Colonisation, diversification and extinction of birds in Macaronesia

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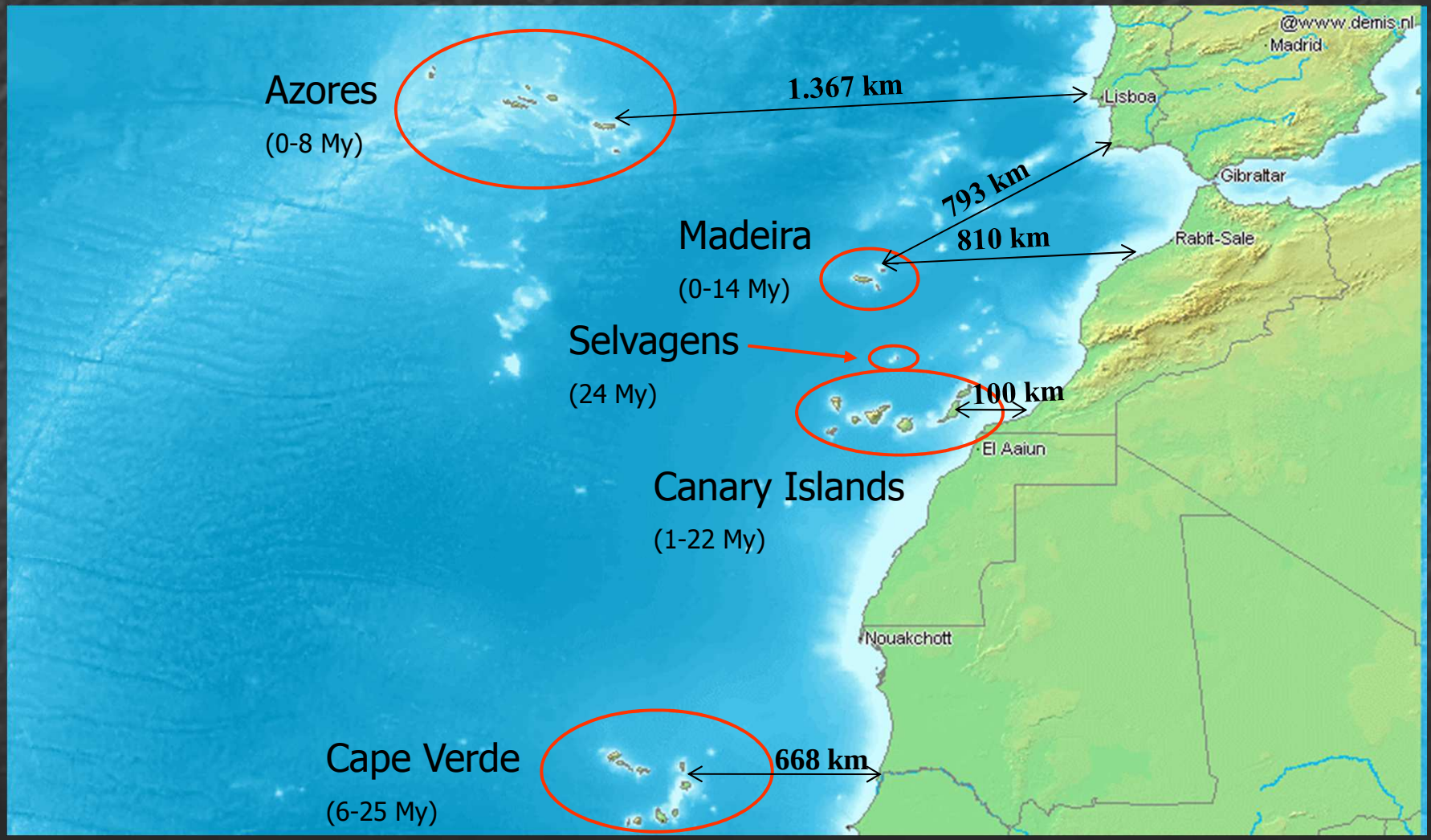
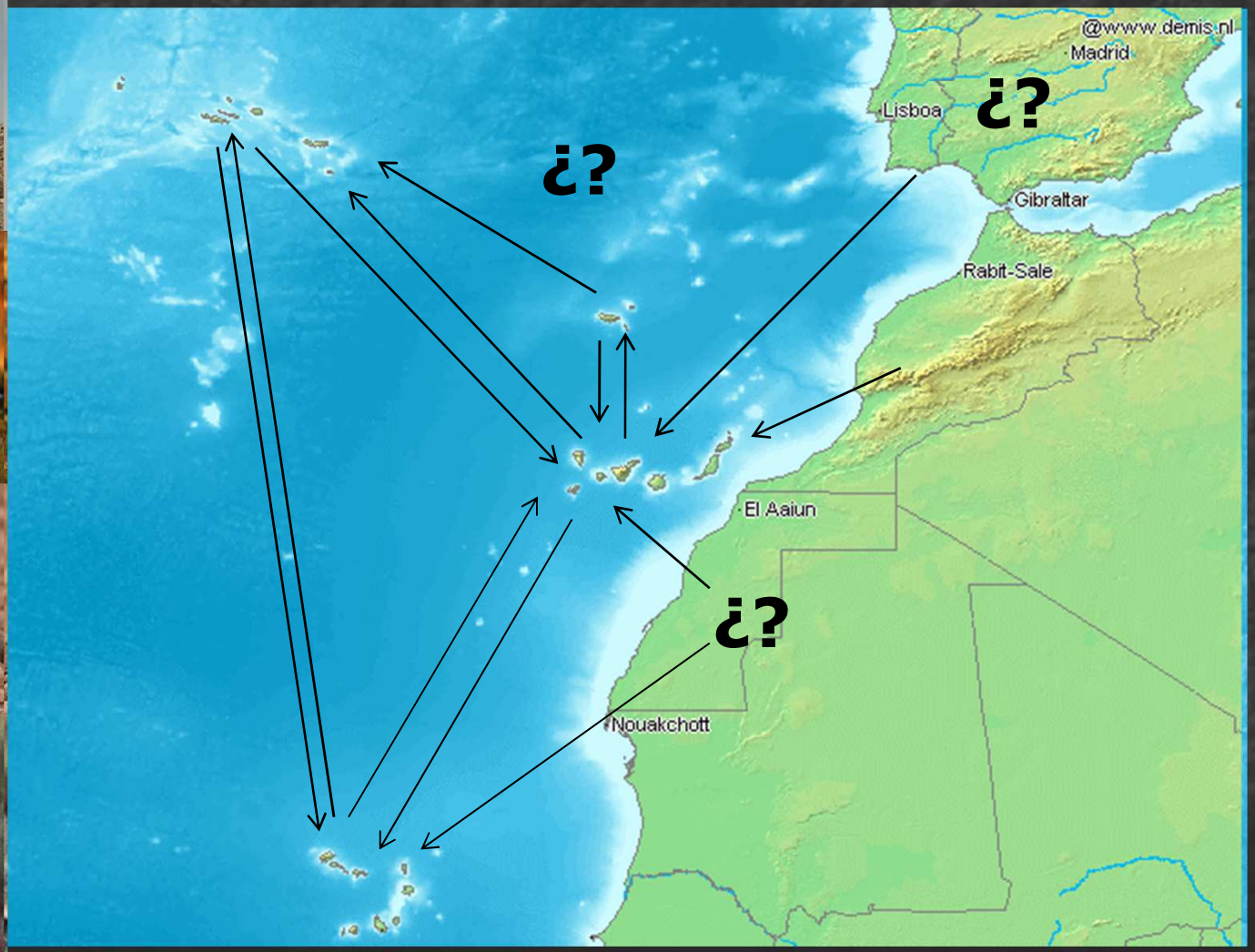
MACARONESIA



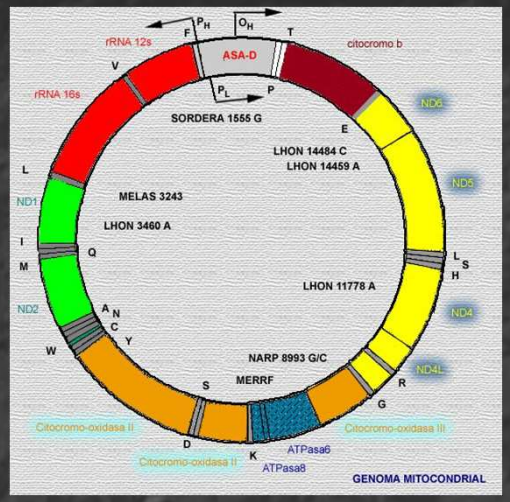
Colonisation: When? From where?



Colonisation and diversification

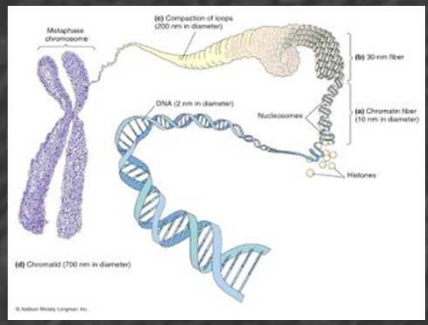
1) Mitochondrial DNA (maternal inheritance)

1. Phylogeny (among species)
2. Phylogeography (within species)



2) Nuclear DNA (maternal and paternal)

1. Population genetics (genetic structure, gene flow)
2. Phylogeography (origin, dispersal)



Flanking region — Short tandem repeats (CAC) — Flanking region

…AGTCCTGGCCTGAA**CACCACCACCACCACCACCACCAC**CCTTAACTGGTAA…

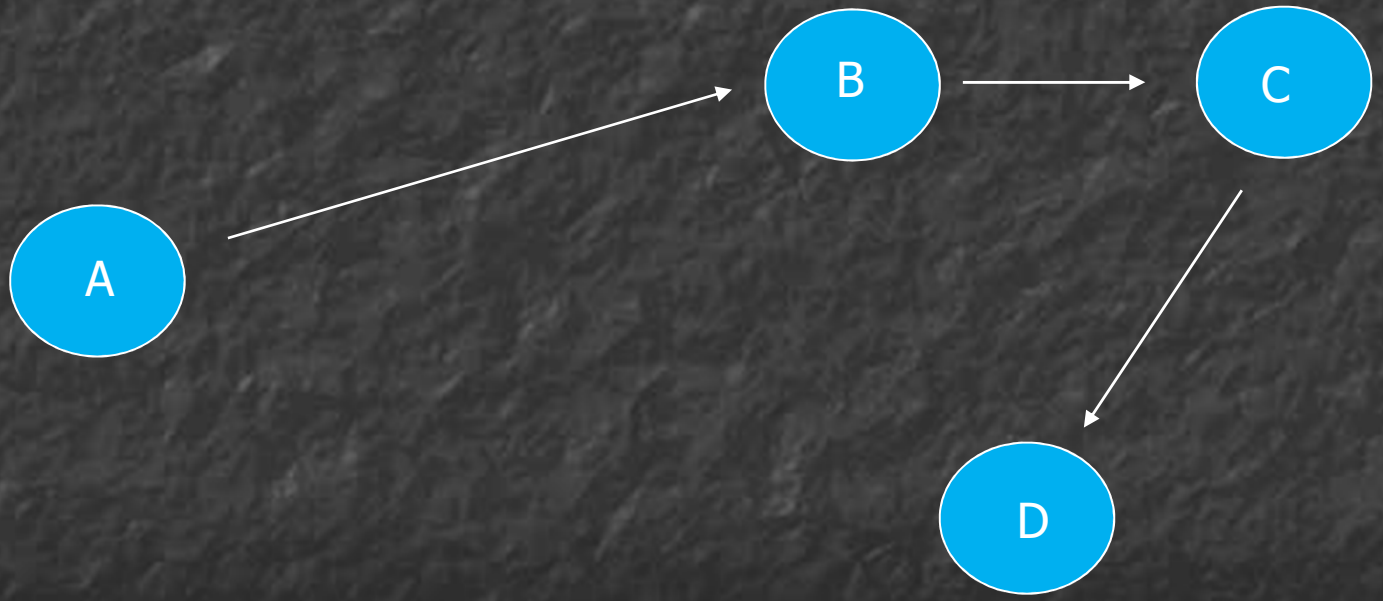
…TCAGGACCGGACTT**GTGGTGGTGGTGGTGGTGGTGGTG**GGAATTGACCATT…

Colonisation and diversification

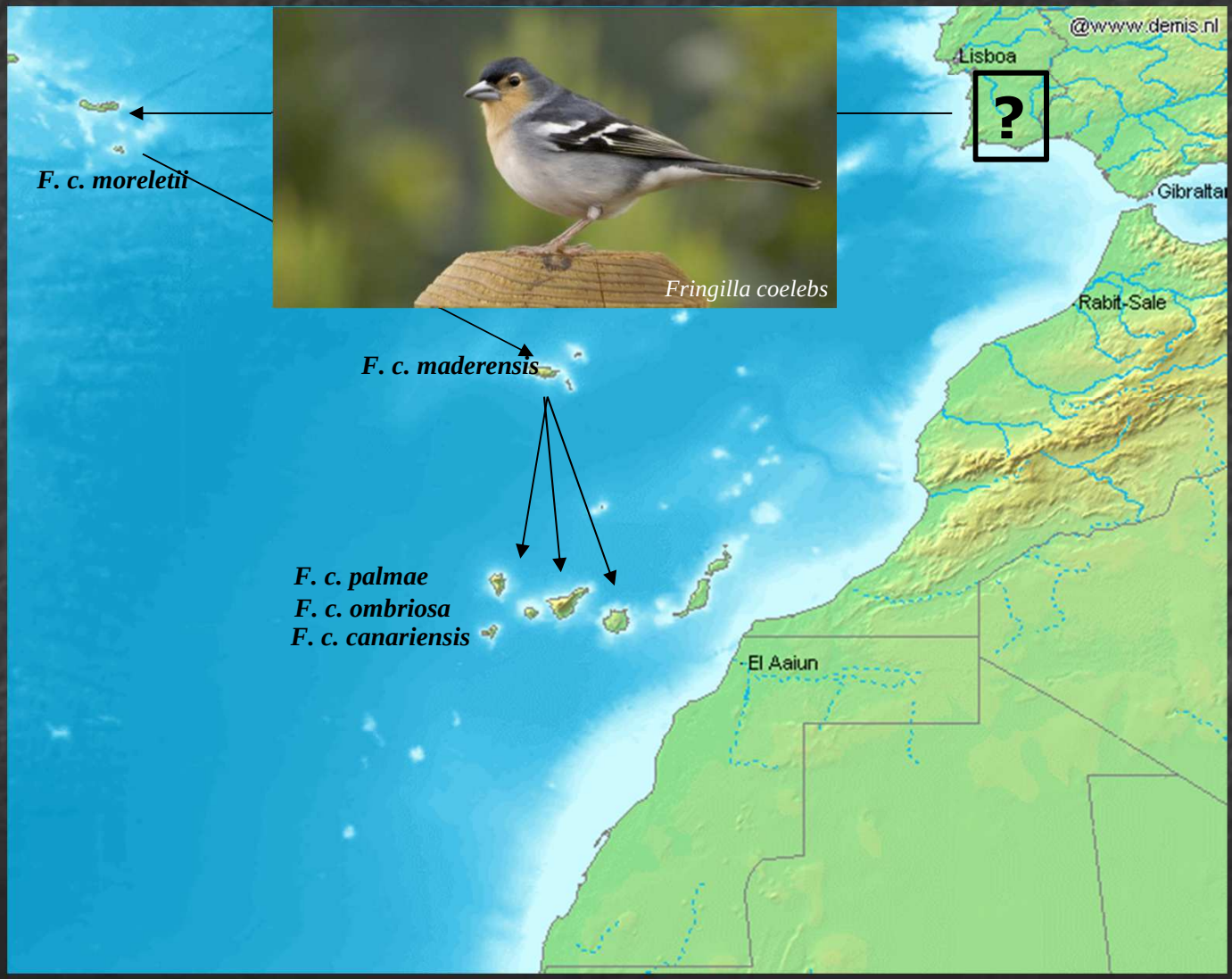
3) Next-generation sequencing

Origin and diversification of island biota

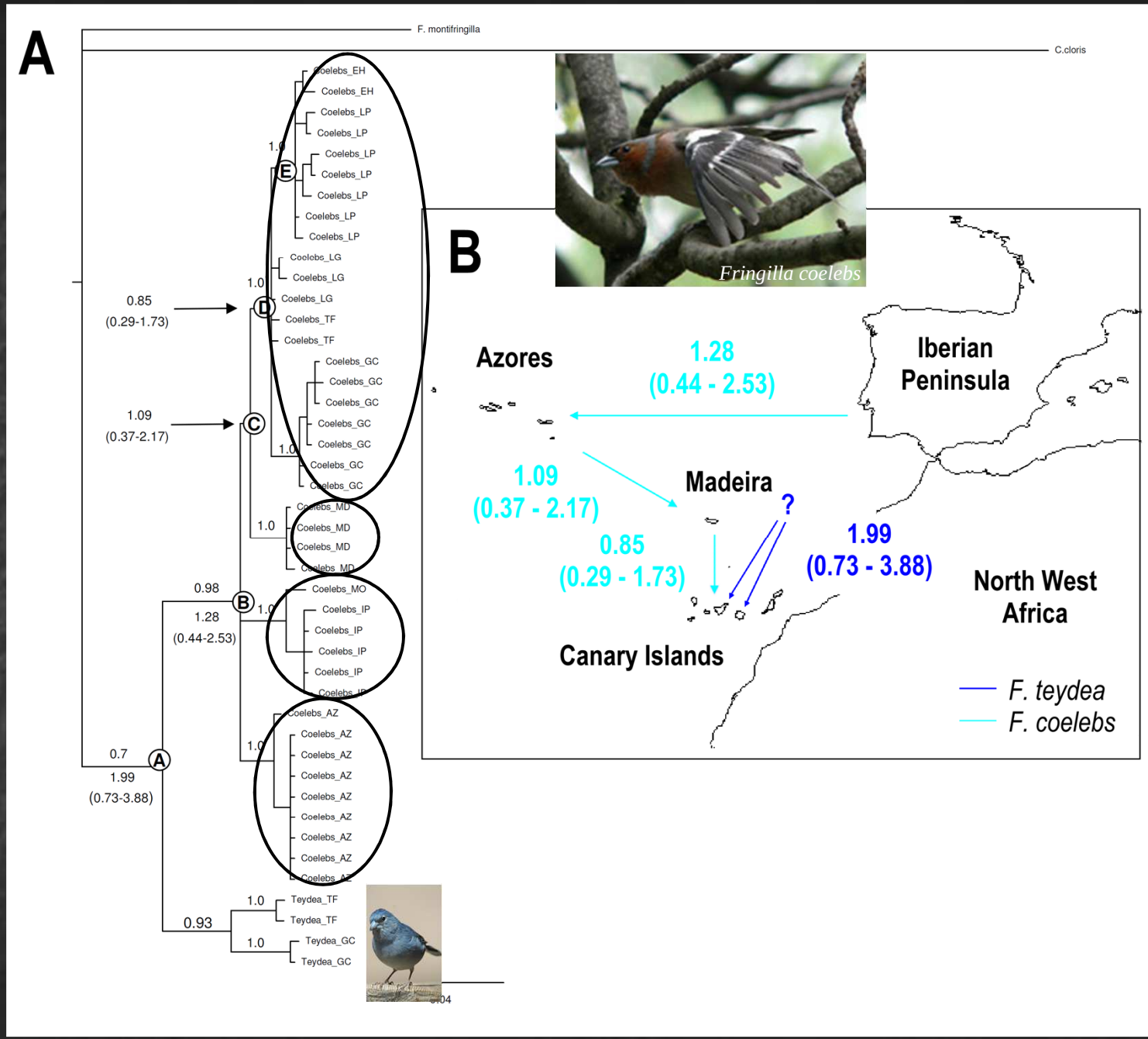
a) A small group of individuals arrive



Colonisation: How? When? From where?



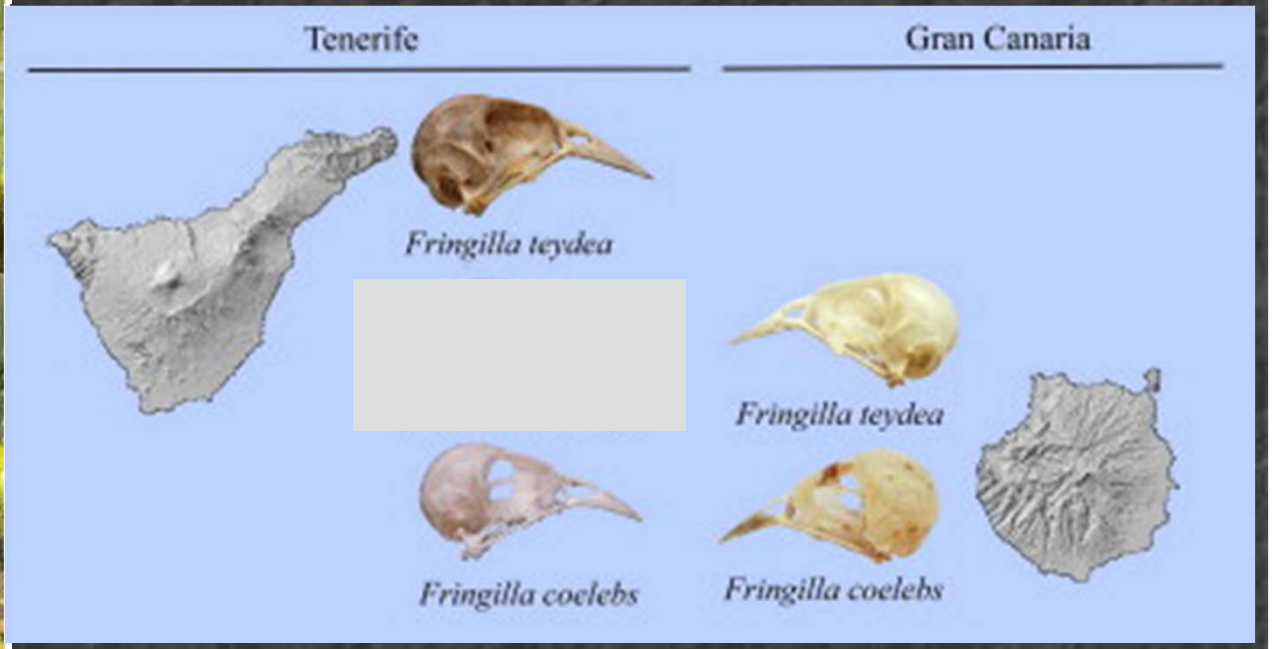
Marshall & Baker, 1999. Mol.Phy.Evol.



Rando et al. 2010 PloS ONE.

Character displacement among finches

Carduelis aurelioi



Rando et al. 2010 PloS ONE

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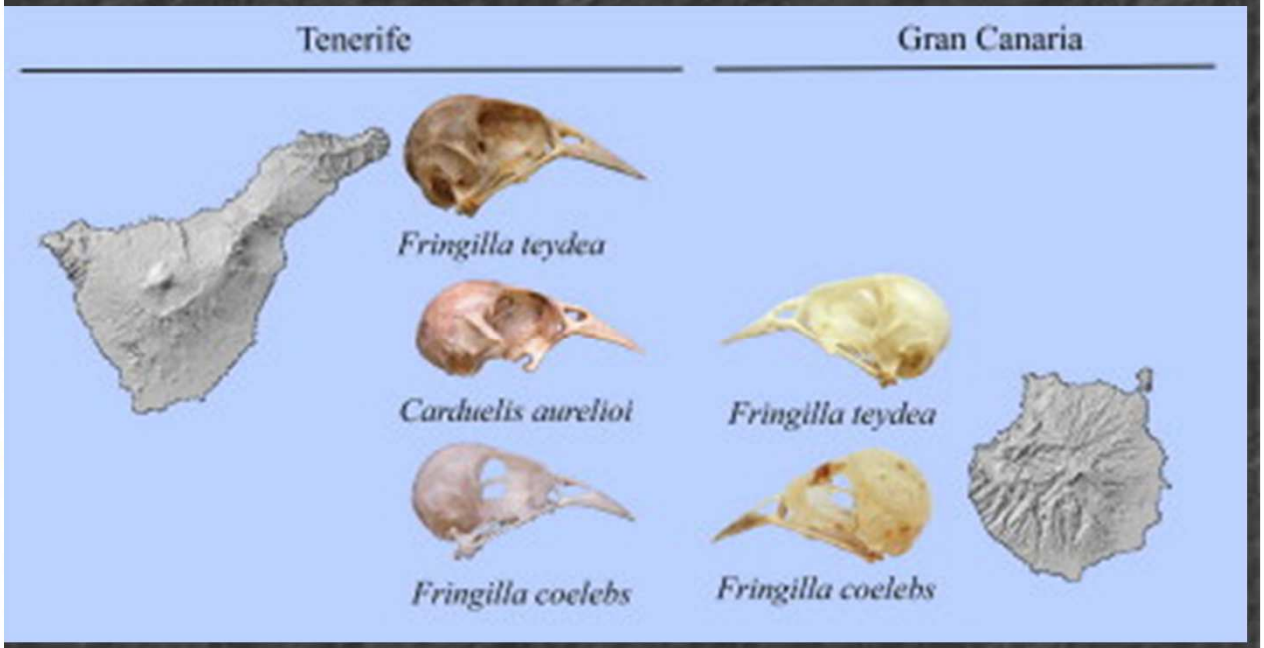
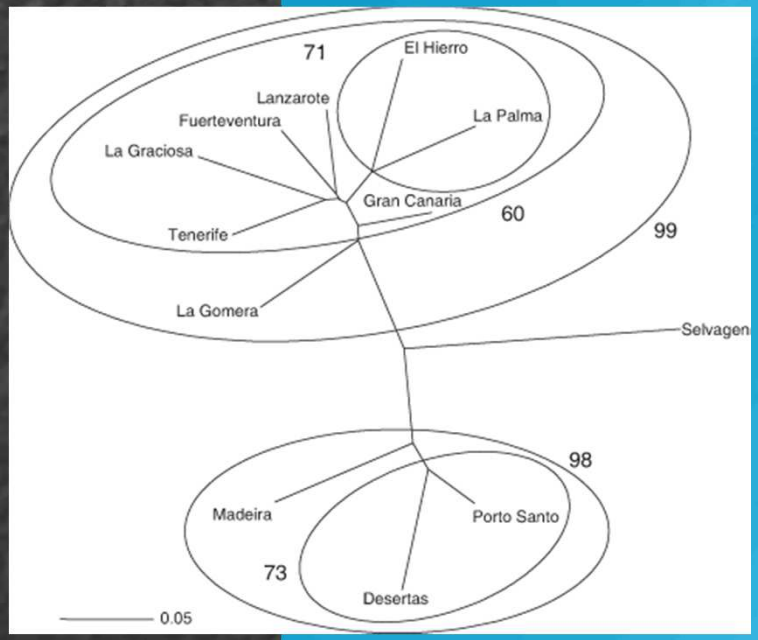
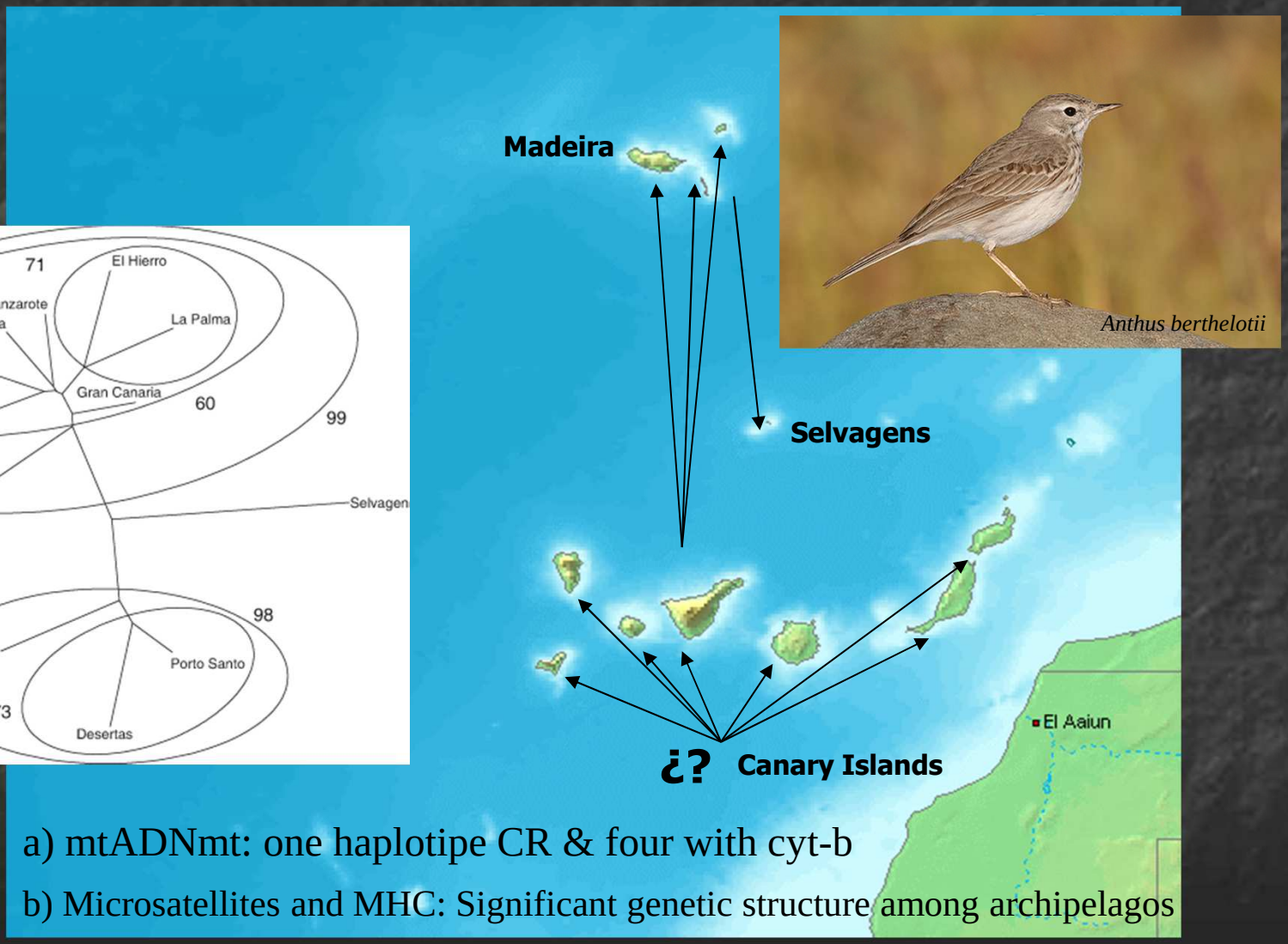


A beak size comparison among the blue chaffinch *(F. teydea*), the common chaffinch (*F. coelebs*) and the extinct slender-billed greenfinch (*C. aurelioi*)

Rando et al. 2010 PloS ONE

Colonisation: How? When? From where?



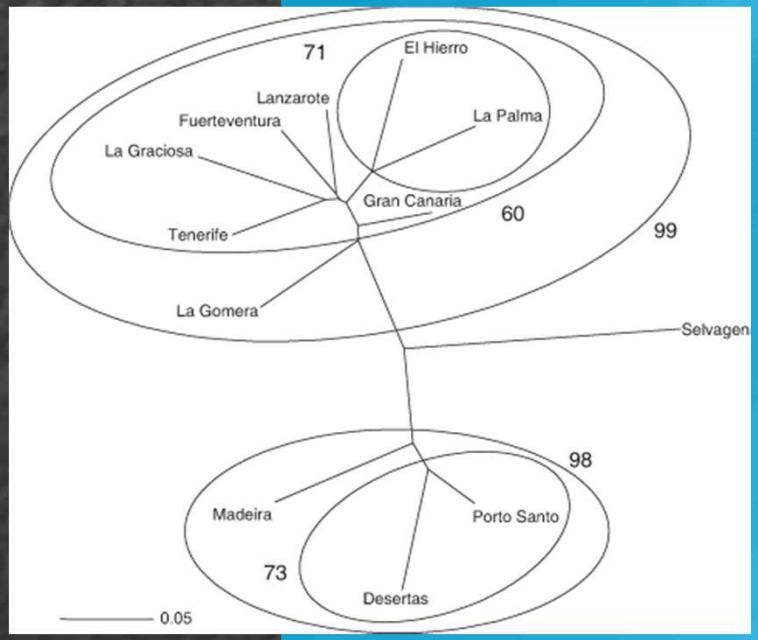


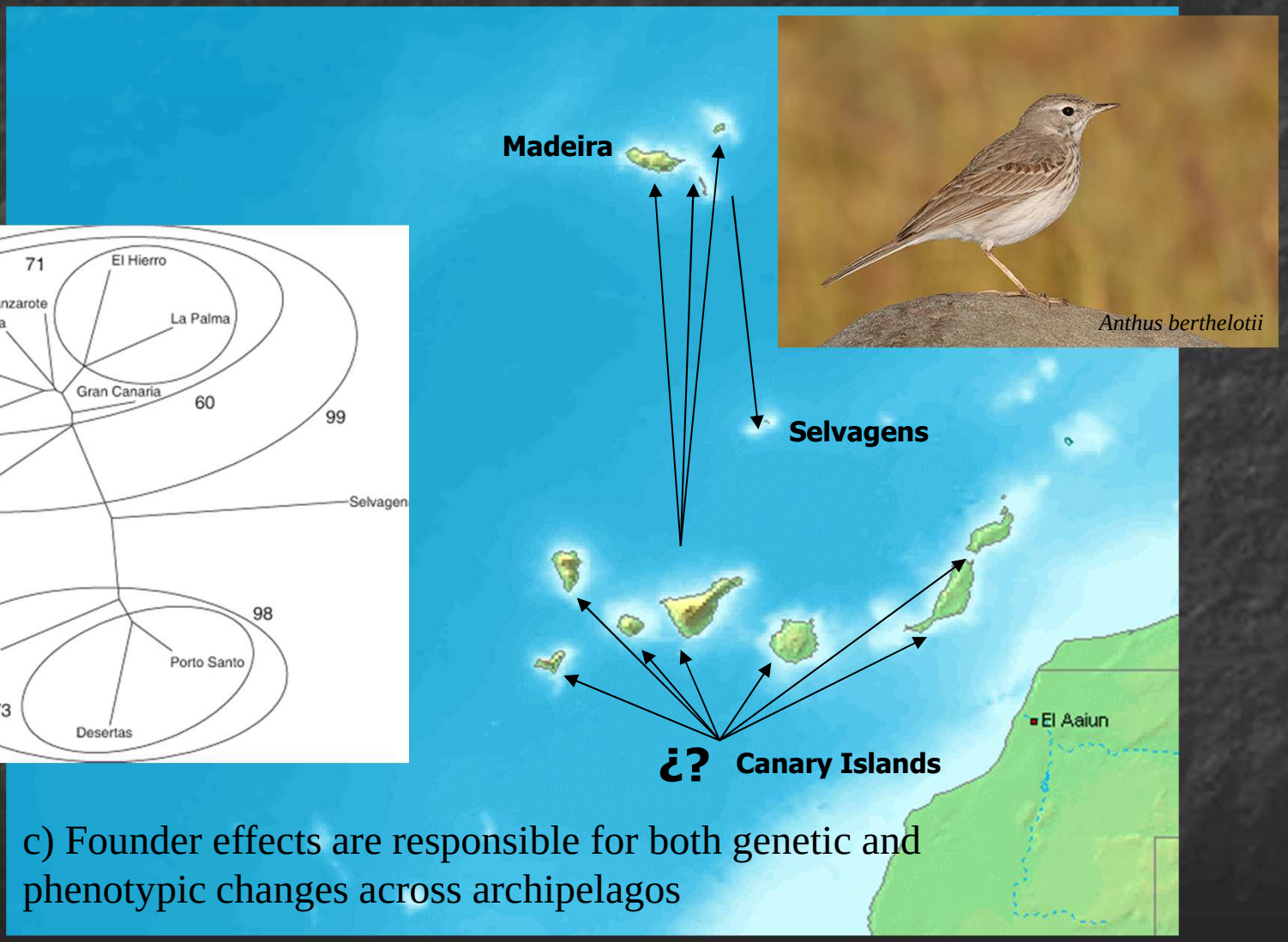
a) mtADNmt: one haplotipe CR & four with cyt-b

b) Microsatellites and MHC: Significant genetic structure among archipelagos

Illera *et al*., 2007. Mol. Ecol.
Spurgin *et al*., 2011; 2014. Mol. Ecol.

Colonisation: How? When? From where?



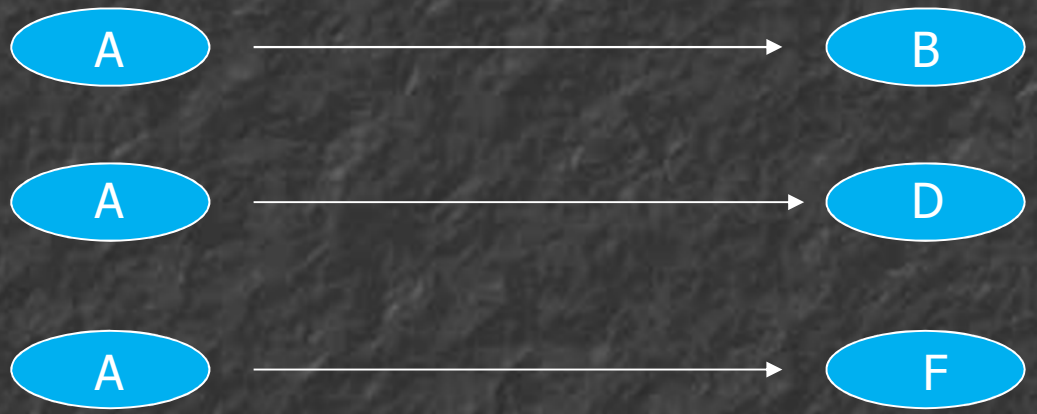


c) Founder effects are responsible for both genetic and phenotypic changes across archipelagos

Spurgin *et al.*, 2014. Mol. Ecol.

Origin and diversification of island biota

b) Multiple invasion waves



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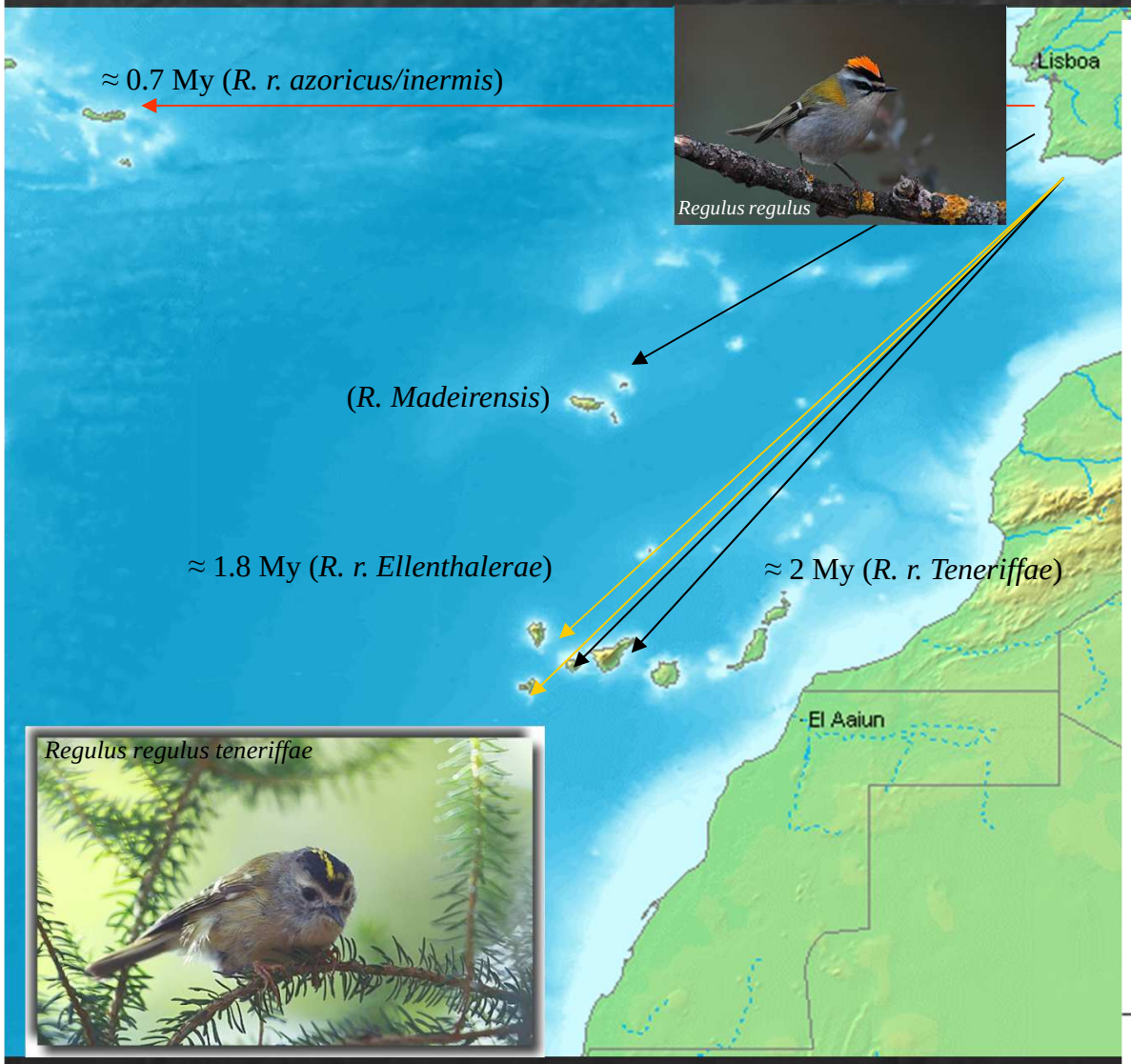
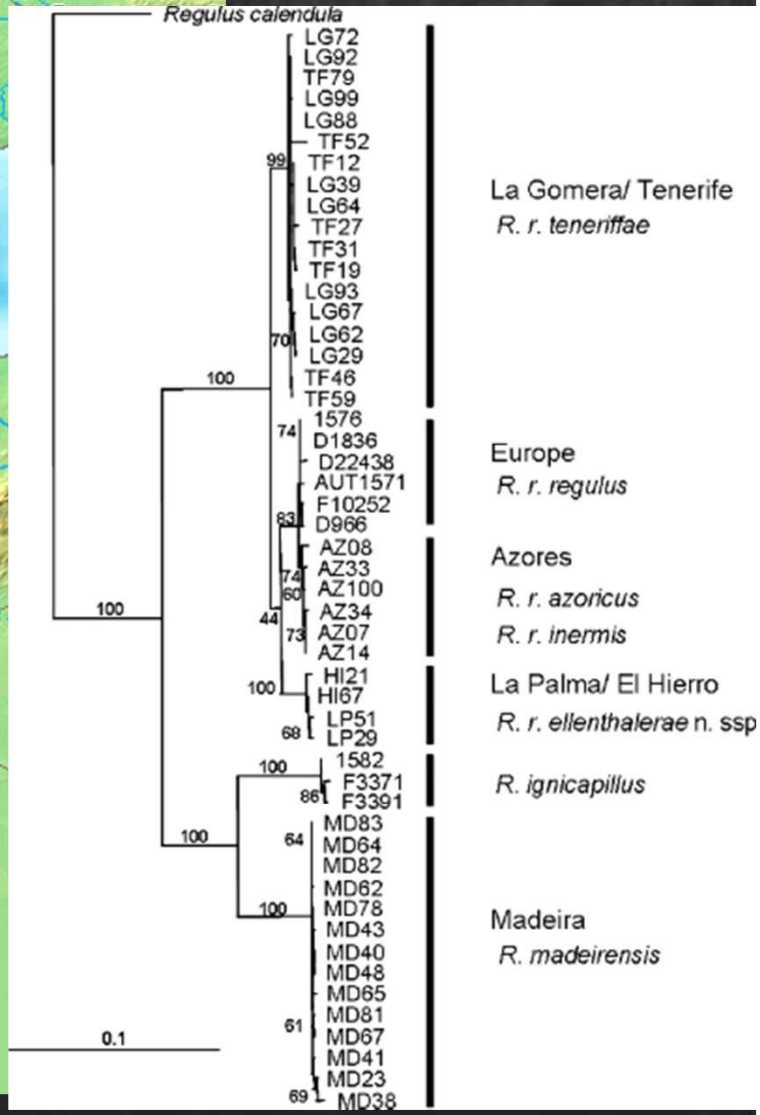




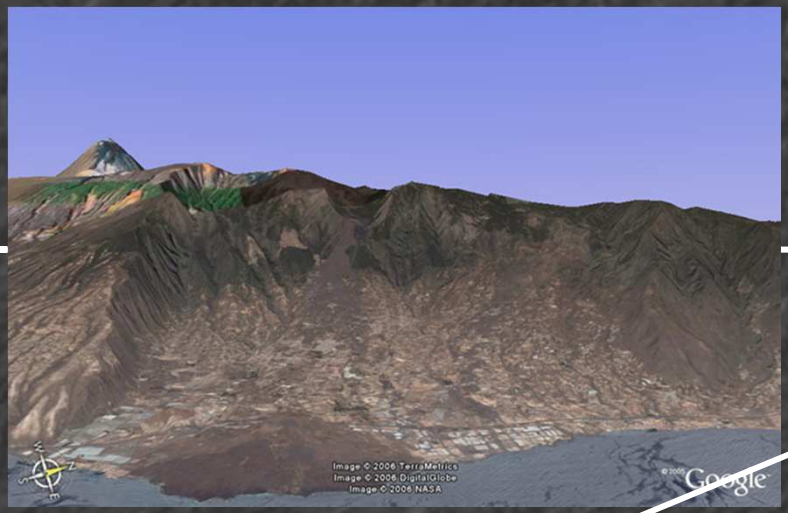
Päckert *et al.*, 2006. J.Avian Biology

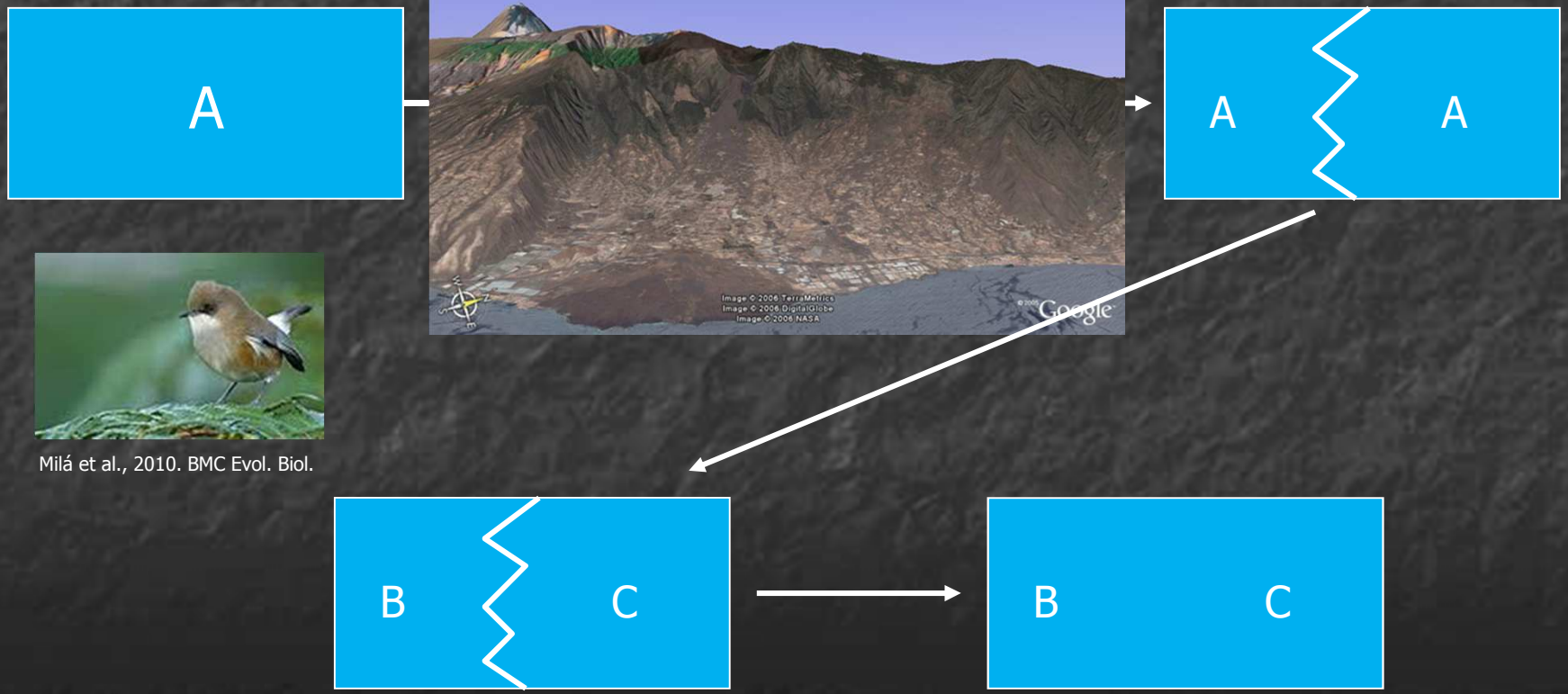
Origin and diversification of island biota

c) Diversification due to vicariance

Brown et al., 2006. Mol. Ecol.

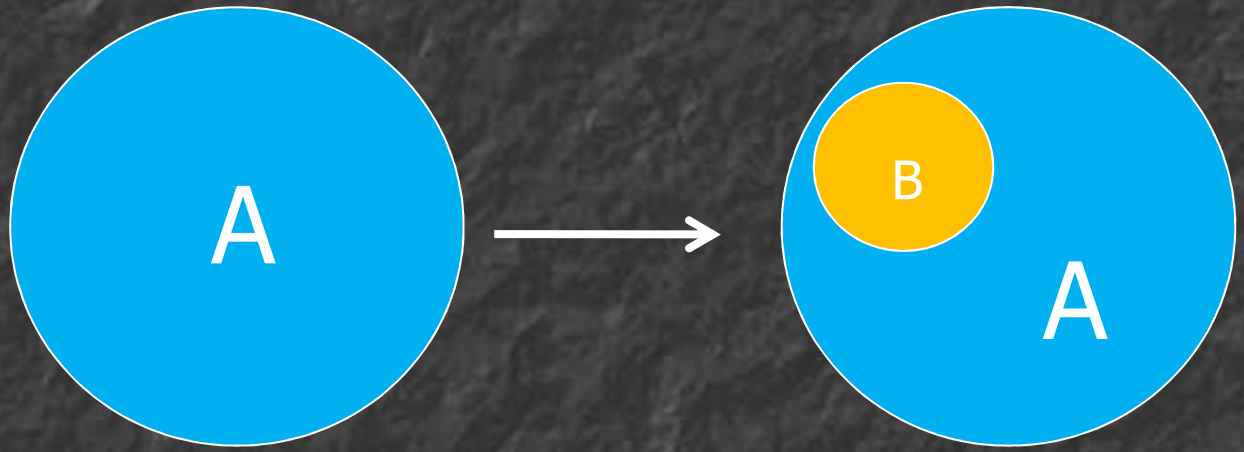
Milá et al., 2010. BMC Evol. Biol.





Origin and diversification of island biota

d) Diversification in sympatry

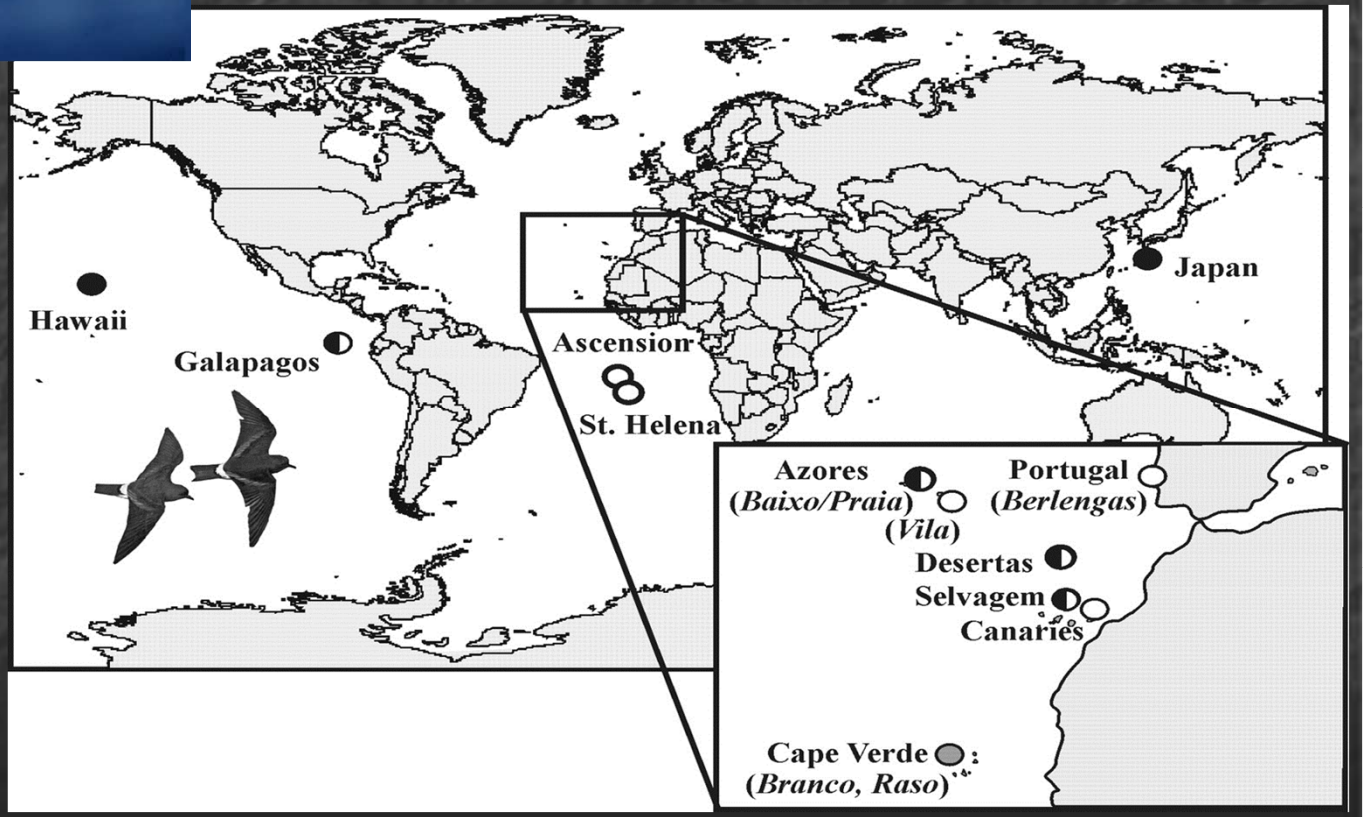


Diversification by allochrony

1) Allochronic populations genetically structured

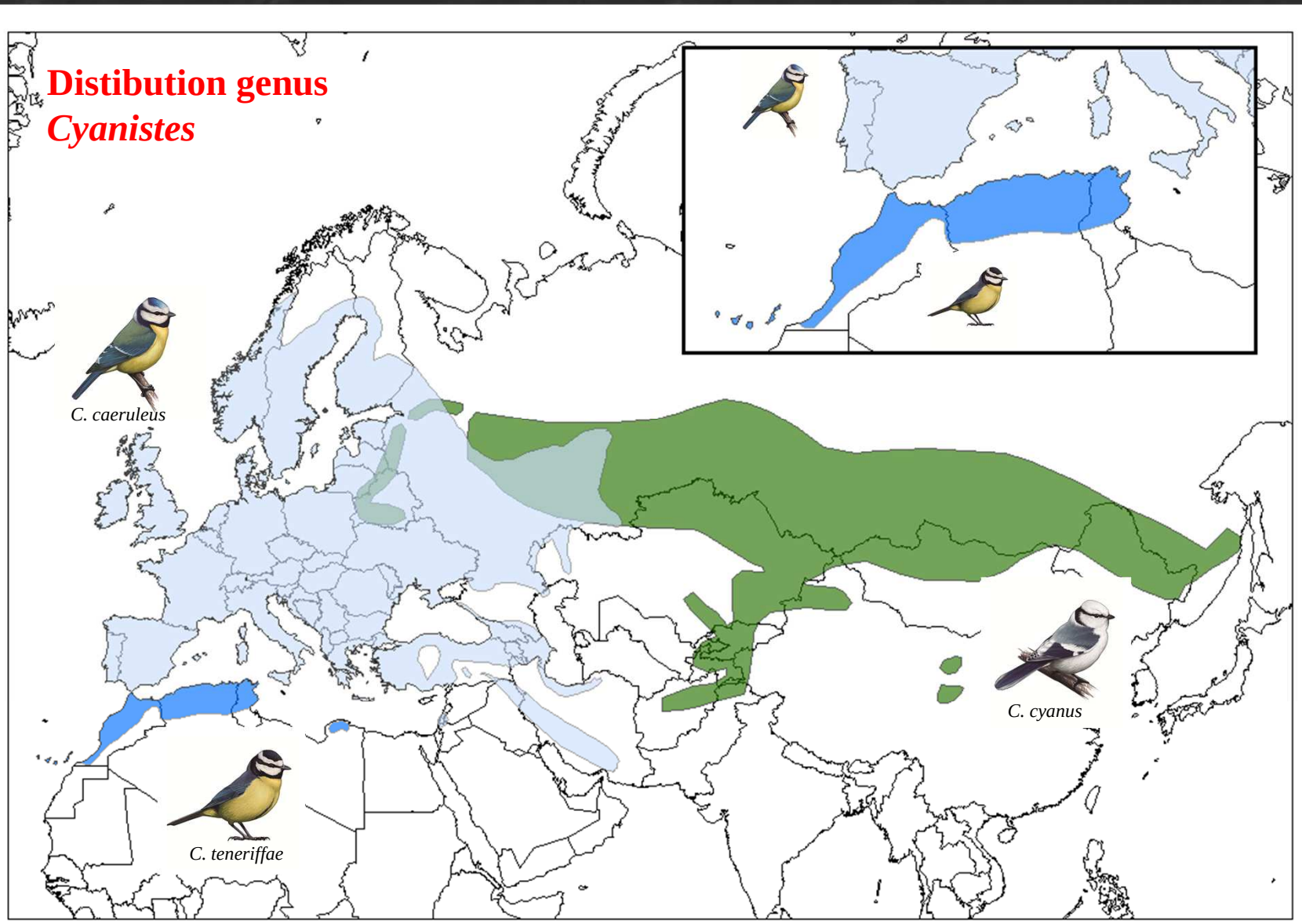
2) Allochrony in four archipelagos

Breeding areas of *Oceanodroma castro/monteiroi* (circles)



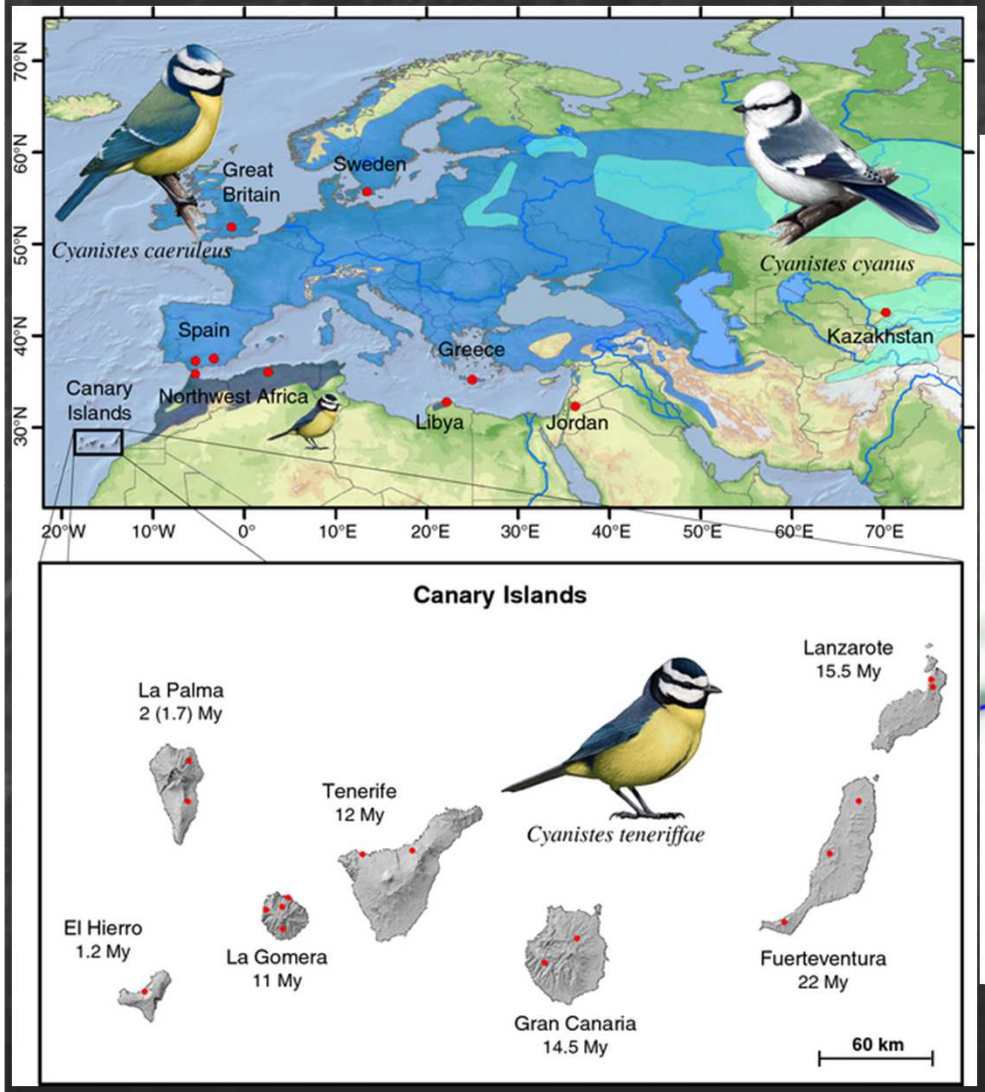
Friesen V. L. *et.al*. (2007). PNAS

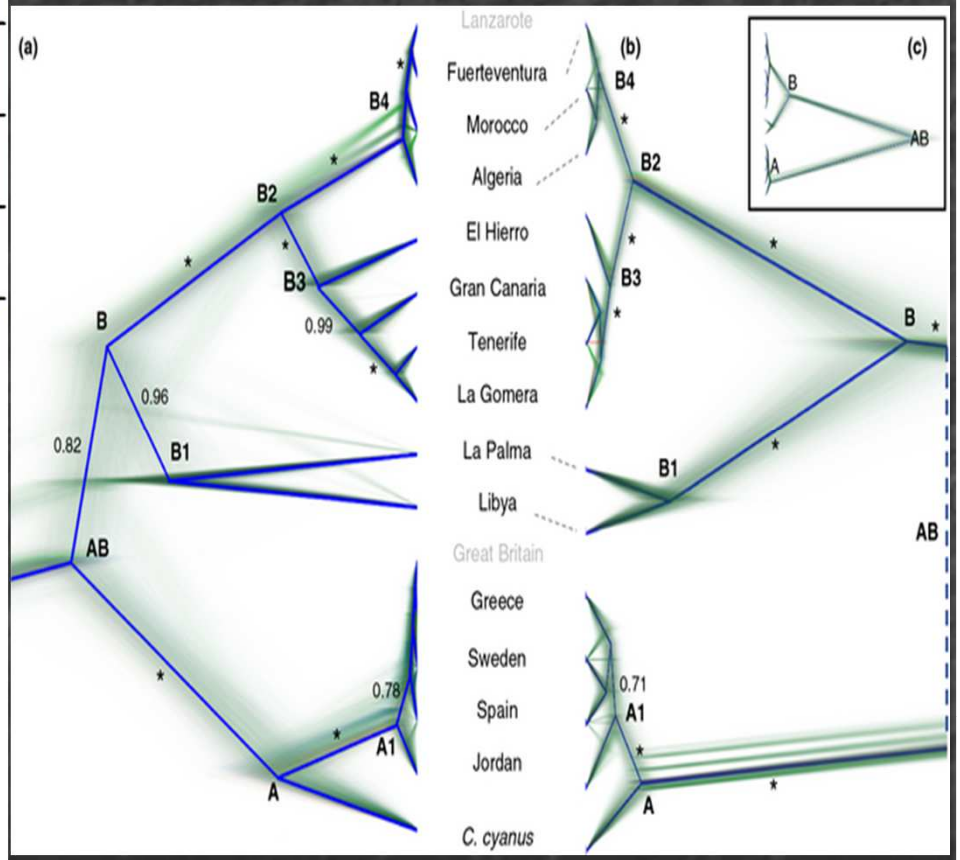
Complex colonisation: How? When? From where?



Illera *et al.*,

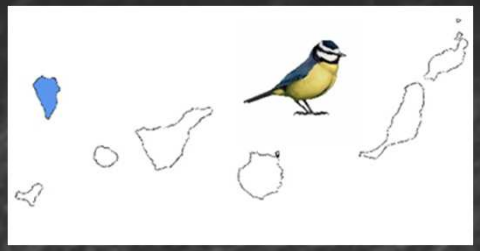
Complex colonisation: How? When? From where?



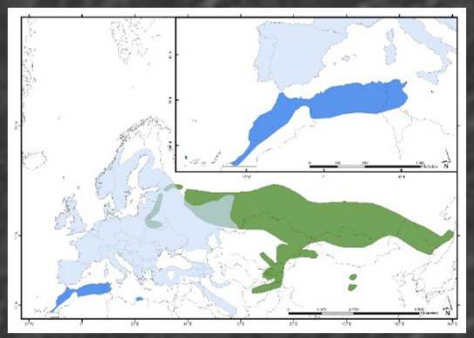


Stervander et *al.*, 2015. Mol.Ecol.

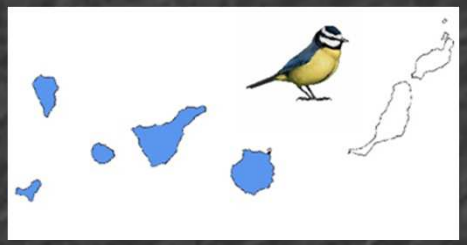
Complex colonisation: How? When? From where?



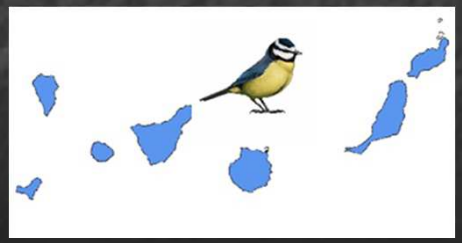
1st wave (3.8-4.8 my)



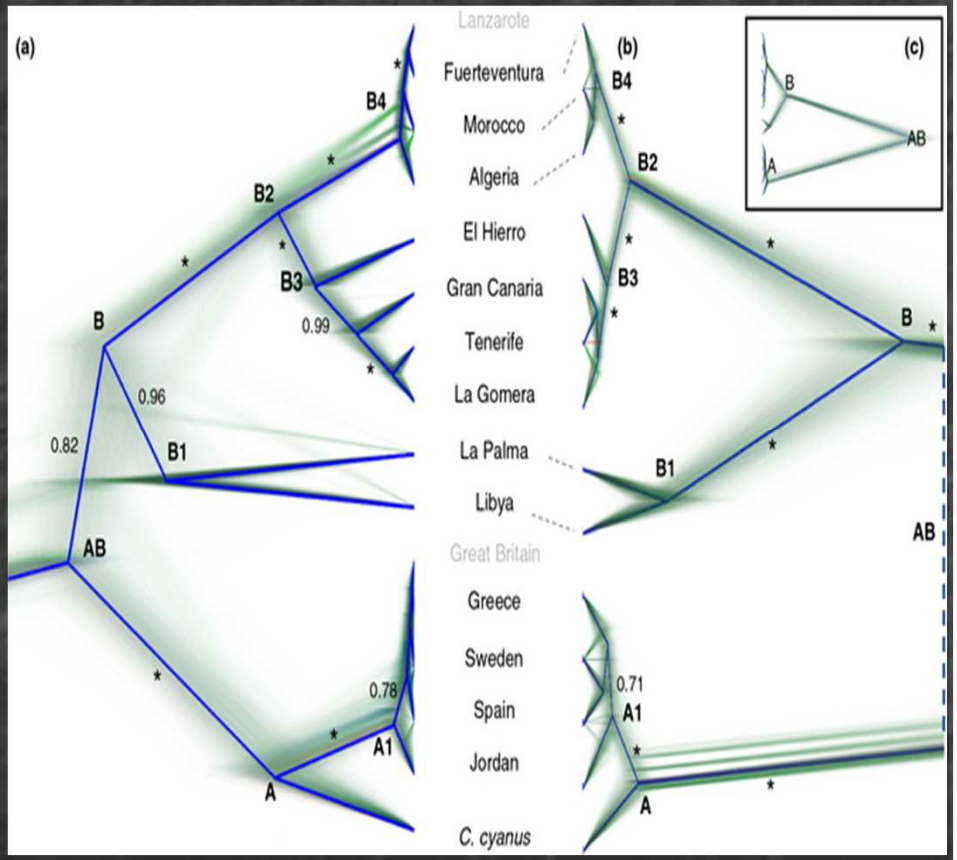
Spit of cyanus-caeruleus (3.0-3.7 my)



2nd wave (2.1-3.4 my)



3rd wave (0.27 my)



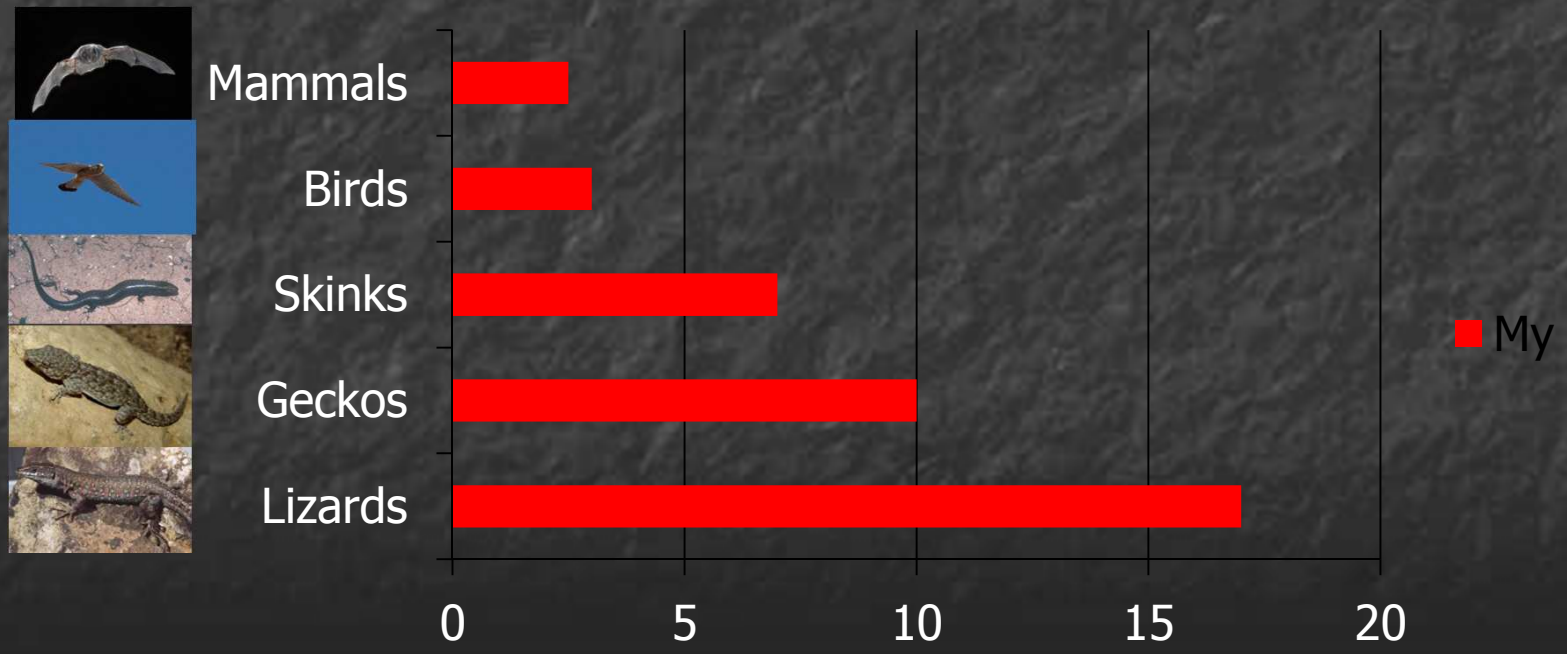
Stervander et *al.*, 2015. Mol.Ecol.

Colonisation: When?

a) Recent colonisation (≈ 0.01-3.1 My)

b) Recent lineages in relation to reptils

c) Significant diference in relation to similar archipelagos



Conclusions

1) Recent colonisation of extant lineages

2) Complex evolutionary histories

3) Lower diversification than other archipelagos

Conclusions

Ok, but is that all?

Extinction of birds in Macaronesia

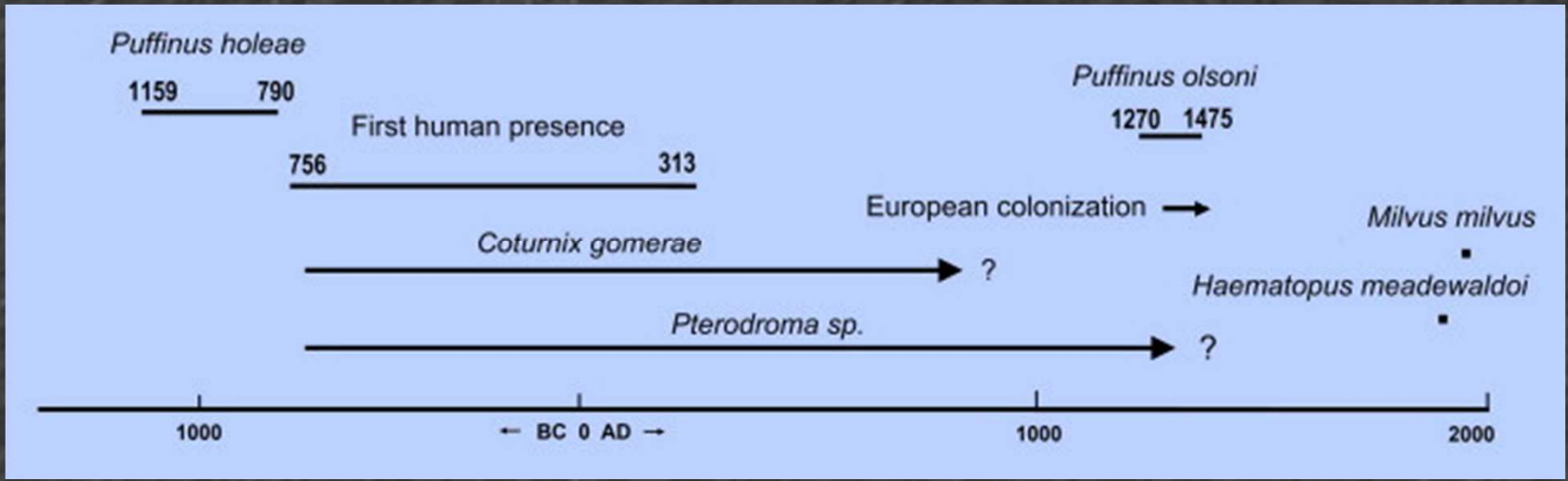
Emberiza alcoveri

Ratites

Coturnix gomerae

Carduelis aurelioi

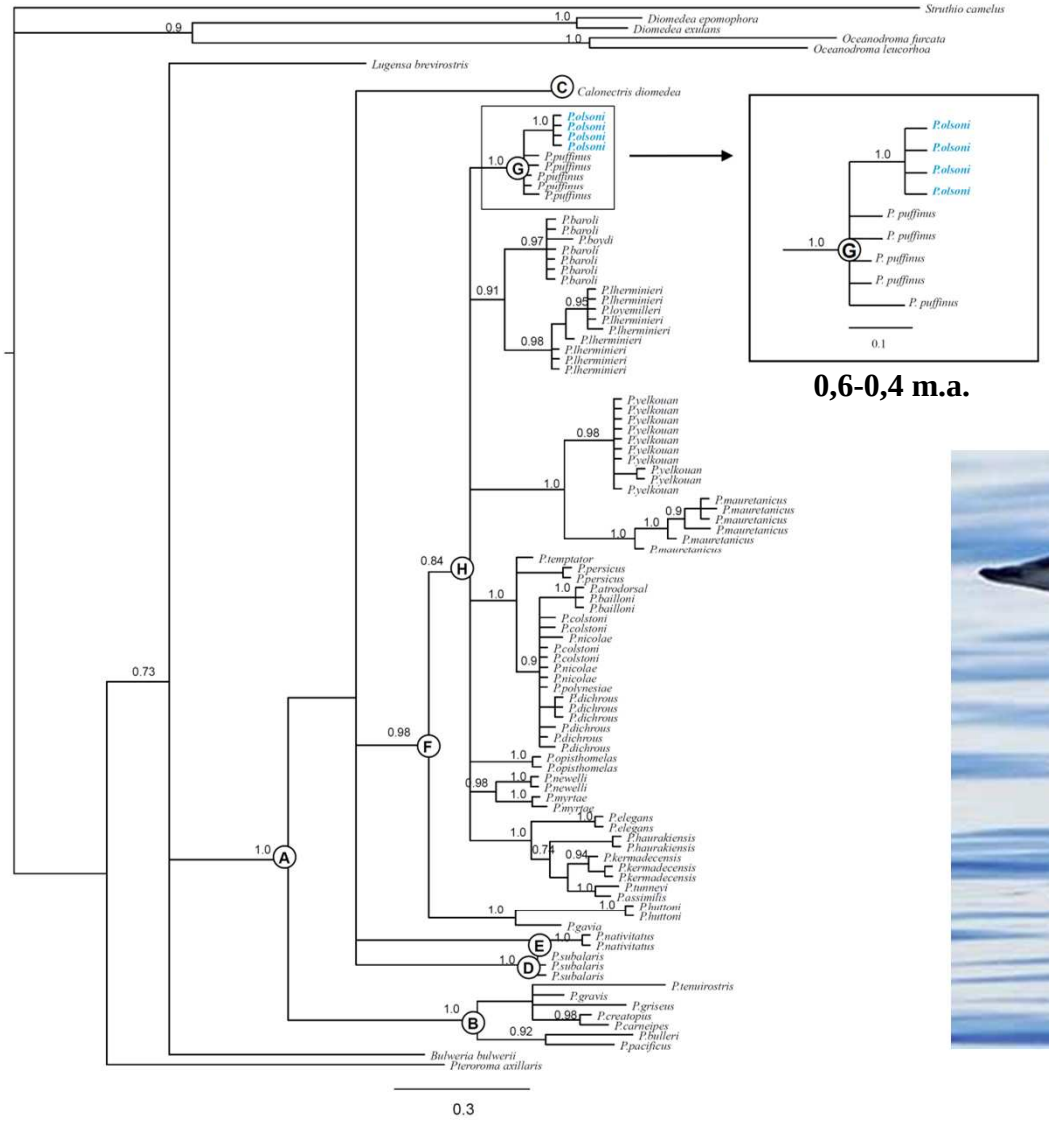
Extinction of birds in Macaronesia



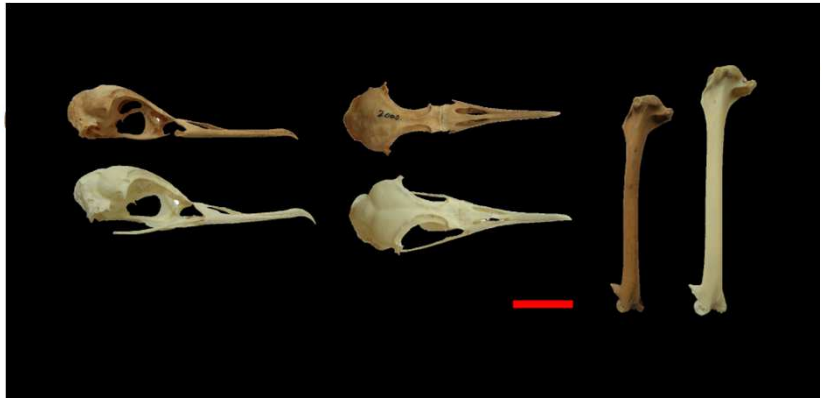
Extinction dates of macaronesian birds estimated with radiocarbon and historical records plotted in relation with human occupation of the archipelagos

Illera et al., 2012. Quaternary Science Reviews

Extinction of birds in Macaronesia



0,6-0,4 m.a.



Ramírez *et al.*, 2010. PLoS ONE

Extinction of birds in Macaronesia

Acknowledgements

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- **Juan de la Cierva and Ramón y Cajal fellowships**

Merci beaucoup!!