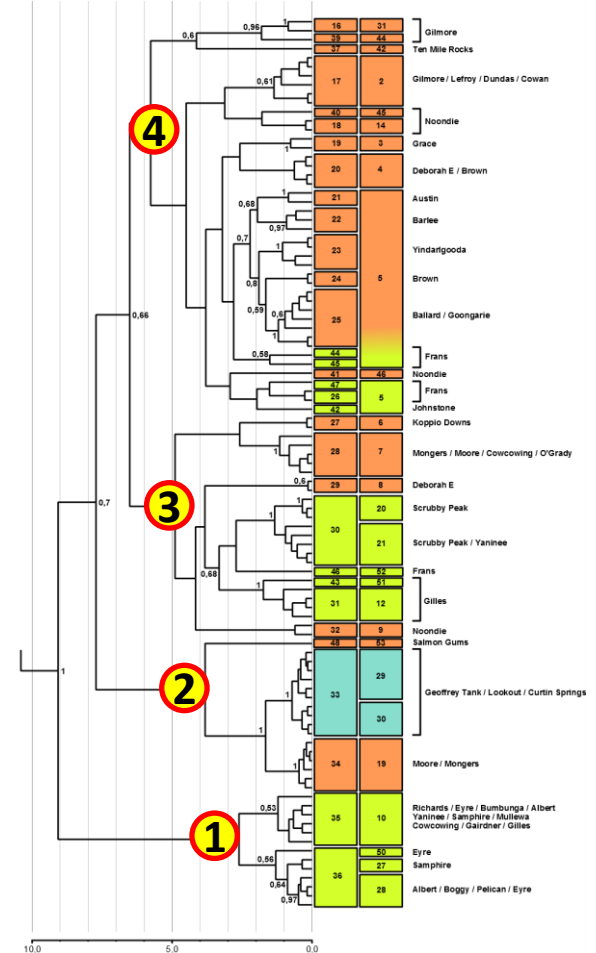
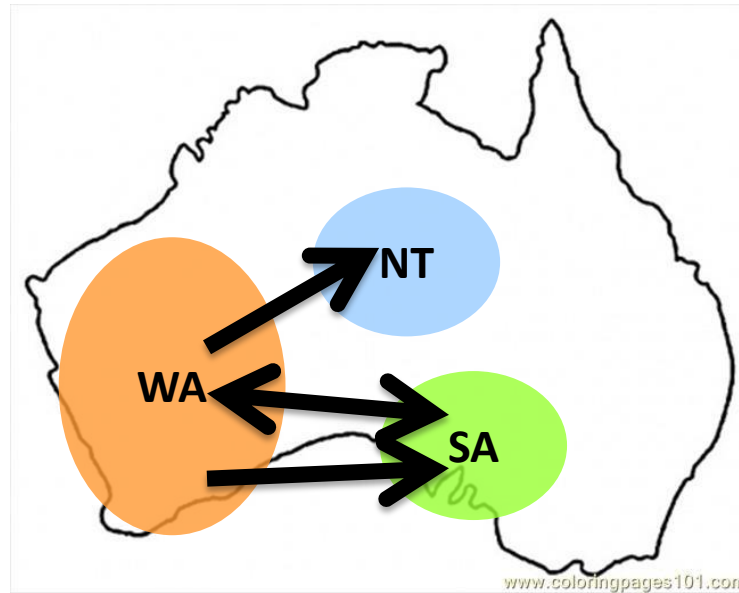


Hypothesis

Results & discussion

blackburni/murchisona species complex

- 4 groups



Results & discussion

blackburni/murchisona species complex

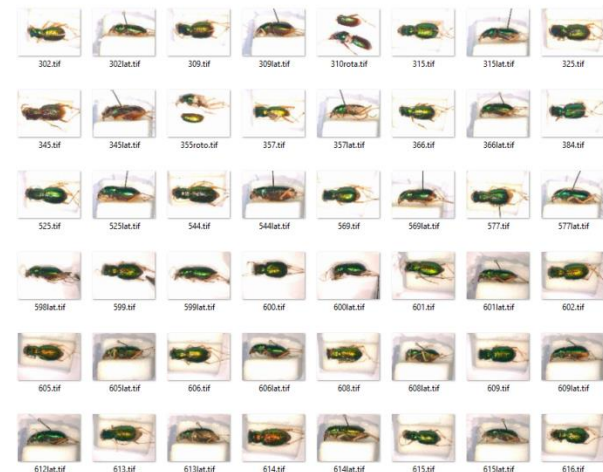
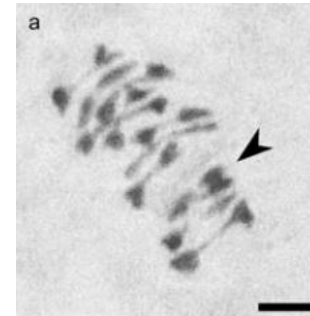
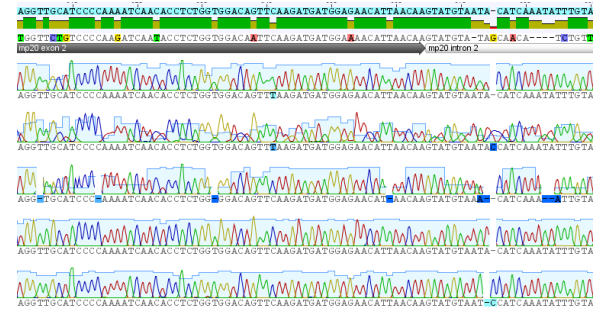
Subclade	Distribution	Entities		Number of phylogenetic species	Includes
		S	M		
1	SA	2	5	2	<i>P. australis</i>
2	WA – NT	3	4	3	<i>P. corpulenta</i> <i>P. cuprascens</i>
3	WA – SA	8	9	7	<i>P. blackburni</i>
4	WA – SA	19	11	10	<i>P. mendacia</i> <i>P. pulchra</i>

Some conclusions

1. High number of cryptic taxa
 - 10 described species
 - 27 undescribed species
2. Main groups diverged during the aridification of Australia
3. The speciation follows the stepping stone model

What are we doing now?

- Nuclear markers
 - mp20
- Karyotypes
- Describe new species

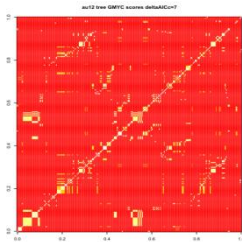


Thanks



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