



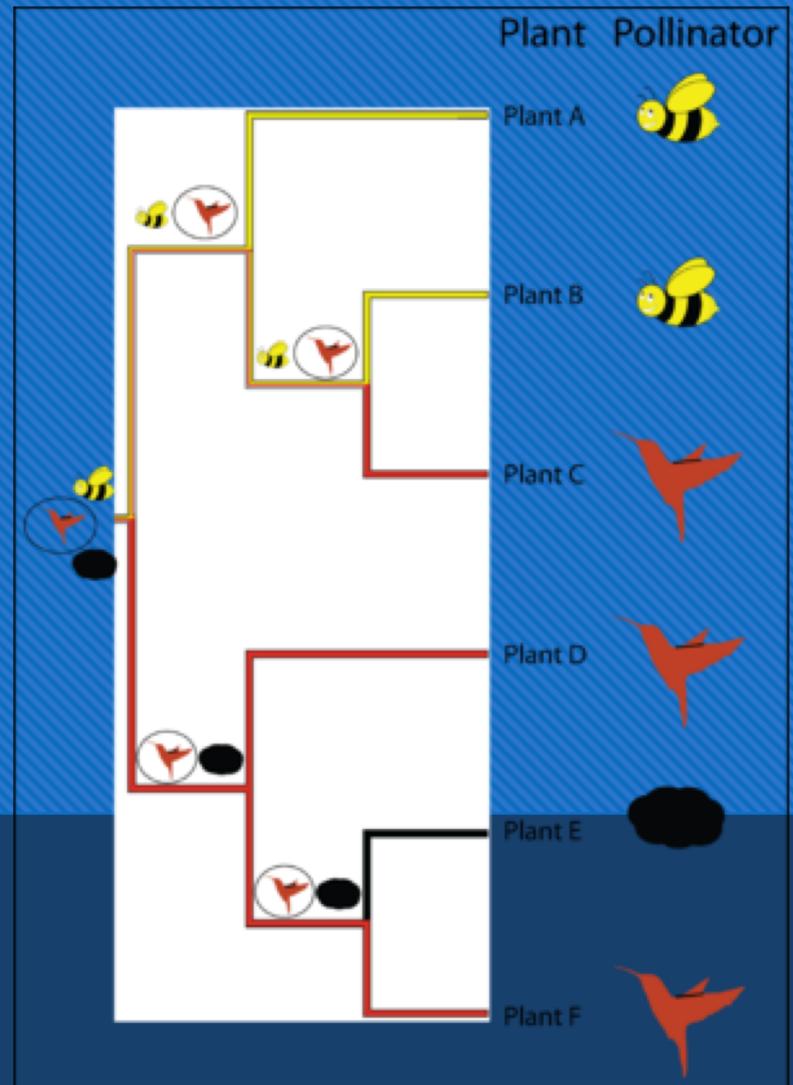
UH Systematics fall 2019:

Biogeography

Camiel Doorenweerd
20191008



Biogeography is a special case of character state evolution





Alfred R. Wallace

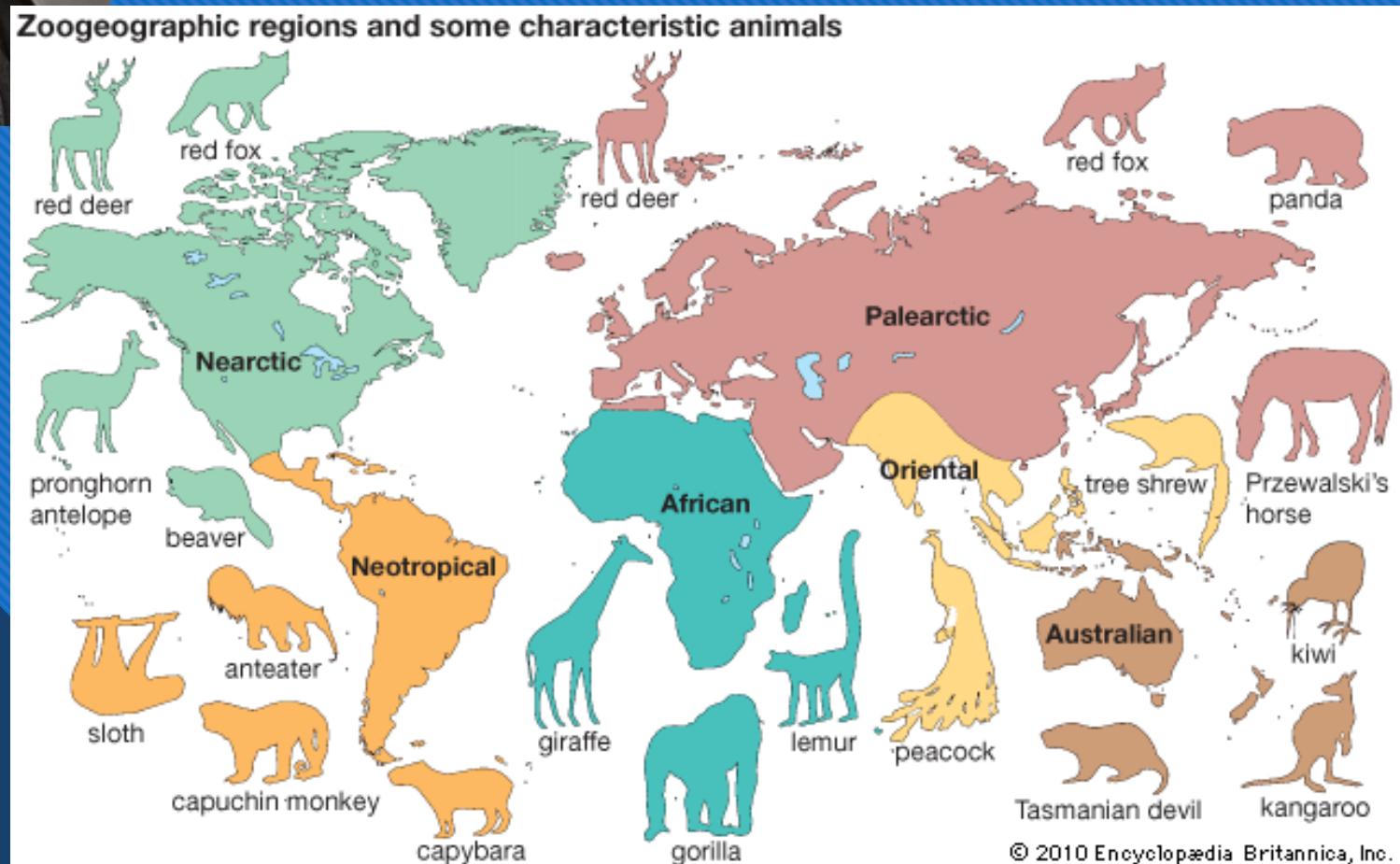
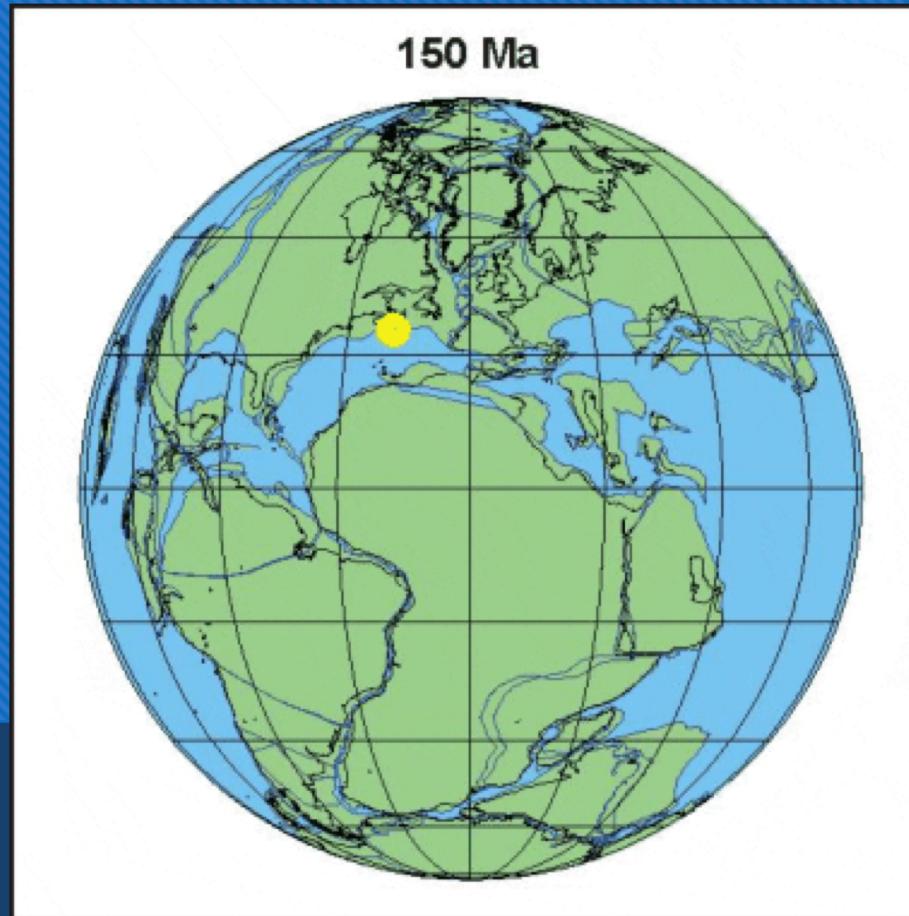
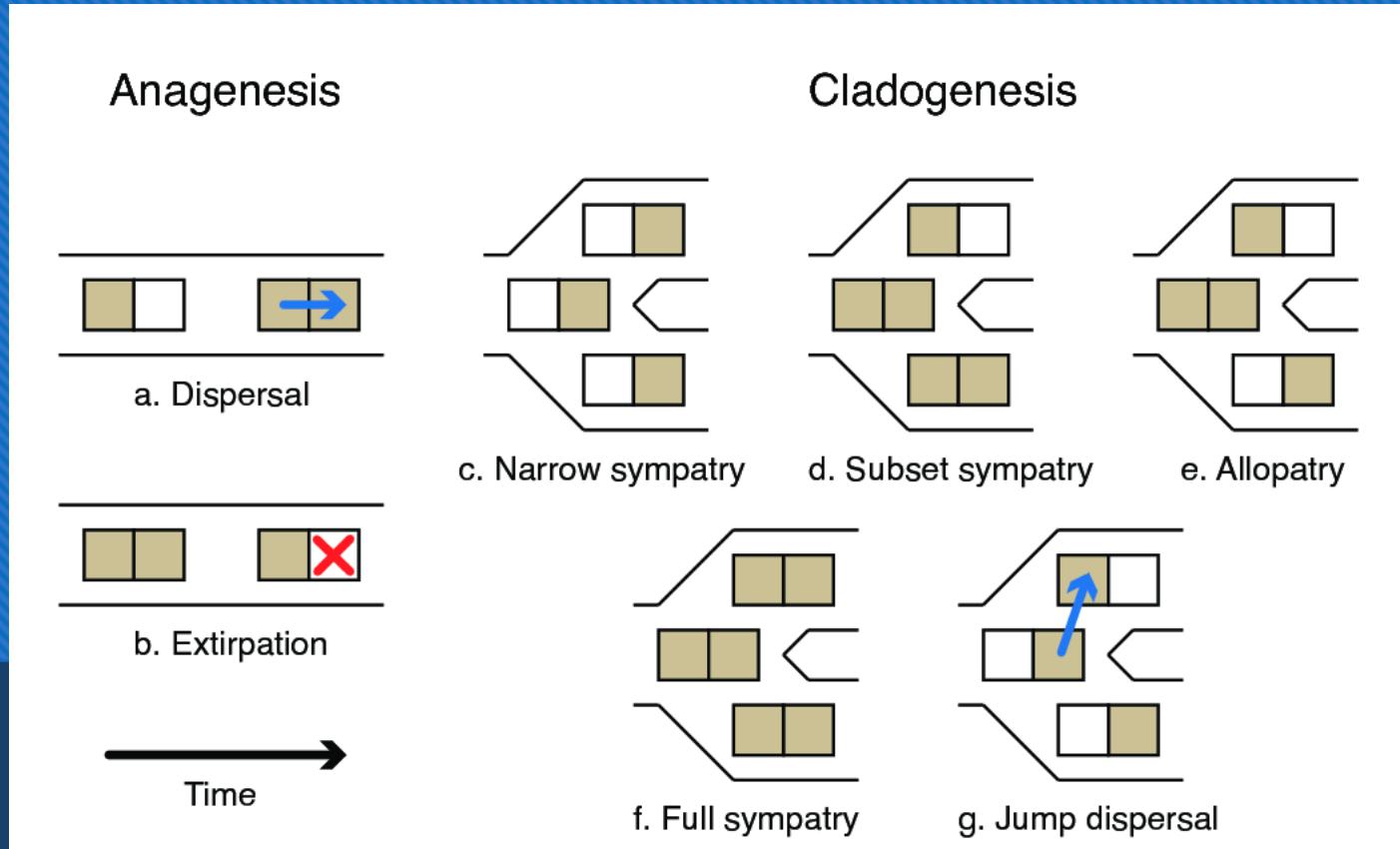


Plate tectonics shaped biogeographic patterns



Anagenesis & cladogenesis



<https://revbayes.github.io>

Selecting a model

	Process	Ranges Before	Ranges After	Character mapping	DIVA	DEC (GeoSSE, LAGRANGE)	BayArea, BBM (RASP)	Parameter of BioGeoBEARS Supermodel
Anagenetic	Dispersal				✓	✓	✓	d (& x, b)
	Extinction				✓	✓	✓	e (& u, b)
	Range-switching				✓			a (& x, b)
Cladogenetic	Sympatry (narrow)				✓	✓	✓	y (& $mx0ly$)
	Sympatry (widespread)						✓	y (& $mx0ly$)
	Sympatry (subset)					✓		S (& $mx0ls$)
	Vicariance (narrow)				✓	✓		V (& $mx0lv$)
	Vicariance (widespread)				✓			V (& $mx0lv$)
	Founder							j (& $x,$ $mx0lj$)



Conceptual and statistical problems with the DEC+J model of founder-event speciation and its comparison with DEC via model selection

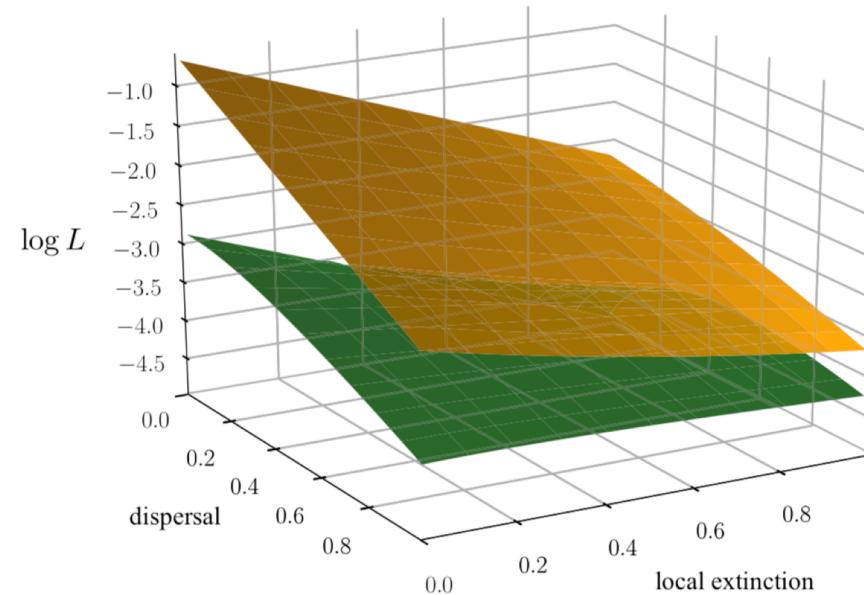


FIGURE 2 Likelihood surfaces for DEC (lower) and DEC+J (upper), for sister species endemic to areas A and B (Figure 1). The

Further model parameters: Hawaiian silverswords example

ORIGINAL ARTICLE

doi:10.1111/evo.13594



Retracing the Hawaiian silversword radiation despite phylogenetic, biogeographic, and paleogeographic uncertainty

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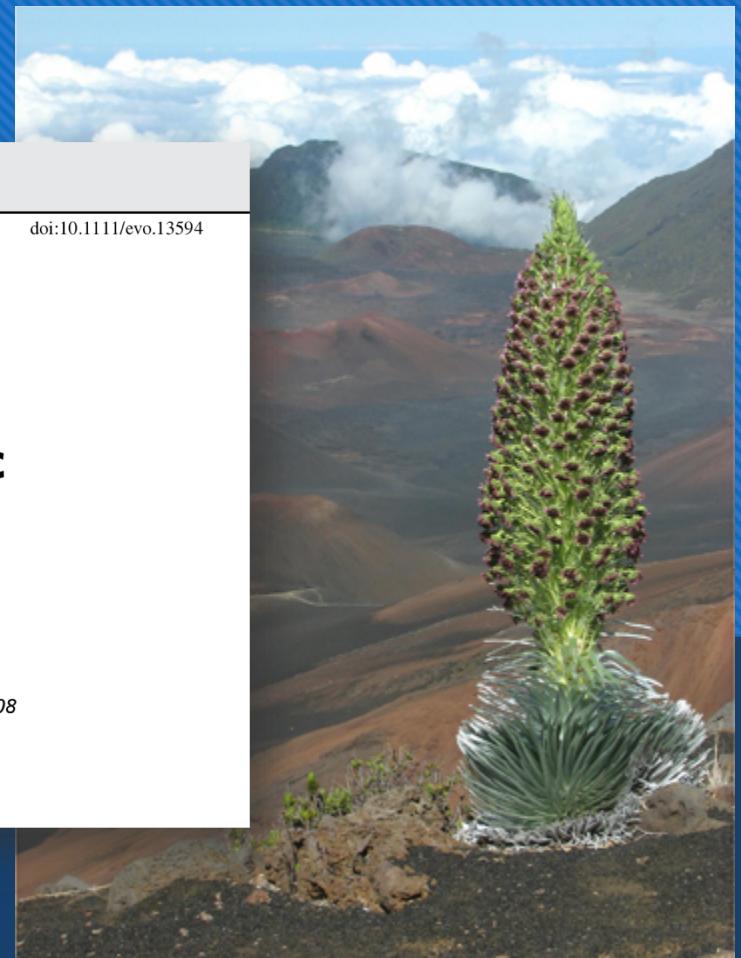
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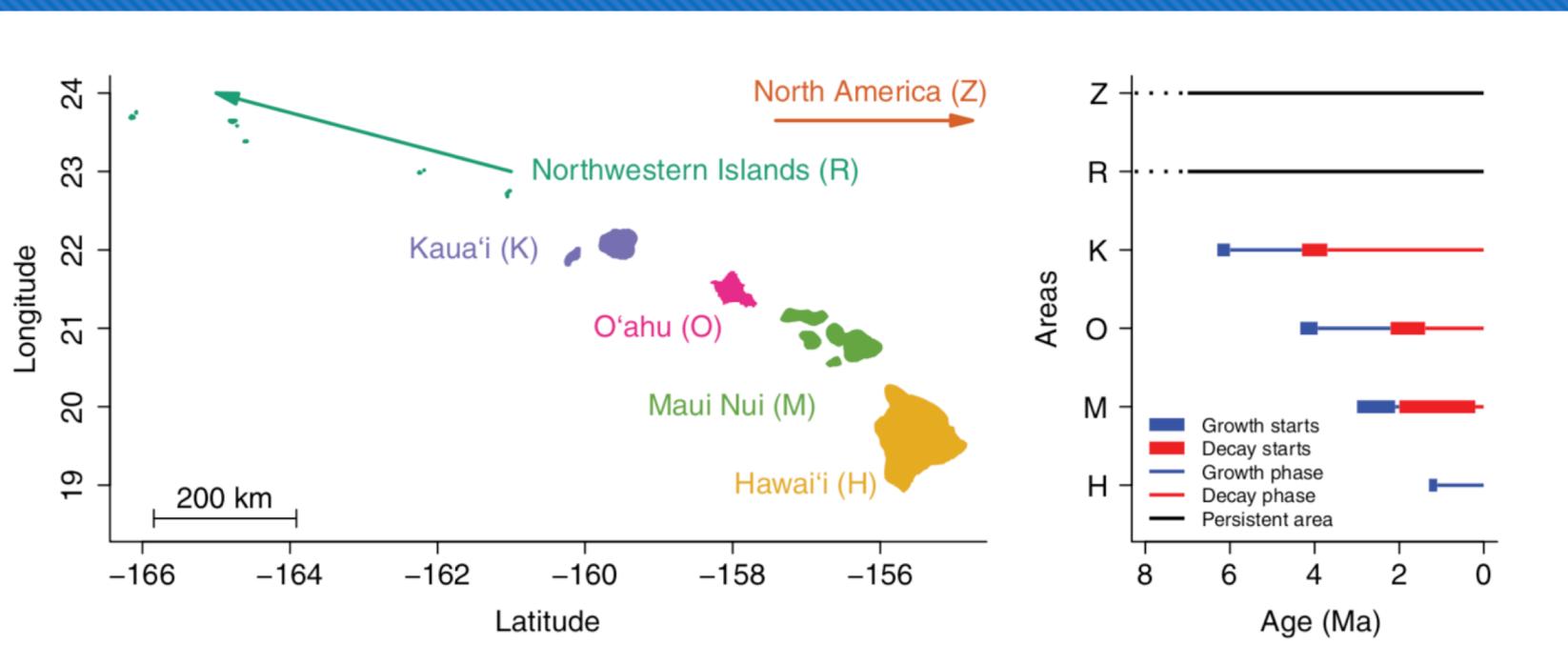
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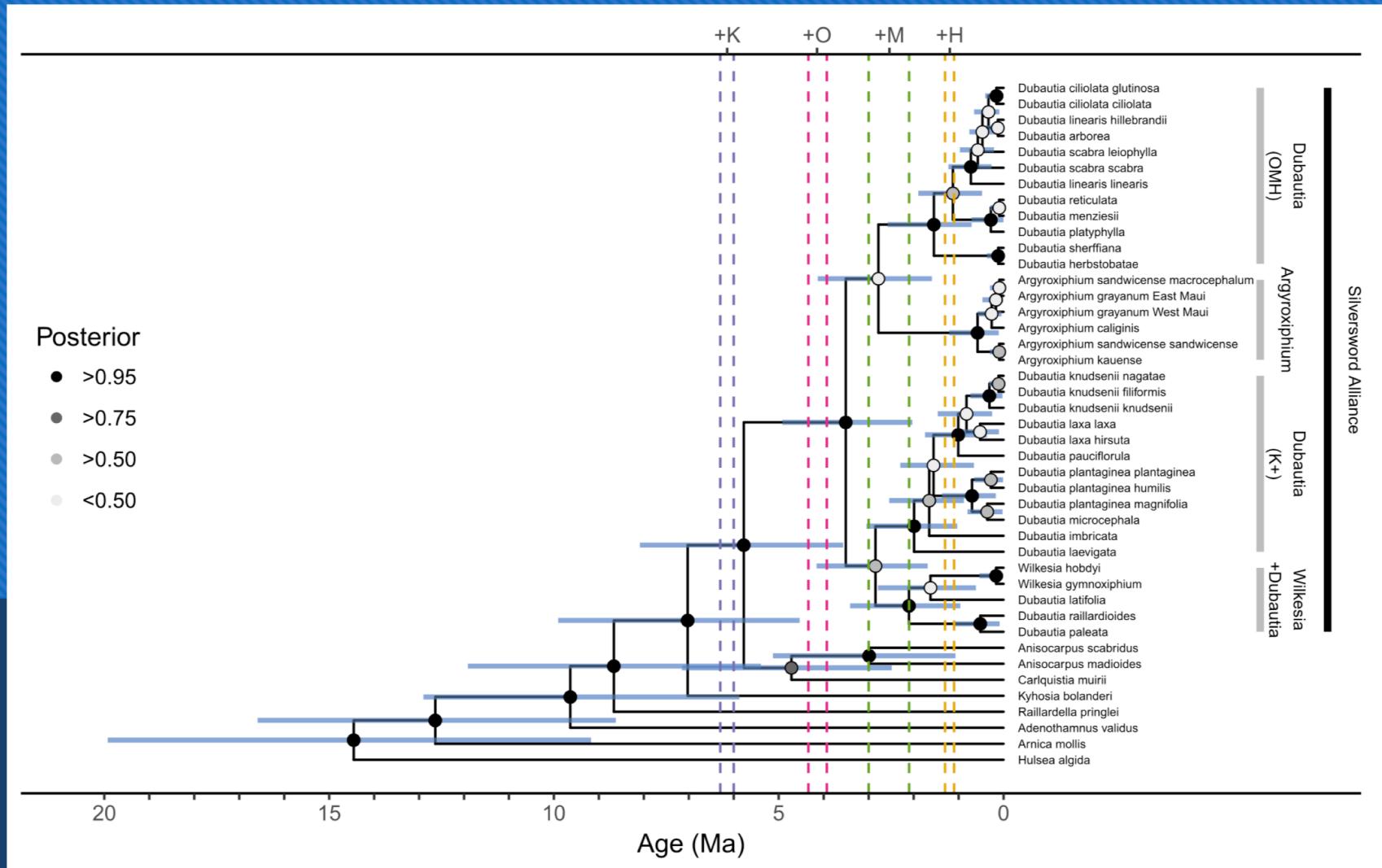
⁵Jepson Herbarium, University of California, Berkeley, California 94720



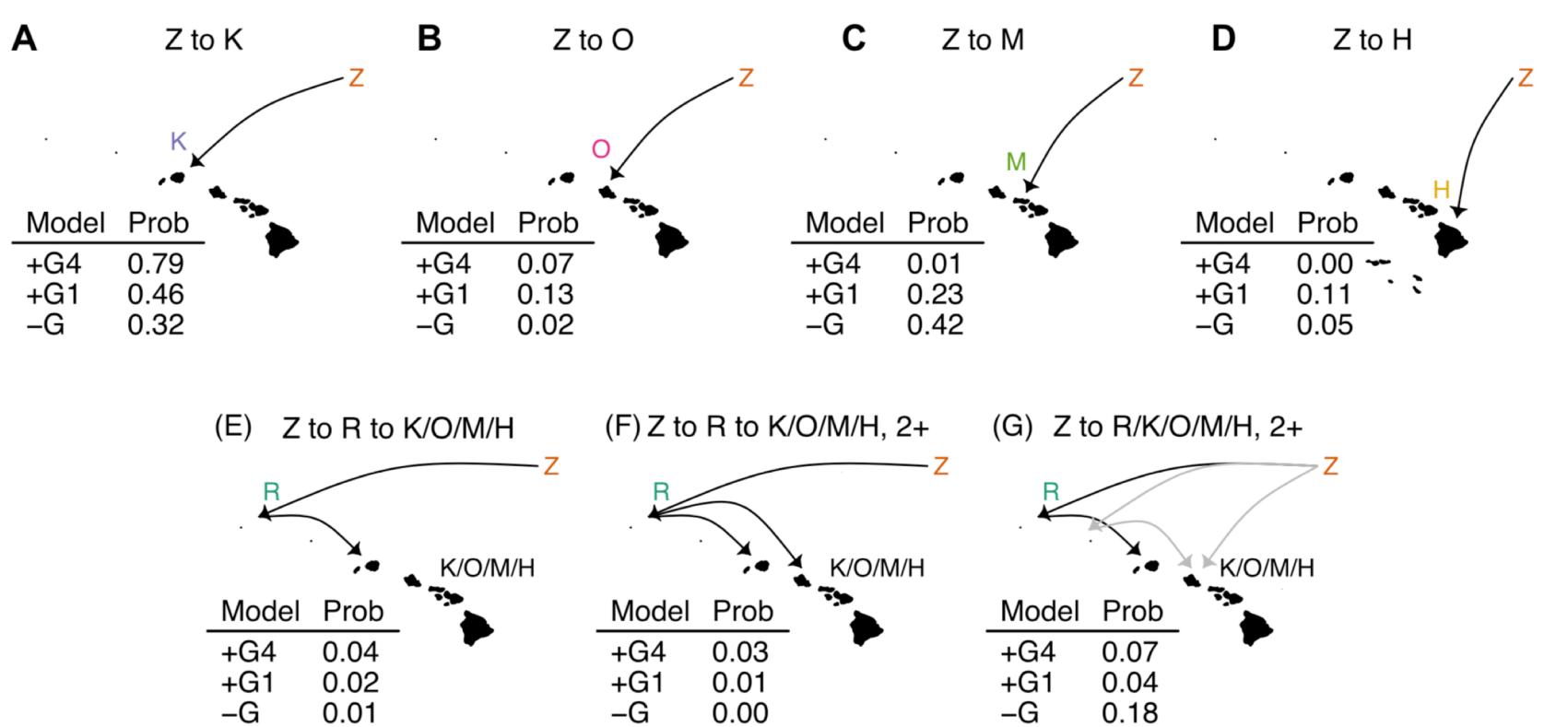
The Hawaiian archipelago



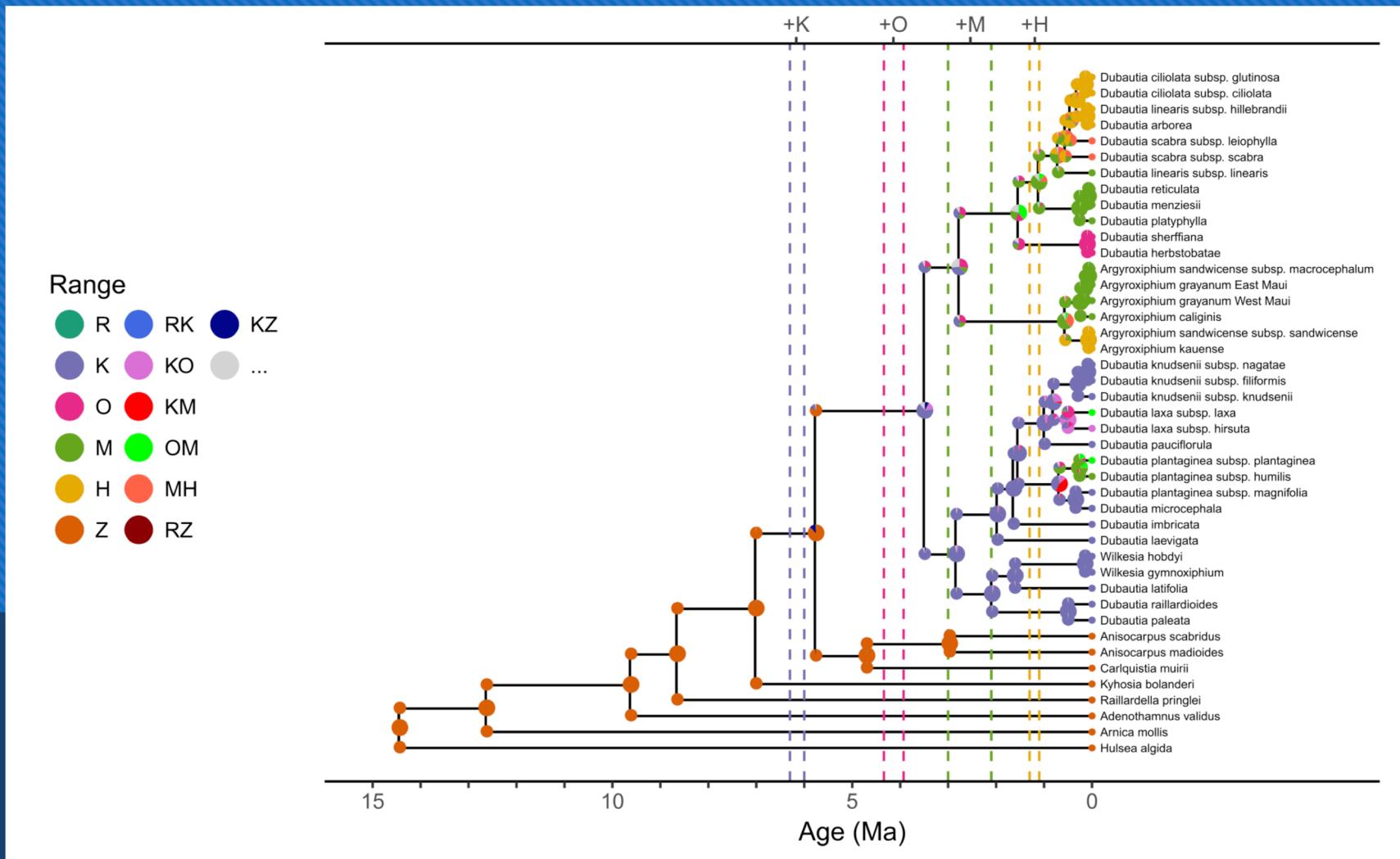
Silverswords & tarweeds



Which island was colonized first?



The ‘progression rule’



Lab:

Biogeobears versus RevBayes

Jupyter notebook

Select sensible regions

Select sensible scenarios

Saturnia Biogeography

References

- Ree RH, Sanmartín I (2018) Conceptual and statistical problems with the DEC+J model of founder-event speciation and its comparison with DEC via model selection. *Journal of Biogeography* 45: 741–749. <https://doi.org/10.1111/jbi.13173>
- Landis MJ, Freyman WA, Baldwin BG (2018) Retracing the Hawaiian silversword radiation despite phylogenetic, biogeographic, and paleogeographic uncertainty. *Evolution* 72: 2343–2359. <https://doi.org/10.1111/evo.13594>