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LETTER

Equilibrium and non-equilibrium dynamics simultaneously operate in the Galápagos islands

Abstract

Island biotas emerge from the interplay between colonisation, speciation and extinction and are often the scene of spectacular adaptive radiations. A common assumption is that insular diversity is at a dynamic equilibrium, but for remote islands, such as Hawaii or Galápagos, this idea

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DAISIE

“Here, we develop DAISIE (Dynamic Assembly of Islands through Speciation, Immigration and Extinction), a likelihood-based phylogenetic method that unifies the island biogeography framework of MacArthur & Wilson with the phylogenetic birth-death models popularised by Nee et al.”

DAISIE unifies
island biogeography
with
birth-death models

Figure 1

25 species, 8 clades

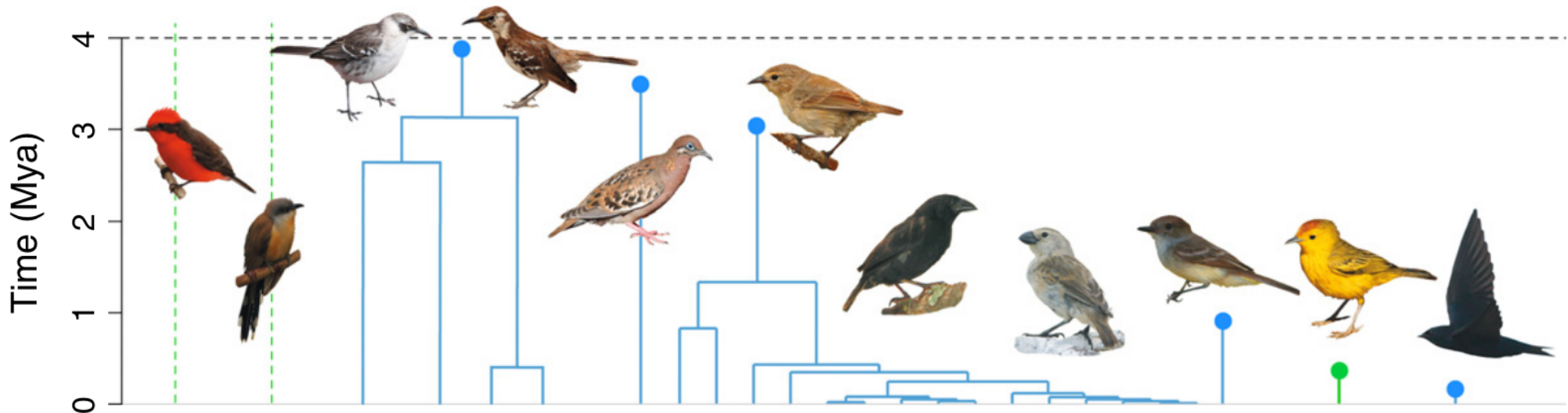
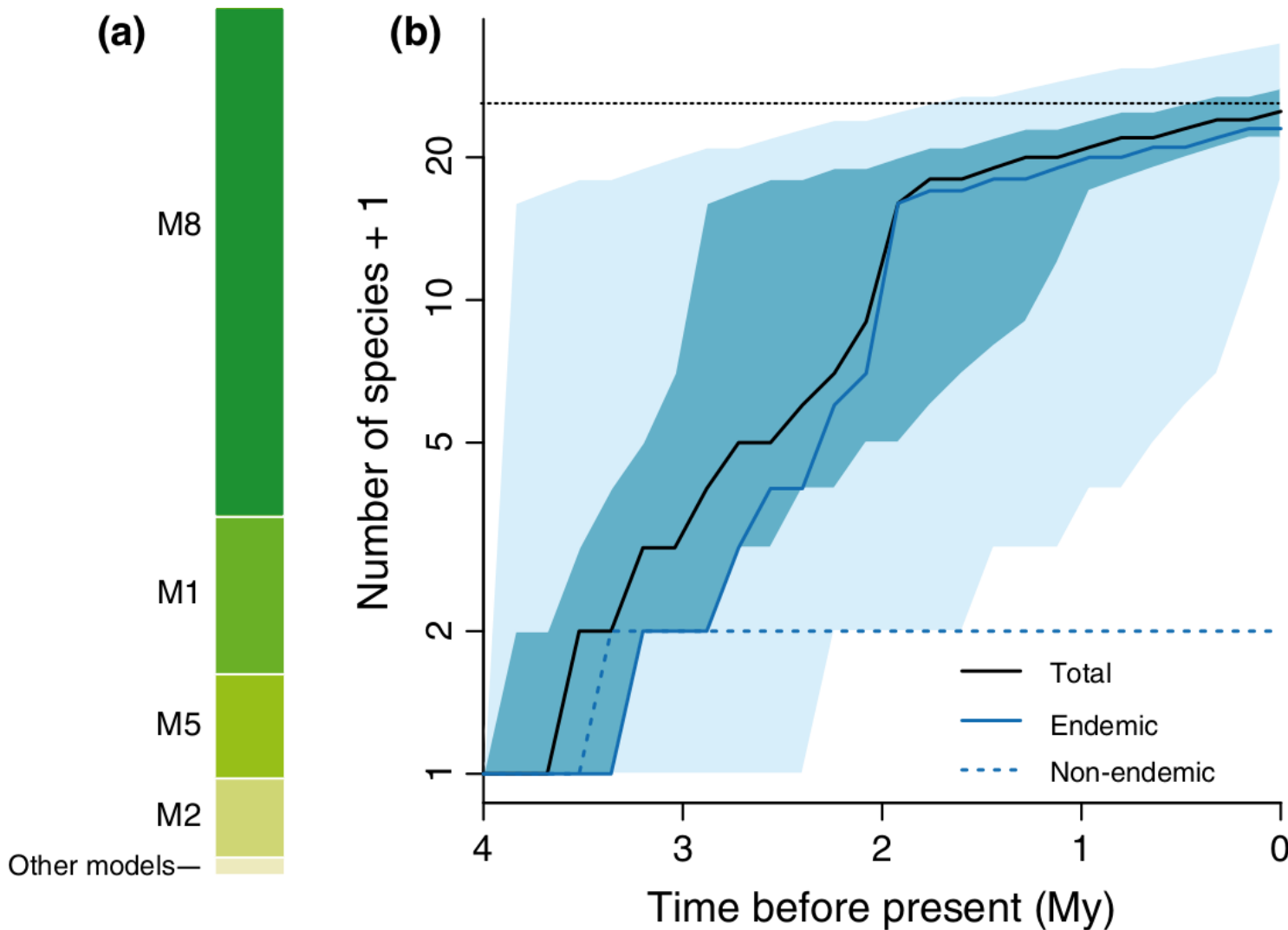


Figure 2



“According to the most strongly supported DAISIE model, the avifauna of the Galapagos islands does not tend towards a diversity steady state”

Figure 3

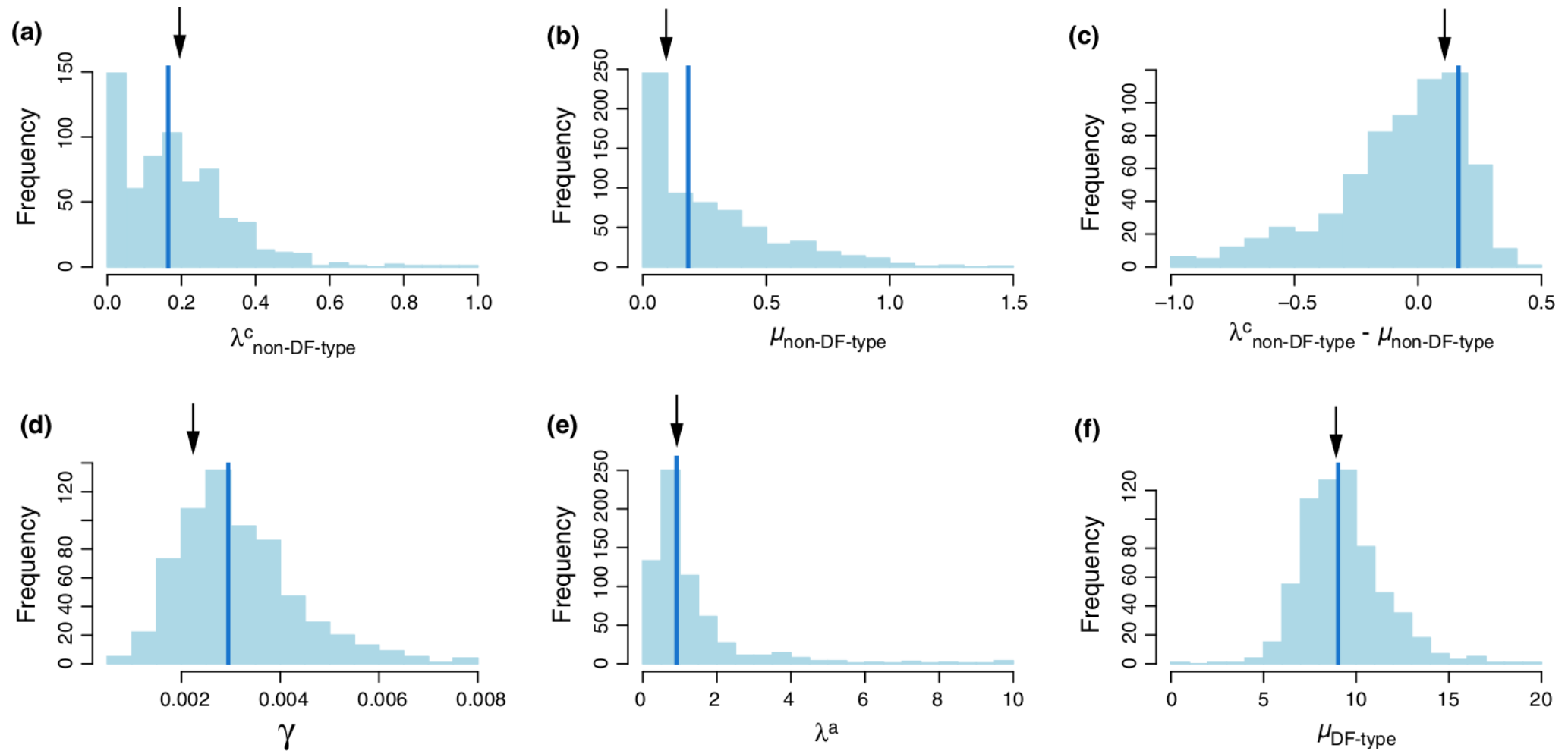
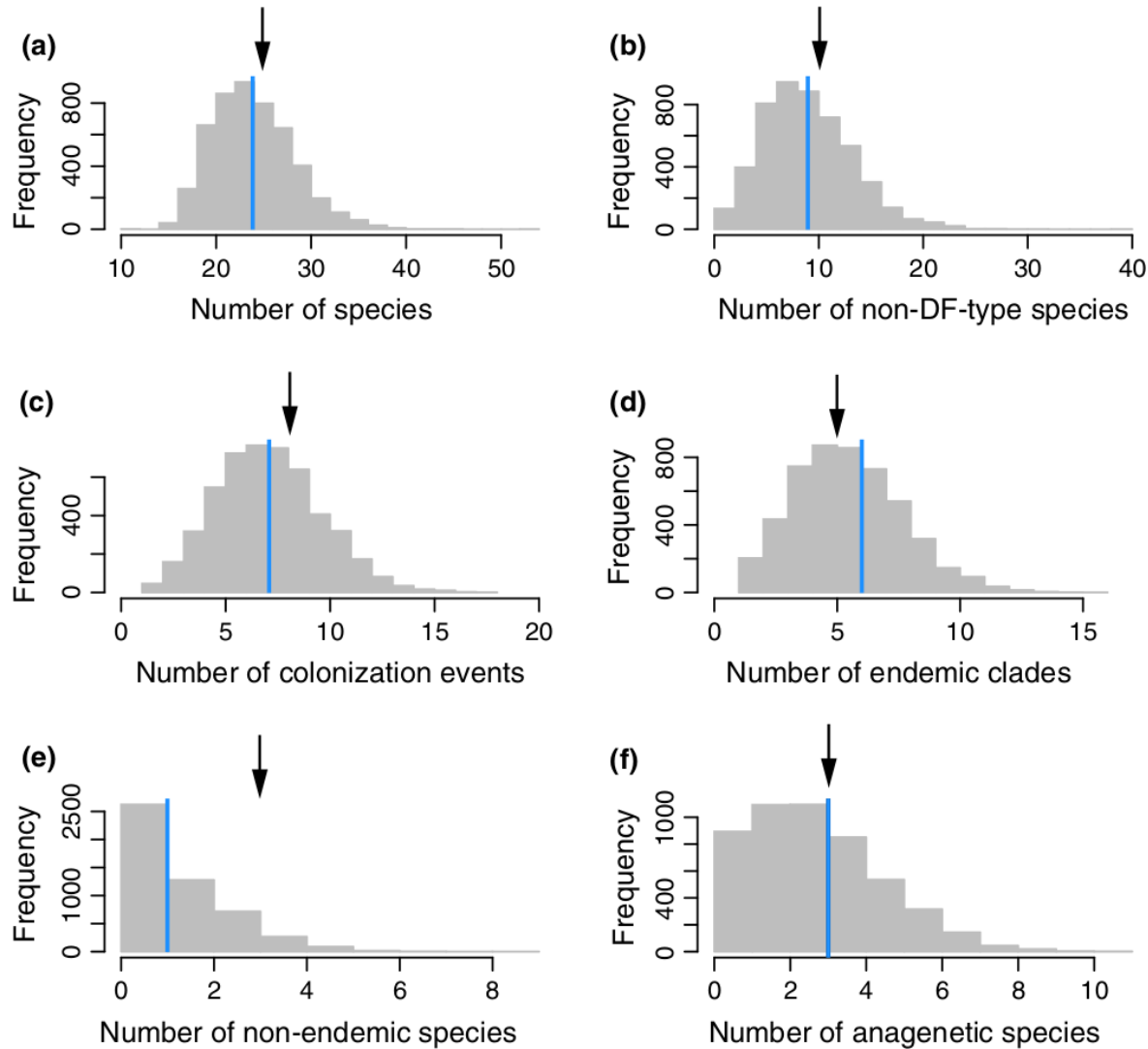


Figure 4



My claim

The Galapagos are a bad illustration of DAISIE, because (1) the final result is weak, and (2) the figures oversell the story

The result

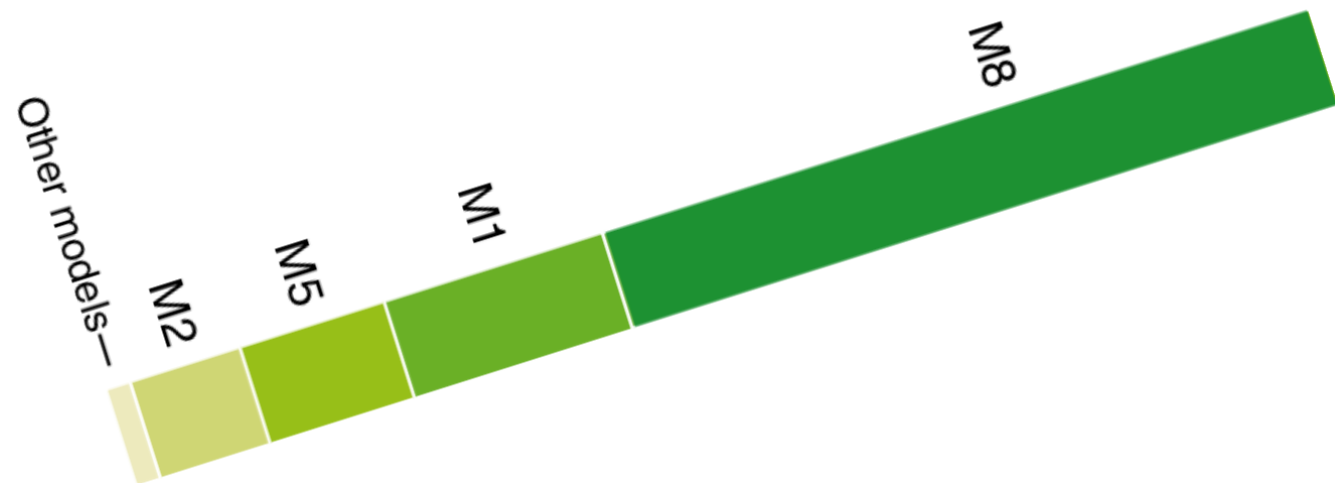
Name	Background					Darwin's finch type			Loglik	BIC	BIC weight	
	λ^c	μ	K'	γ	λ^a	λ^c	μ	K'				
M1	2.55	2.68	-	0.009	1.01	-	-	-	-76.0	186.98	1.81×10^{-1}	M8
M2	0.38	0.55	-	0.004	1.10	2.28	-	-	-72.3	188.36	9.14×10^{-2}	
M3	2.48	2.70	-	0.009	1.02	-	2.25	-	-75.7	195.17	3.03×10^{-3}	
M4	2.55	2.68	-	0.009	1.01	-	-	∞	-76.0	195.73	2.29×10^{-3}	
M5	0.29	0.38	-	0.004	1.03	6.87	6.51	-	-67.7	187.81	1.20×10^{-1}	
M6	0.38	0.55	-	0.004	1.10	2.28	-	∞	-72.3	197.10	1.15×10^{-3}	
M7	2.48	2.70	-	0.009	1.02	-	2.25	∞	-75.7	203.92	3.83×10^{-5}	
M8	0.20	0.09	-	0.002	0.87	$\gg \mu K'$	8.91	14.99	-61.7	184.64	5.86×10^{-1}	
M1'	2.56	2.69	∞	0.009	1.01	-	-	-	-76.0	195.73	2.29×10^{-3}	M1
M2'	0.42	0.52	23.7	0.004	1.10	2.27	-	-	-72.3	197.09	1.16×10^{-3}	
M3'	2.65	0.46	3.7	0.003	1.32	-	2.07	-	-73.4	199.29	3.87×10^{-4}	
M4'	1.84	0.49	4.0	0.003	1.25	-	-	∞	-74.5	201.52	1.26×10^{-4}	
M5'	0.33	0.36	17.3	0.004	1.02	6.85	6.48	-	-67.7	196.53	1.53×10^{-3}	M5
M6'	0.42	0.52	23.7	0.004	1.10	2.27	-	∞	-72.3	205.83	1.47×10^{-5}	
M7'	2.65	0.46	3.7	0.003	1.32	-	2.07	∞	-73.4	208.03	4.88×10^{-6}	M2
M8'	0.33	0.05	5.4	0.002	0.90	$\gg \mu K'$	8.91	14.99	-61.6	193.18	8.20×10^{-3}	
Other models—												

The results without DF

Name	Background					BIC weight
	λ^c	μ	K'	γ	λ^a	
M1	2.55	2.68	-	0.009	1.01	1.81×10^{-1}
M1'	2.56	2.69	∞	0.009	1.01	2.29×10^{-3}

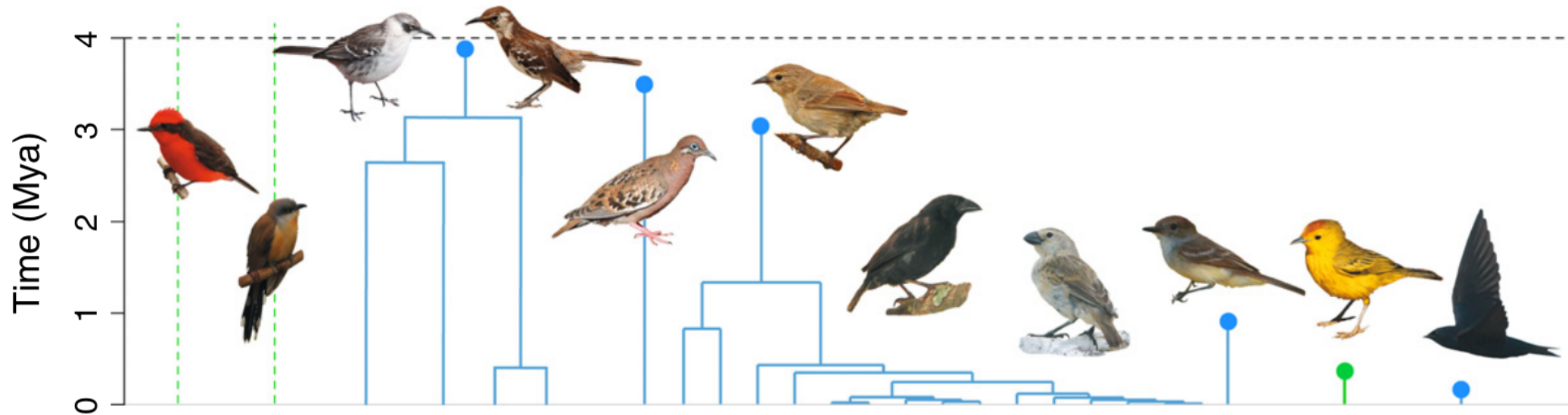
Top results

Name	Background					Darwin's finch type			BIC weight
	λ^c	μ	K'	γ	λ^a	λ^c	μ	K'	
M8	0.20	0.09	-	0.002	0.87	$\gg \mu K'$	8.91	14.99	5.86×10^{-1}
M1	2.55	2.68	-	0.009	1.01	-	-	-	1.81×10^{-1}
M5	0.29	0.38	-	0.004	1.03	6.87	6.51	-	1.20×10^{-1}
M2	0.38	0.55	-	0.004	1.10	2.28	-	-	9.14×10^{-2}



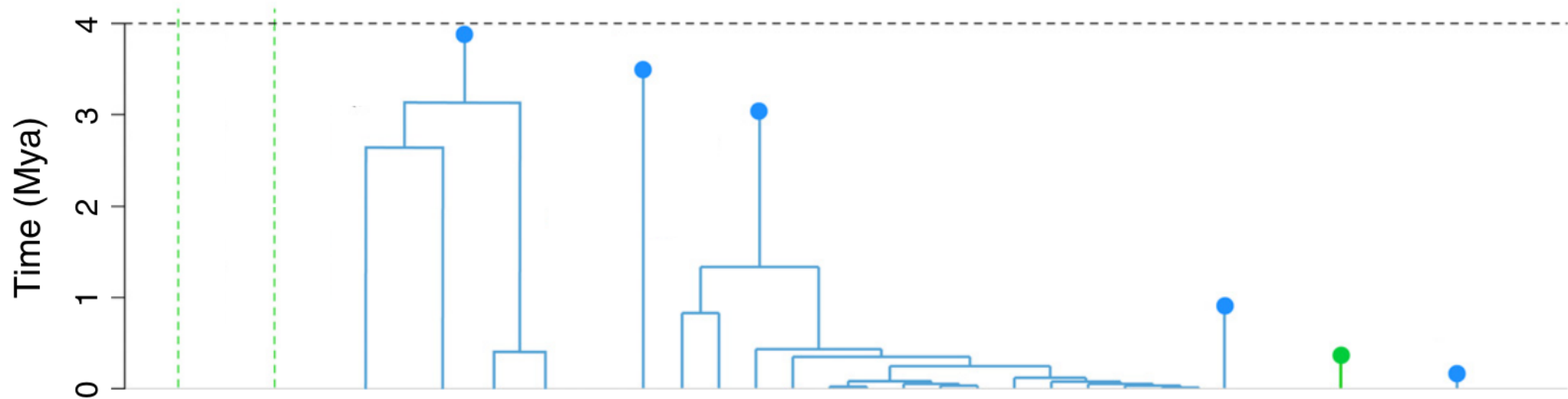
What does the result work on?

Pretty birds, 25 species, 8 clades



What does the result work on?

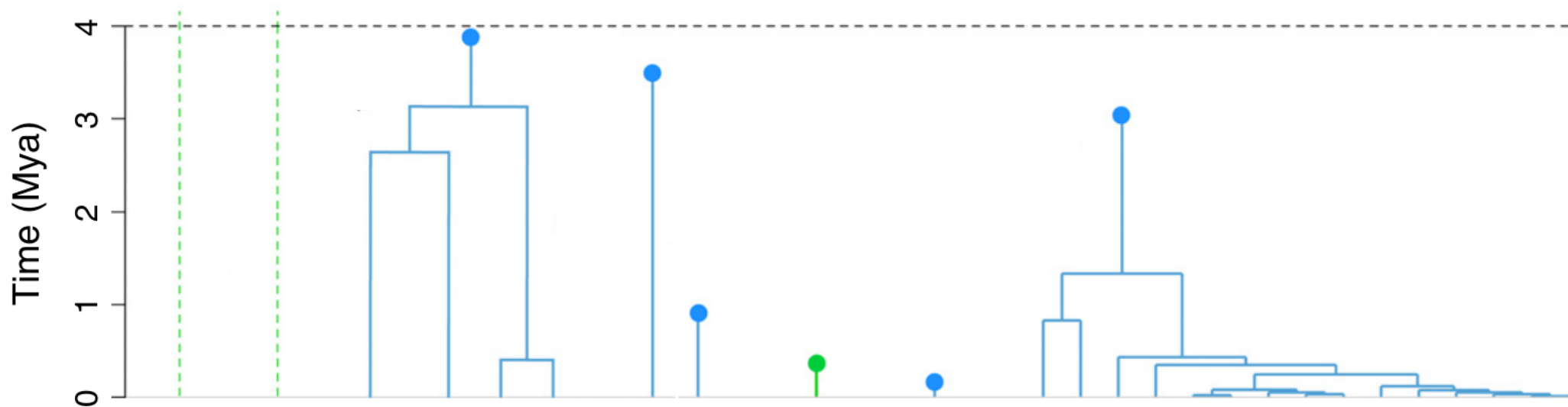
25 species, 8 clades



What does the result work on?

7 clades with 10 species

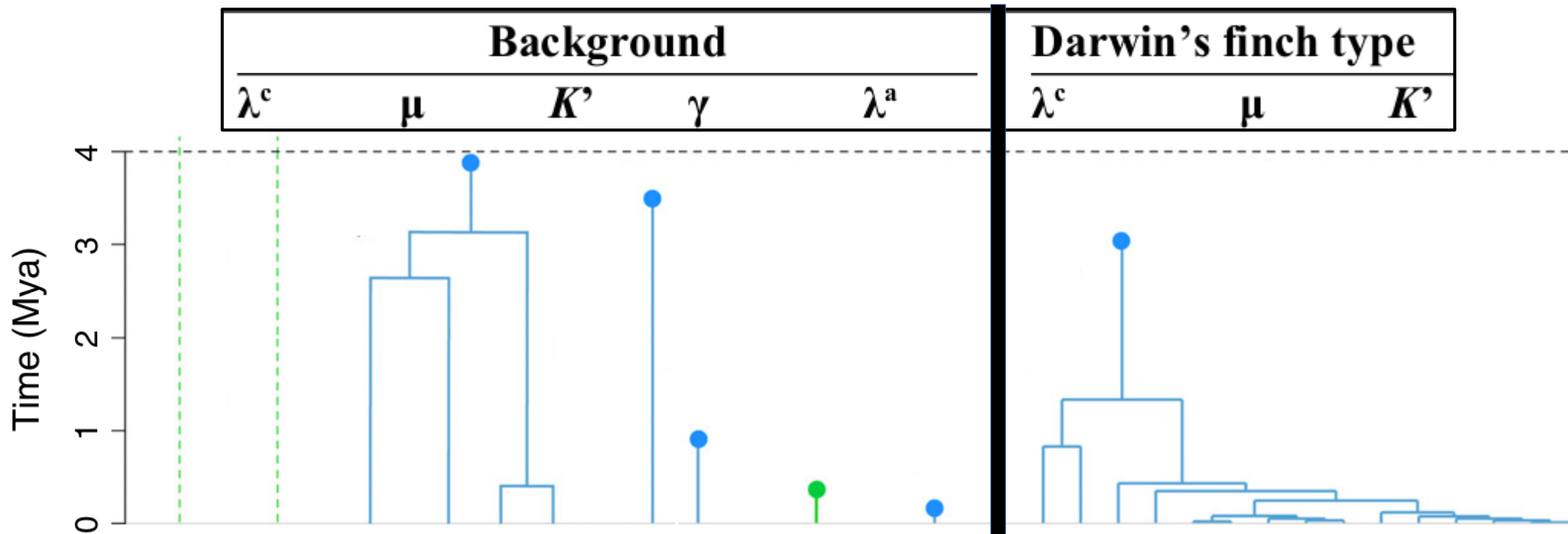
1 clade with 15 species



What does the result work on?

7 clades with 10 species
1 clade with 15 species

DAISIE unifies
island biogeography
with
birth-death models



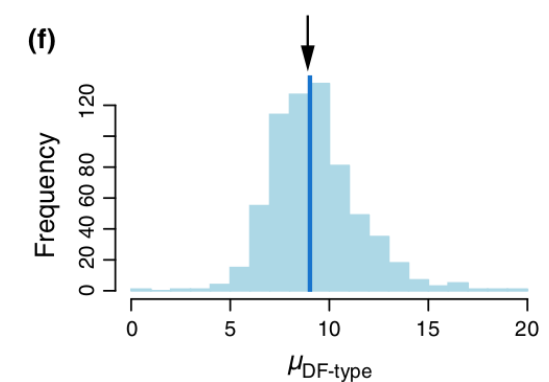
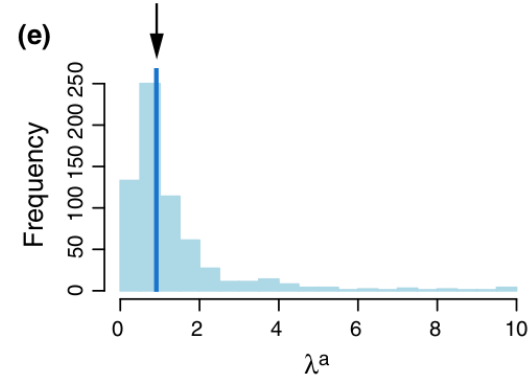
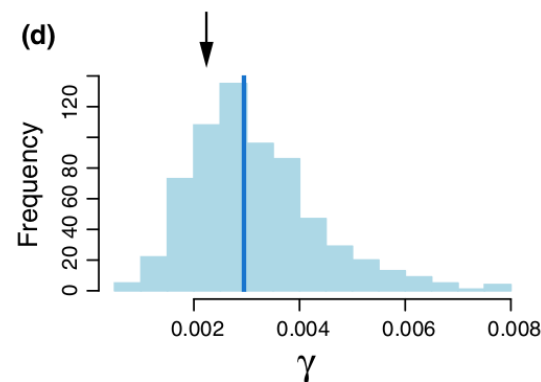
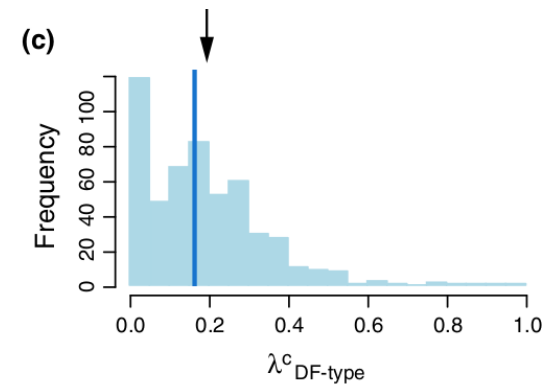
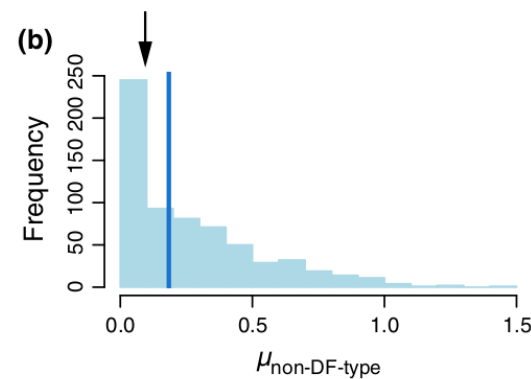
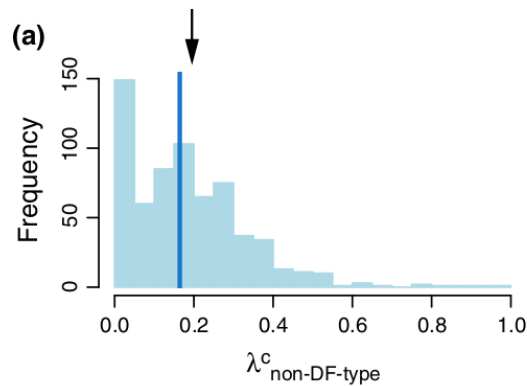
My claim

The Galapagos are a bad illustration of DAISIE, because (1) the final result is weak, and (2) the figures oversell the story

(1) there is no unification

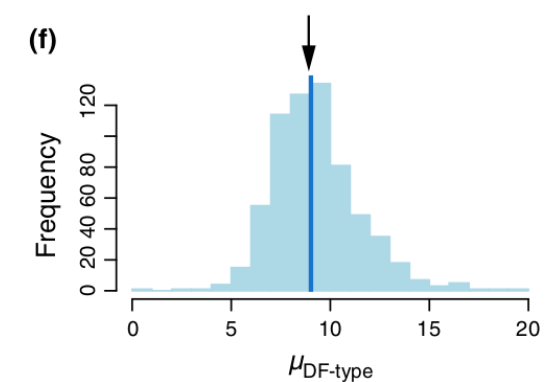
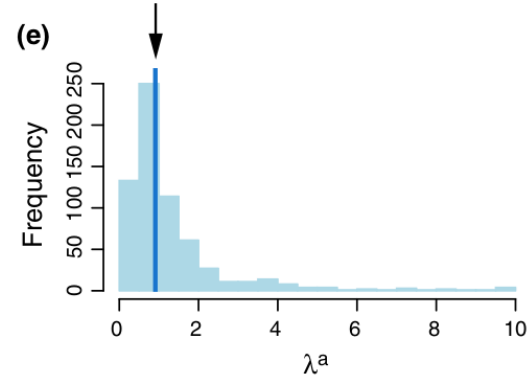
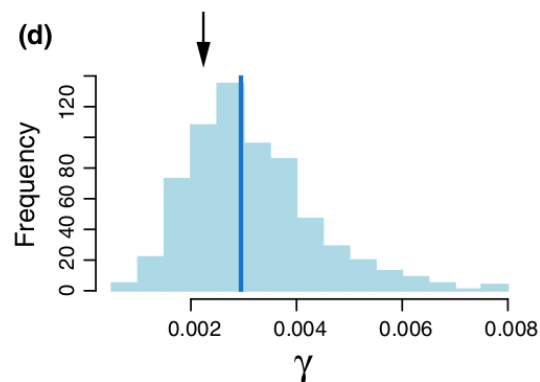
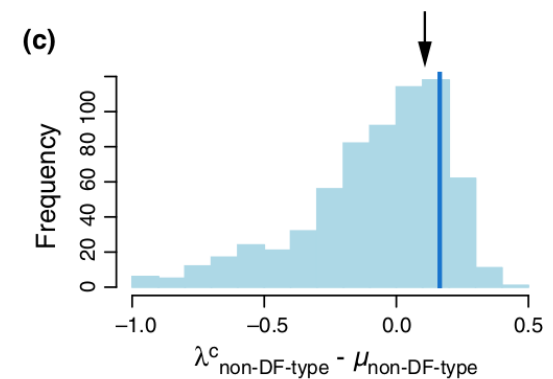
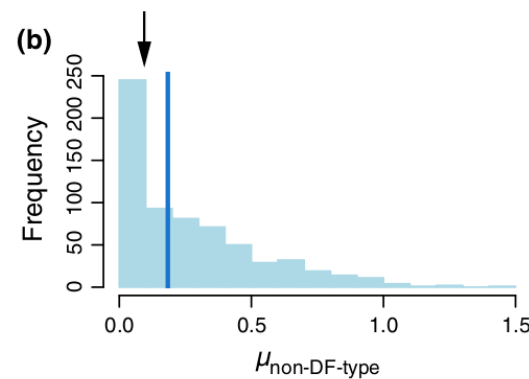
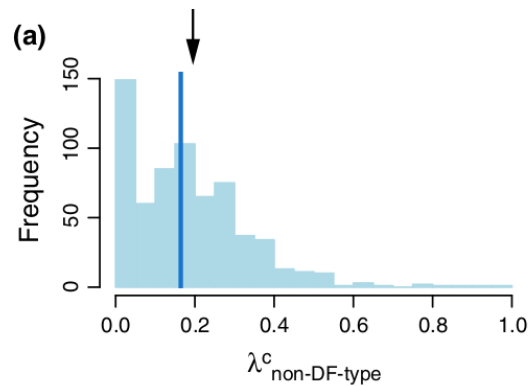
Figures, expected

Name	Background					Darwin's finch type		
	λ^c	μ	K'	γ	λ^a	λ^c	μ	K'
M8	0.20	0.09	-	0.002	0.87	$\gg \mu K'$	8.91	14.99

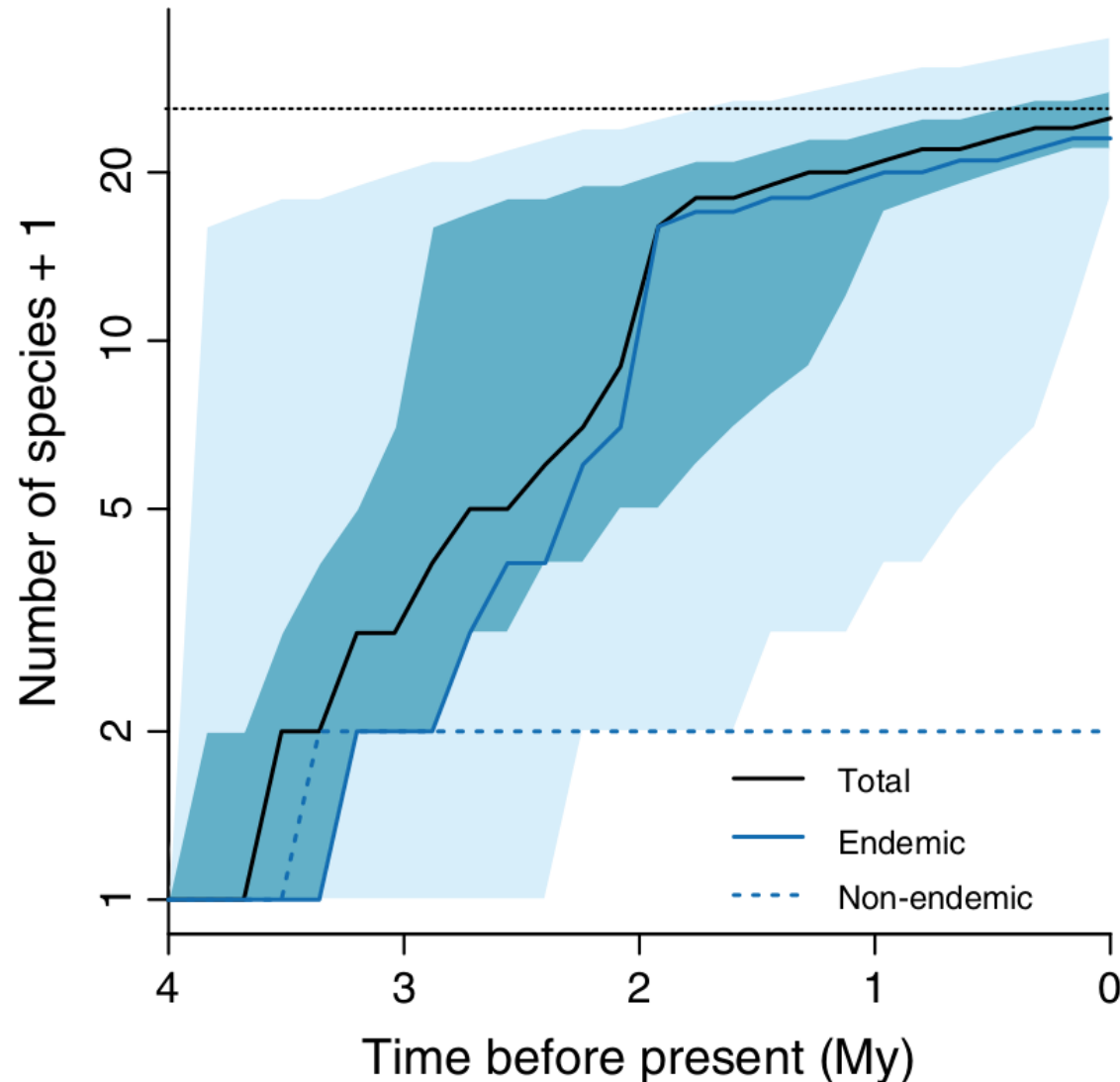


Figures

Name	Background					Darwin's finch type		
	λ^c	μ	K'	γ	λ^a	λ^c	μ	K'
M8	0.20	0.09	-	0.002	0.87	$\gg \mu K'$	8.91	14.99

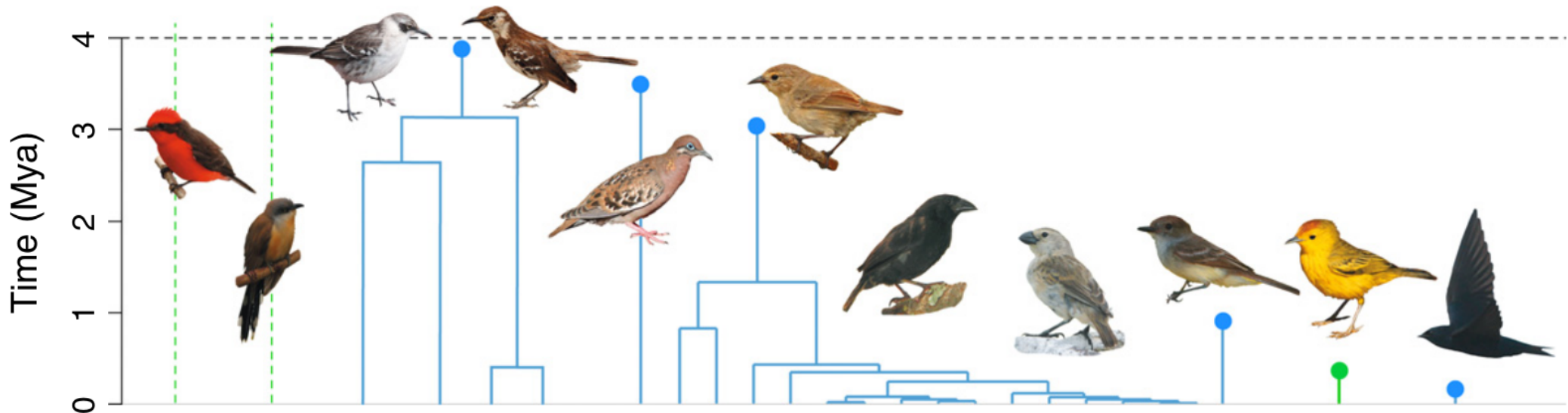


Figures

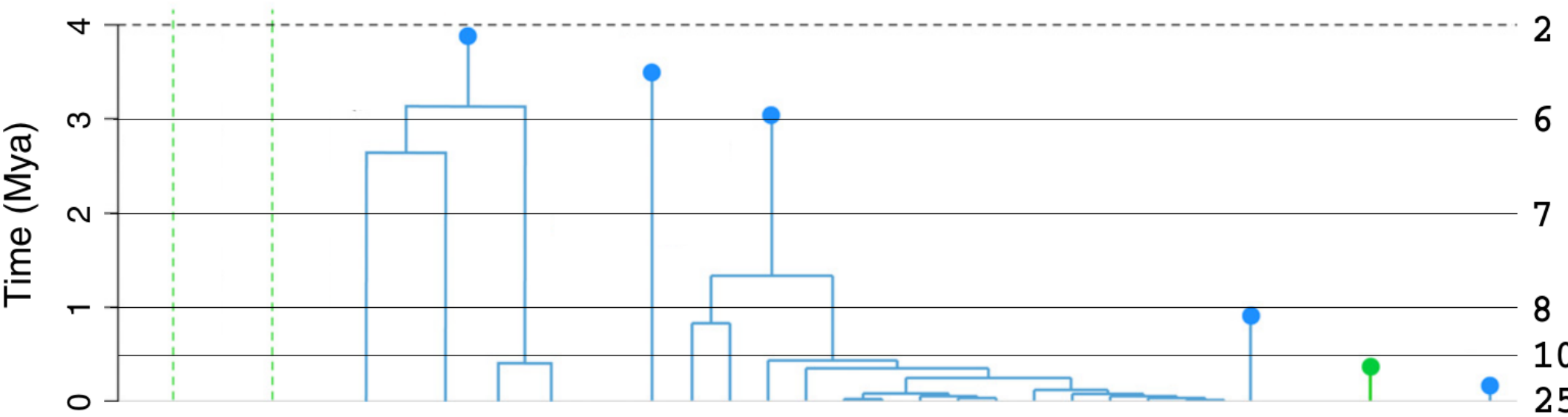


“According to the most strongly supported DAISIE model, the avifauna of the Galapagos islands does not tend towards a diversity steady state”

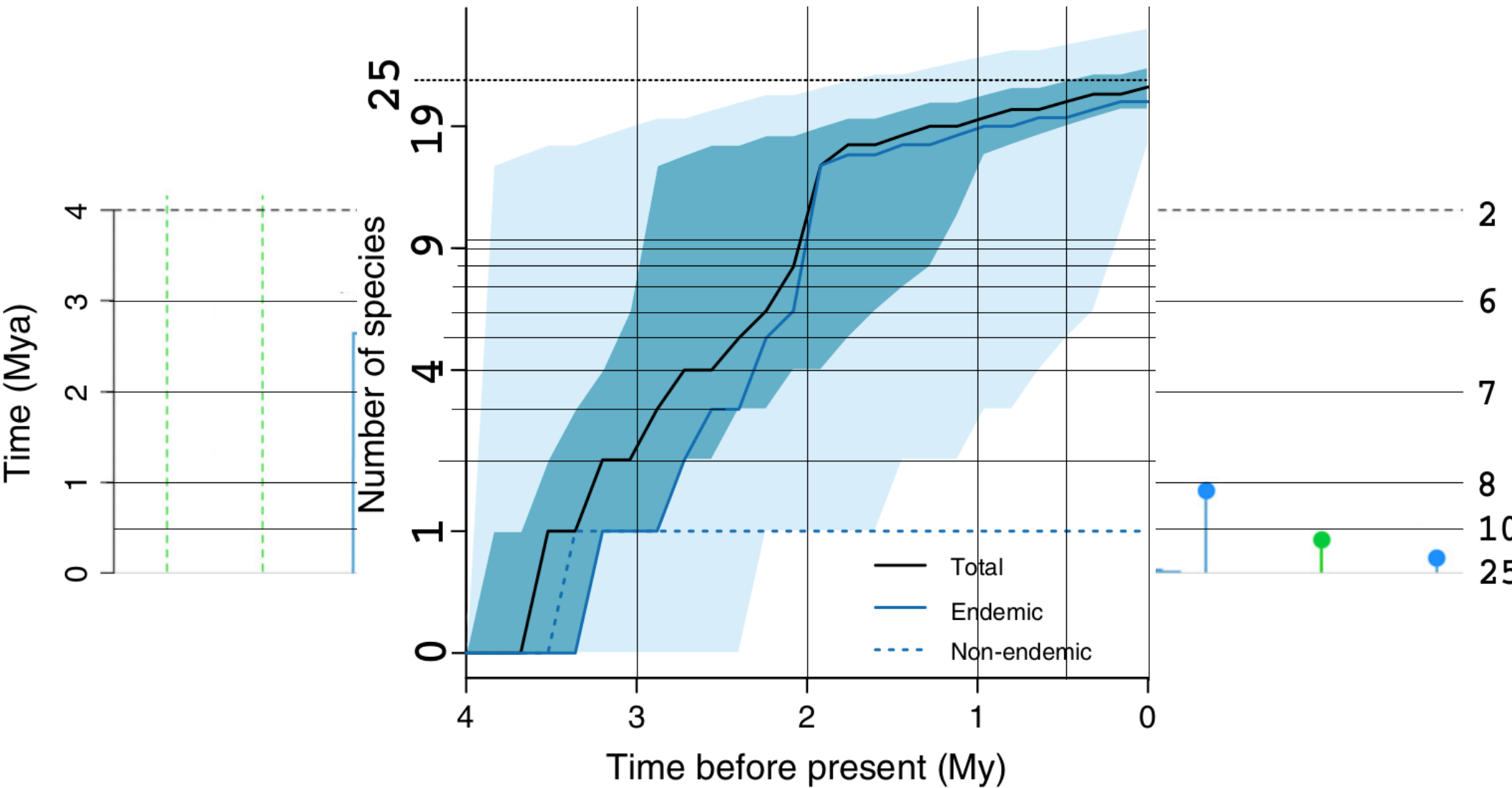
Figures



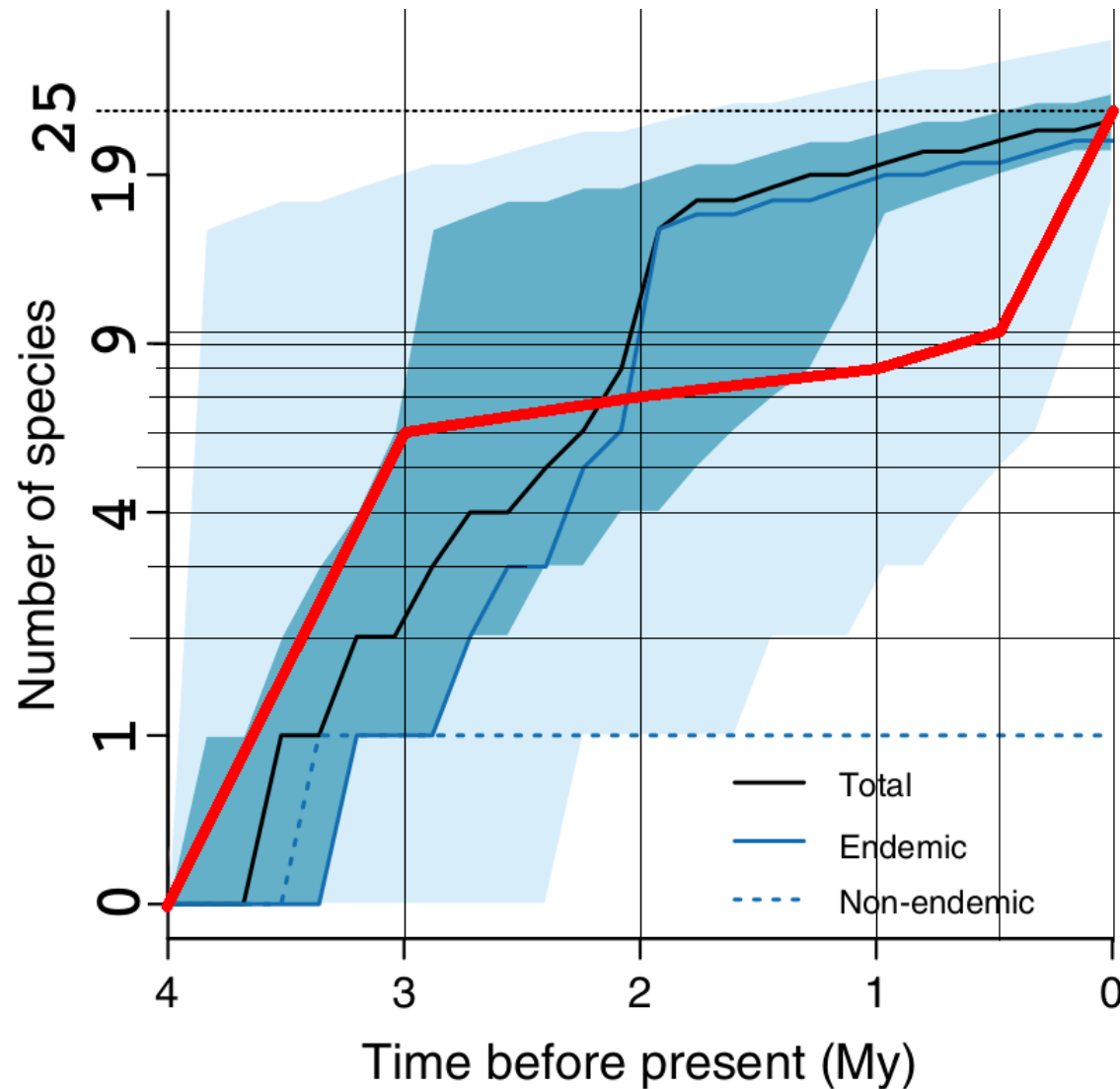
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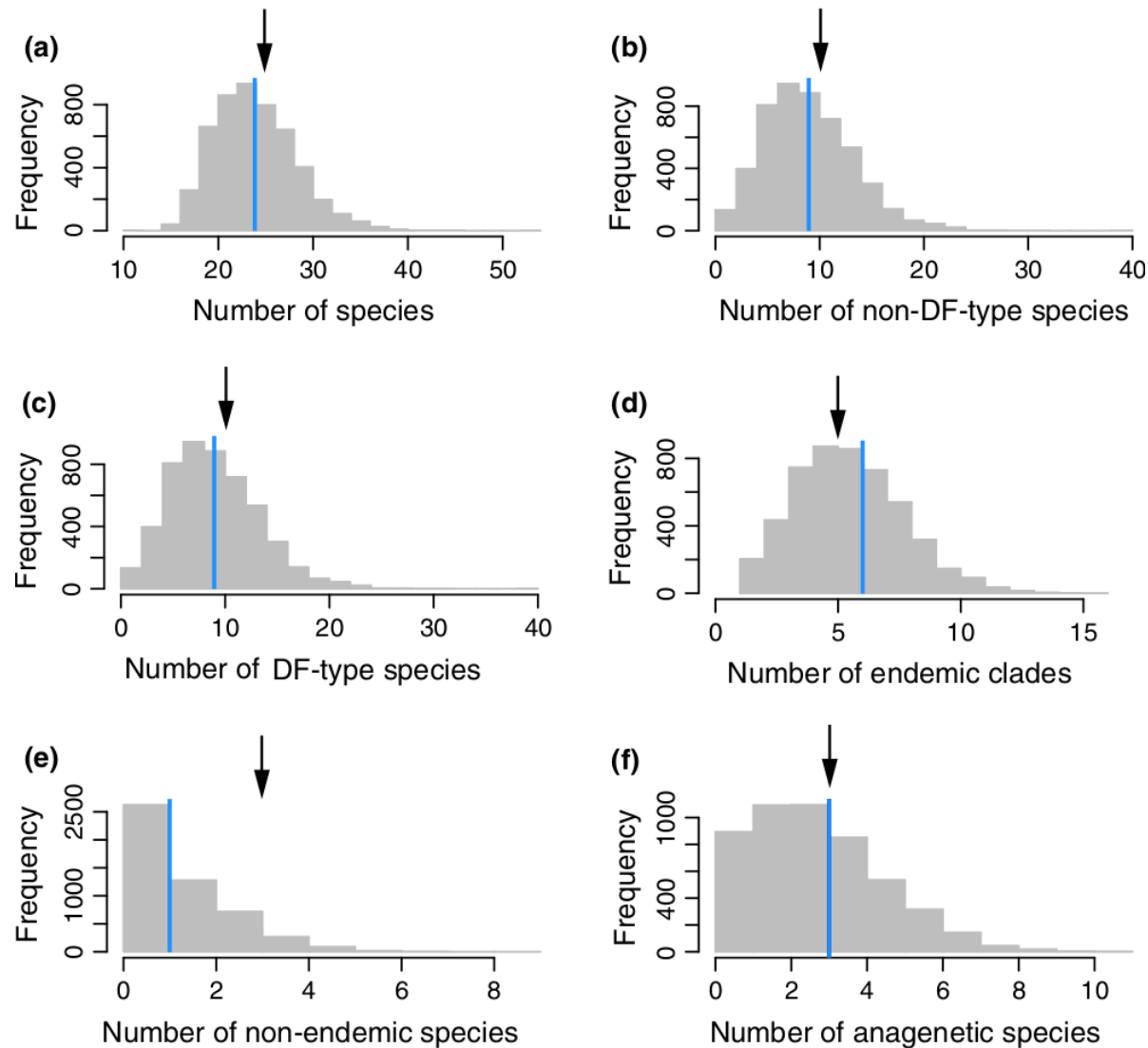
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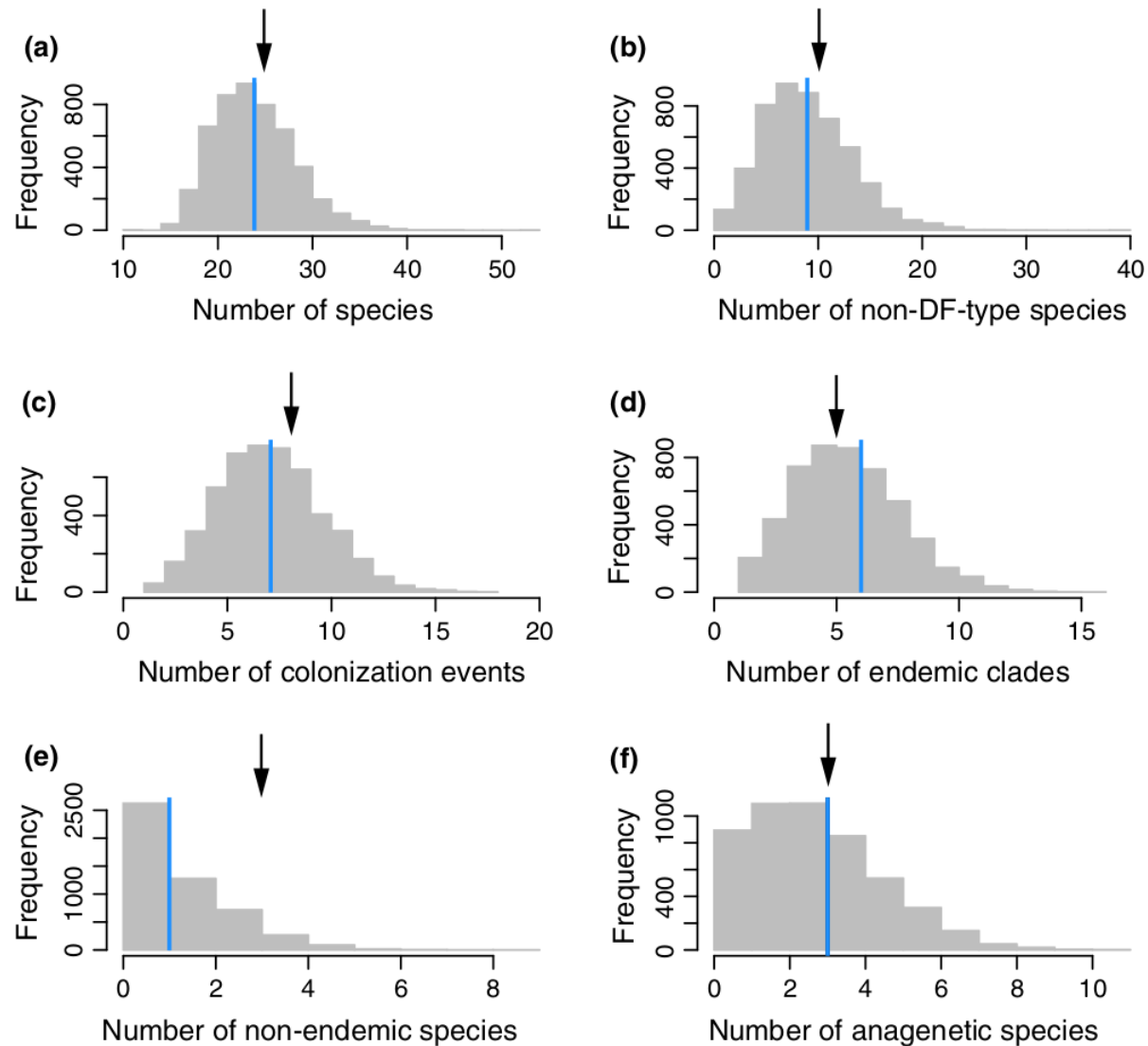
Figures



Figures



Figures



My claim

The Galapagos are a bad illustration of DAISIE, because (1) the final result is weak, and (2) the figures oversell the story

(1) there is no unification

(2) ugly results are omitted

Questions

What do you think?