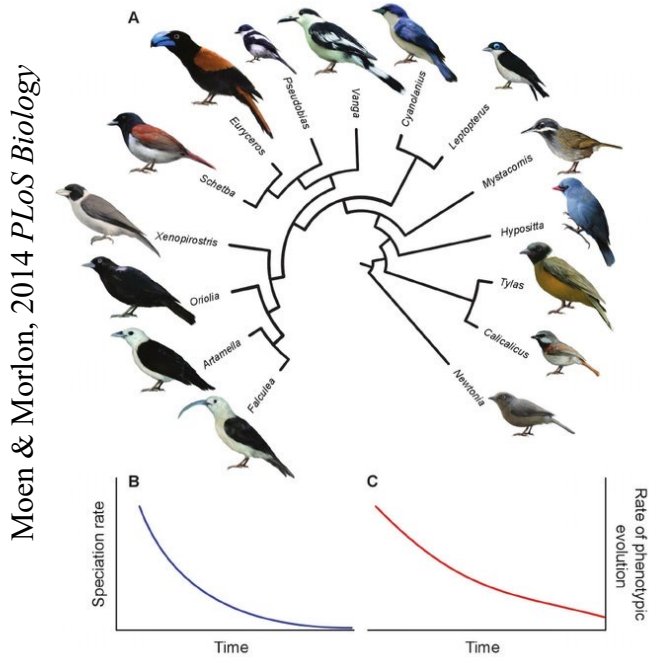
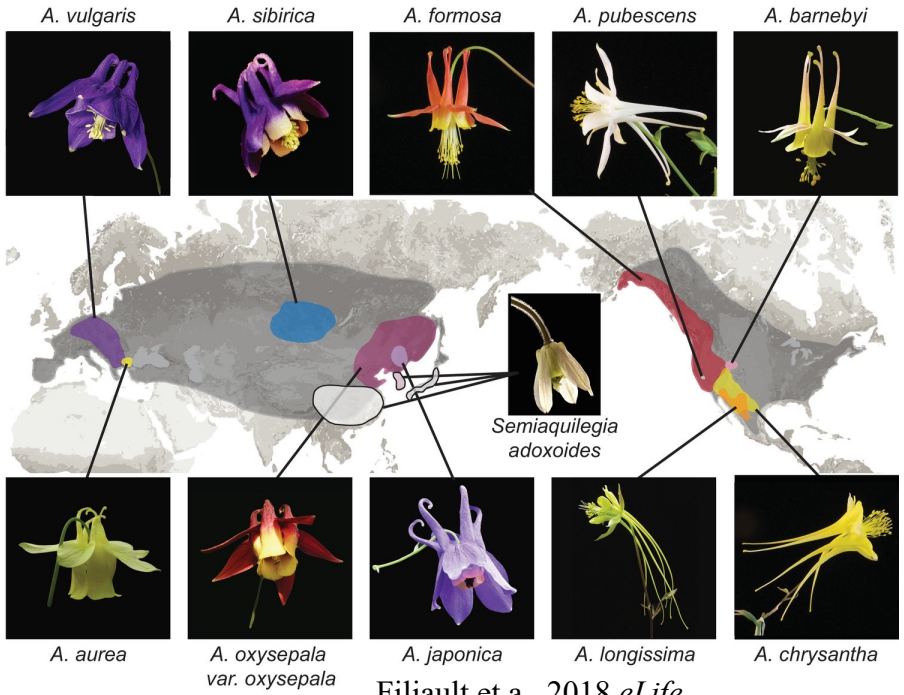
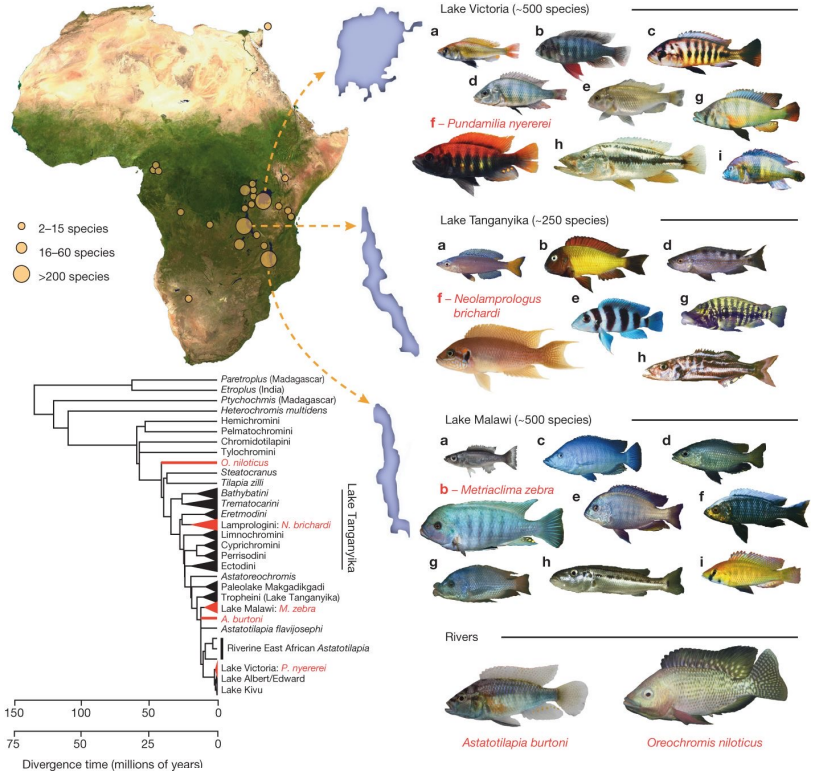
Introducción a modelos State-Speciaction-Extinción (SSE)



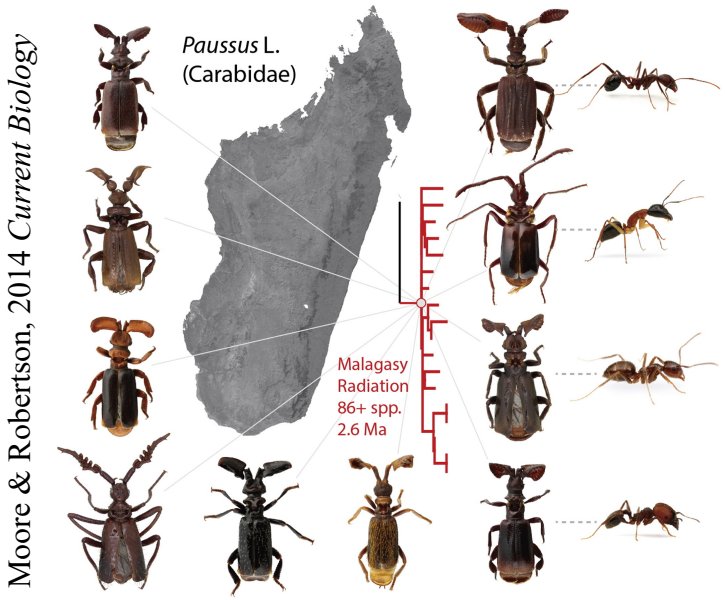
Moen & Morlon, 2014 *PLoS Biology*



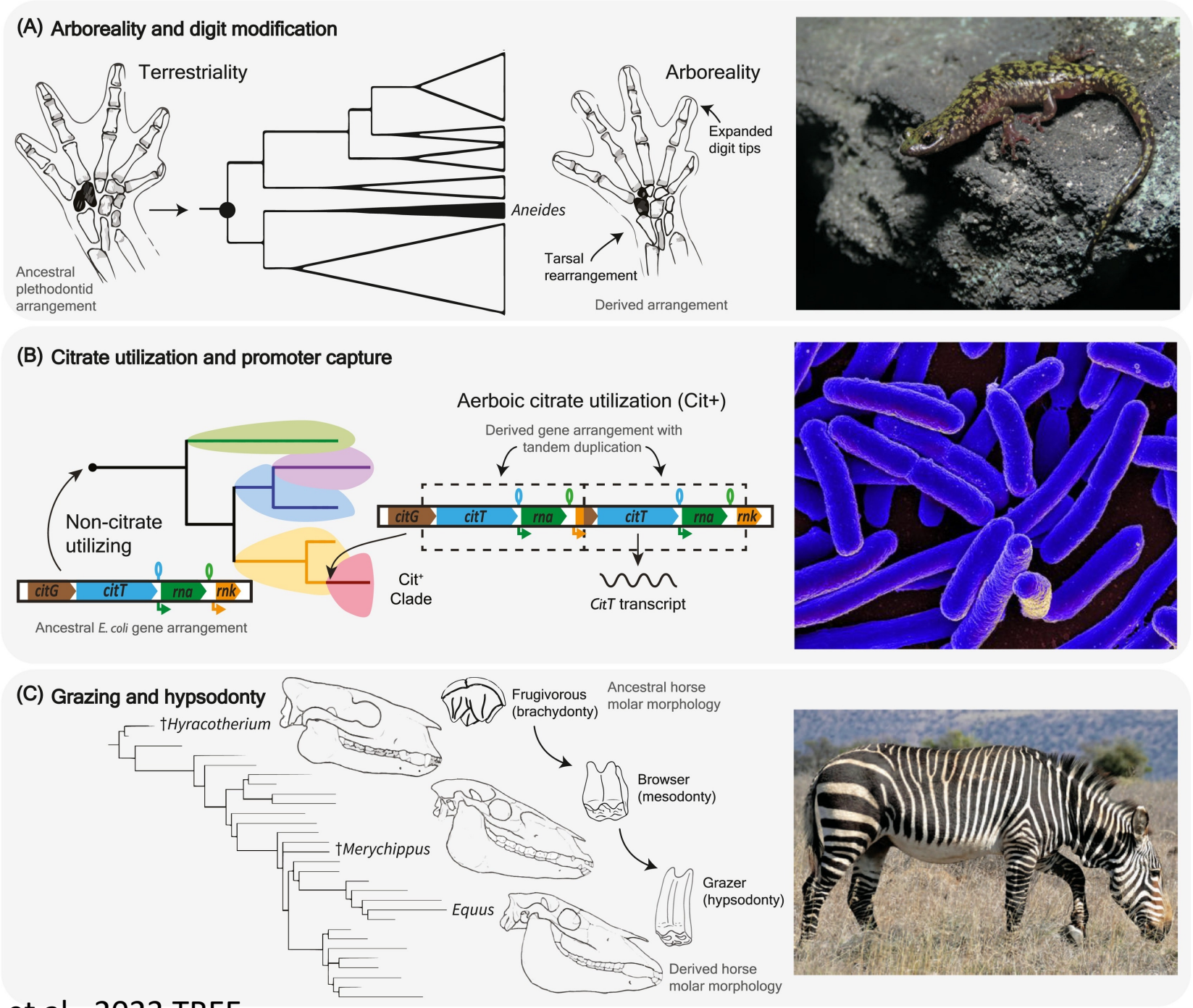
Filiault et a., 2018 *eLife*



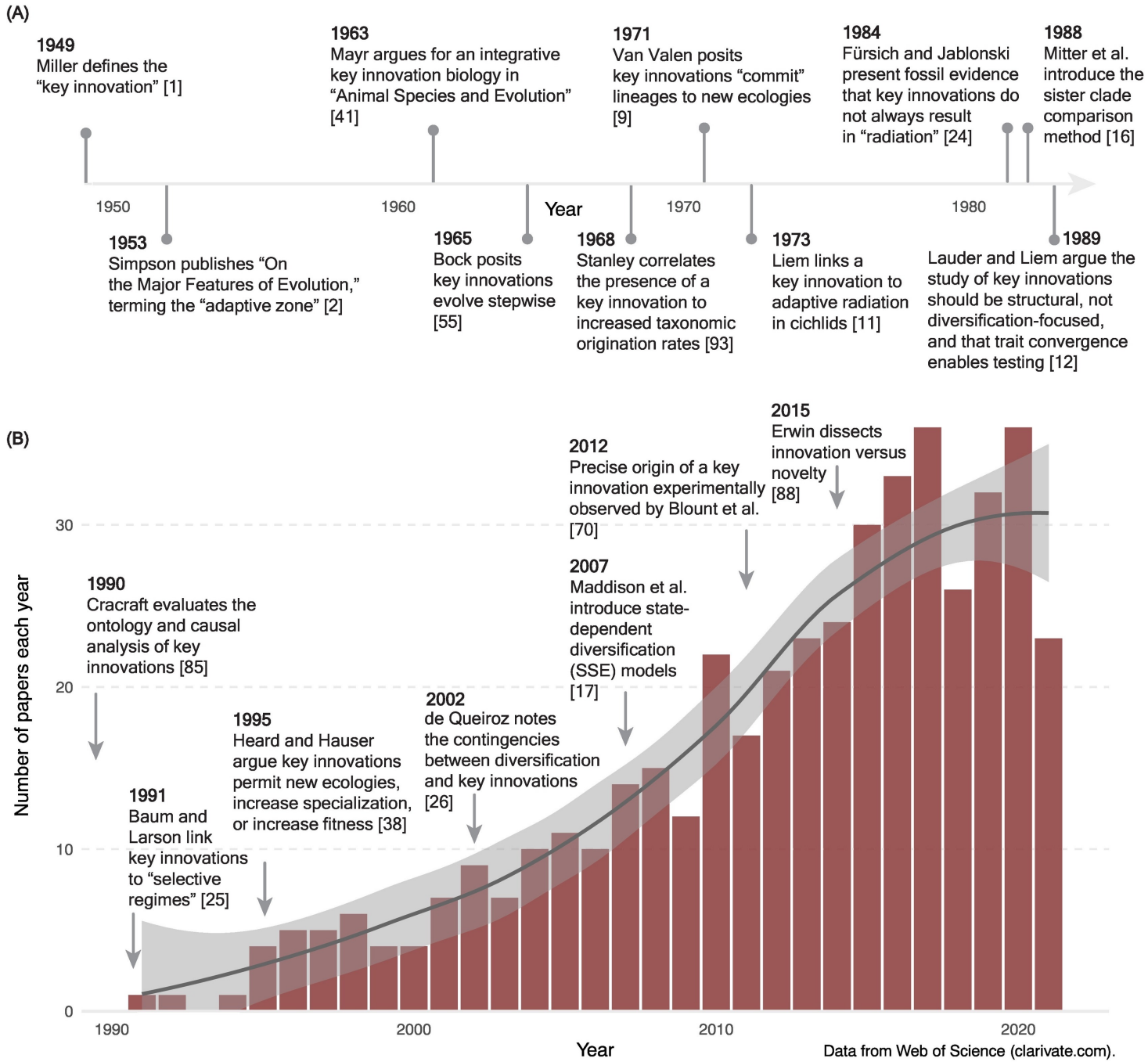
Brawand et al., 2014 *Nature*



Moore & Robertson, 2014 *Current Biology*

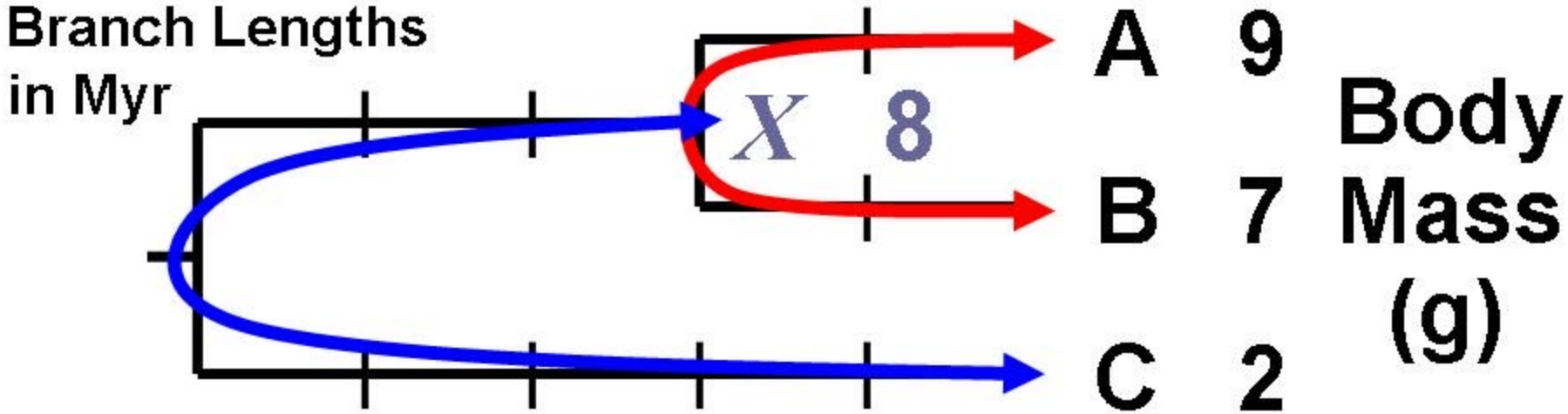


Miller et al., 2023 TREE



Miller et al., 2023 TREE

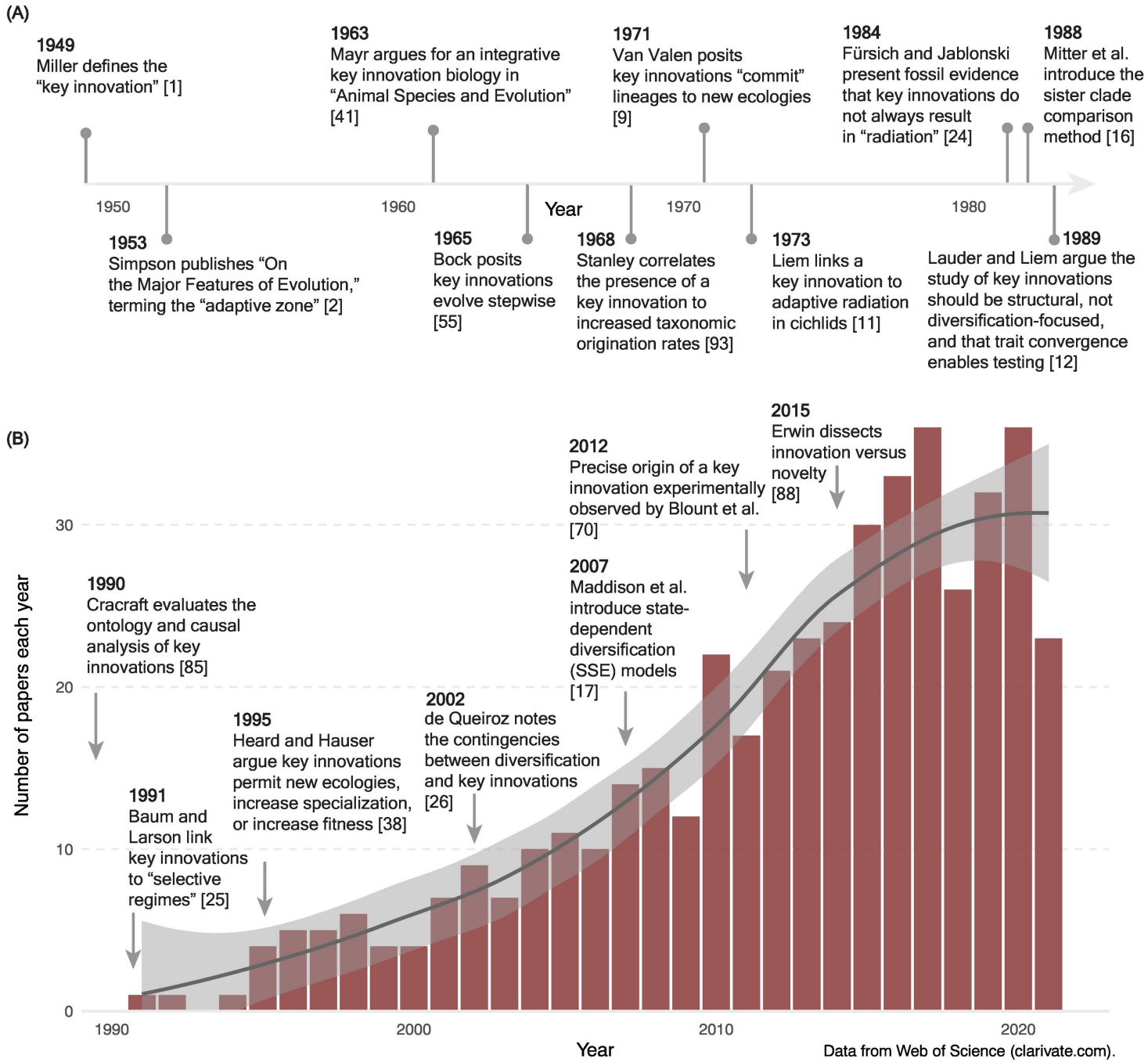
Trends in Ecology & Evolution



Identify and Compute Independent Contrasts

Compute square roots of sums of (corrected) branch lengths = S.D.

Contrast	Value	S.D.	Standardized Contrast
A-B	2	2	1
X-C	6	3	2

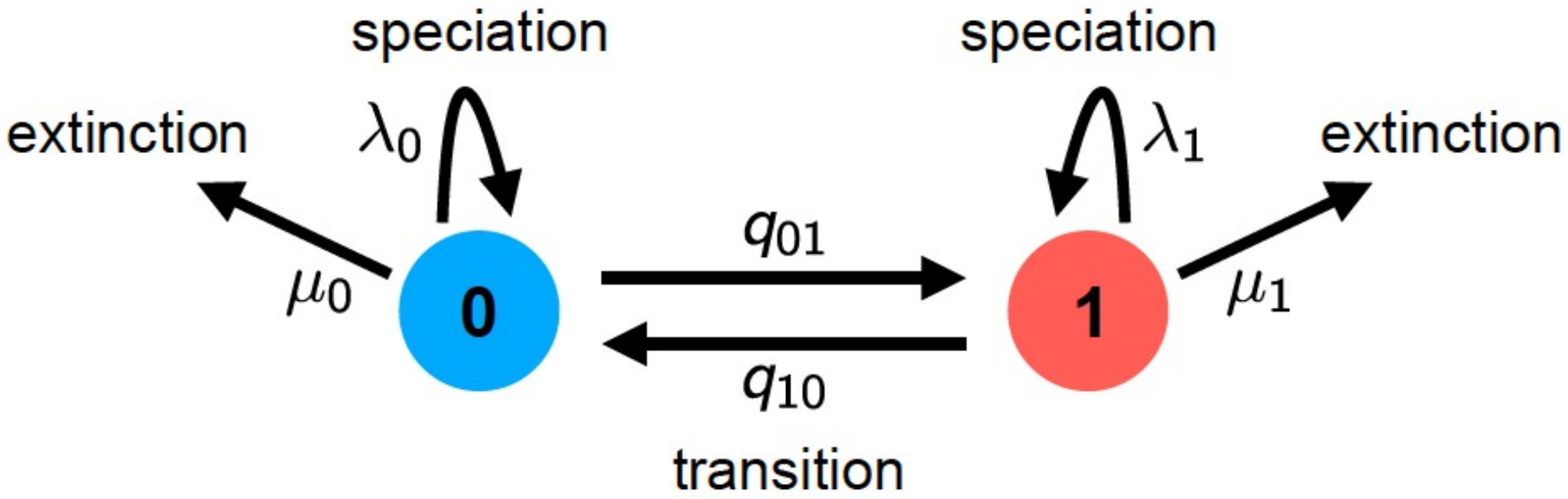


Miller et al., 2023 TREE

Trends in Ecology & Evolution

BiSSE

Maddison et al., 2007;
Systematic Biology



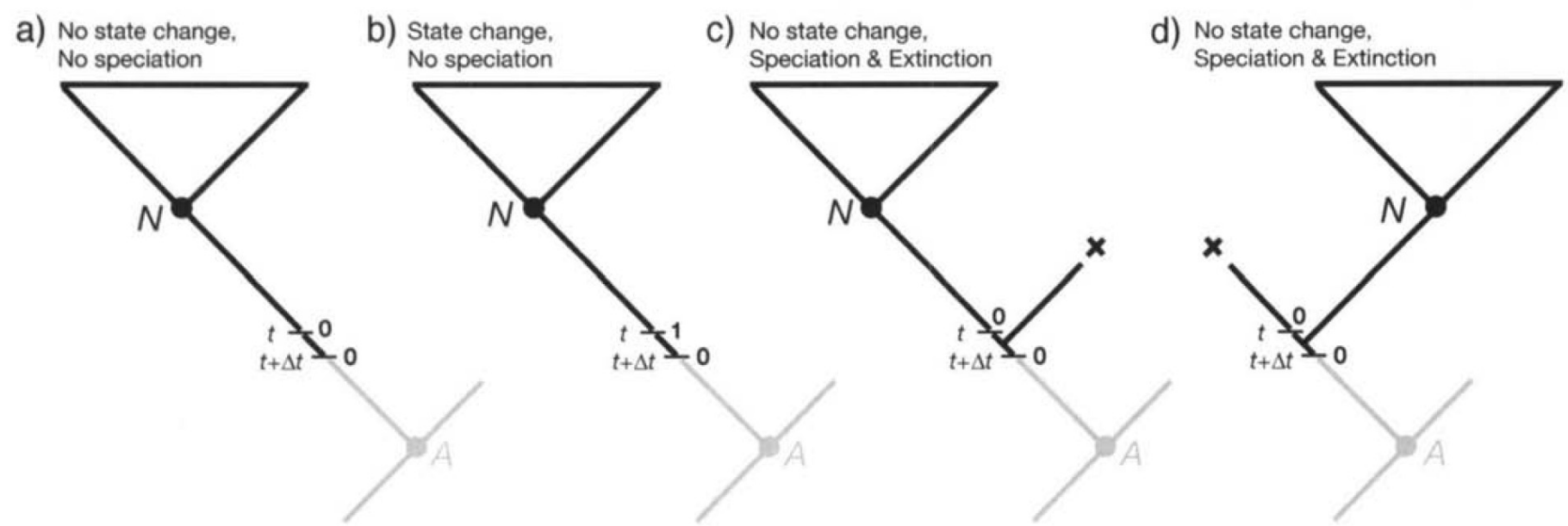
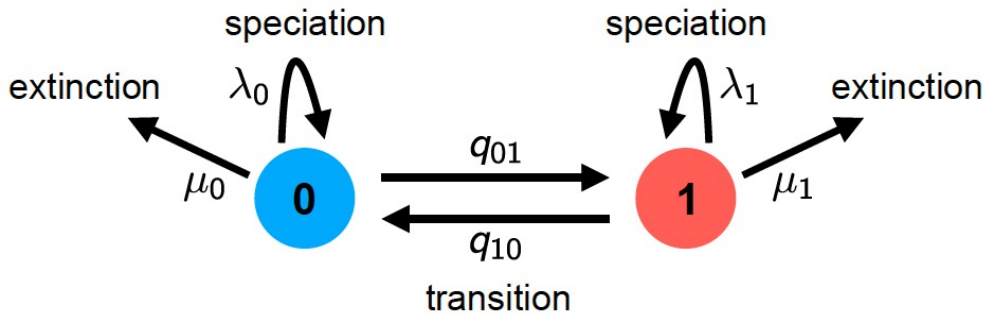
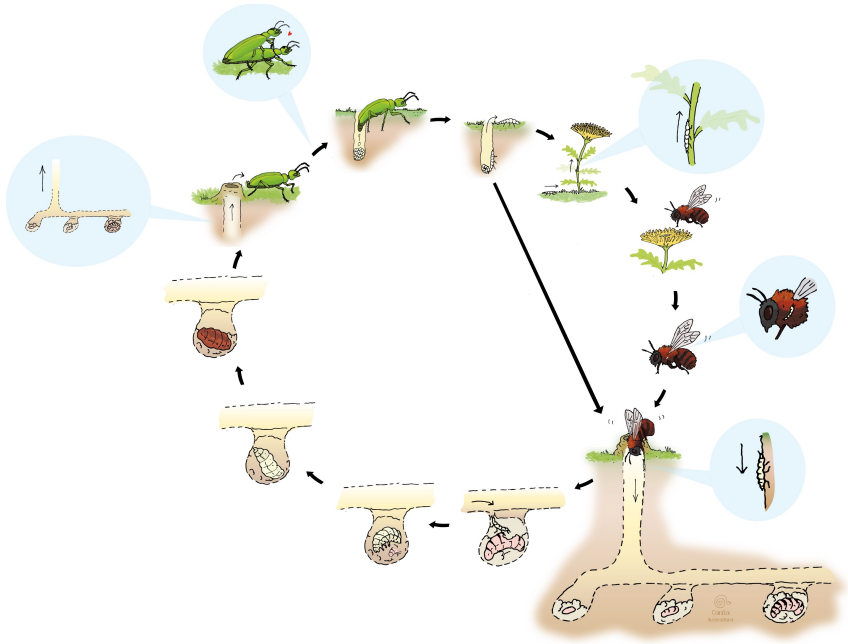
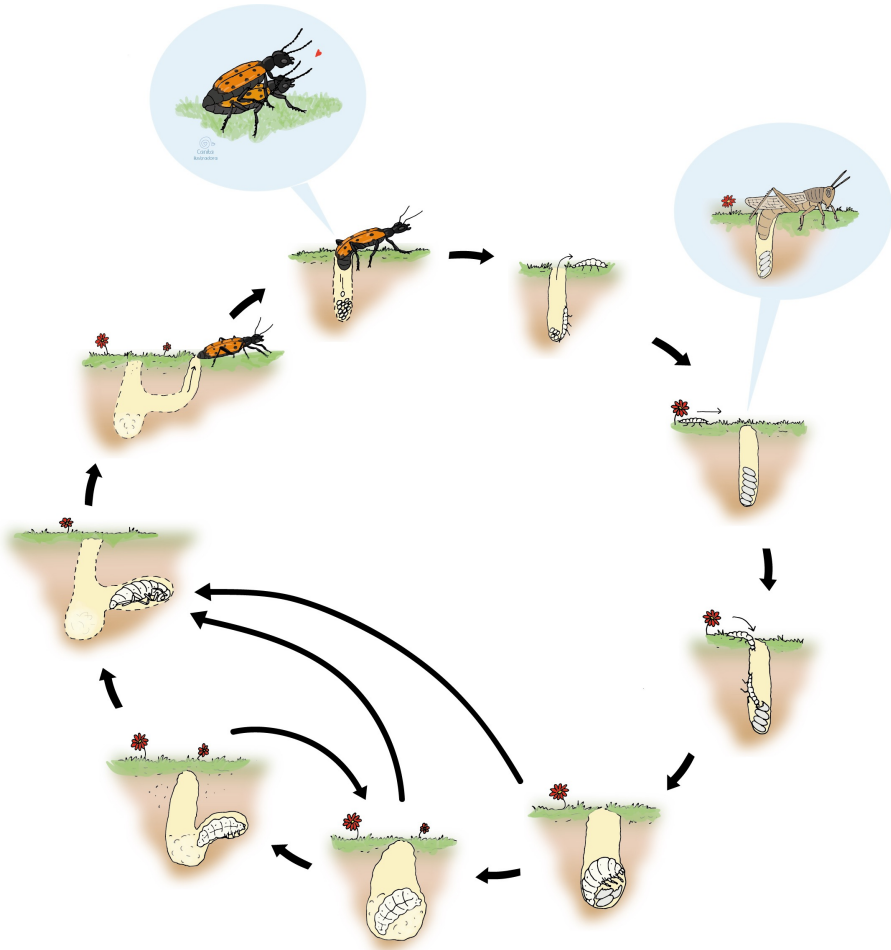
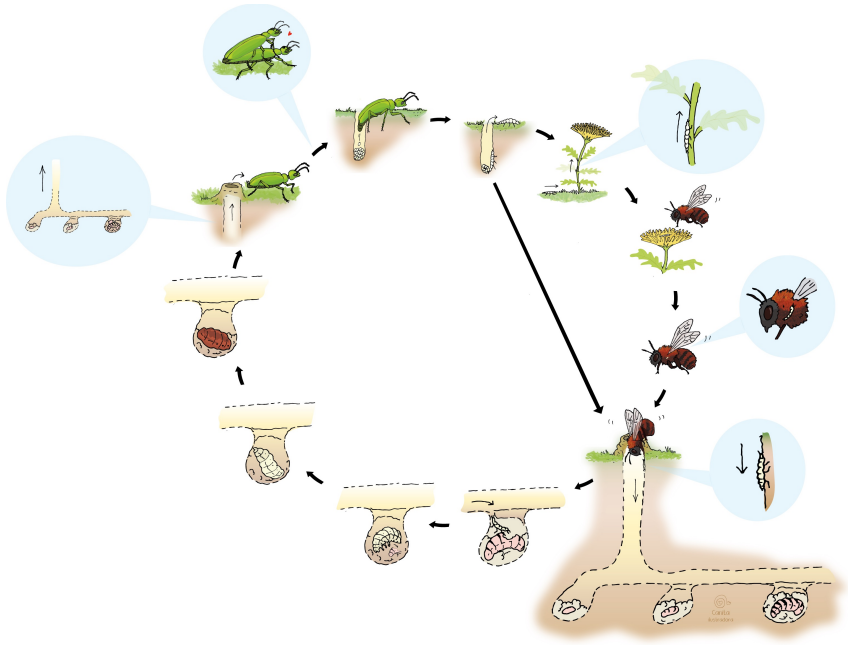


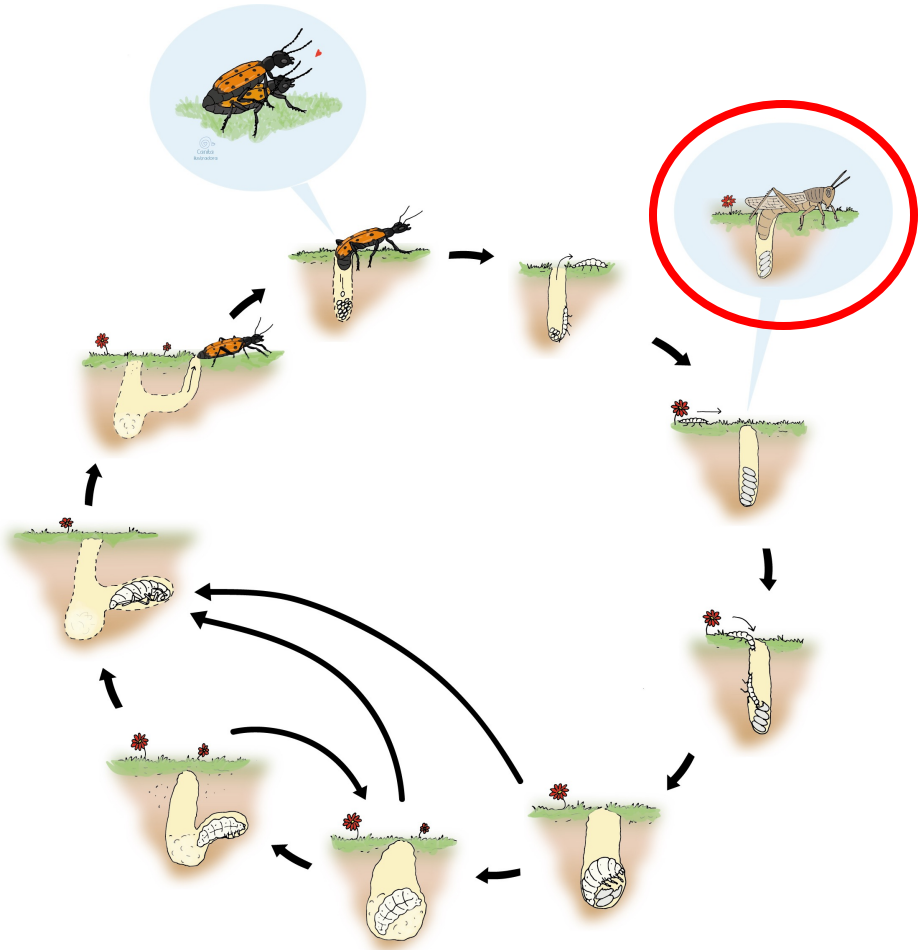
FIGURE 2. Alternative scenarios by which a lineage with state 0 at time $t+\Delta t$ on the branch might yield clade decended from node N but no other living descendants.

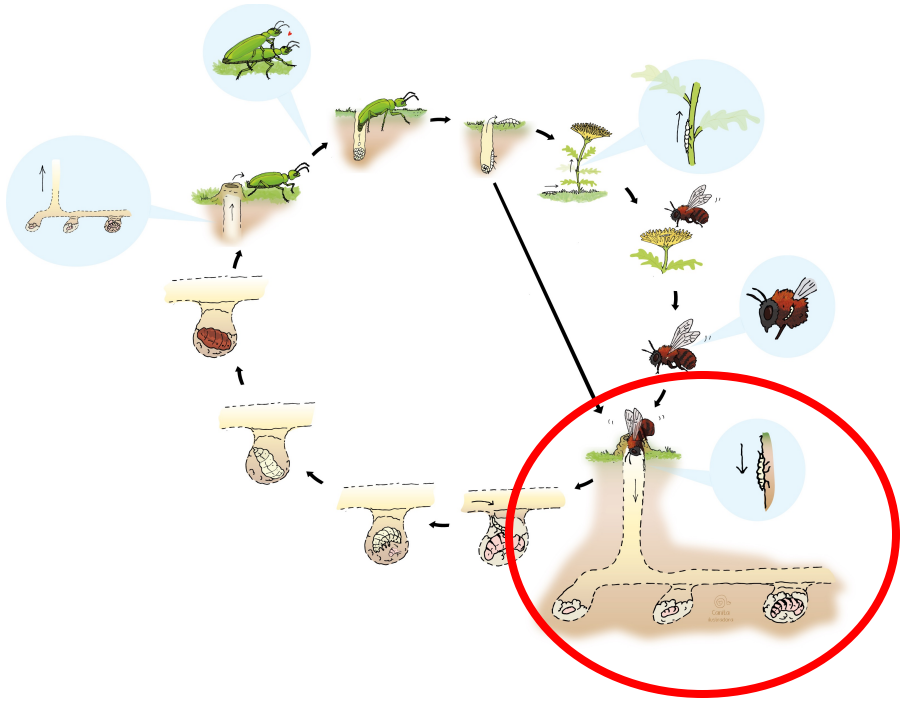


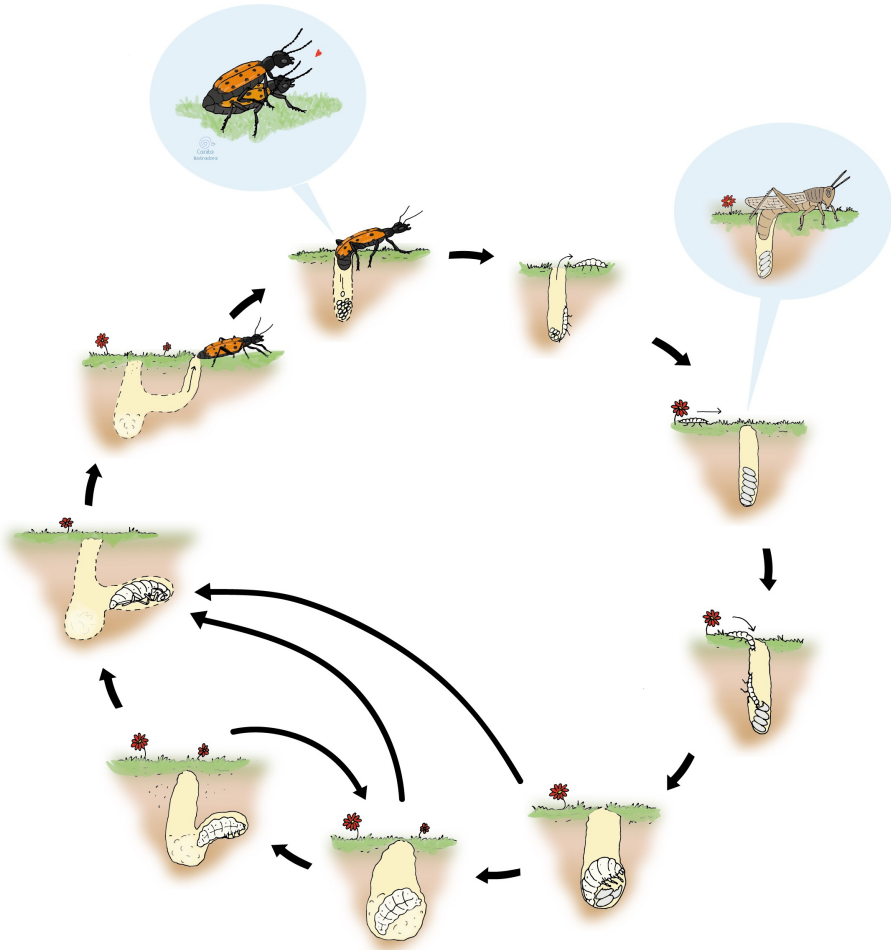


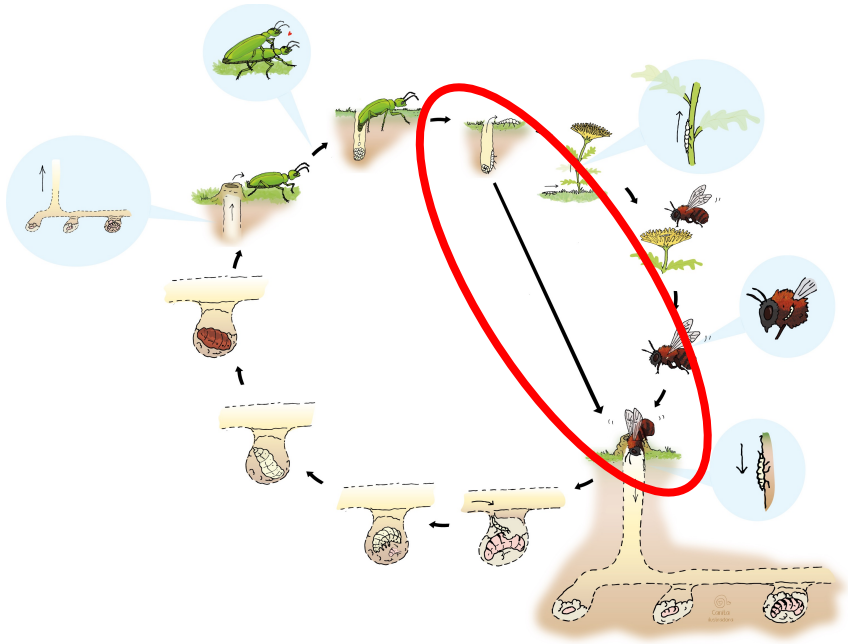


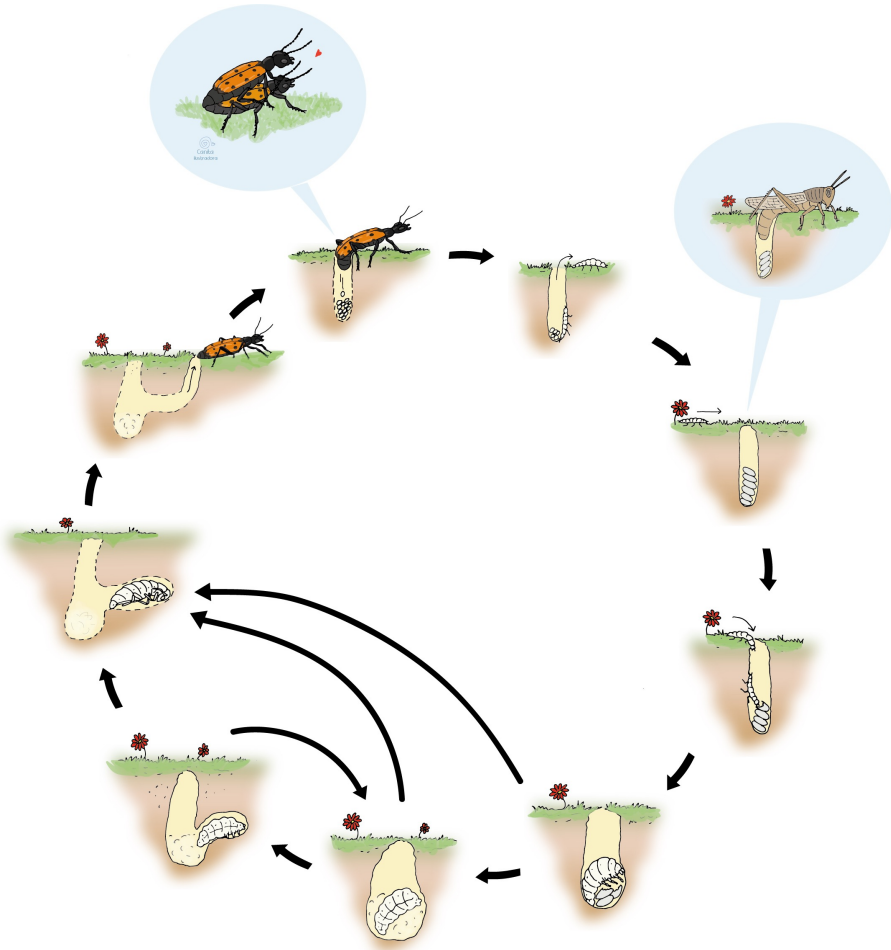


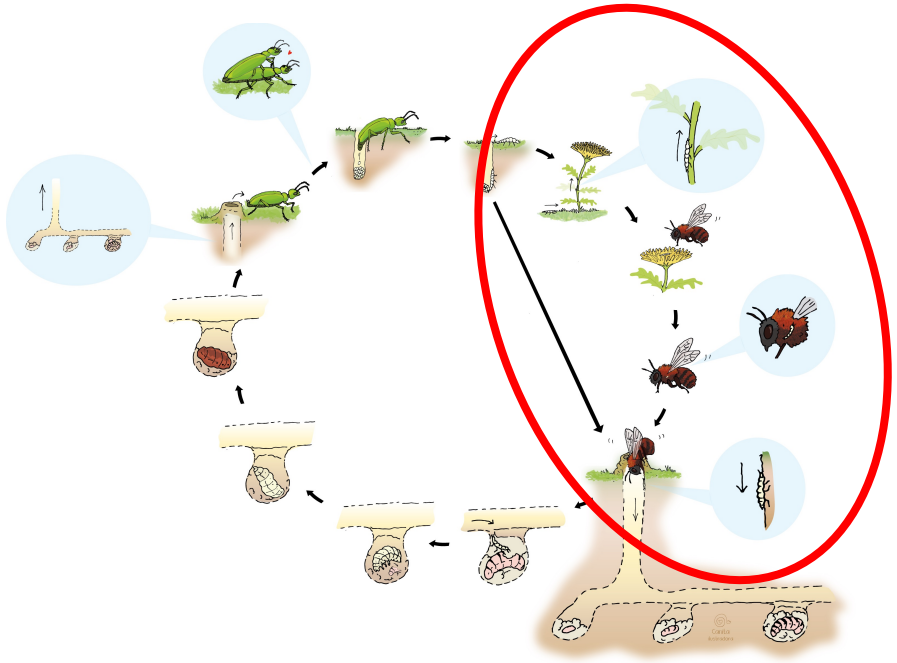


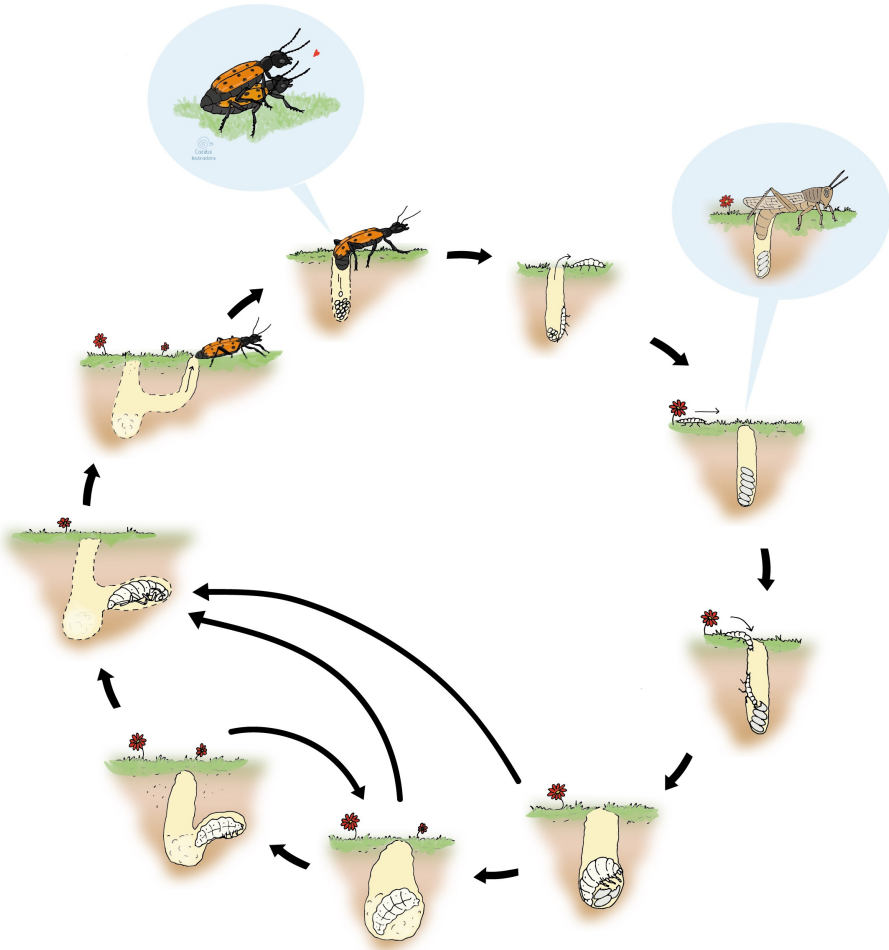


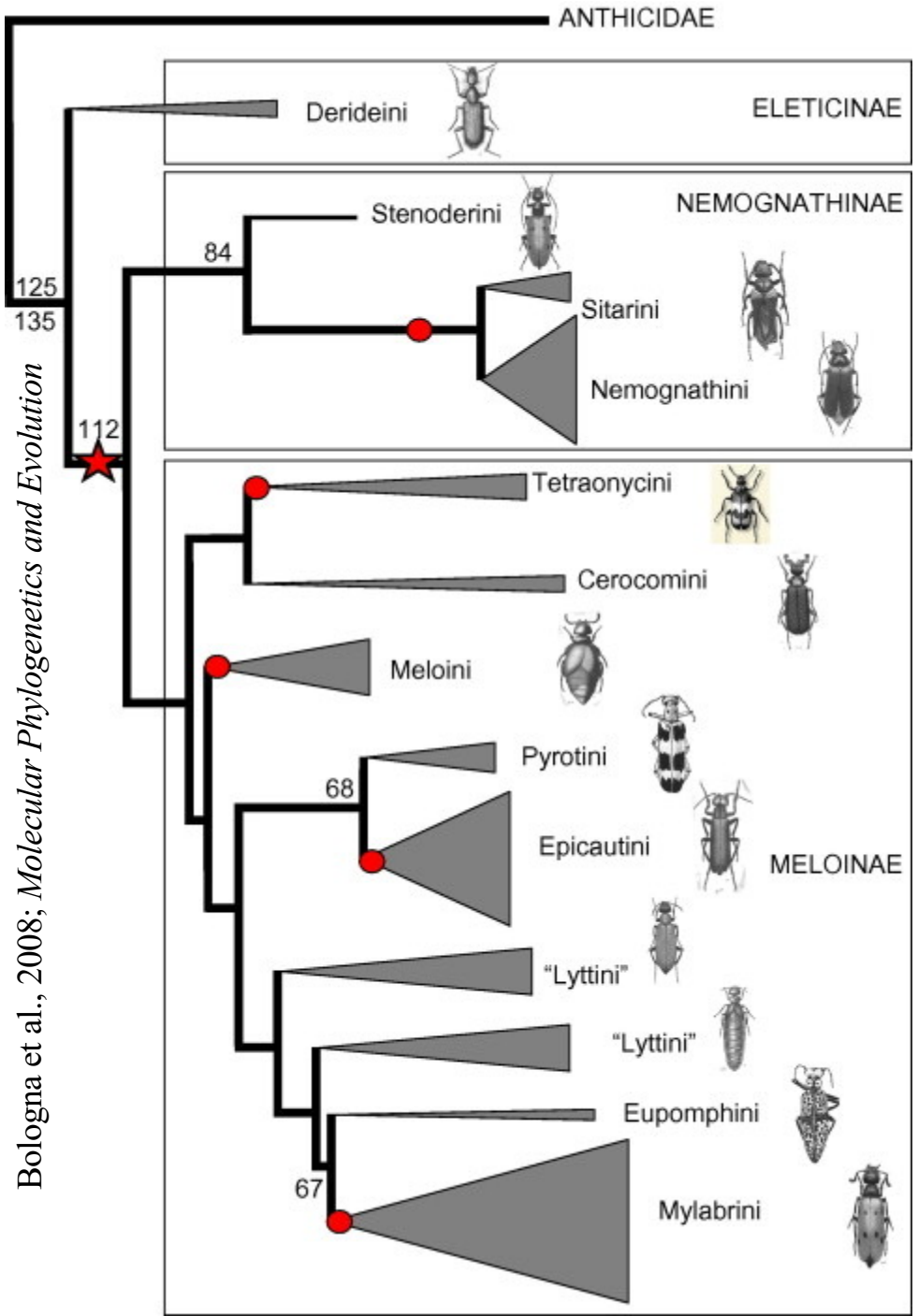




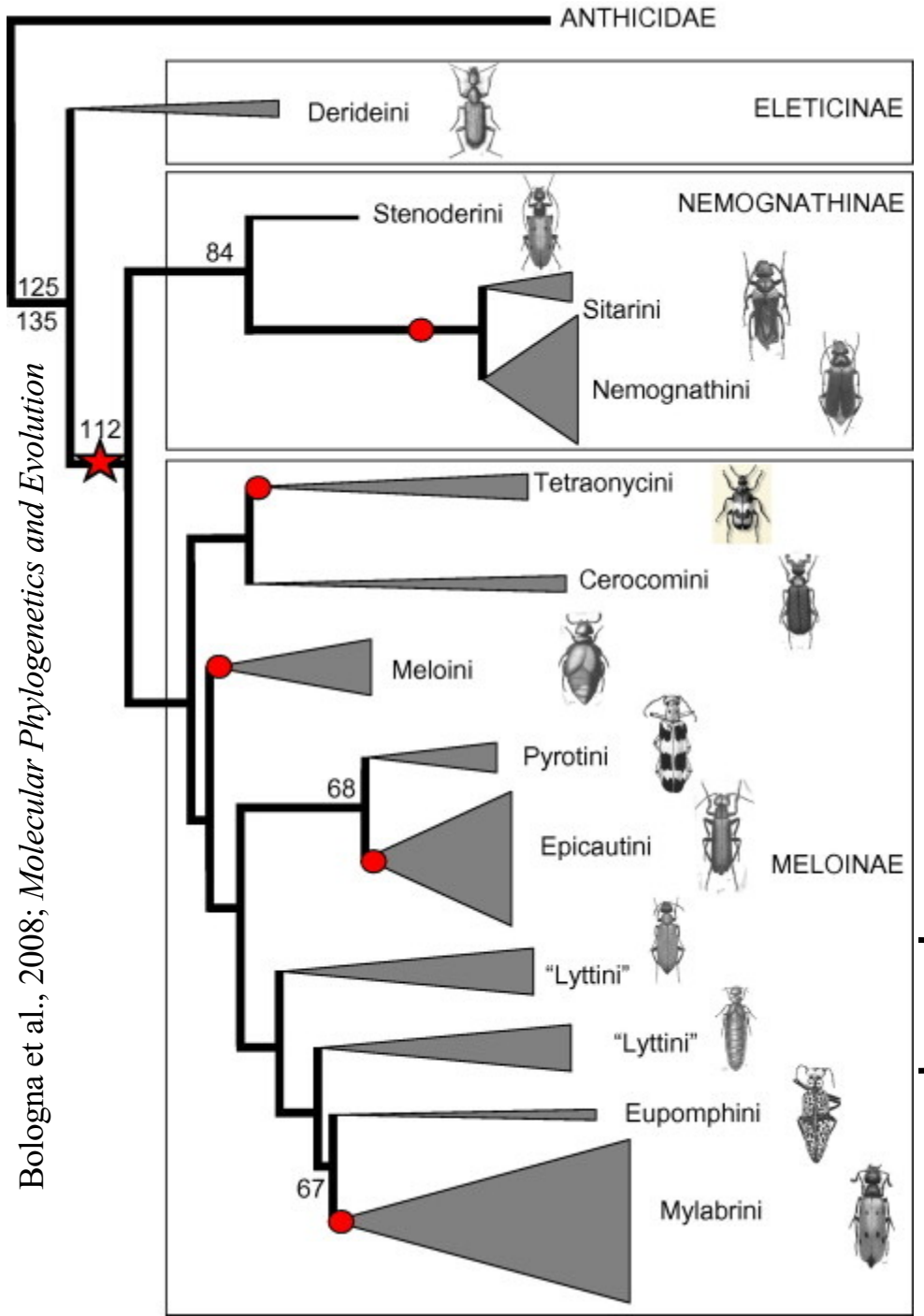








Bologna et al., 2008; *Molecular Phylogenetics and Evolution*



Bologna et al., 2008; *Molecular Phylogenetics and Evolution*

~ 120 spp.

~ 523 spp.

~ 103 spp.

~ 40 spp.

~ 160 spp.

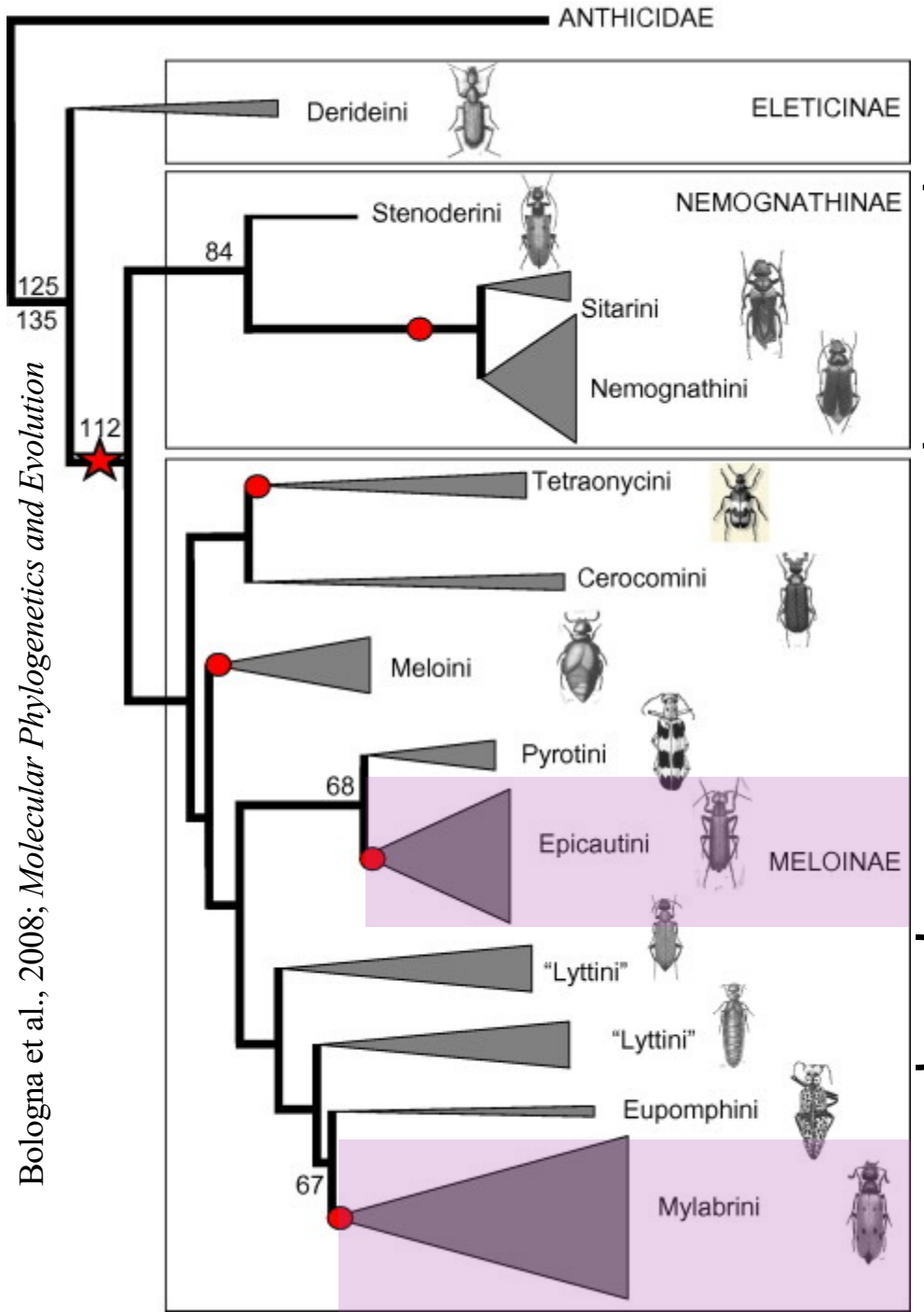
~ 100 spp.

~ 595 spp.

~ 361 spp.

~ 26 spp.

~735 spp.



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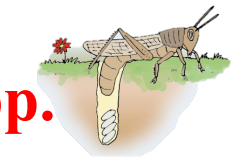
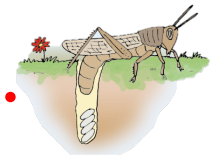
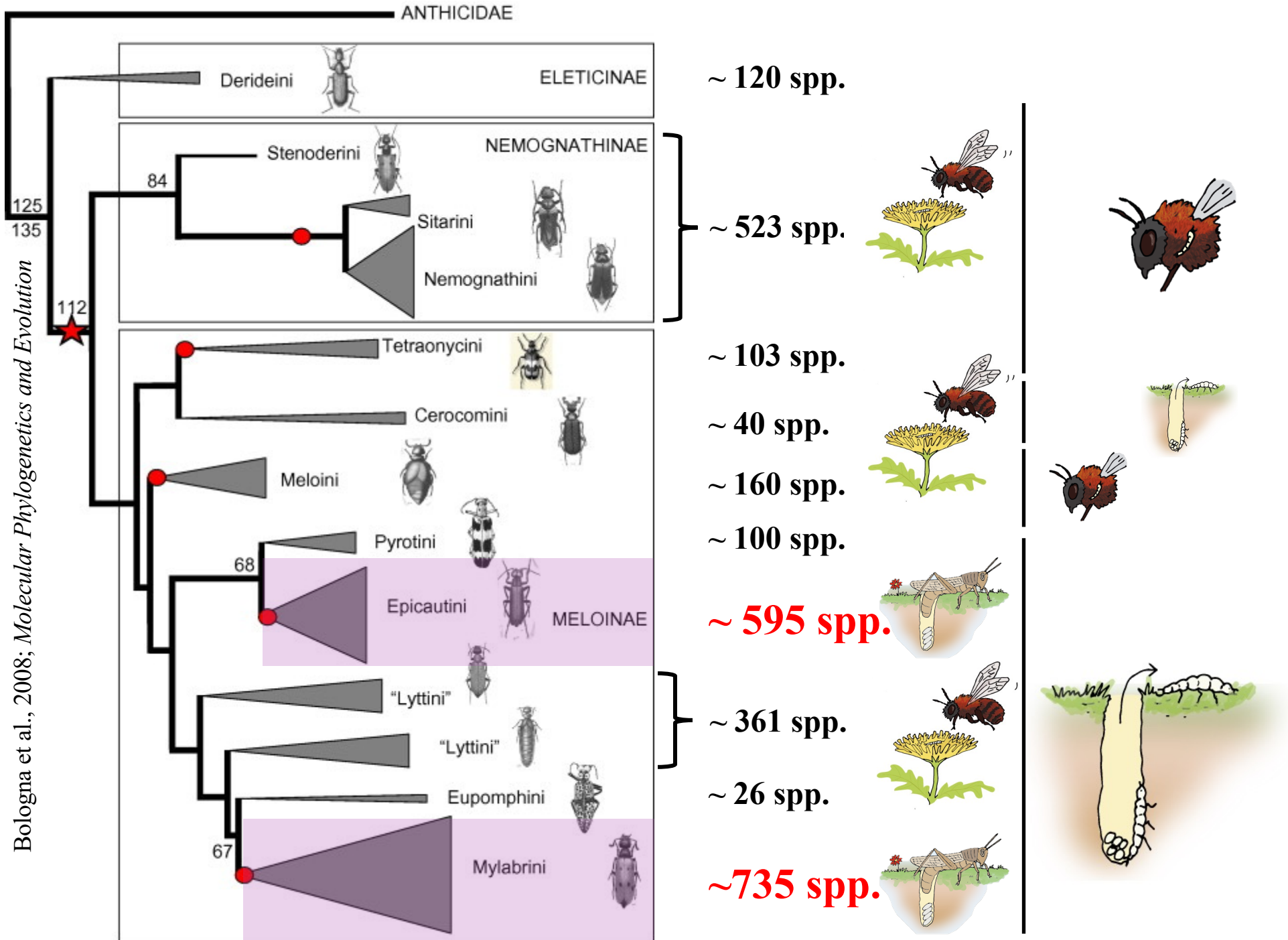


~ 361 spp.

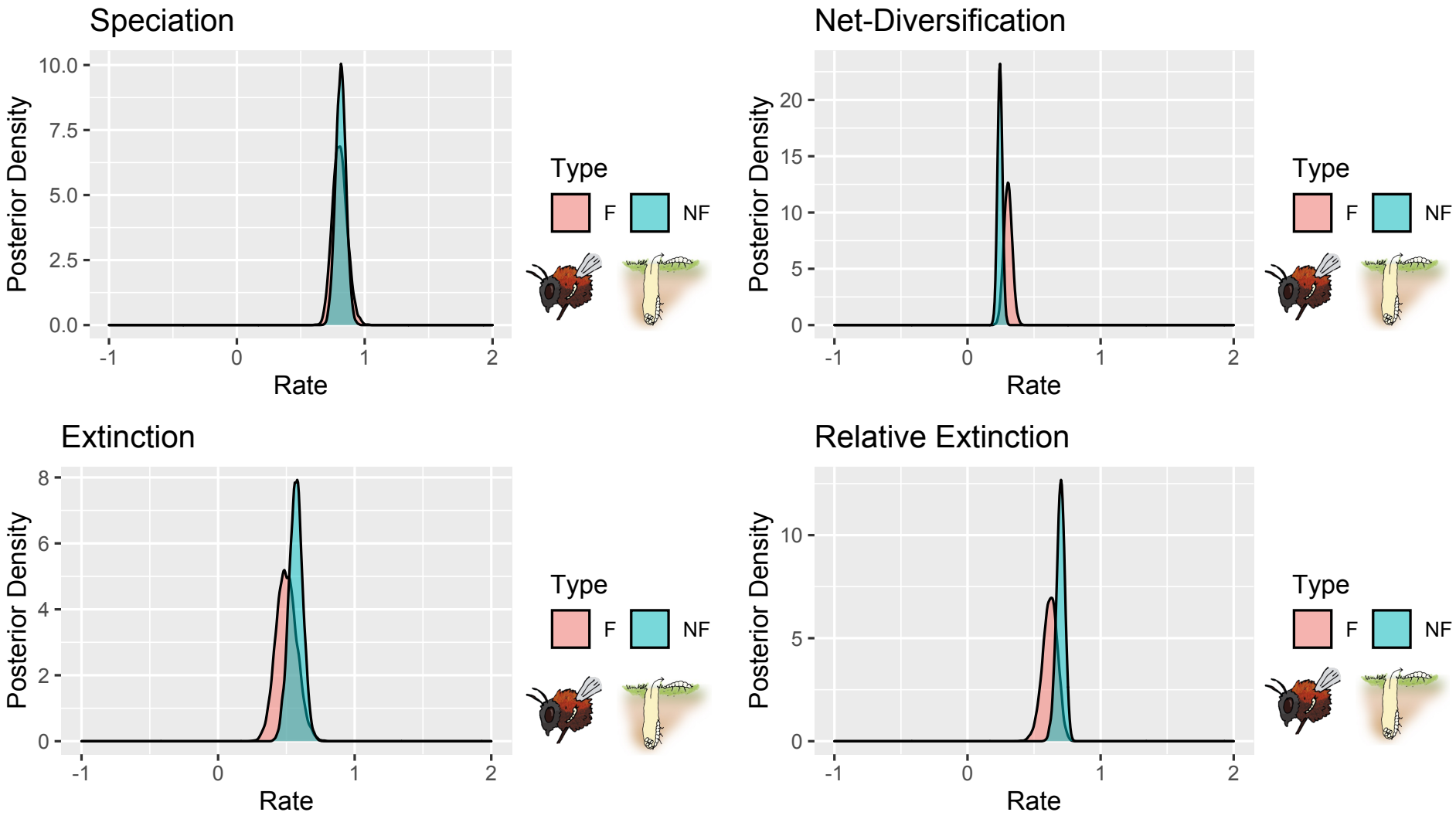
~ 26 spp.

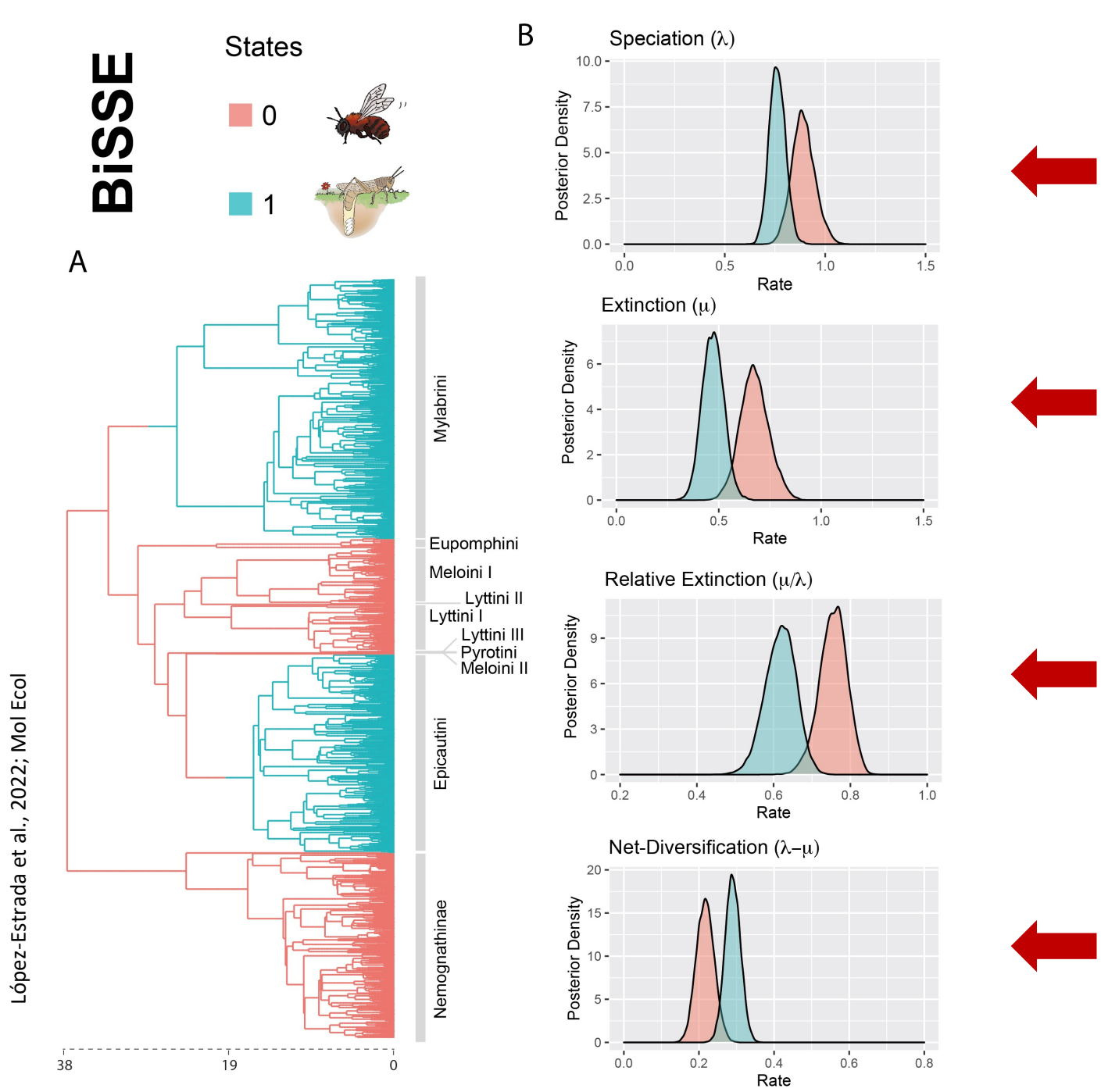
~735 spp.




ANTHICIDAE
Derideini
ELETICINAE
~ 120 spp.
Stenoderini
NEMOGNATHINAE
84
125
135
Sitarini
Nemognathini
~ 523 spp.
112
Tetraonycini
~ 103 spp.
Cerocomini
~ 40 spp.
Meloini
~ 160 spp.
Pyrotini
~ 100 spp.
68
Epicautini
MELOINAE
~ 595 spp.
"Lyttini"
~ 361 spp.
"Lyttini"
Eupomphini
~ 26 spp.
67
Mylabrini
~735 spp.
Bologna et al., 2008; *Molecular Phylogenetics and Evolution*

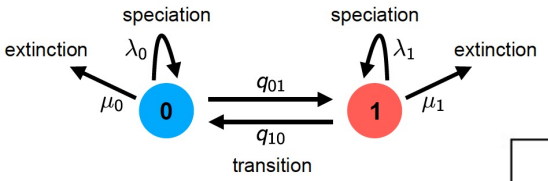
BiSSE: foresia




BiSSE
States
0
1
A
Mylabrini
Eupomphini
Meloini I
Lyttini II
Lyttini I
Lyttini III
Pyrotini
Meloini II
Epicautini
Nemognathinae
38
19
0
López-Estrada et al., 2022; Mol Ecol
B
Speciation (λ)
Extinction (μ)
Relative Extinction (μ/λ)
Net-Diversification (λ−μ)
Posterior Density
Rate

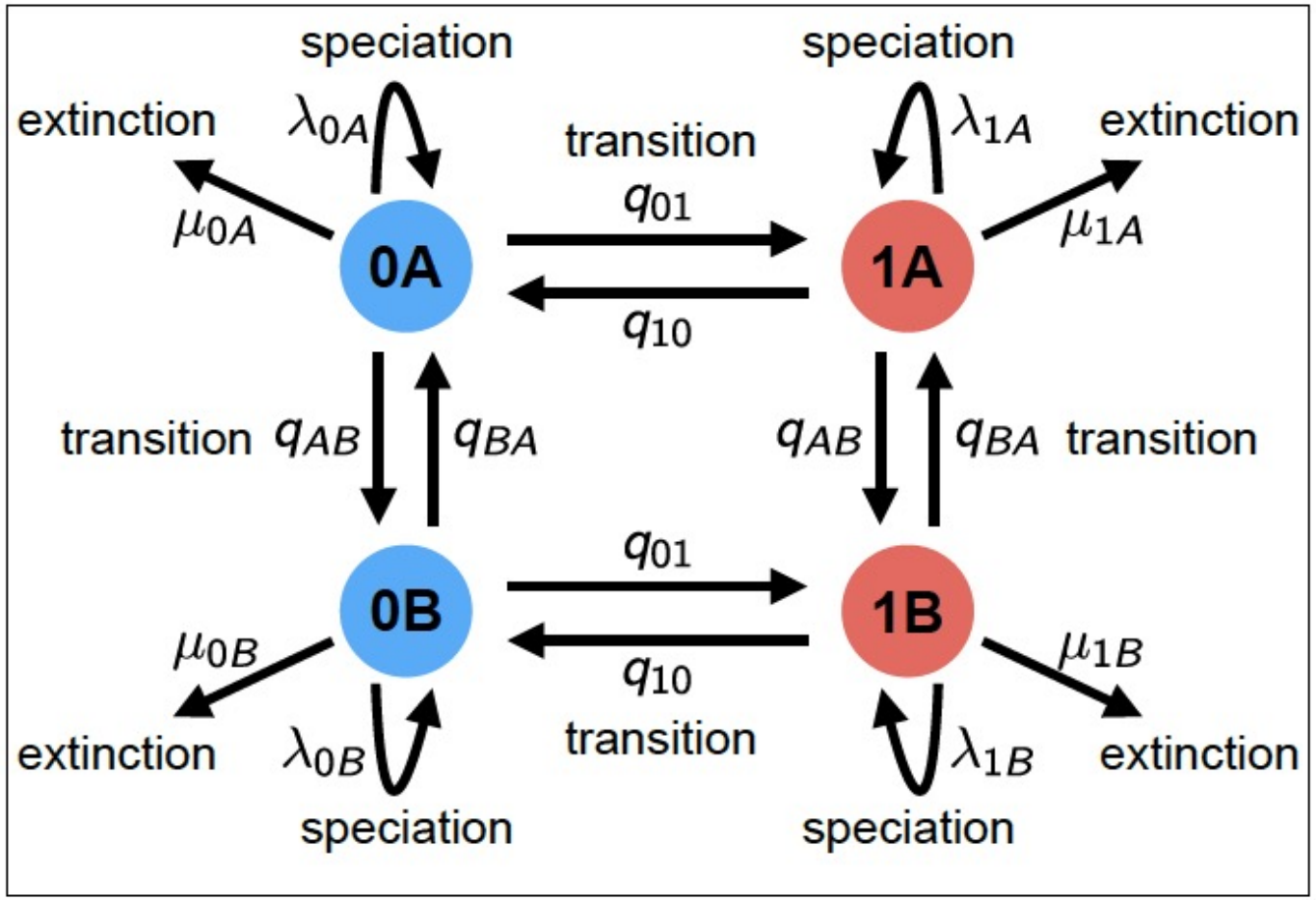
BiSSE

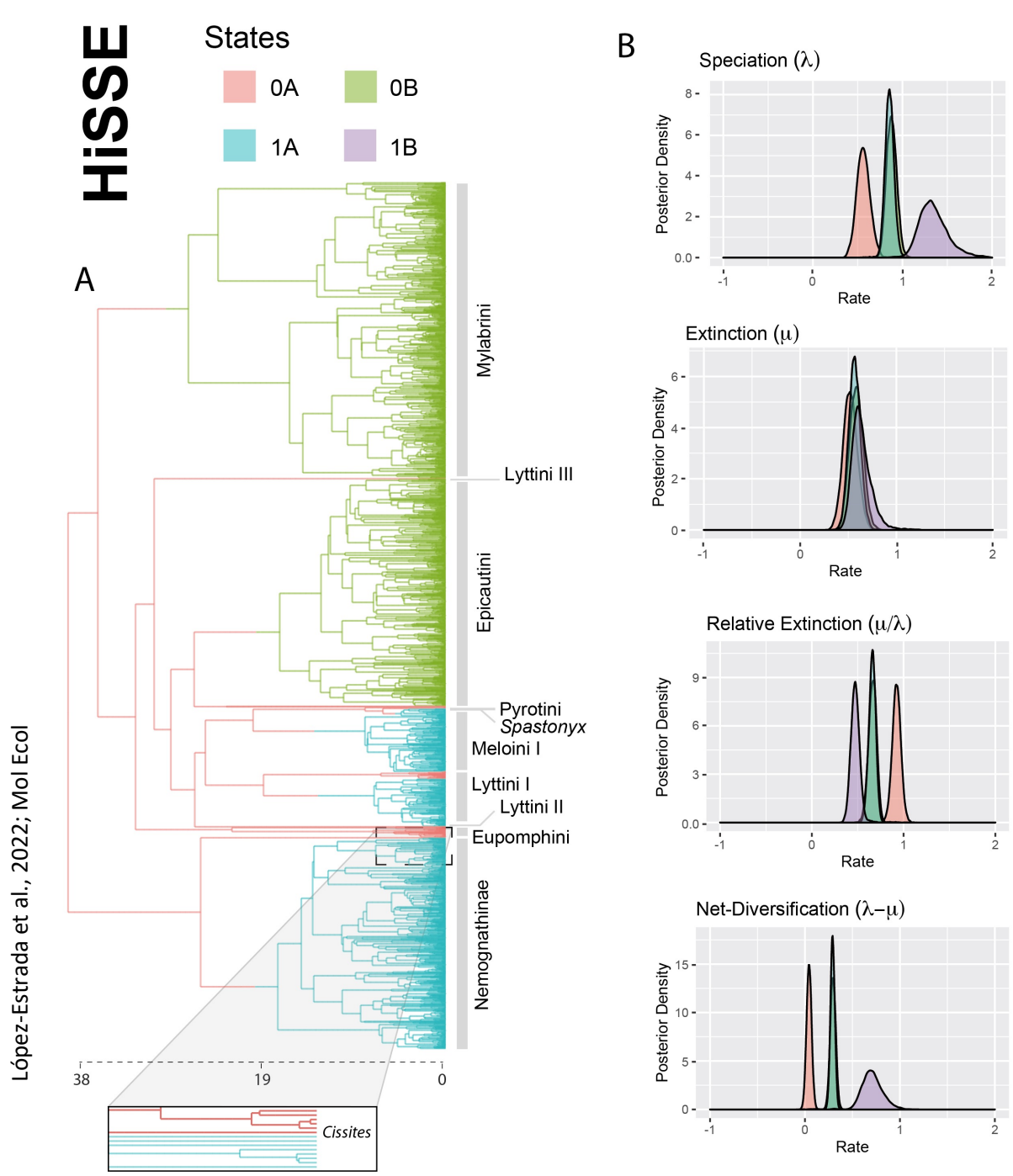
Maddison et al., 2007;
Systematic Biology



HiSSE

Maddison and FitzJohn 2015;
Systematic Biology





López-Estrada et al., 2022; Mol Ecol

JOURNAL ARTICLE

Stochastic Character Mapping of State-Dependent Diversification Reveals the Tempo of Evolutionary Decline in Self-Compatible Onagraceae Lineages

William A Freyman ✉, Sebastian Höhna

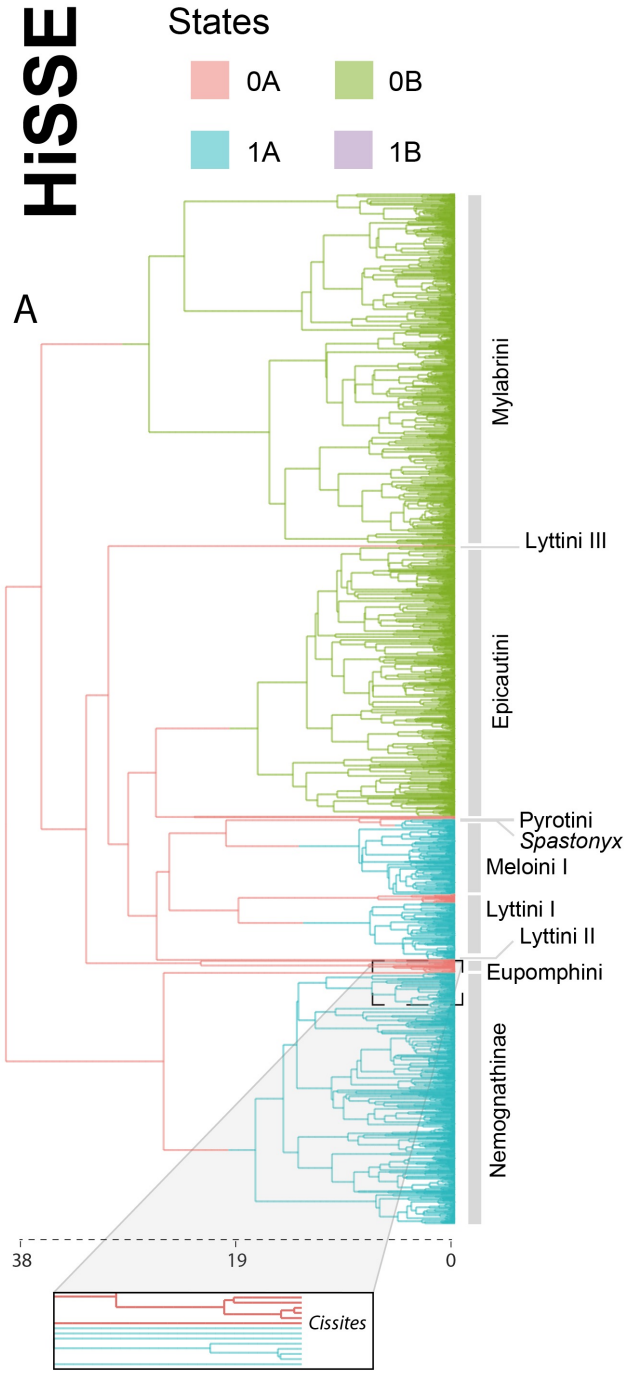
Systematic Biology, Volume 68, Issue 3, May 2019, Pages 505–519, https://doi.org/10.1093/sysbio/syy078

Published: 26 November 2018 **Article history** ▾

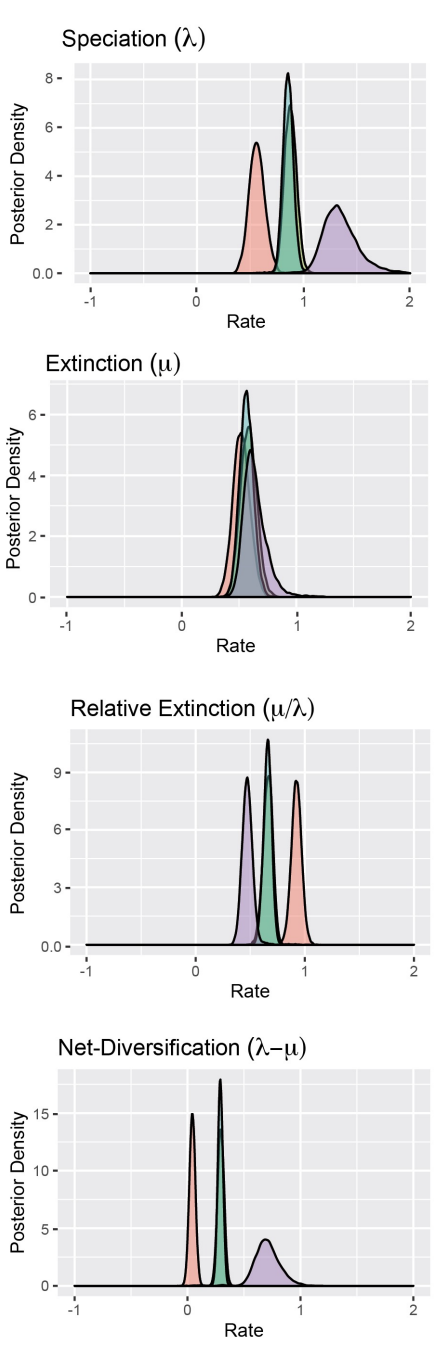
1 **Hidden state models improve the adequacy of state-dependent diversification approaches**
2 **using empirical trees, including biogeographical models**

3 Daniel S. Caetano[1,3], Brian C. O'Meara[2], and Jeremy M. Beaulieu[1]

4 [1]Department of Biological Sciences, University of Arkansas, Fayetteville AR 72701.
5 [2]Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville TN
6 37996-1610
7 [3]Author for correspondence: Daniel S. Caetano, Email: dcaetano@uark.edu



López-Estrada et al., 2022; Mol Ecol

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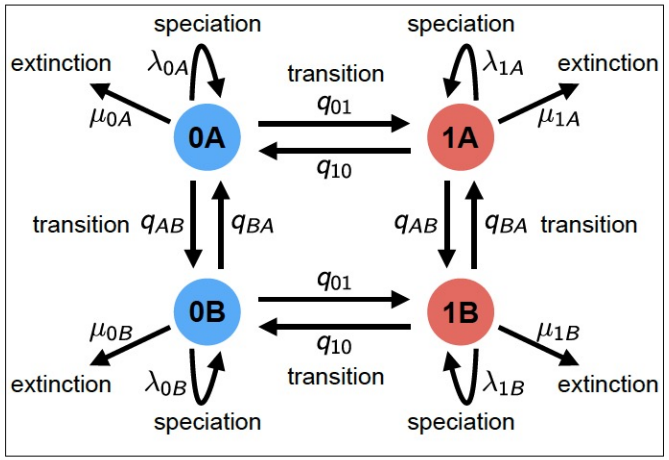

(1) if the diversification rates varied between 0 and 1, but not between hidden states a and b, we could conclude that shifts in mating system explained all diversification rate heterogeneity

(2) if the diversification rates did not vary between 0 and 1, but did vary between hidden states a and b we could conclude that there were background rate changes unassociated with mating system and that mating system evolution was not associated with rate shifts; or

(3) if the diversification rates varied both between 0/1 and between hidden states a/b, then depending on the phylogenetic pattern of the hidden states they could represent the different long and short term consequences of the loss of SI

JOURNAL ARTICLE

Stochastic Character Mapping of State-Dependent Diversification Reveals the Tempo of Evolutionary Decline in Self-Compatible Onagraceae Lineages

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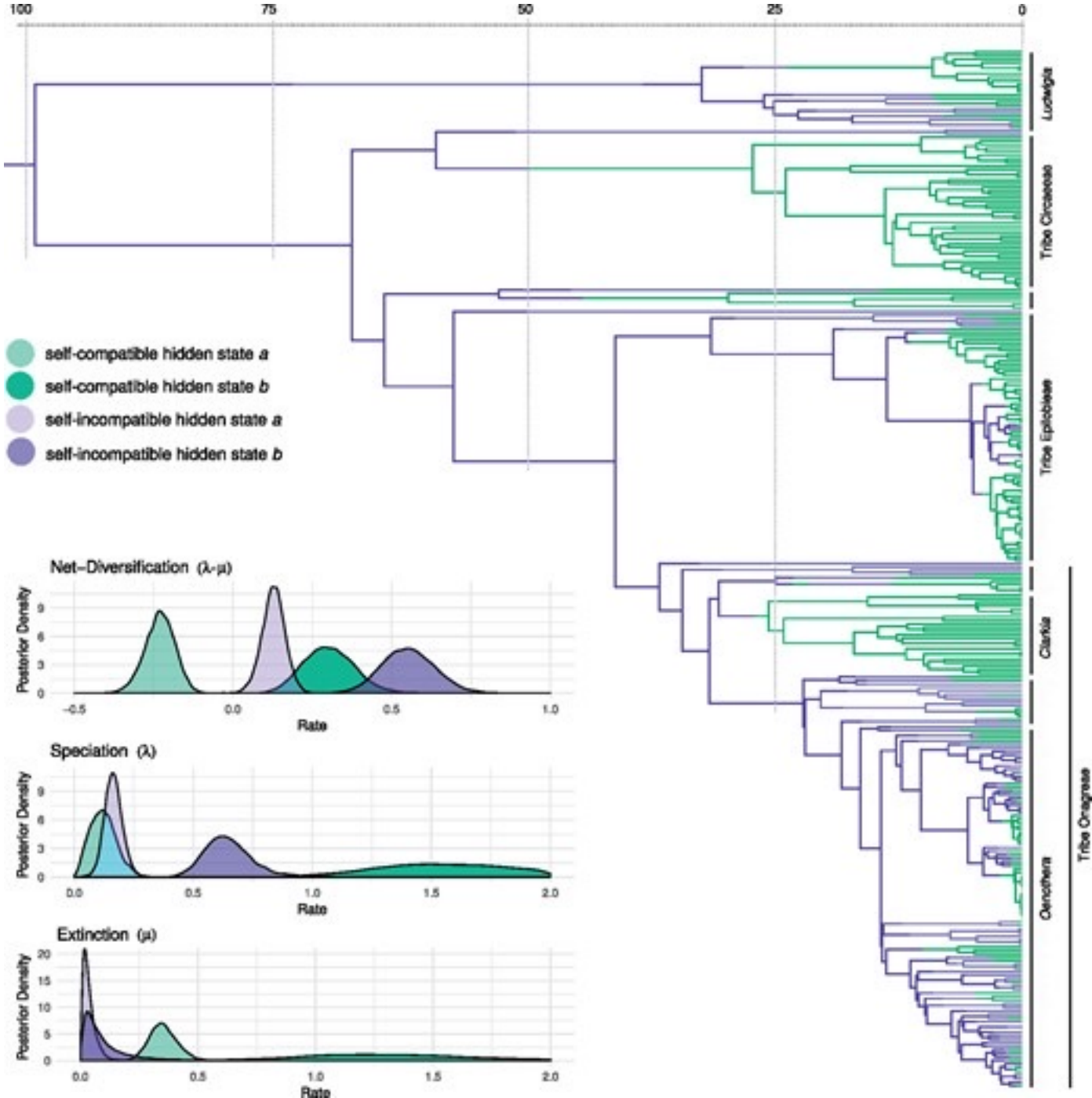
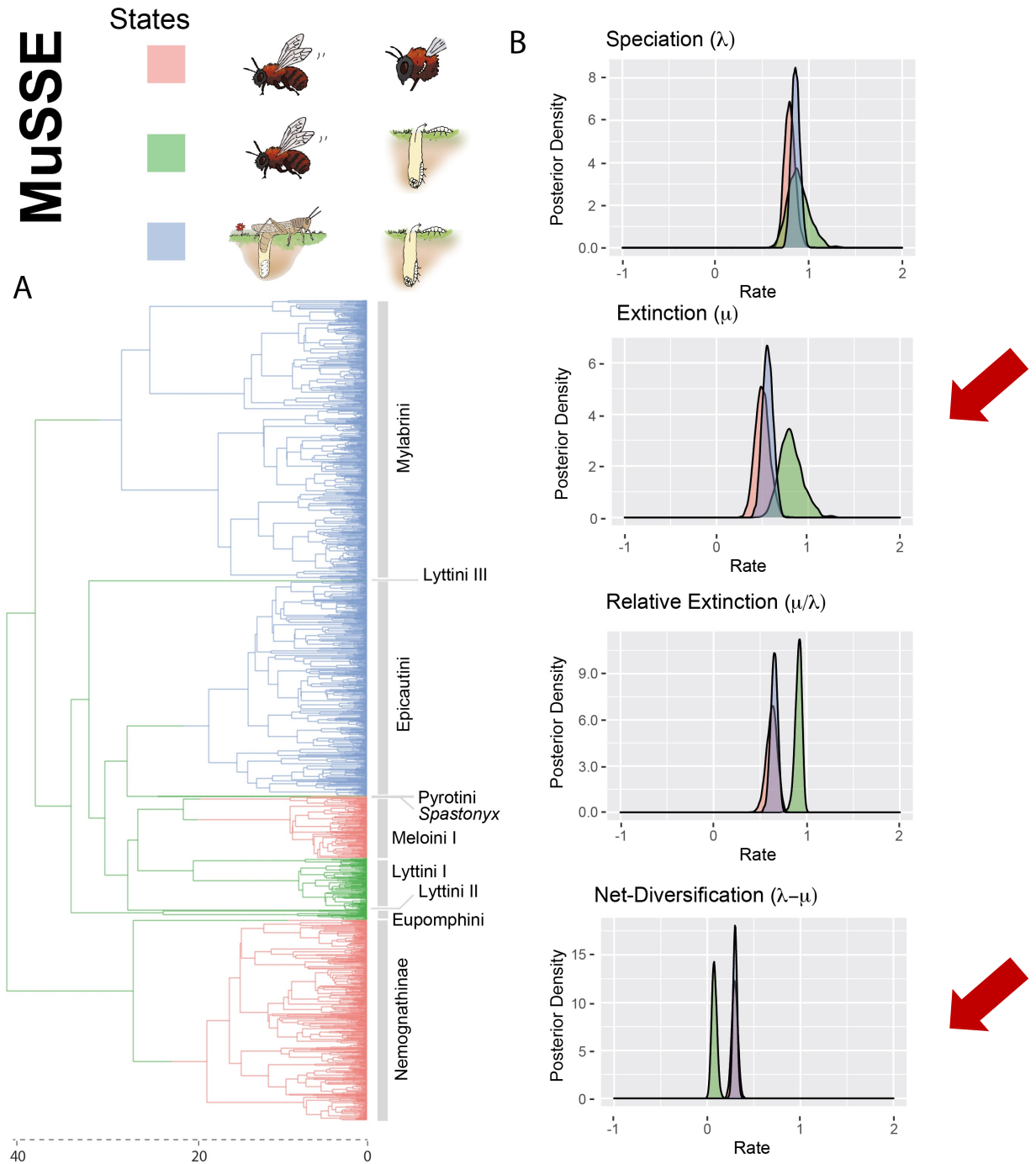
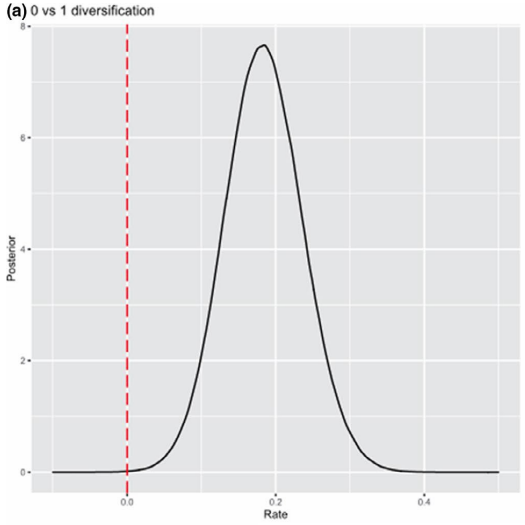
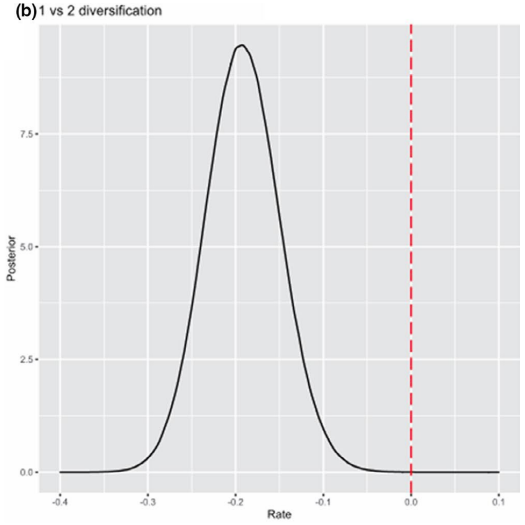
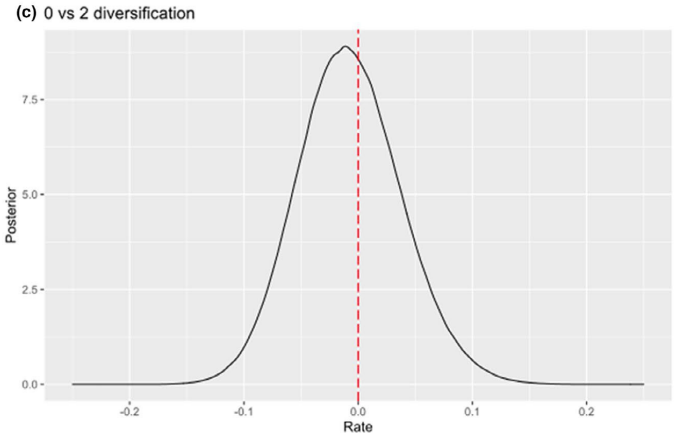
(3) if the diversification rates varied both between 0/S1 and between hidden states a/b, then depending on the phylogenetic pattern of the hidden states they could represent the different long and short term consequences of the loss of SI

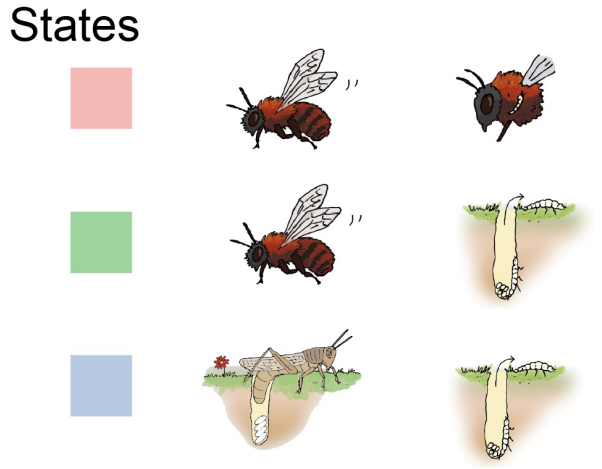



MuSSE
States
A
Mylabrini
Lyttini III
Epicautini
Pyrotini
Spastonyx
Meloini I
Lyttini I
Lyttini II
Eupomphini
Nemognathinae
40
20
0
B
Speciation (λ)
Extinction (μ)
Relative Extinction (μ/λ)
Net-Diversification (λ−μ)
Posterior Density
Rate

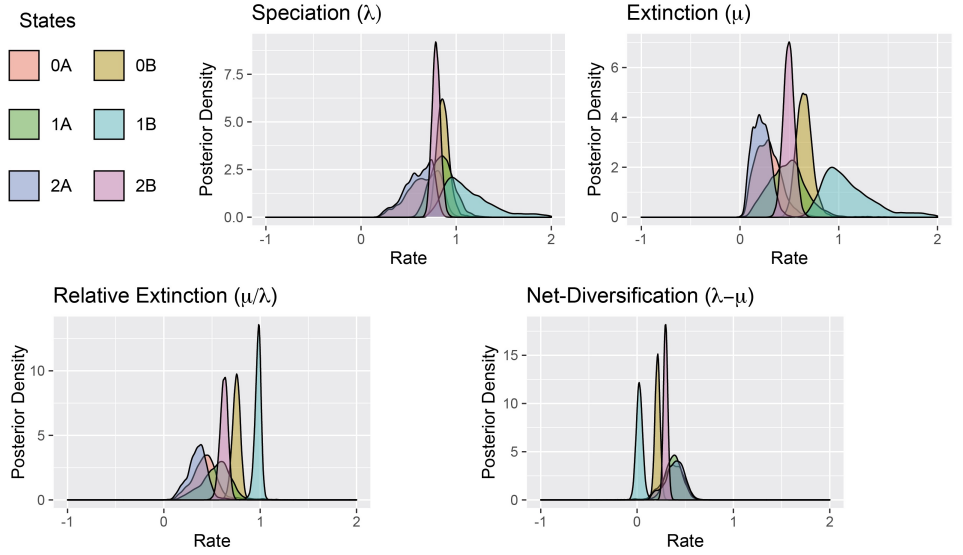

(a) 0 vs 1 diversification
Posterior
Rate


(b) 1 vs 2 diversification
Posterior
Rate


(c) 0 vs 2 diversification
Posterior
Rate


States

MuHiSSE


States
0A
0B
1A
1B
2A
2B
Speciation (λ)
Extinction (μ)
Relative Extinction (μ/λ)
Net-Diversification (λ−μ)
Posterior Density
Rate

Character-Independent Model

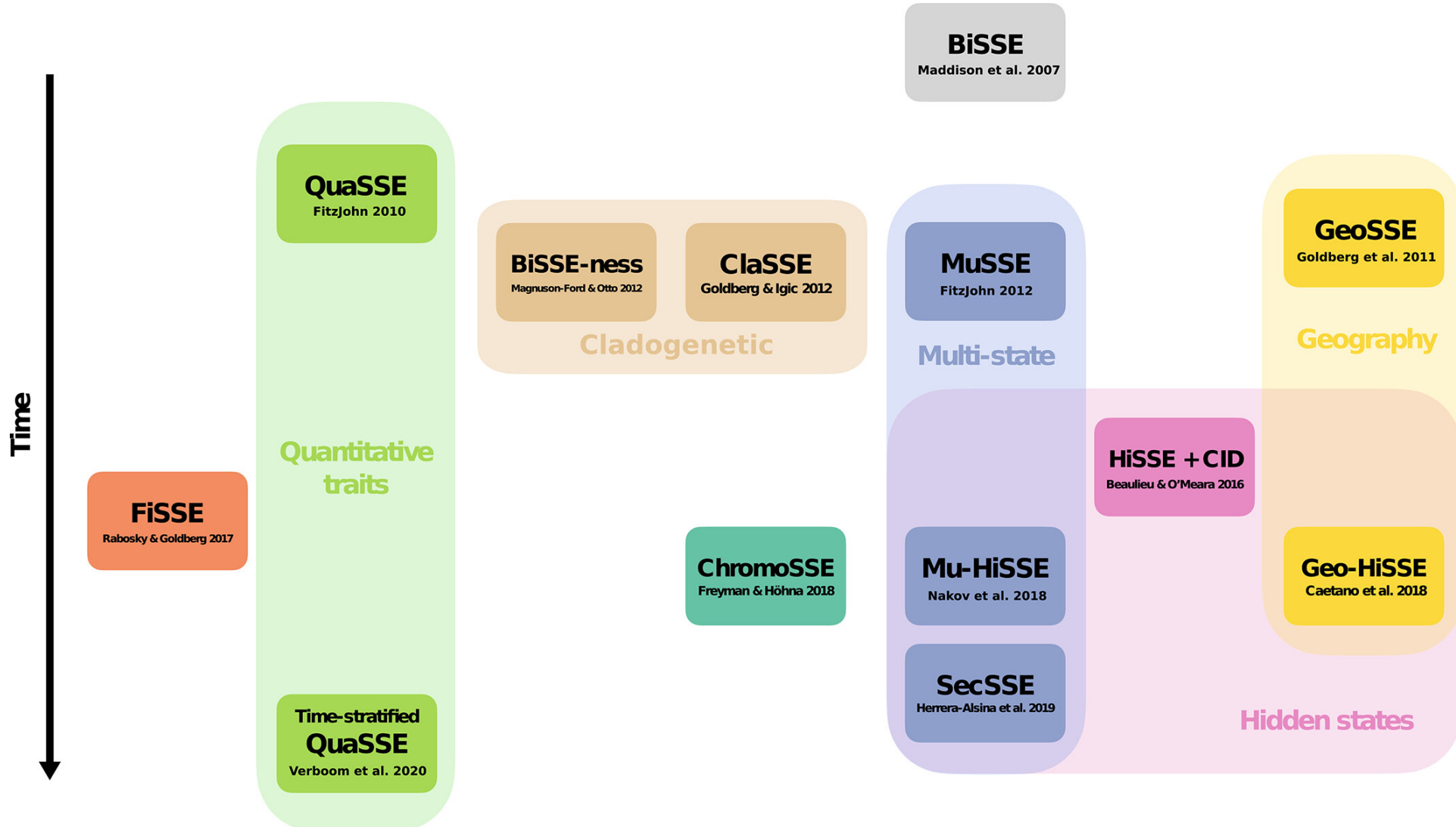
JOURNAL ARTICLE

Detecting Hidden Diversification Shifts in Models of Trait-Dependent Speciation and Extinction

Jeremy M. Beaulieu ✉, Brian C. O'Meara Author Notes

Systematic Biology, Volume 65, Issue 4, July 2016, Pages 583–601, https://doi.org/10.1093/sysbio/syw022
Published: 25 March 2016 **Article history** ▾

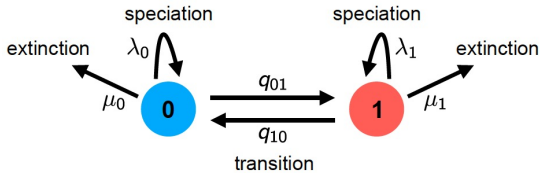
$$
Q = \begin{array}{c} \\ 0A \\ 0B \\ 0C \\ 0D \\ 1A \\ 1B \\ 1C \\ 1D \end{array}
\begin{array}{c}
\begin{array}{cccccccc} 0A & 0B & 0C & 0D & 1A & 1B & 1C & 1D \end{array} \\
\begin{bmatrix}
- & q_{0A\to0B} & q_{0A\to0C} & q_{0A\to0D} & q_{0A\to01} & 0 & 0 & 0 \\
q_{0B\to0A} & - & q_{0B\to0C} & q_{0B\to0D} & 0 & q_{0B\to1B} & 0 & 0 \\
q_{0D\to0A} & q_{0C\to0B} & - & q_{0C\to0D} & 0 & 0 & q_{0C\to1C} & 0 \\
q_{0D\to0A} & q_{0D\to0B} & q_{0D\to0C} & - & 0 & 0 & 0 & q_{0D\to1D} \\
q_{1B\to0A} & 0 & 0 & 0 & - & q_{1A\to1B} & q_{1A\to1C} & q_{0A\to1D} \\
0 & q_{1B\to0B} & 0 & 0 & q_{1B\to1A} & - & q_{1B\to1C} & q_{1B\to1D} \\
0 & 0 & q_{0C\to0C} & 0 & q_{1C\to1A} & q_{1C\to1B} & - & q_{1C\to1D} \\
0 & 0 & 0 & q_{1D\to0D} & q_{1D\to1A} & q_{1D\to1B} & q_{1D\to1C} & -
\end{bmatrix}
\end{array}
$$



Helmstetter et al., 2023 Ecology Letters

BiSSE

Maddison et al., 2007;
Systematic Biology



Potential survival of some, but not all, diversification methods

Running title (40 characters max): Diversification method survival

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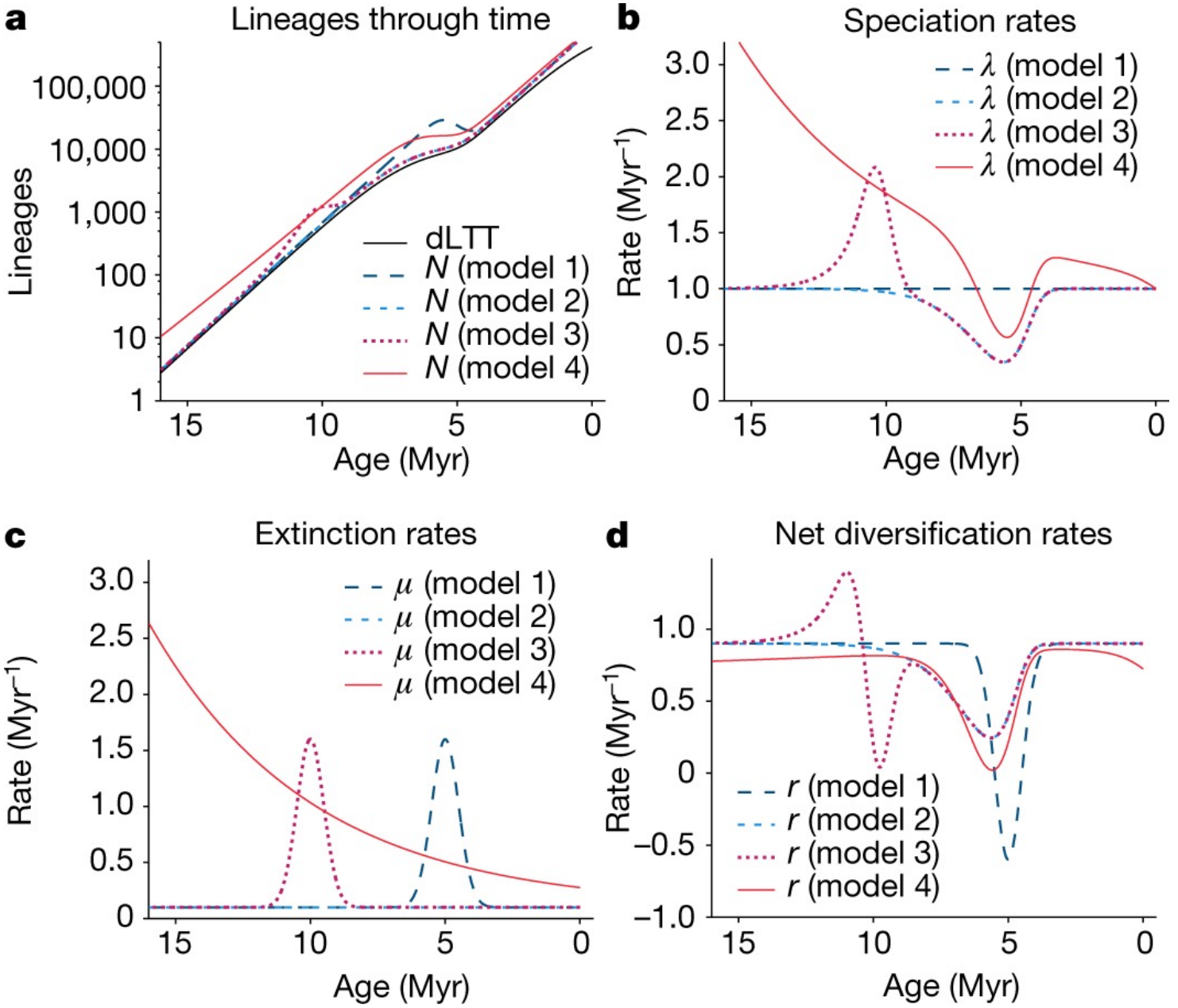


Louca y Pennell, 2020; Nature

Cladogenetic State change Speciation and Extinction (ClaSSE)

Introducción a la Biogeografía Paramétrica

Semana 2

Dra. Karen López y Dra. Marysol Trujano

JOURNAL ARTICLE

TEMPO AND MODE IN PLANT BREEDING SYSTEM EVOLUTION

Emma E. Goldberg, Boris Igić

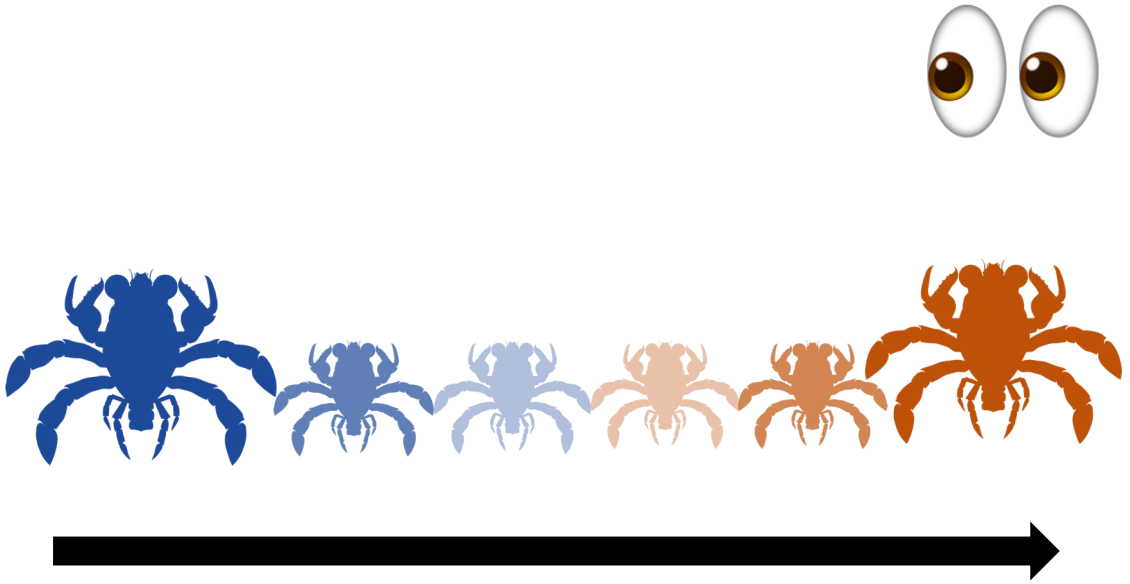
Evolution, Volume 66, Issue 12, 1 December 2012, Pages 3701–3709, https://doi.org/10.1111/j.1558-5646.2012.01730.x

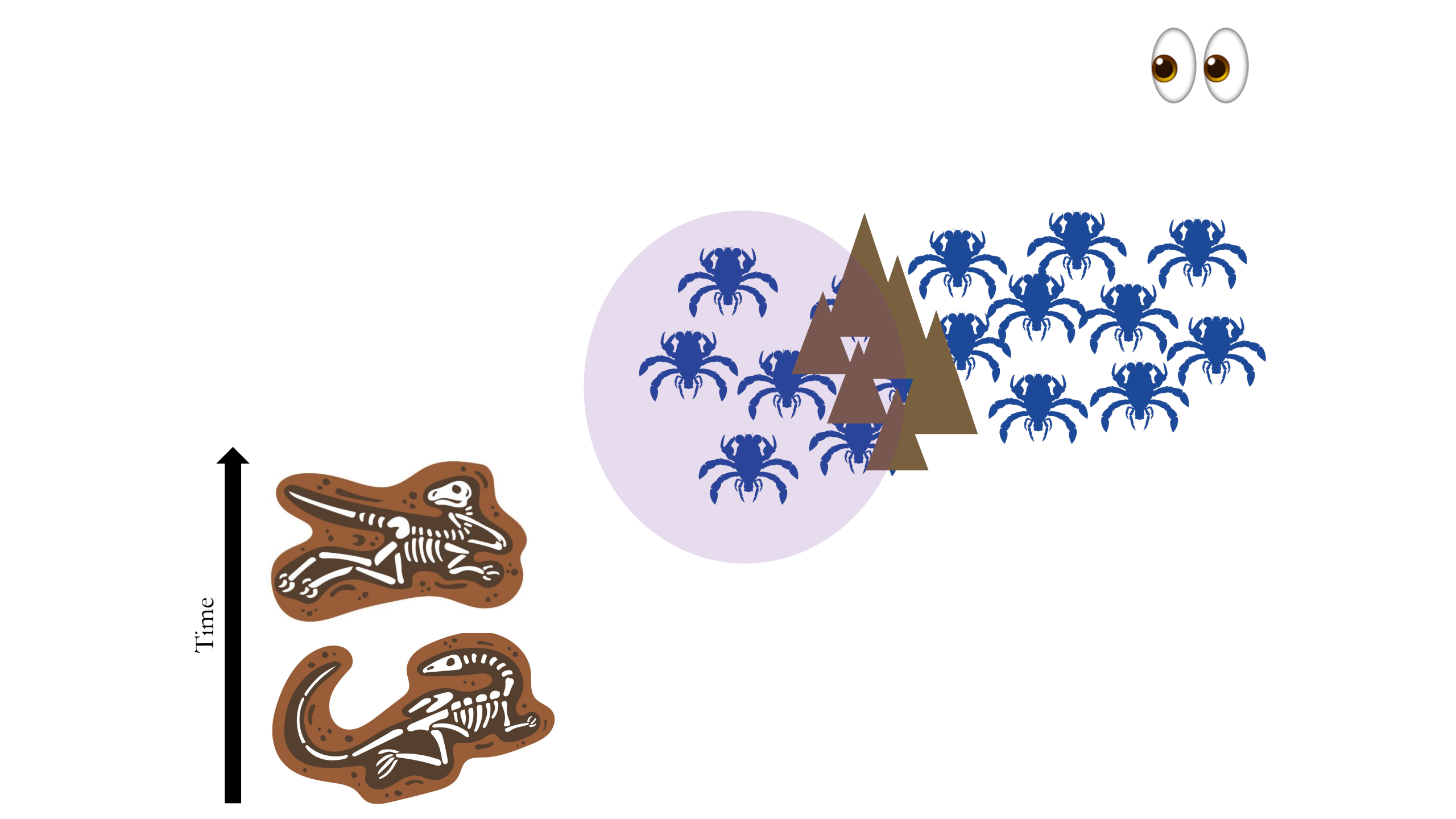
Published: 01 December 2012 **Article history** ▾

Abstract

Classic questions about trait evolution—including the directionality of character change and its interactions with lineage diversification—intersect in the study of plant breeding systems. Transitions from self-incompatibility to self-compatibility are frequent, and they may proceed within a species ("anagenetic" mode of breeding system change) or in conjunction with speciation events ("cladogenetic" mode of change). We apply a recently developed phylogenetic model to the nightshade family Solanaceae, quantifying the relative contributions of these two modes of evolution along with the

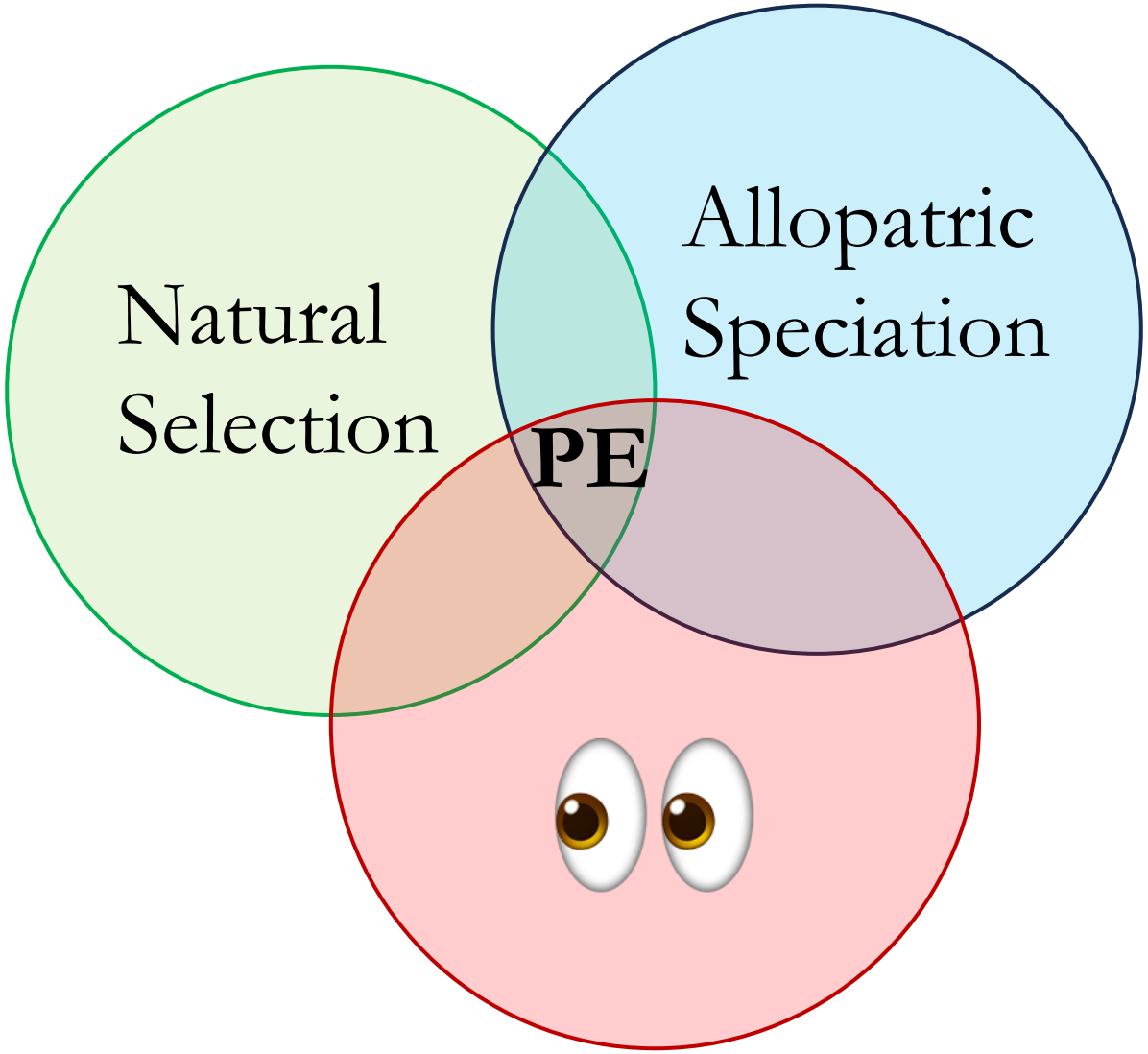

Time
MIND THE GAP


Time

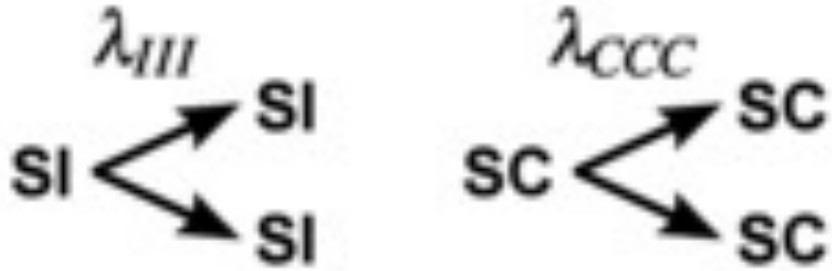

Time

Punctuated Equilibria (PE)

1970s by Eldredge and Gould



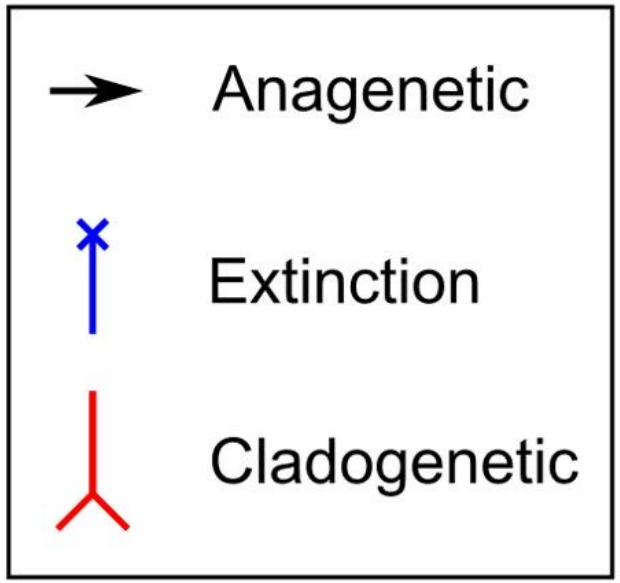
Cladogenesis, no state change
(BiSSE & ClaSSE)



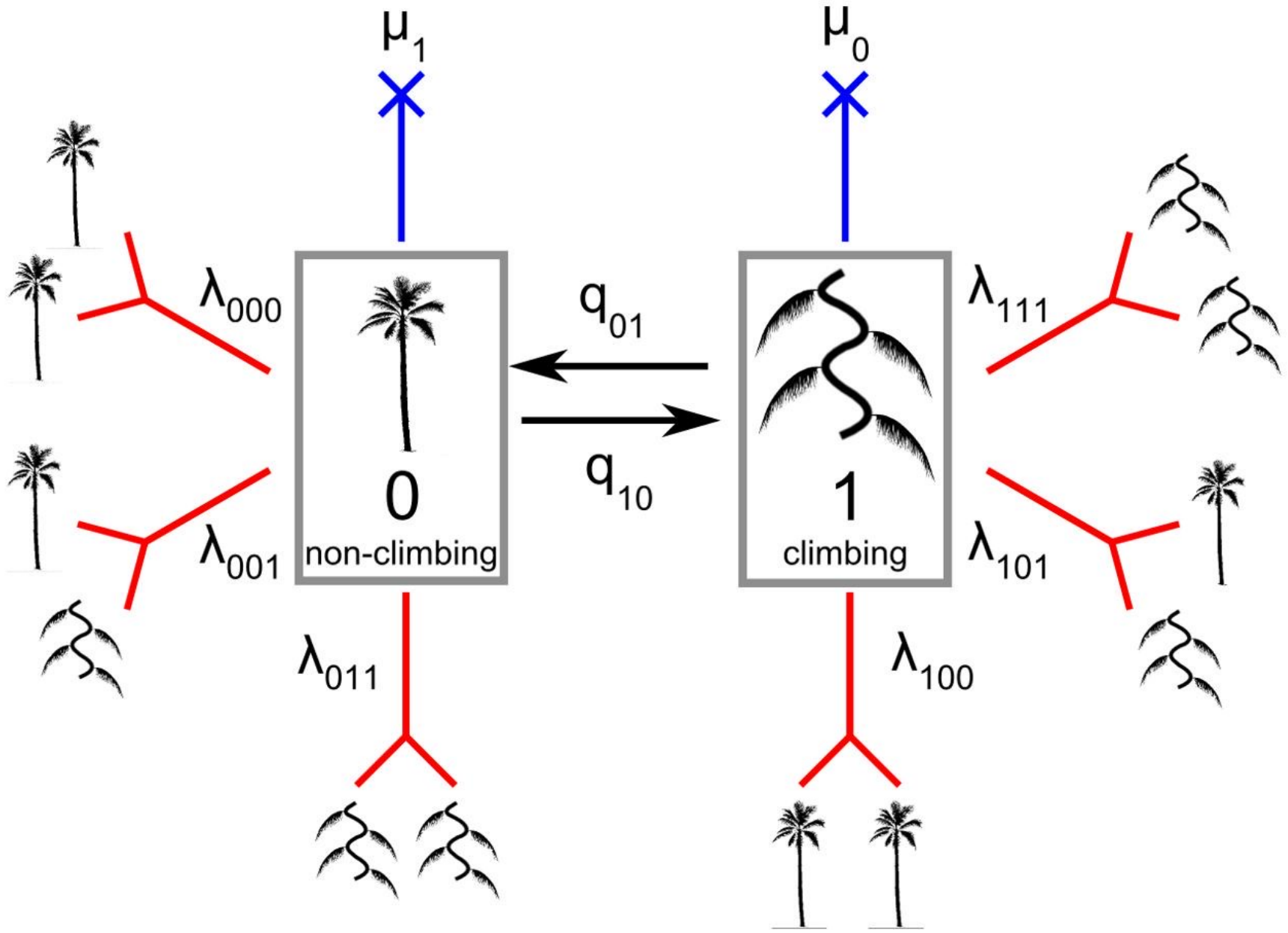
Cladogenetic state change
(ClaSSE only)

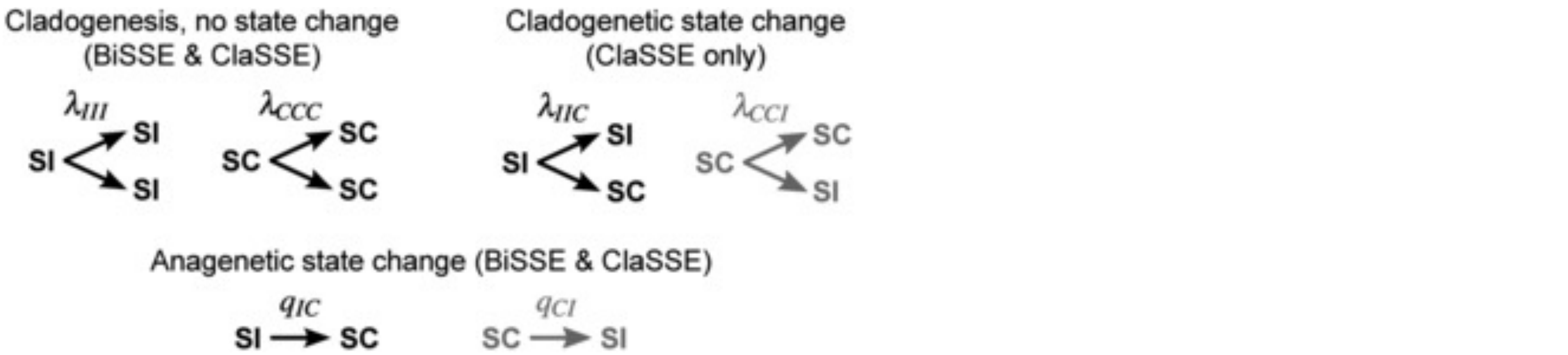
Anagenetic state change (BiSSE & ClaSSE)

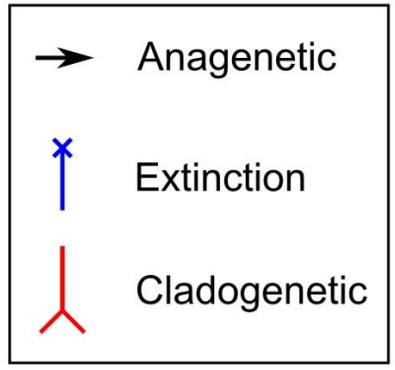
ClaSSE

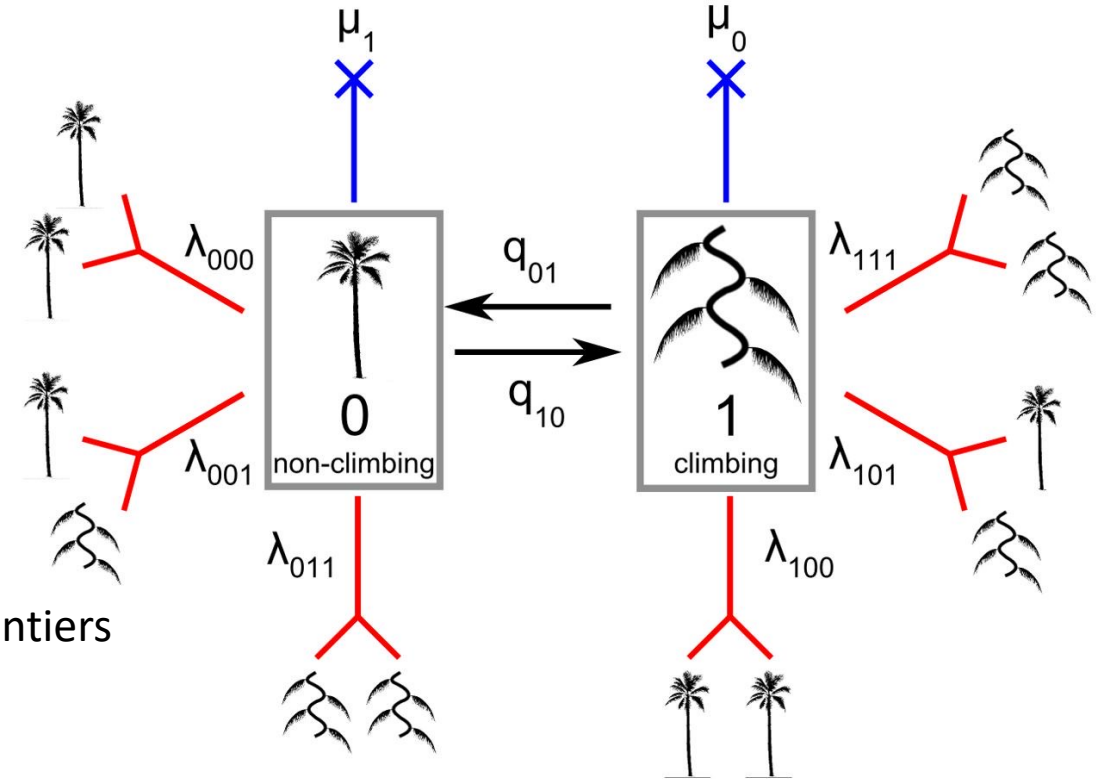


Couvreur et al., 2015; Frontiers









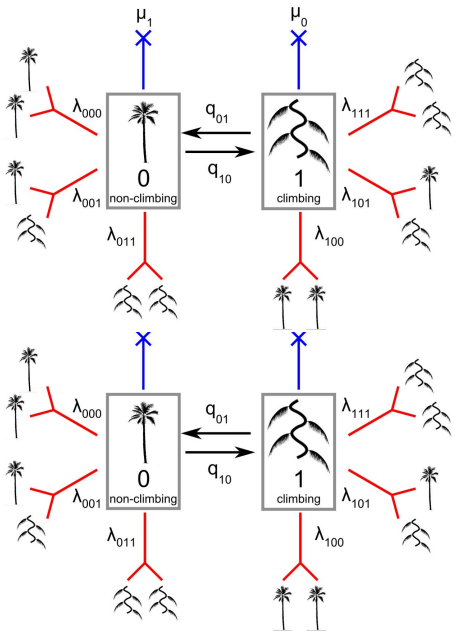
Couvreur et al., 2015; Frontiers

0 = 00 = the null state with no range

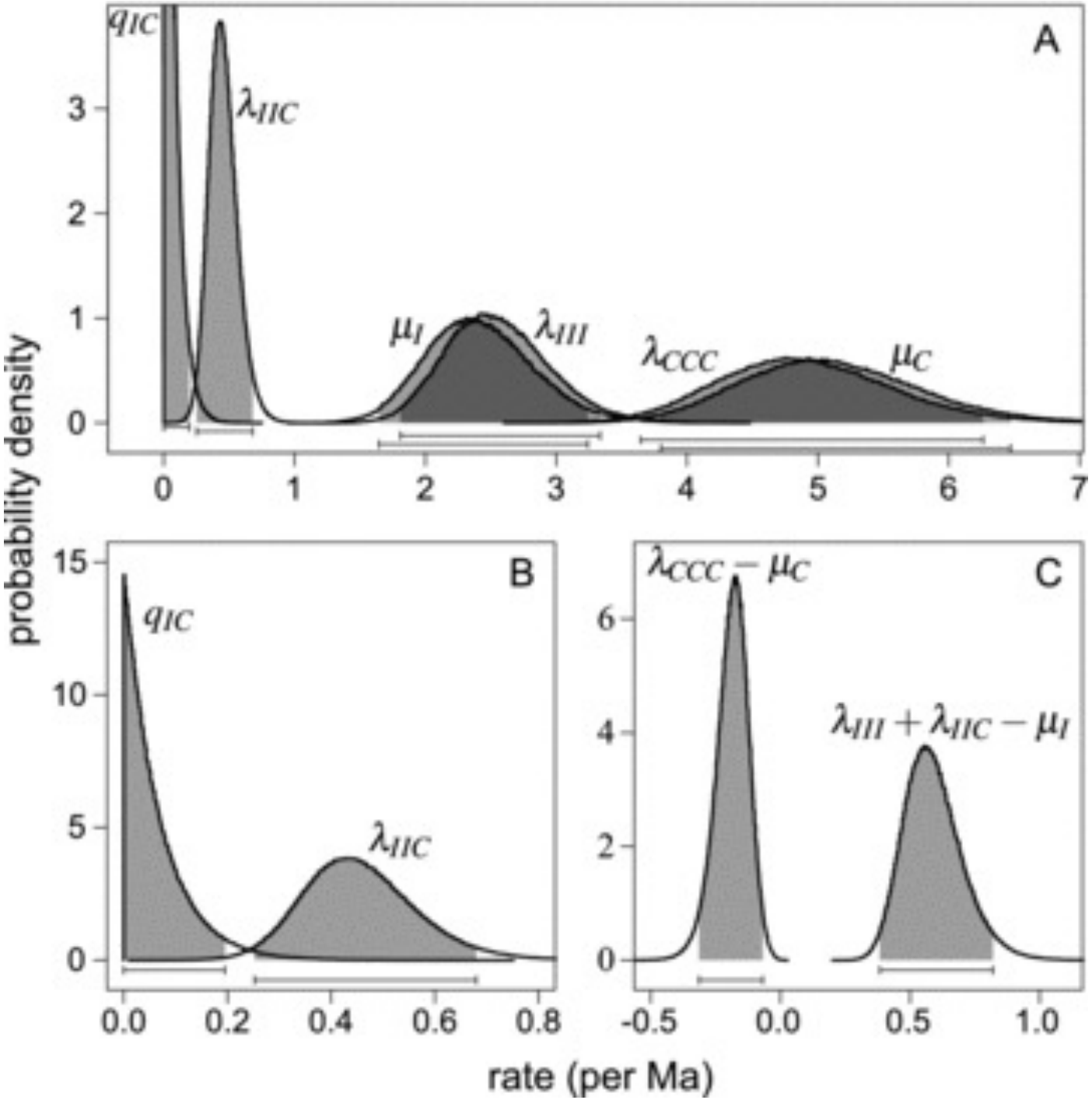
1 = 01 = Area A only

2 = 10 = Area B only

3 = 11 = both areas AB



state,range
0,0000
1,1000
2,0100
3,0010
4,0001
5,1100
6,1010
7,0110
8,1001
9,0101
10,0011
11,1110
12,1101
13,1011
14,0111
15,1111


A
q_{IC}
λ_{IIC}
μ_I
λ_{III}
λ_{CCC}
μ_C
probability density
B
q_{IC}
λ_{IIC}
C
$\lambda_{CCC} - \mu_C$
$\lambda_{III} + \lambda_{IIC} - \mu_I$
rate (per Ma)