

Evolutionary history of eastern subterranean termites: *Distributional shifts and postglacial expansion in the Appalachian Mountains*

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and

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Department of Biology

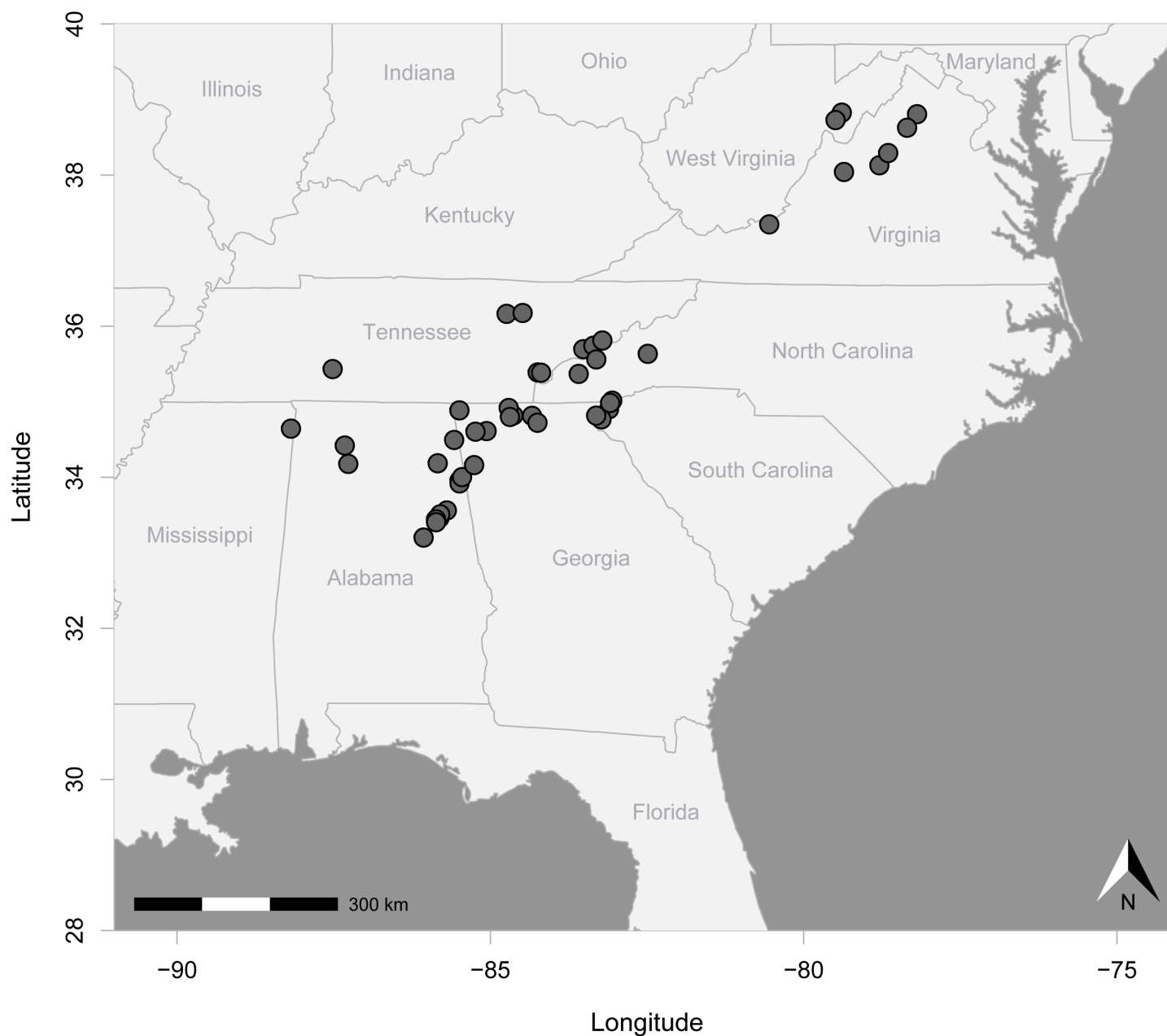
University of Mississippi



THE UNIVERSITY of
MISSISSIPPI



Sampling



46 sites:

50 logs:

128 individuals

Genetic Data Collection



DNA sequencing:

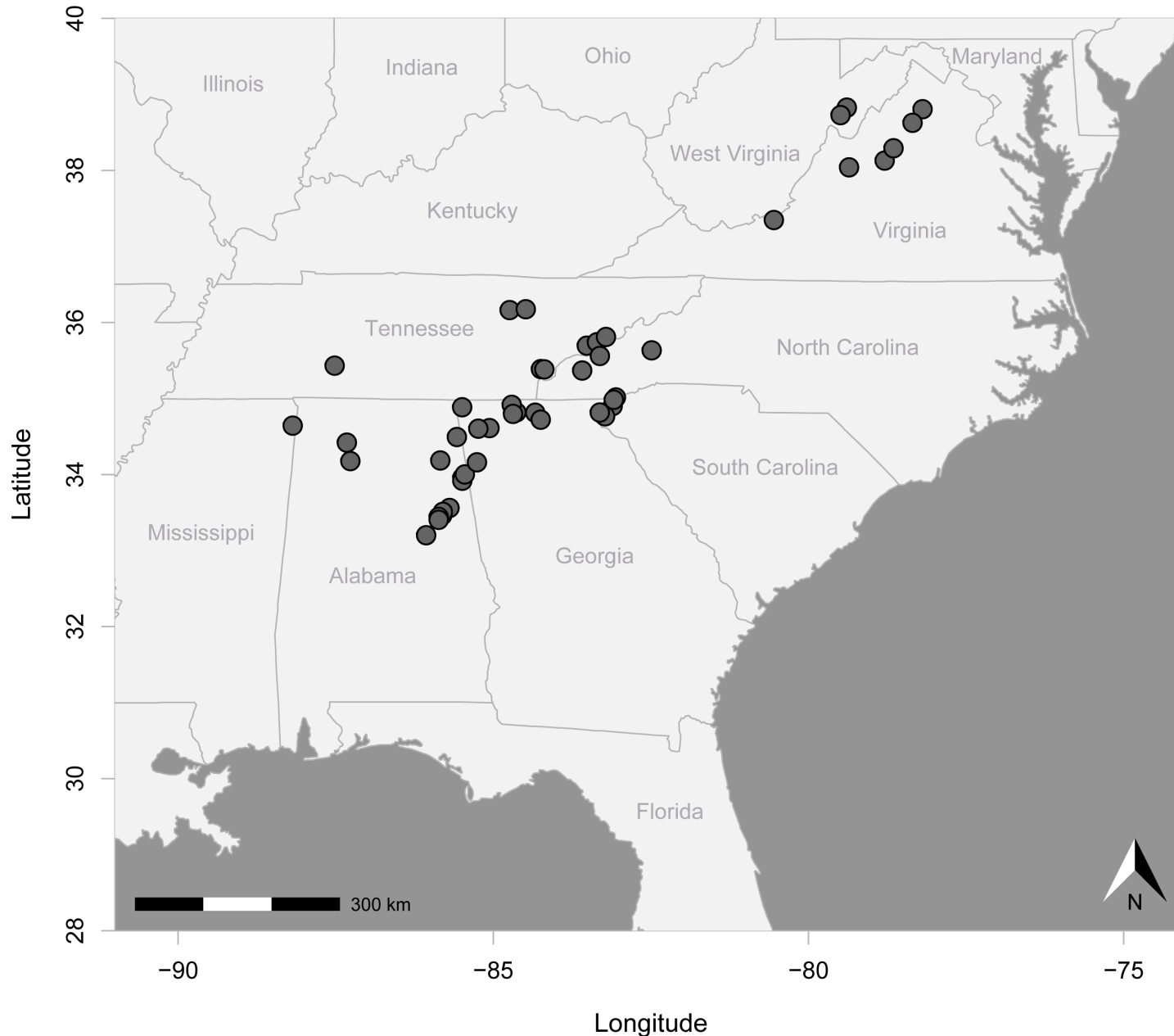
2 markers:

1 nuclear:

endo-beta-1,4-glucanase
(seq. length: 251 bp)

1 mitochondrial:

cytochrome c oxidase I and II
(seq. length: 1,117 bp)





Evolutionary History of *Reticulitermes flavipes*

Divergence of genetic lineages → dealing with environmental change

Population size dynamics → is population size increasing?

Geographic distribution → is geographic distribution shifting/expanding?

Evolutionary History of *flavipes*: Questions

-  How many lineages of *flavipes*?
-  When did these lineages arise and how did they change through time?
-  Did distributional change affect genetic divergence of *flavipes*?

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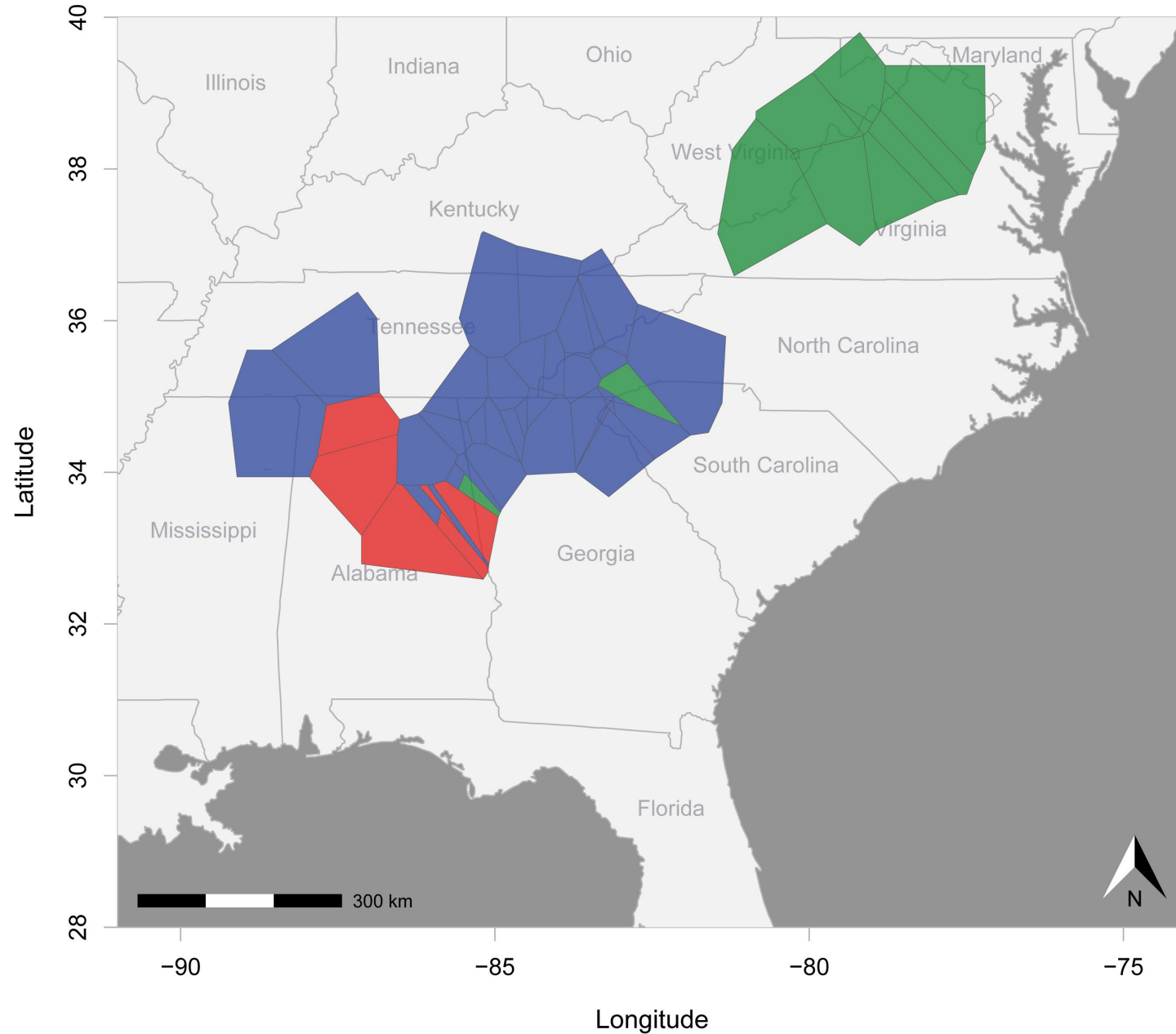
How many lineages?

Three Lineages:

N = Northern

C = Central

S = Southern



When did *flavipes* lineages arise and how did they change through time?

Approximate Bayesian Computation

Competing evolutionary history hypotheses characterized using:

Divergence time

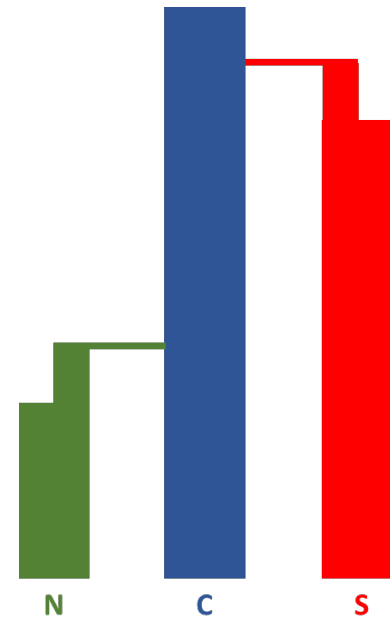
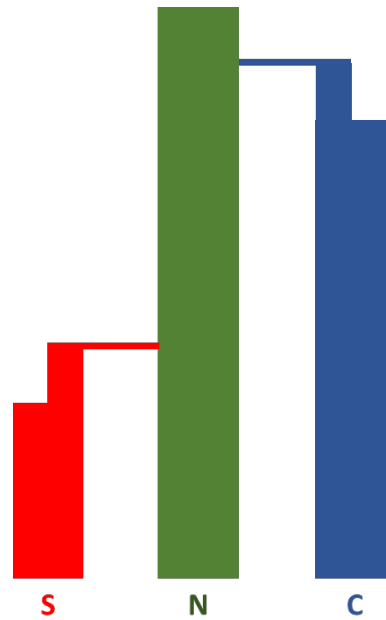
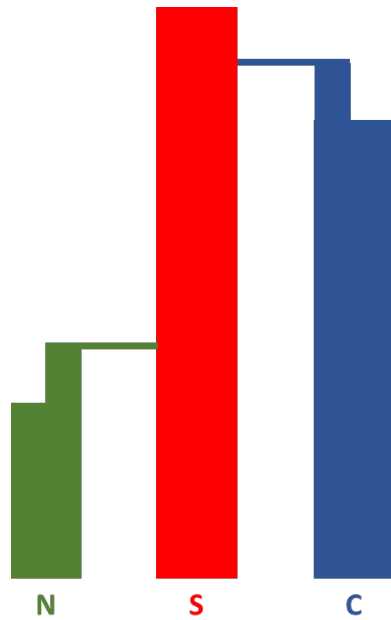
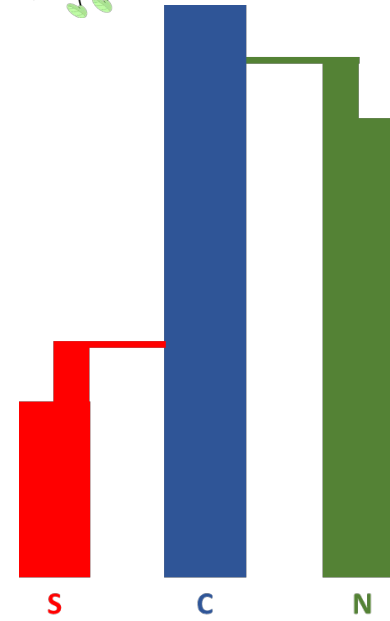
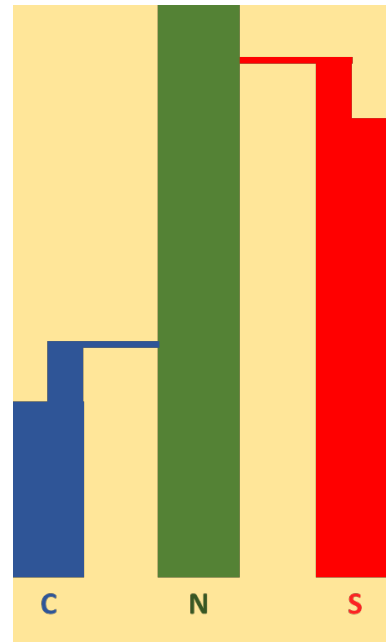
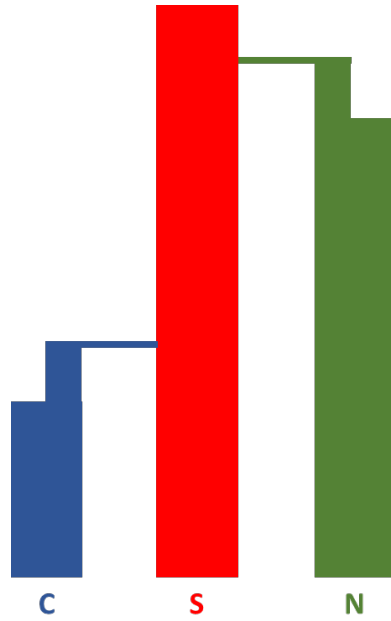
Population

Best-fit hypothesis: closest match between simulated and empirical data:

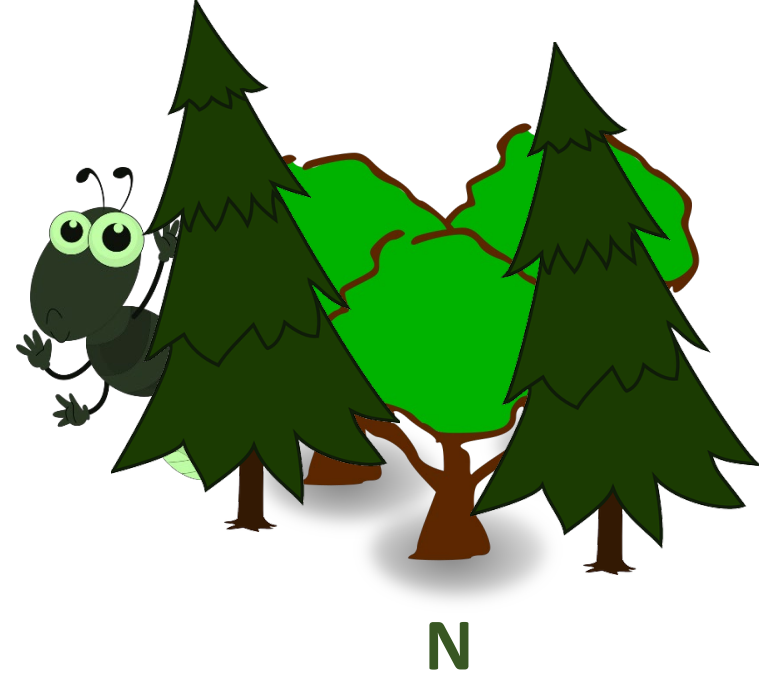
1 million simulated datasets for each hypothesis

Compare simulated data with empirical data

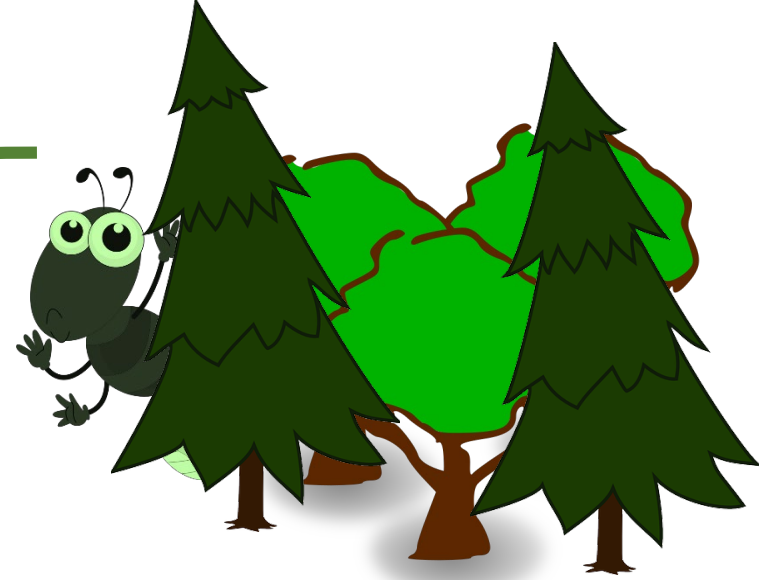
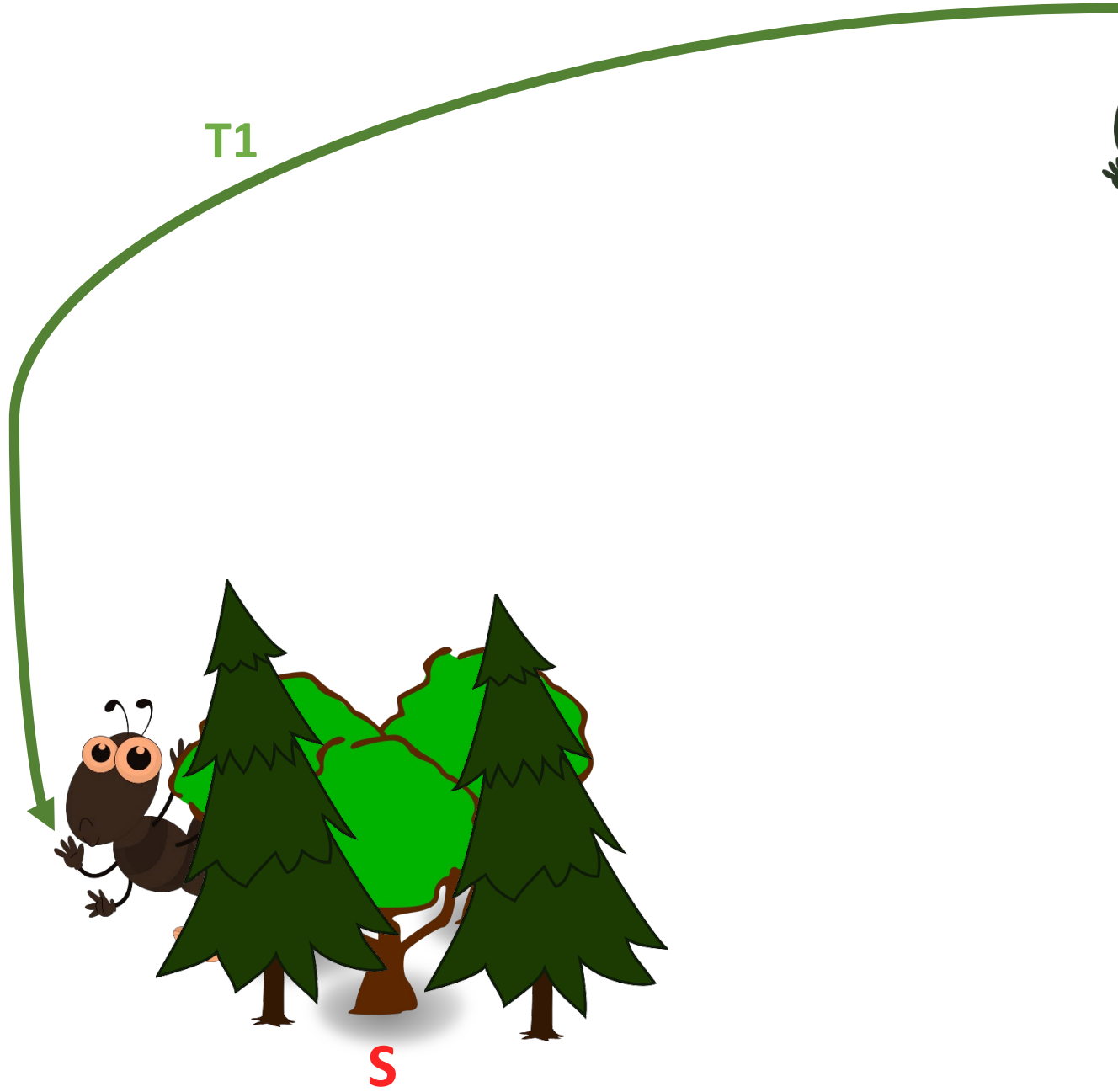
Evolutionary History Hypotheses: Single Source



Single Source: N



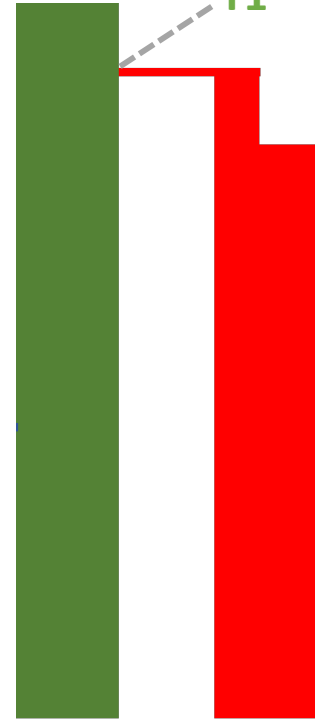
Single Source: $N \rightarrow S$



N

$T1$

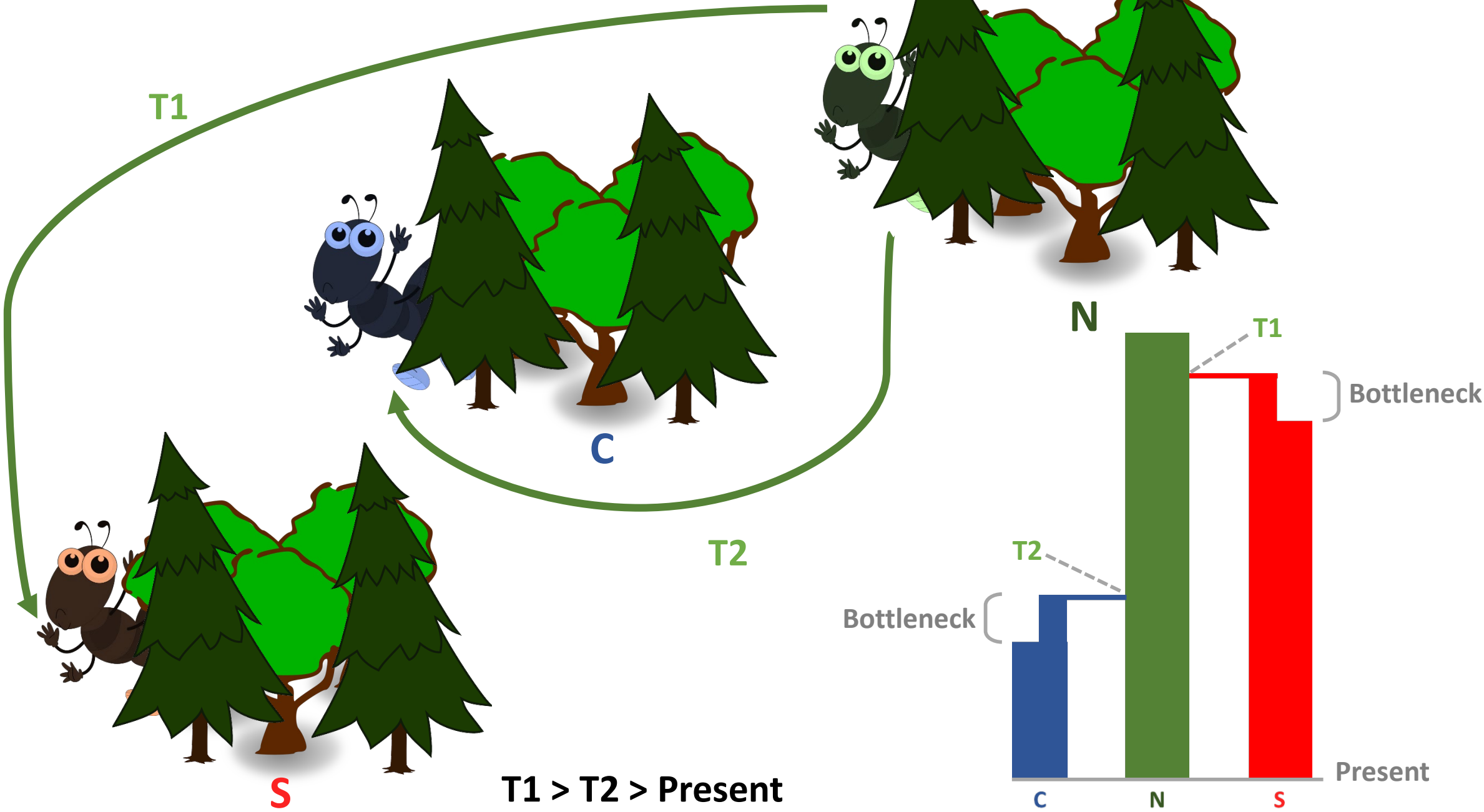
Bottleneck



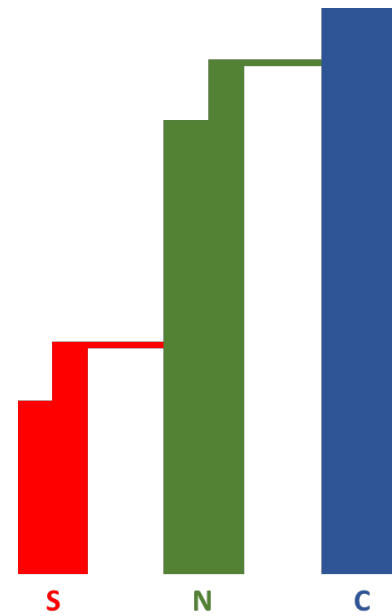
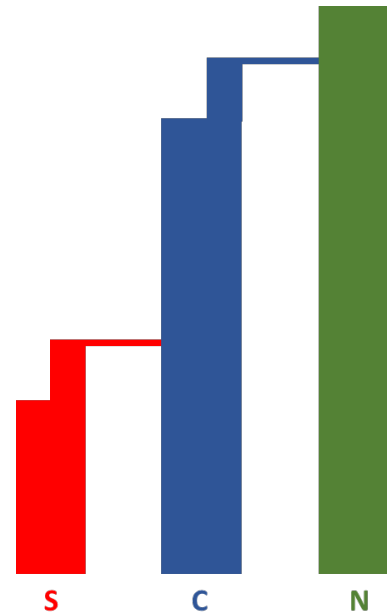
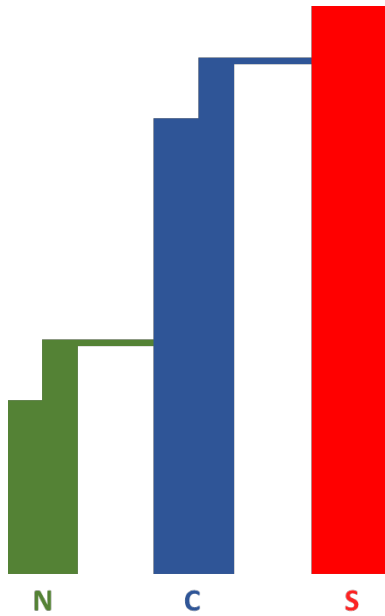
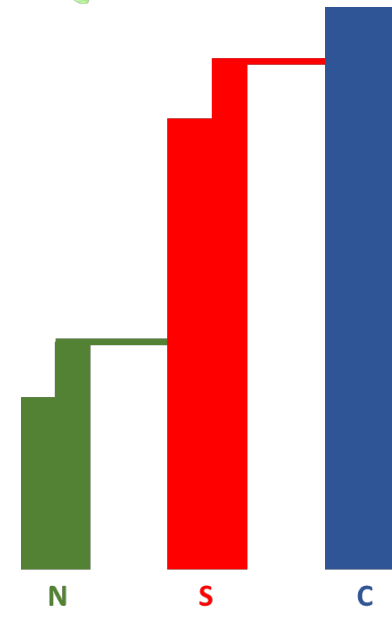
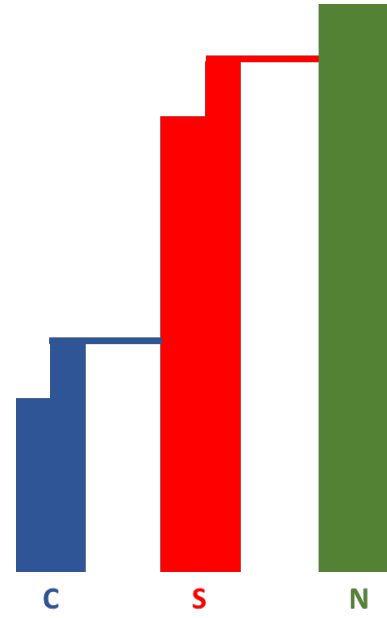
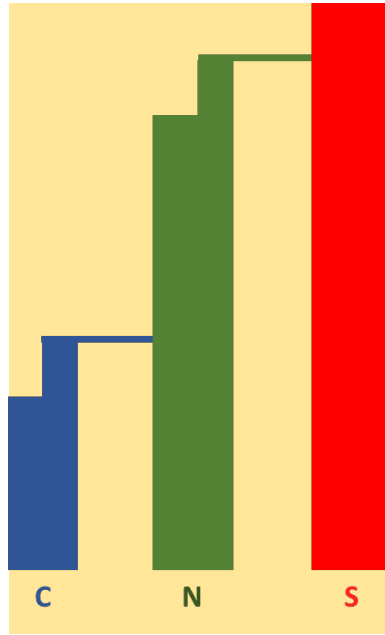
N

S

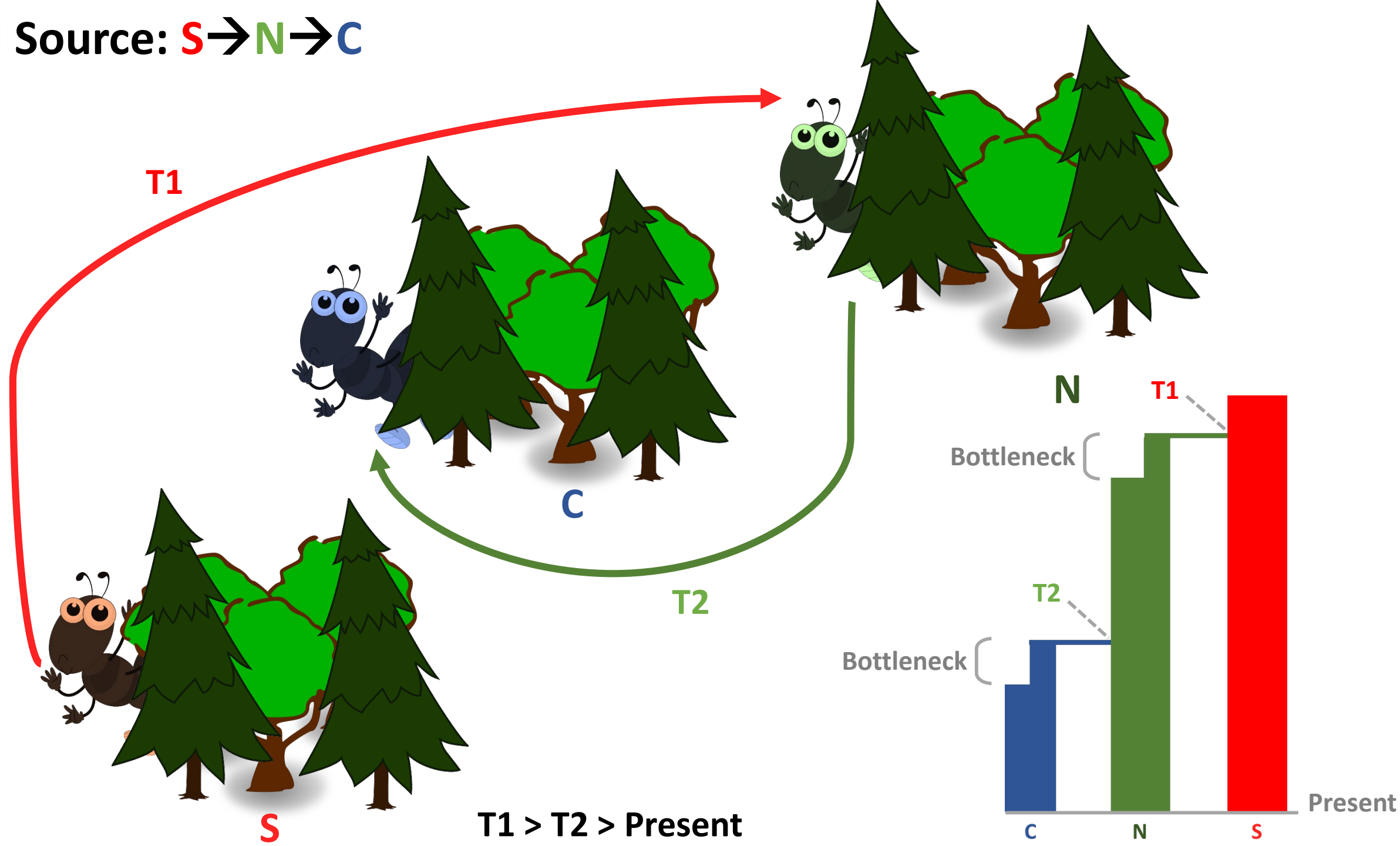
Single Source: $N \rightarrow S$; $N \rightarrow C$



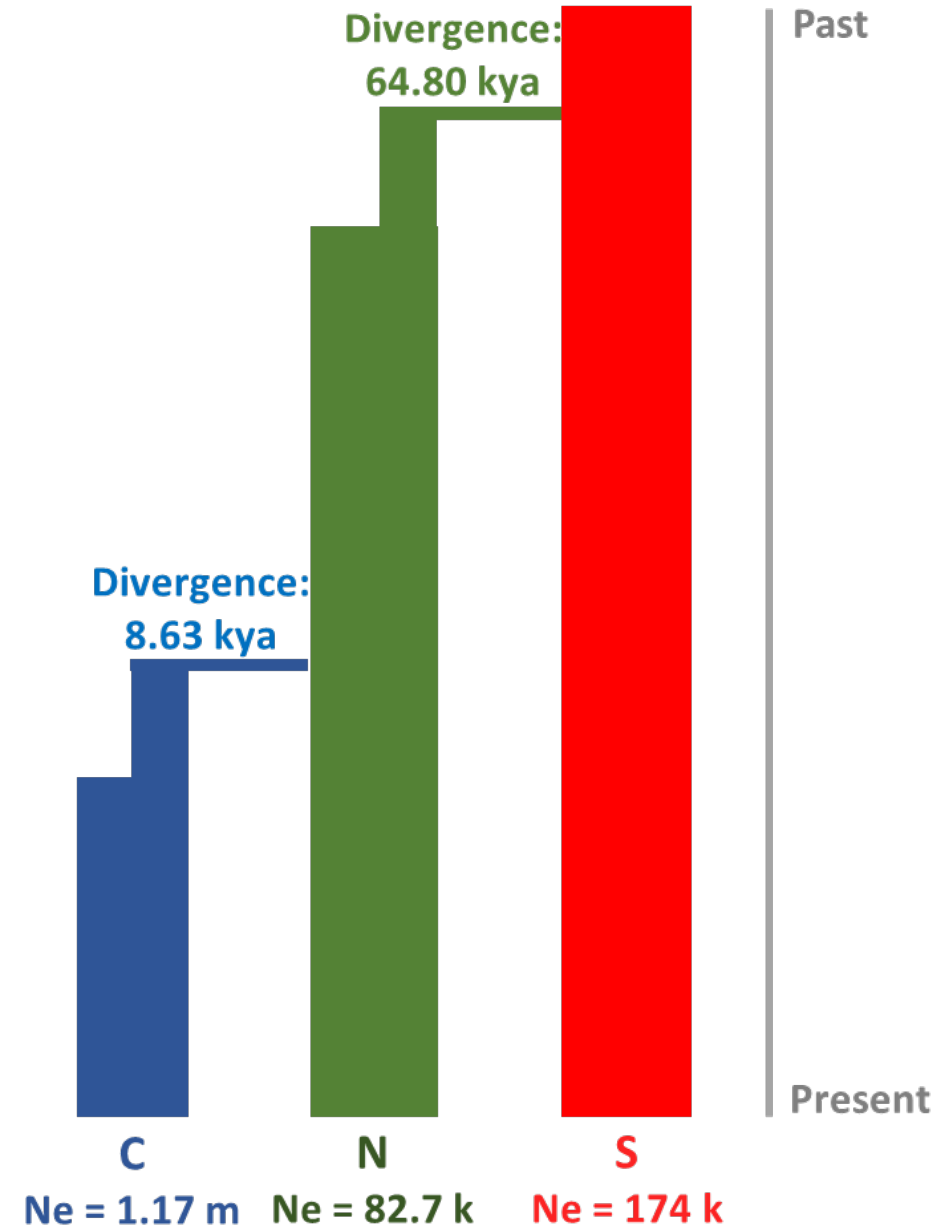
Evolutionary History Hypotheses: Dual Source



Dual Source: $S \rightarrow N \rightarrow C$

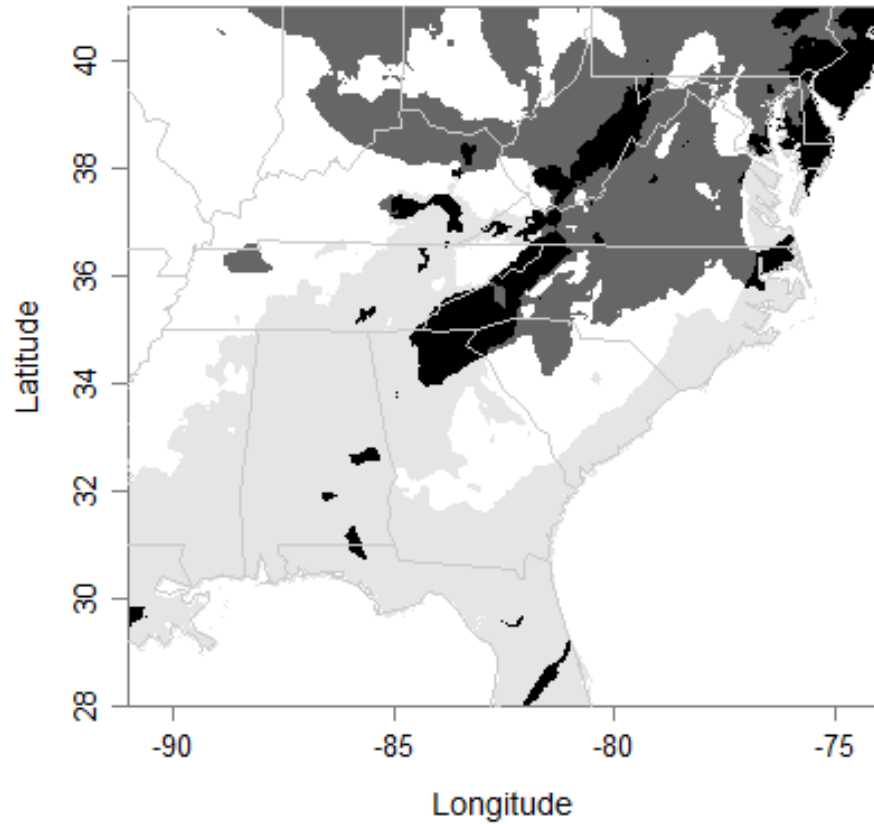


Best-Fit Hypothesis

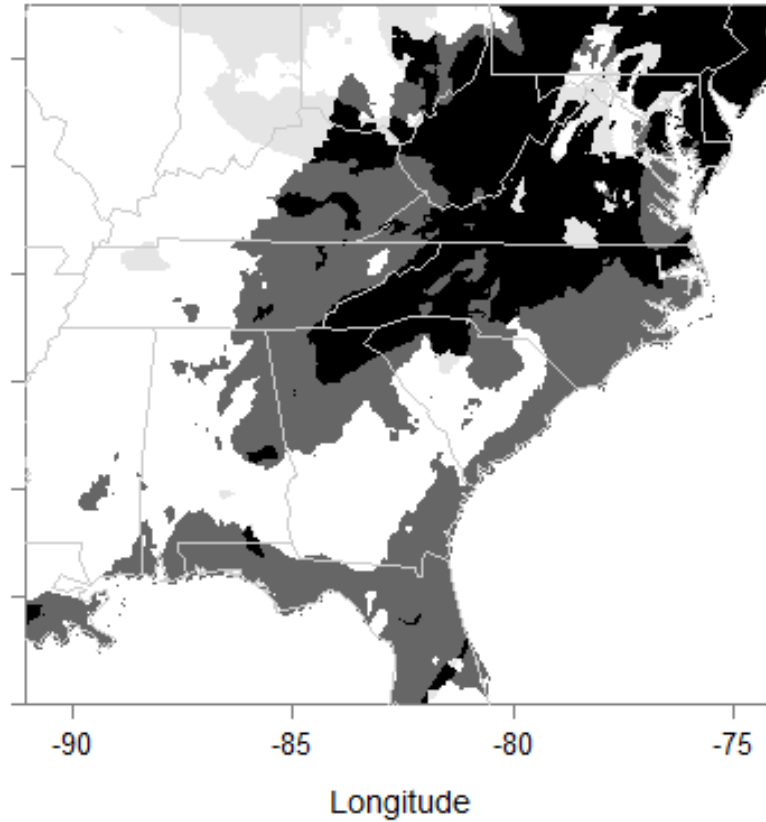


Did distributional change affect genetic divergence of *flavipes*?

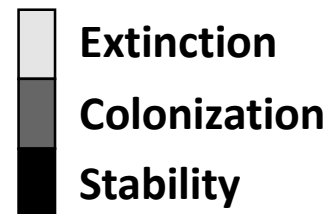
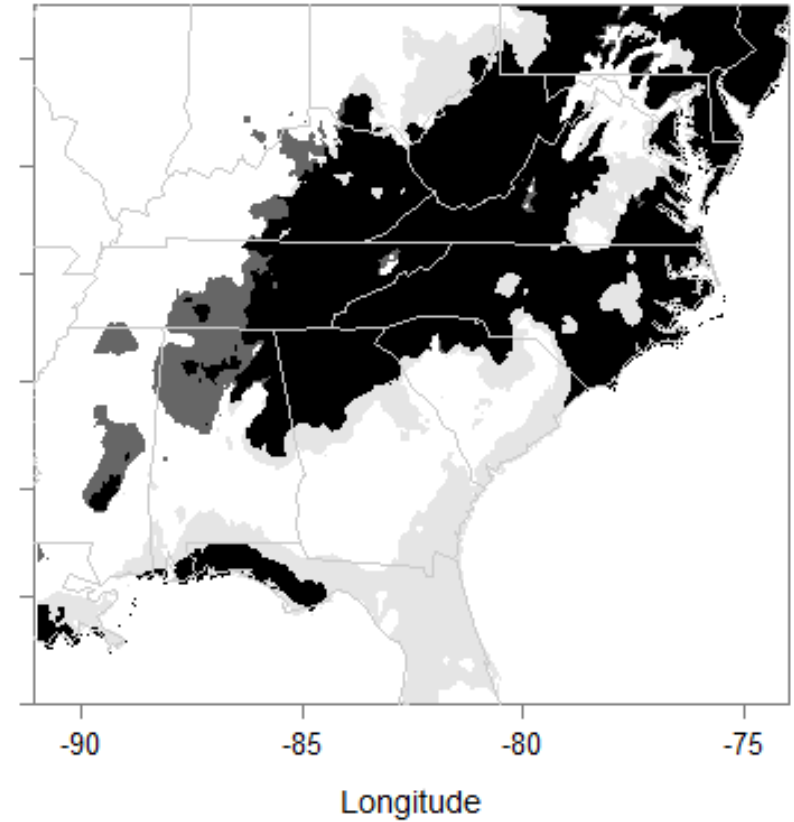
120,000 to 22,000



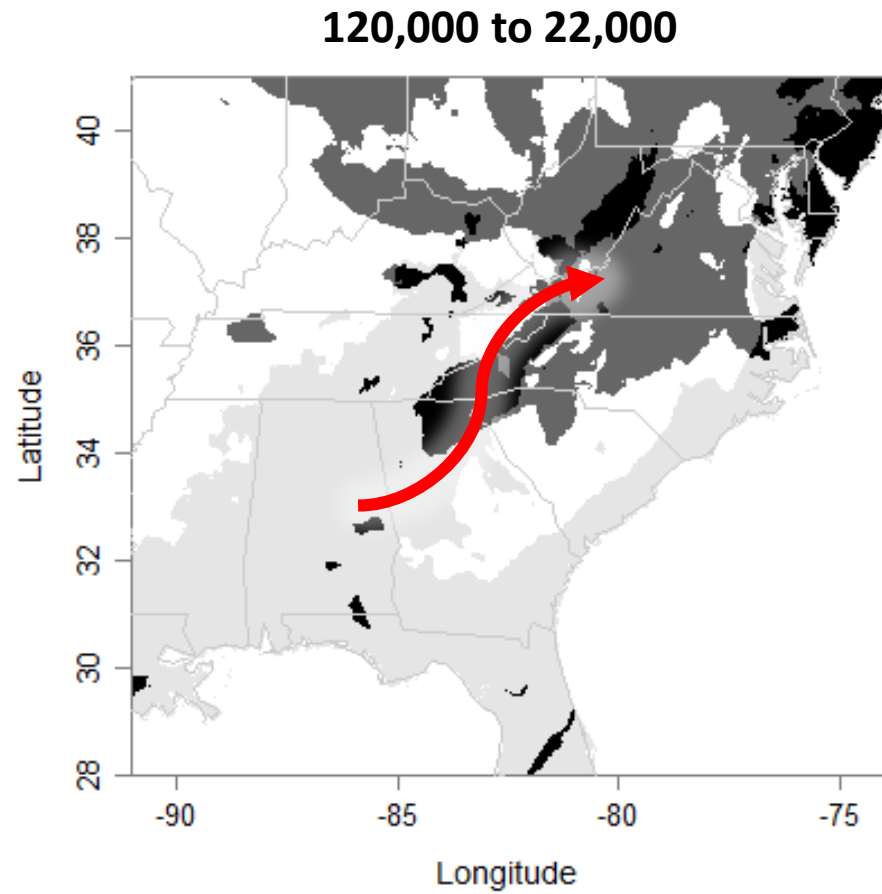
22,000 to 6,000



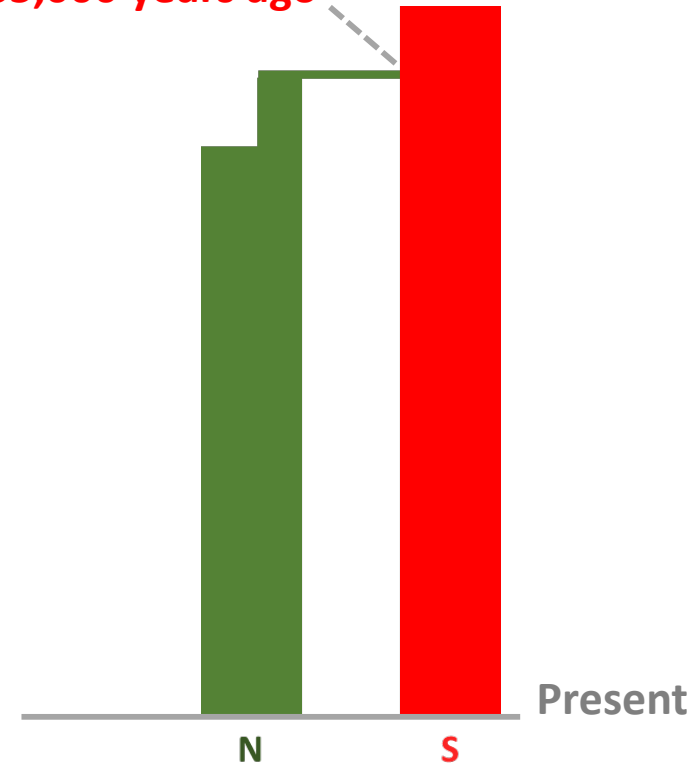
6,000 to present



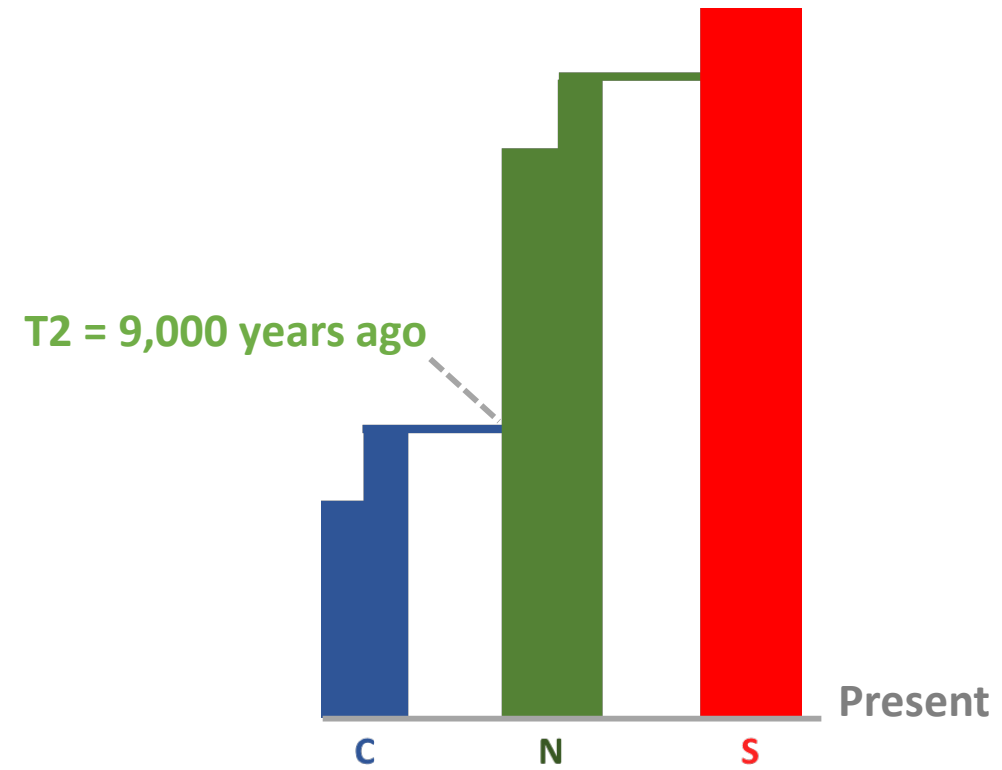
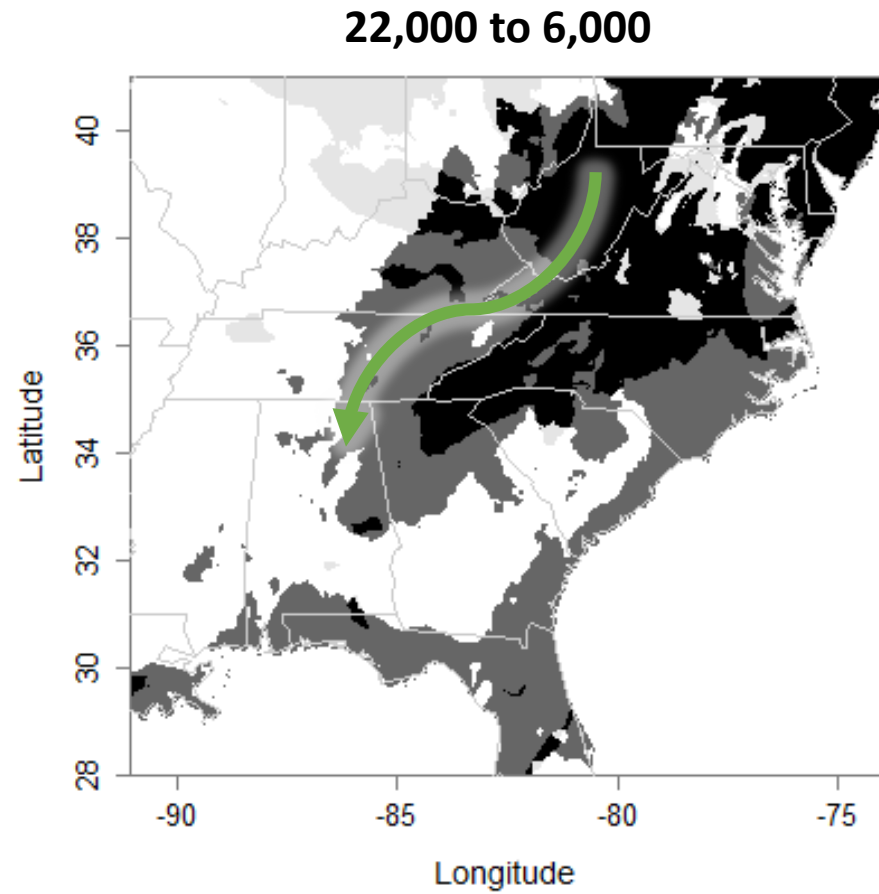
Distributional Shift: **South-to-North**



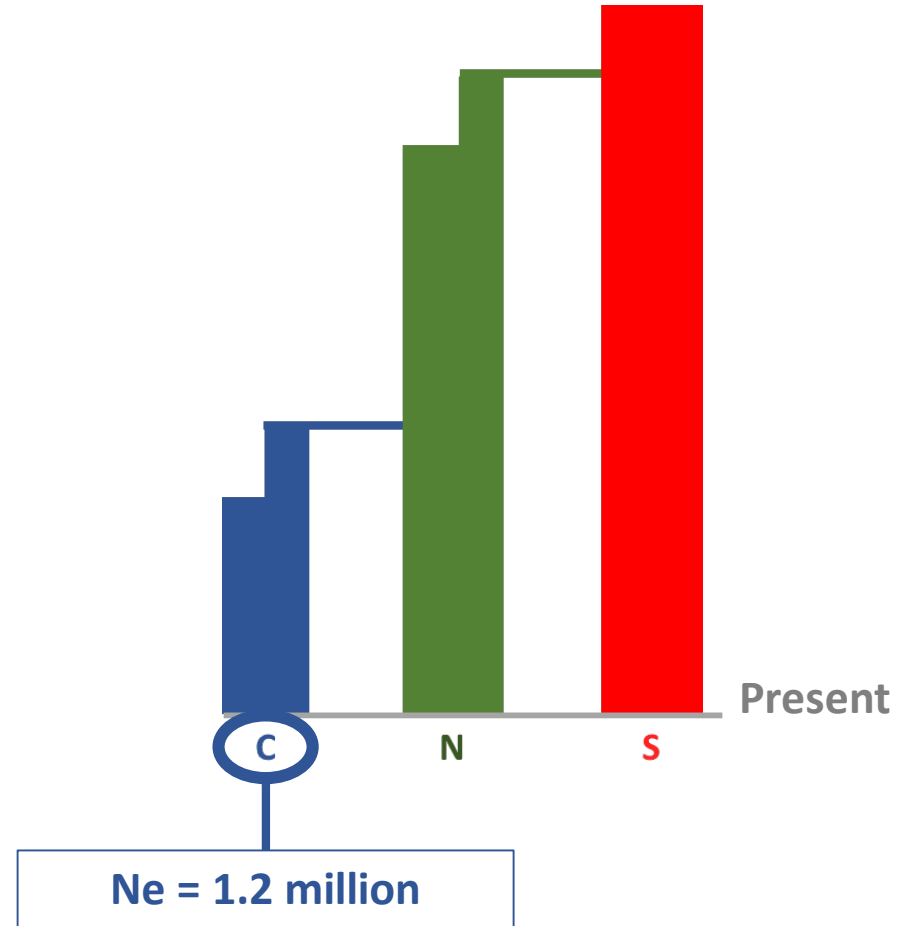
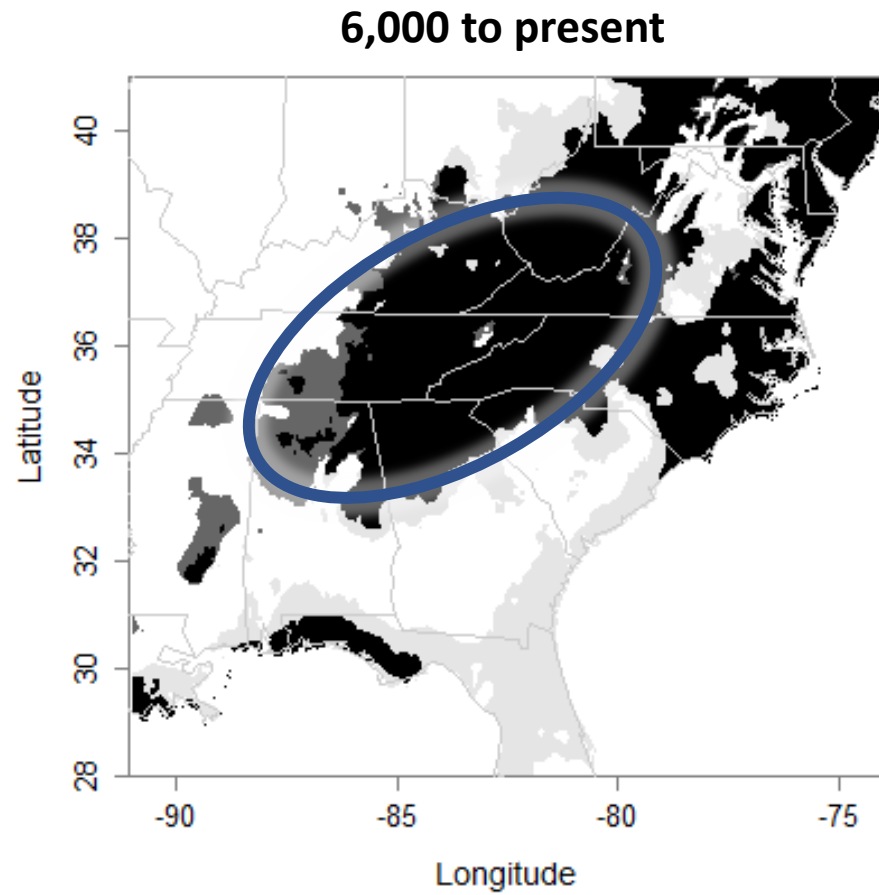
T1 = 65,000 years ago



Distributional Shift: North-to-Center



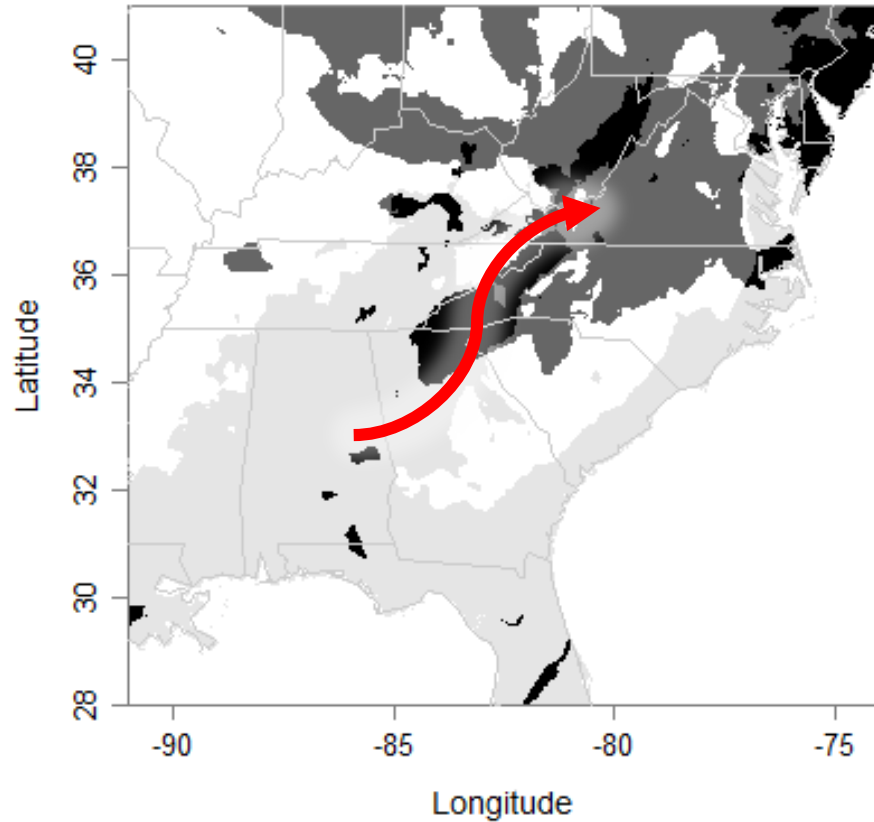
Central Expansion



Correspondence between distributional change and genetic divergence

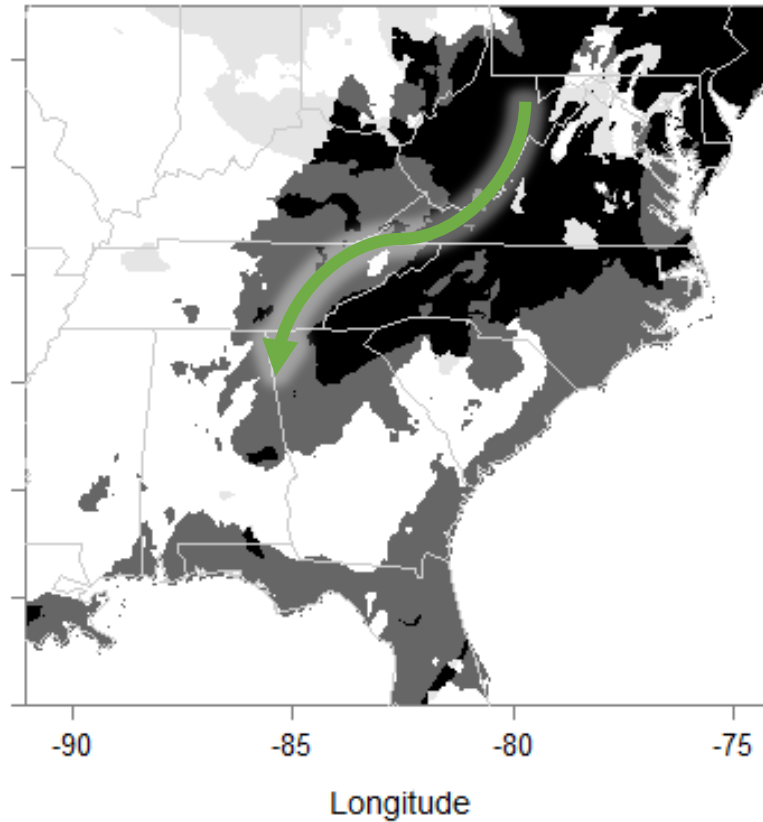
South-to-North

120,000 to 22,000



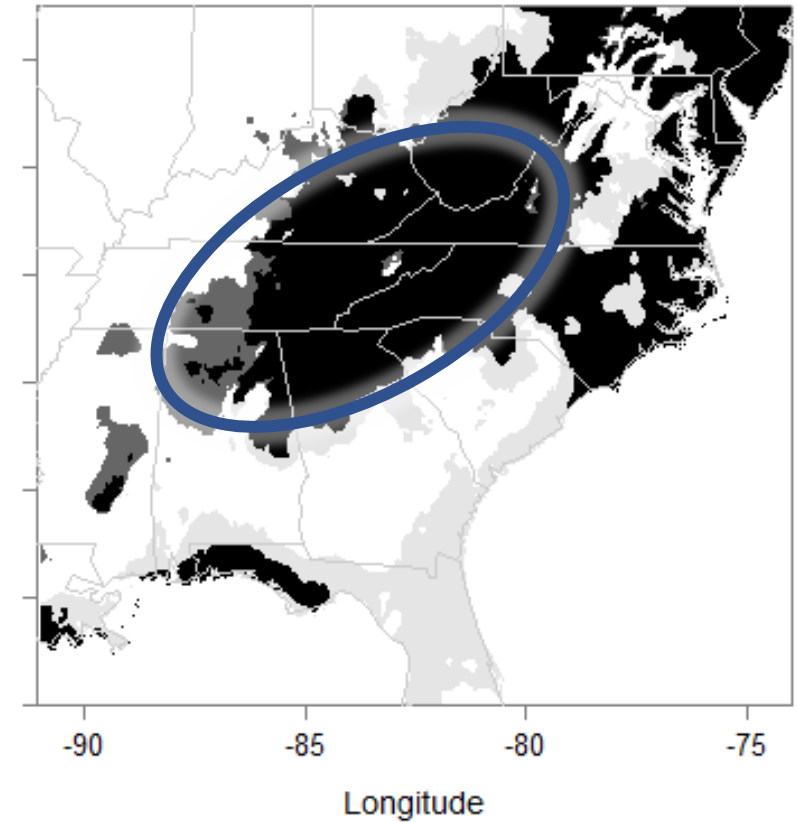
North-to-Center

22,000 to 6,000



Central Expansion

6,000 to present



Acknowledgements

- Committee
 - Dr. Brice Noonan
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 - Dana Reppel
 - Reese Worthington
- Family/Field Assistants
 - Estelle Blair
 - Lucy Blair
 - Baxter



D3596:

Phylogeography of eastern subterranean termites:

Distributional shifts and postglacial expansion in the Appalachian Mountains

Wednesday, November 8, 2017

08:00 AM - 02:00 PM

Mile High Ballroom

