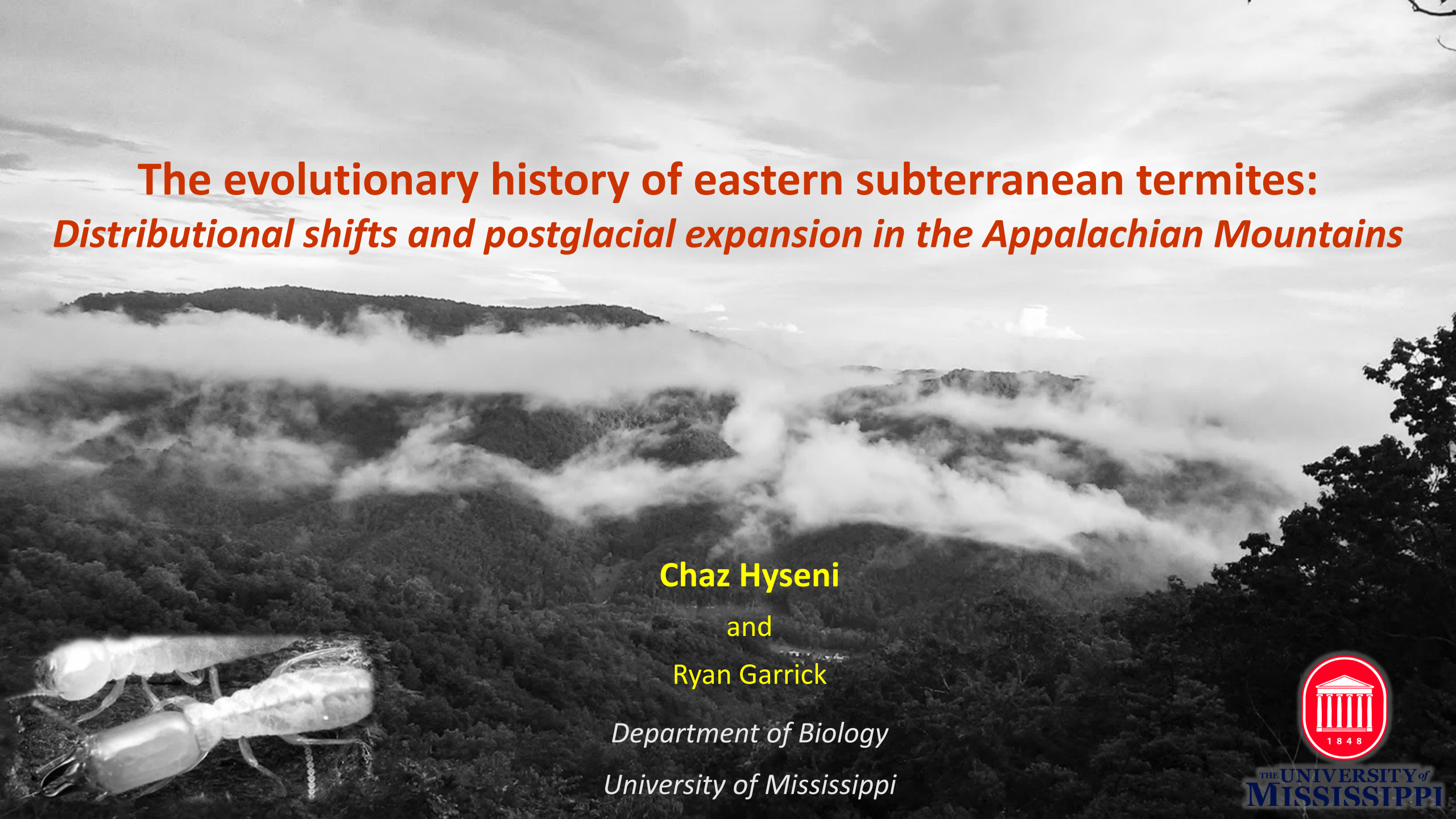
The evolutionary history of eastern subterranean termites:

Distributional shifts and postglacial expansion in the Appalachian Mountains



Chaz Hyseni

and

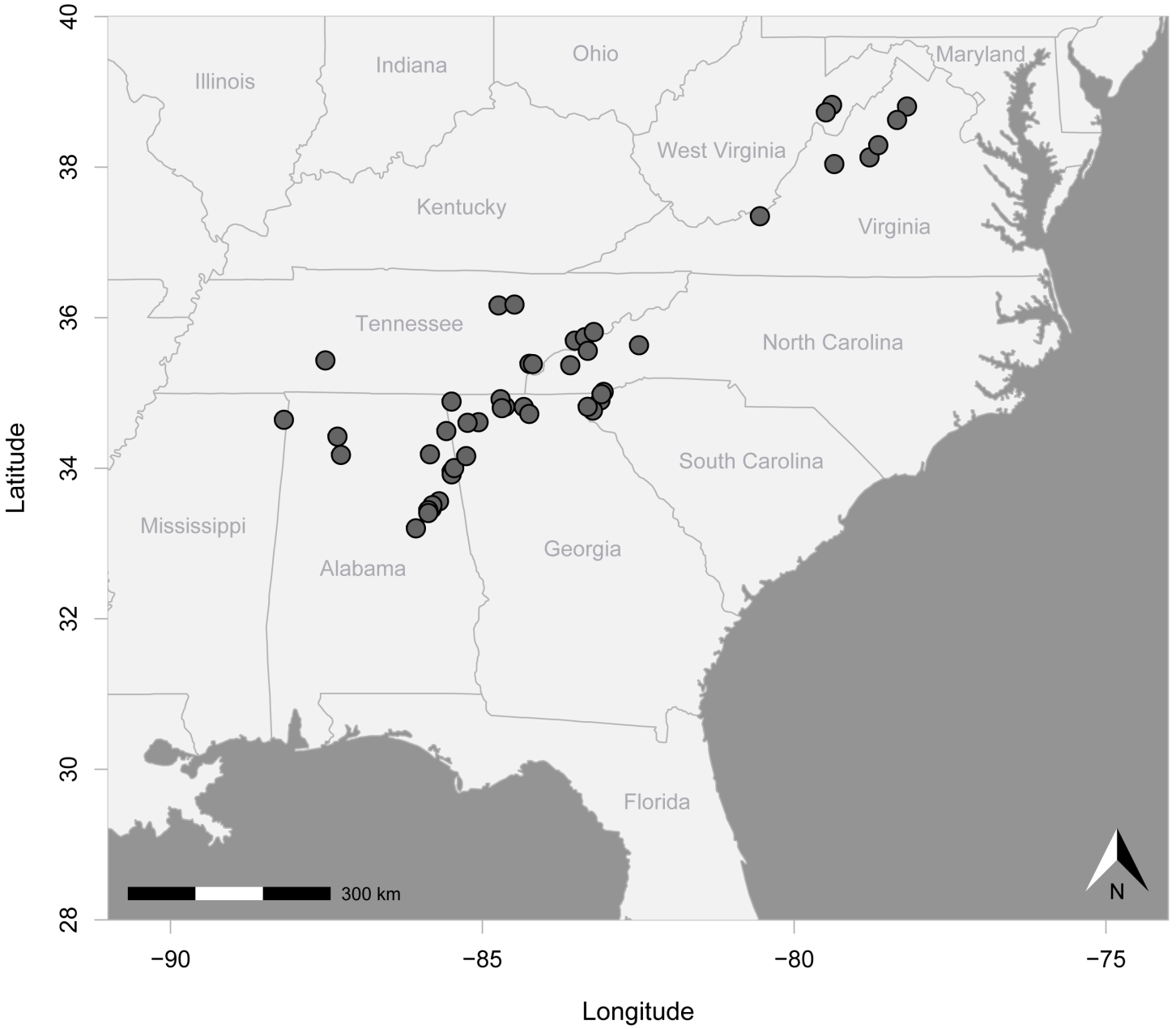
Ryan Garrick

Department of Biology

University of Mississippi


Cordilleran
Ice Sheet
Laurentide Ice Sheet

Sampling

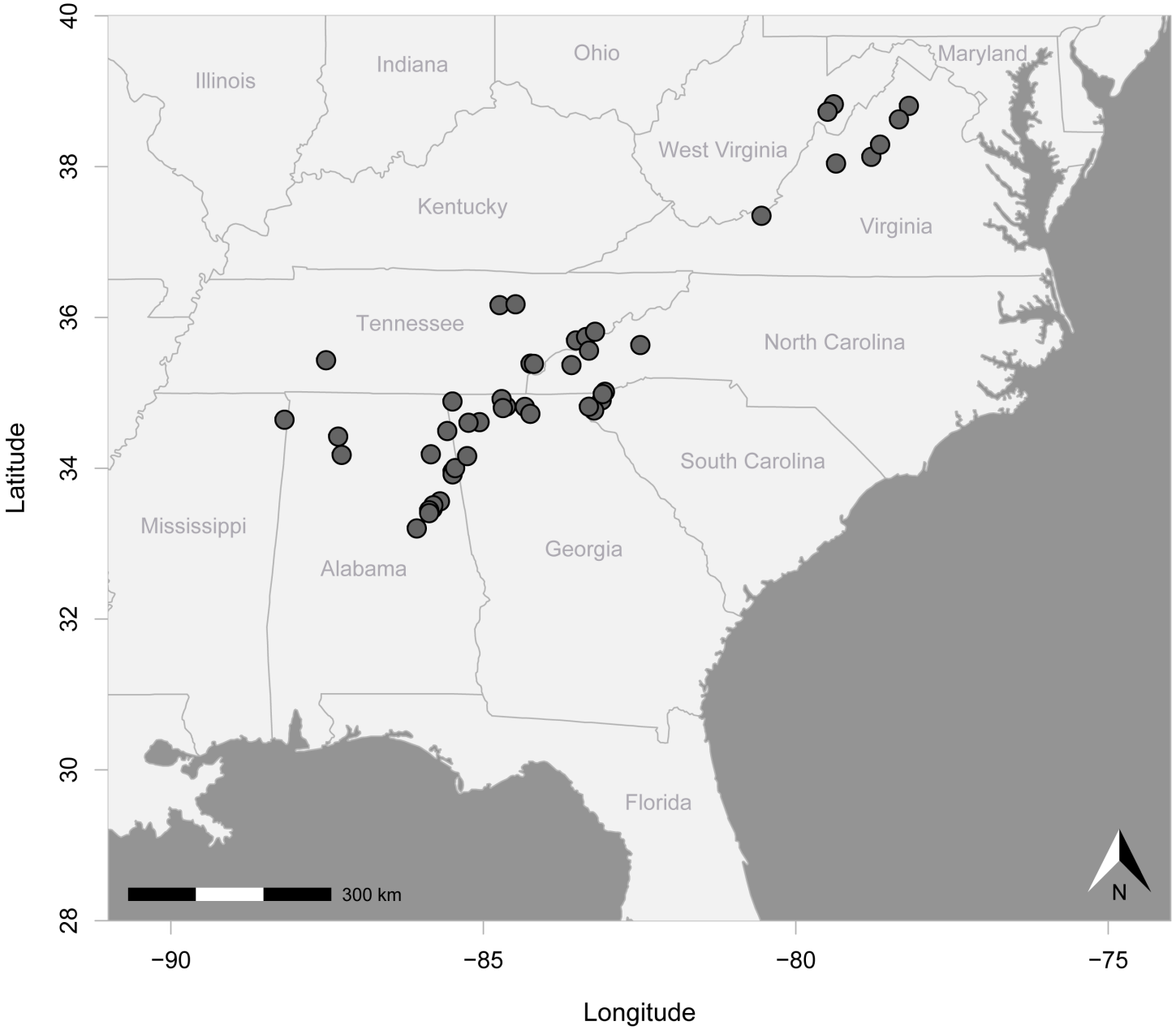


46 sites:

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*?

Evolutionary History of *flavipes*: Questions

- How many lineages of *flavipes*?
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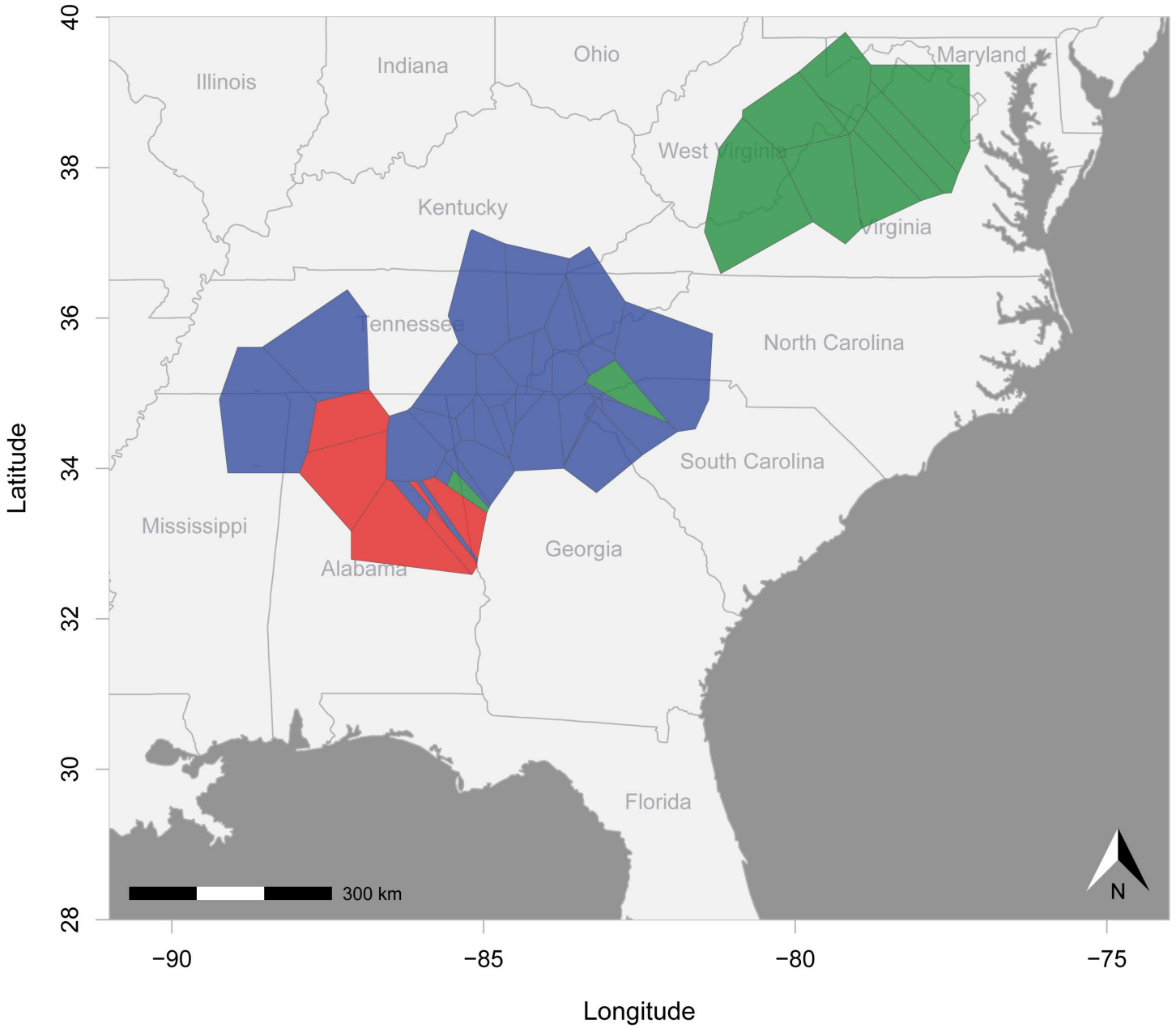
Evolutionary History of *flavipes*: Questions

- 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*?**

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

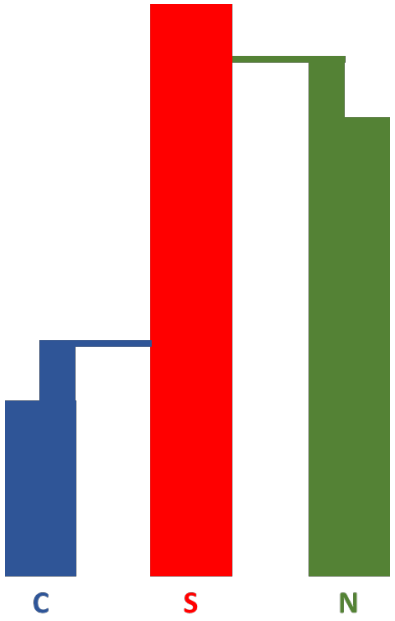
Population

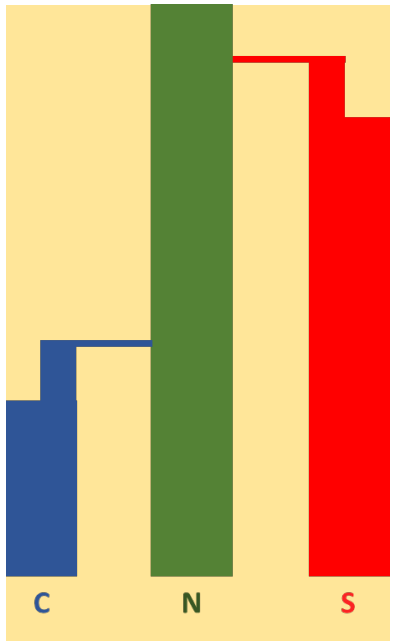
Best-fit hypothesis: closest match between simulated and empirical data:

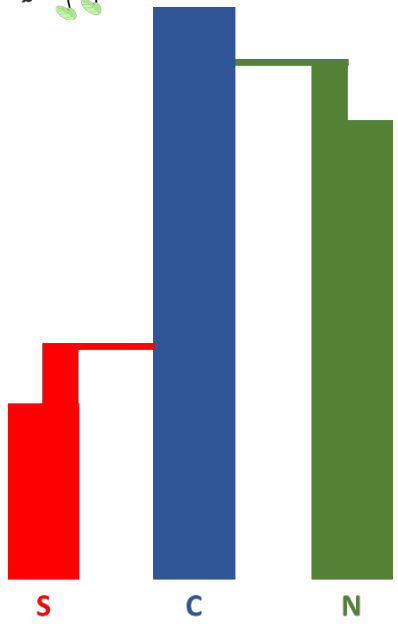
1 million simulated datasets for each hypothesis

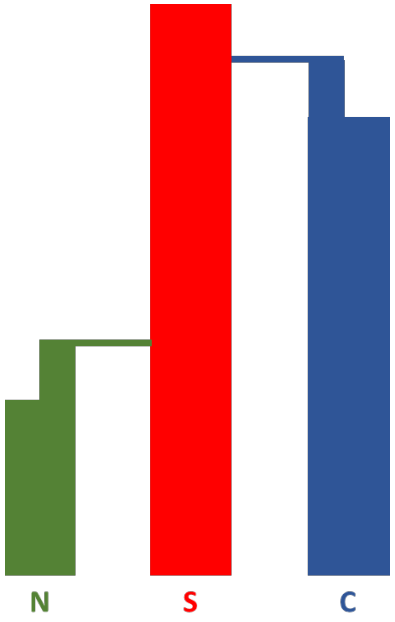
Compare simulated data with empirical data

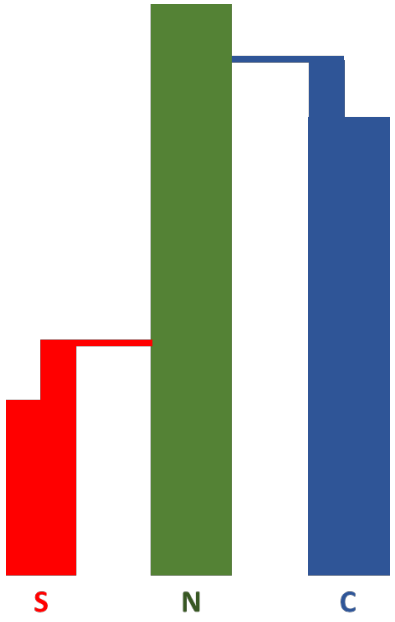
Evolutionary History Hypotheses: Single Source

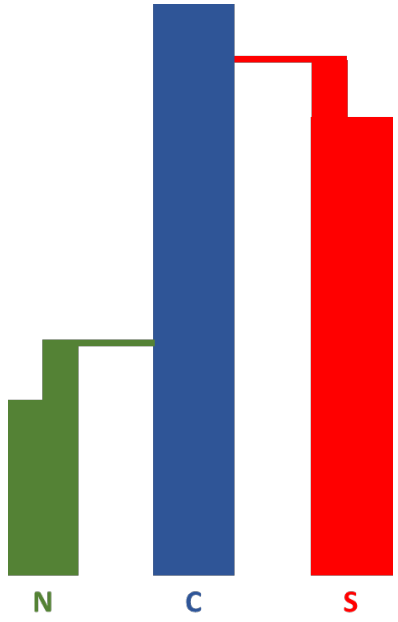




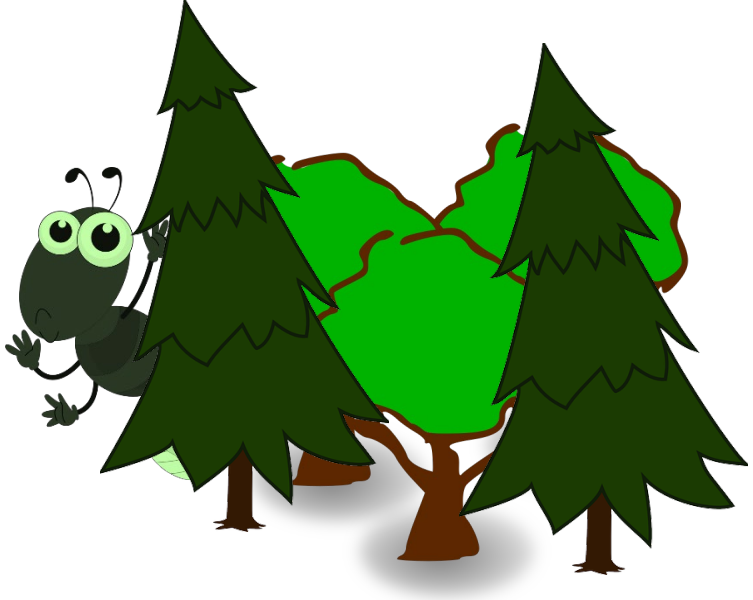






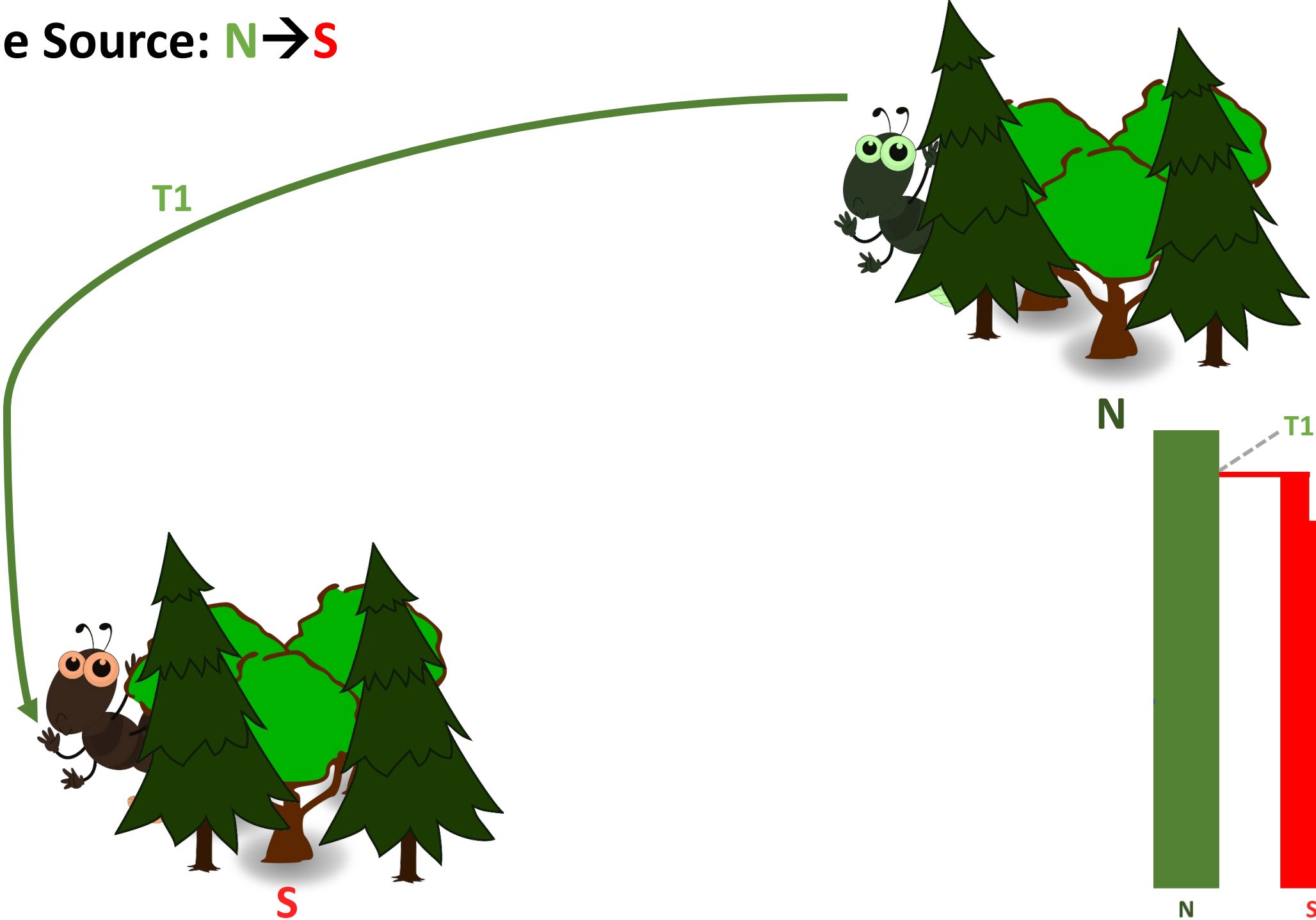


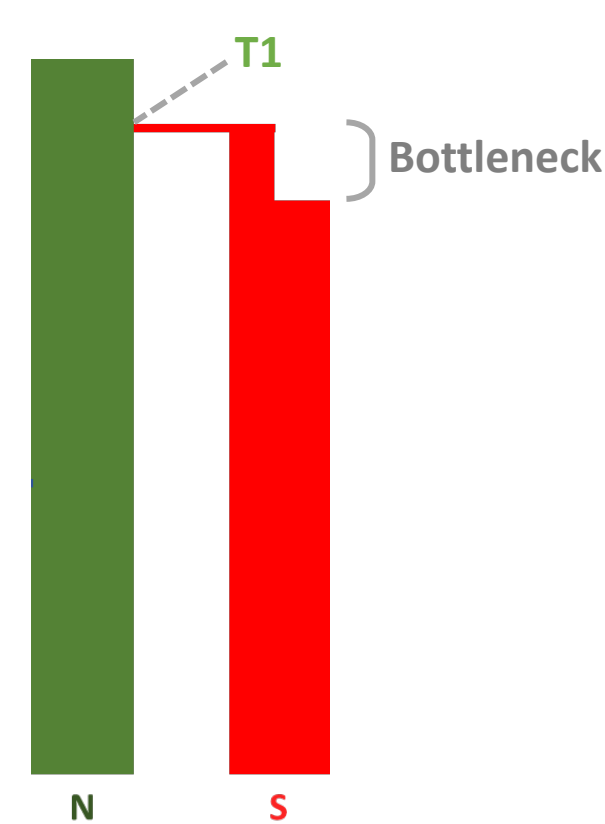
Single Source: N



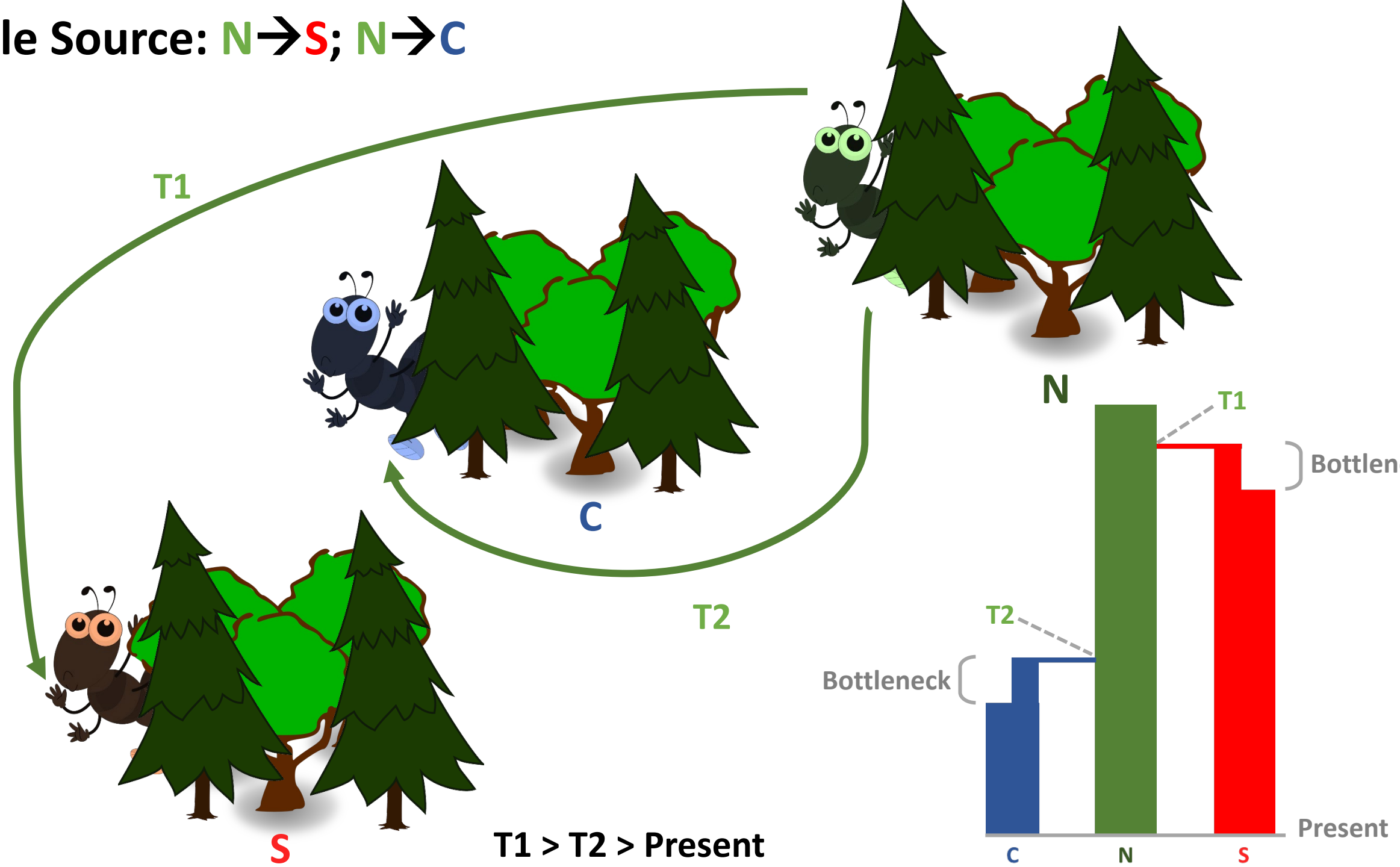
N

Single Source: N→S

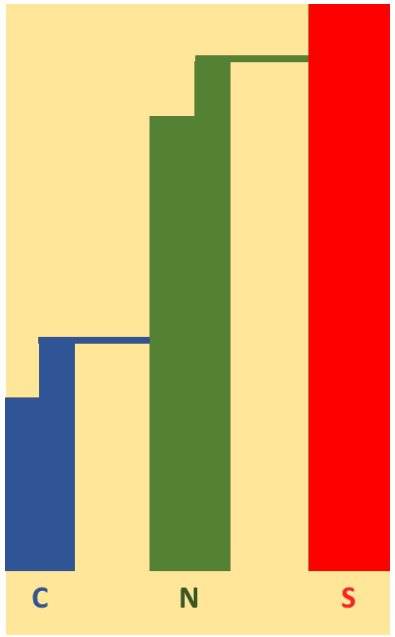


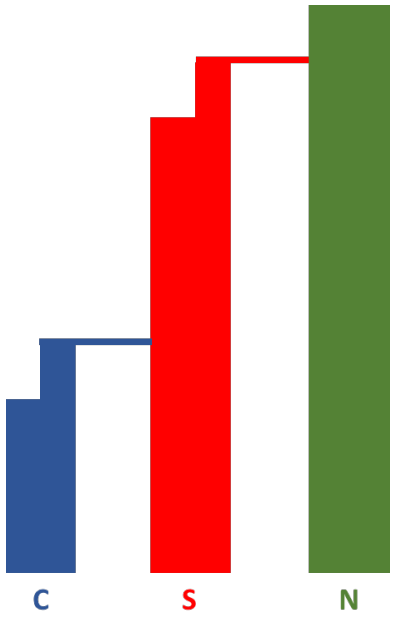


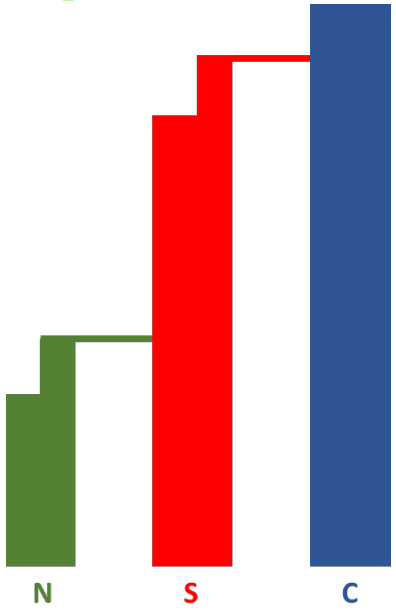
Single Source: N→S; N→C

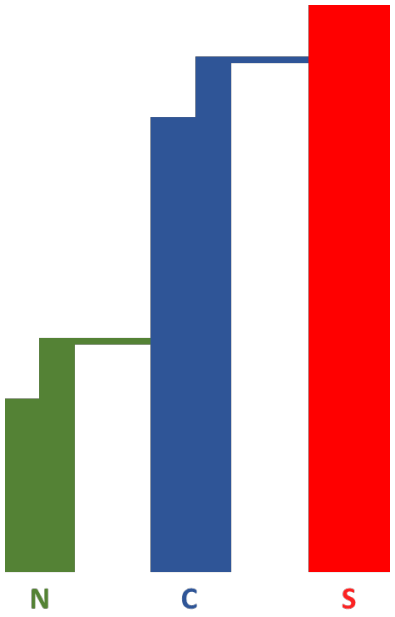


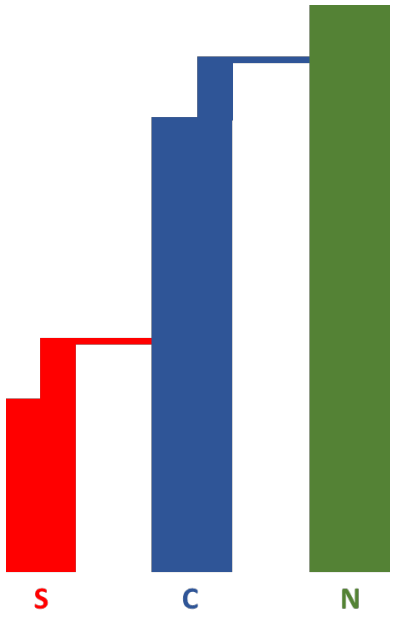
Evolutionary History Hypotheses: Dual Source

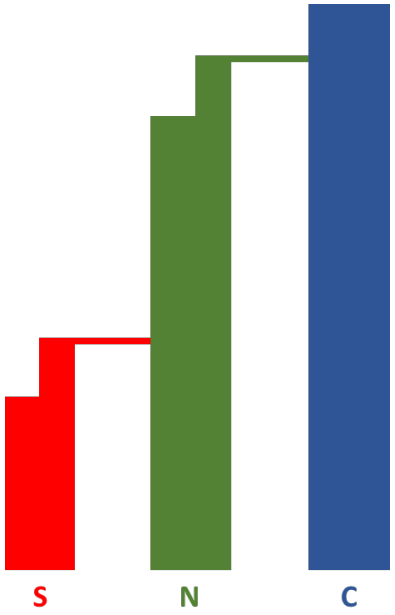




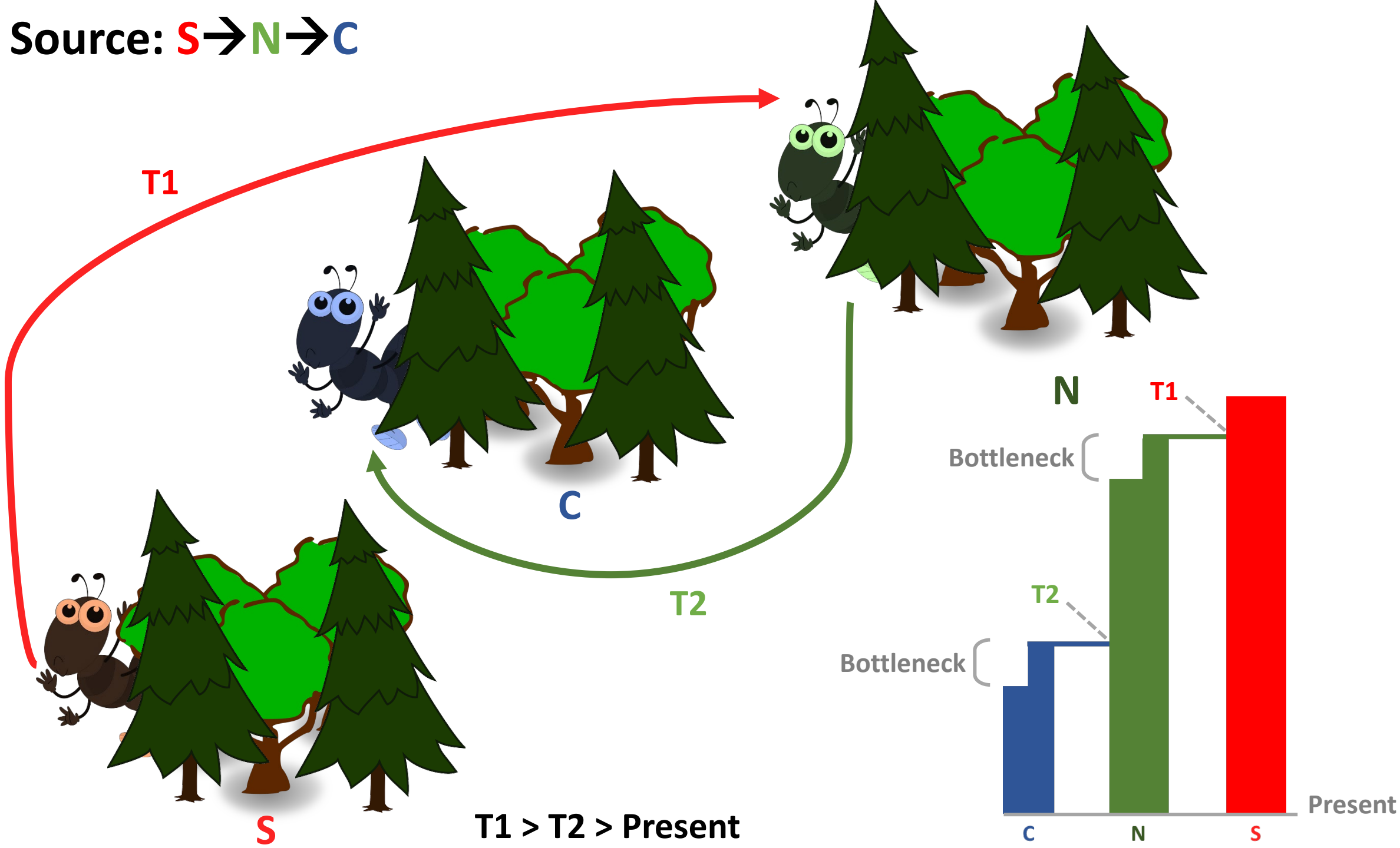






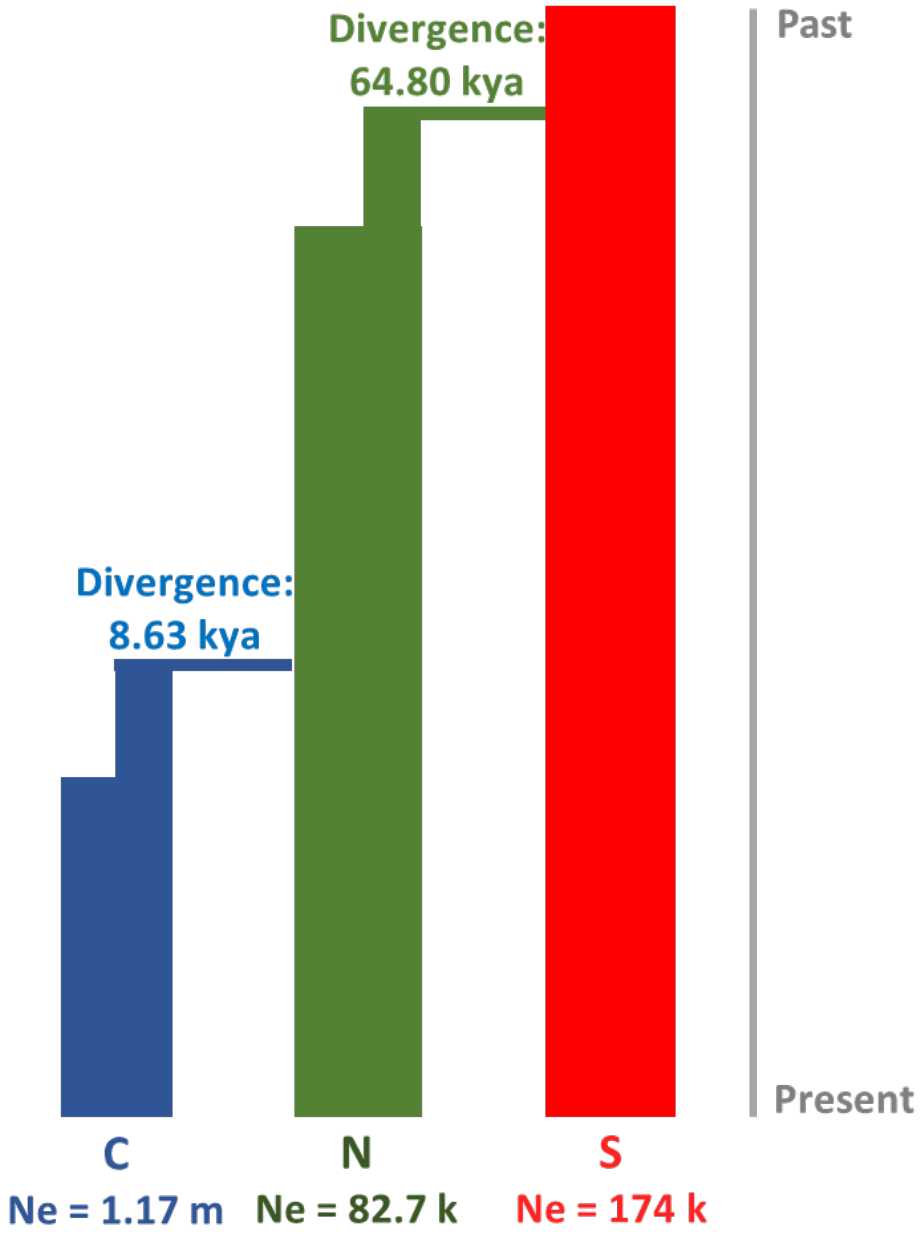


Dual Source: S→N→C

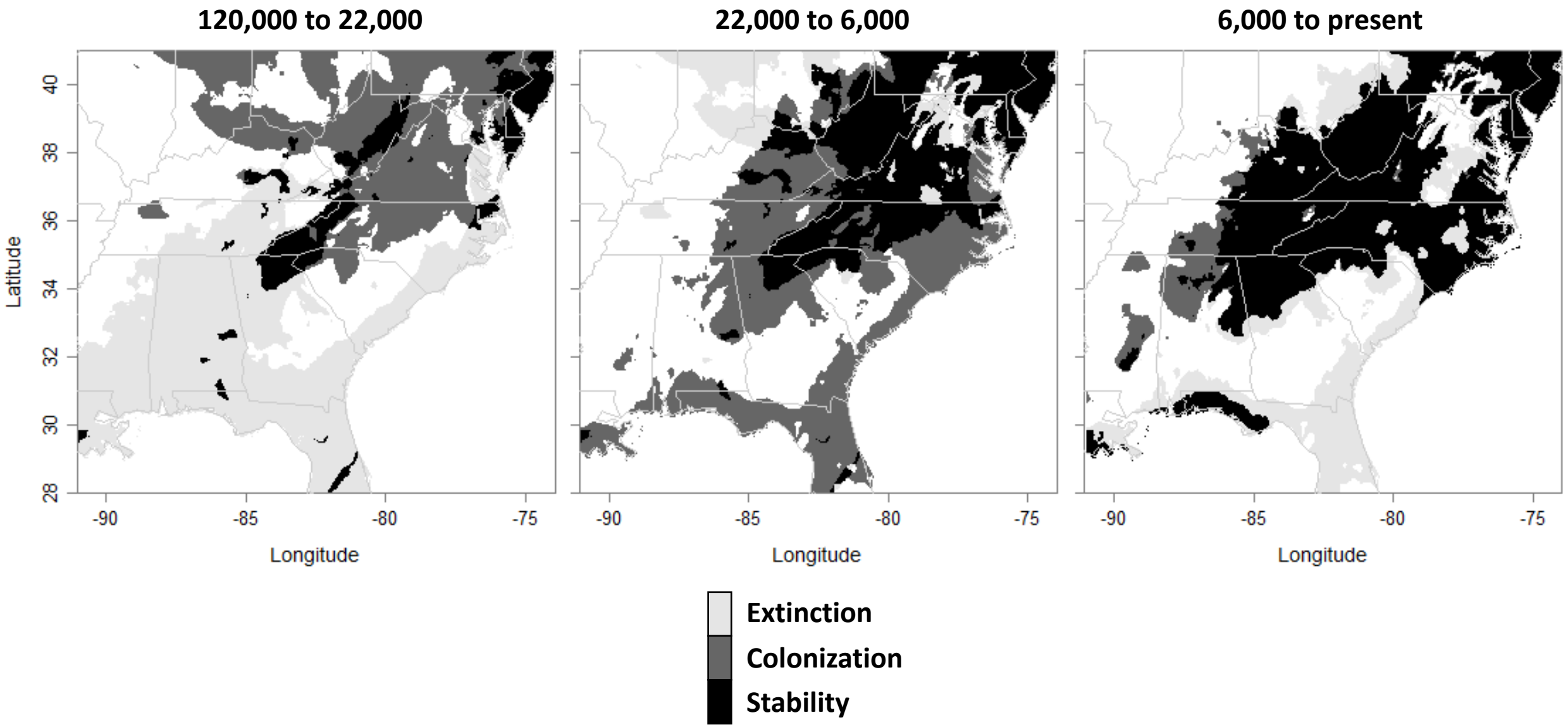


T1 > T2 > Present

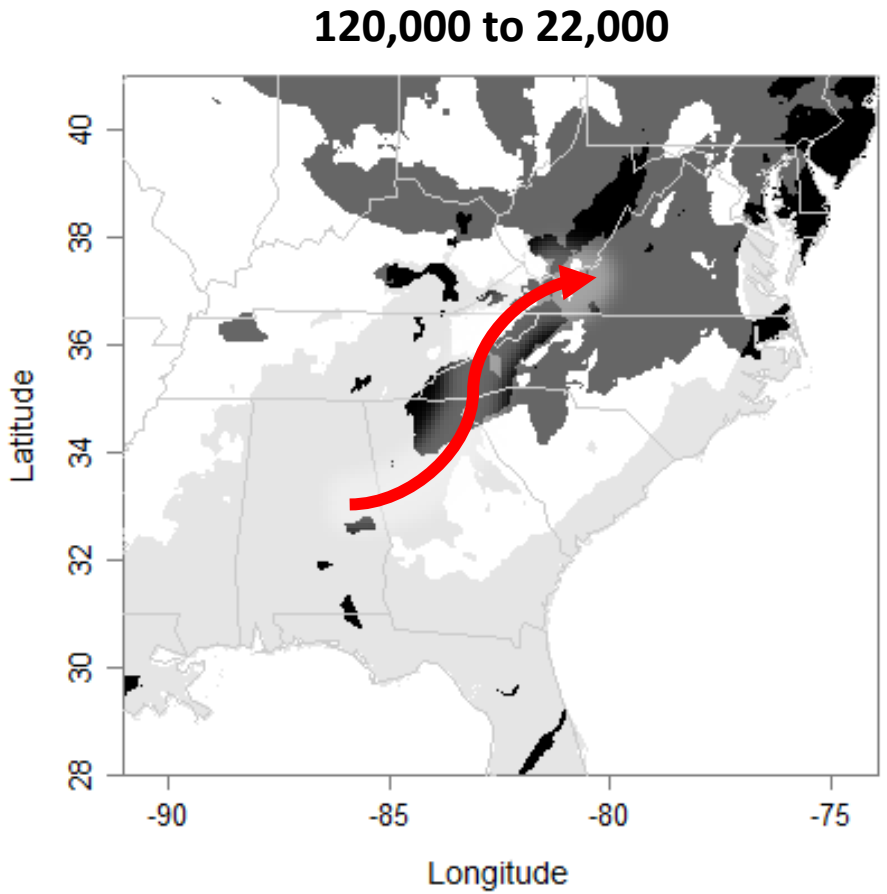
Best-Fit Hypothesis

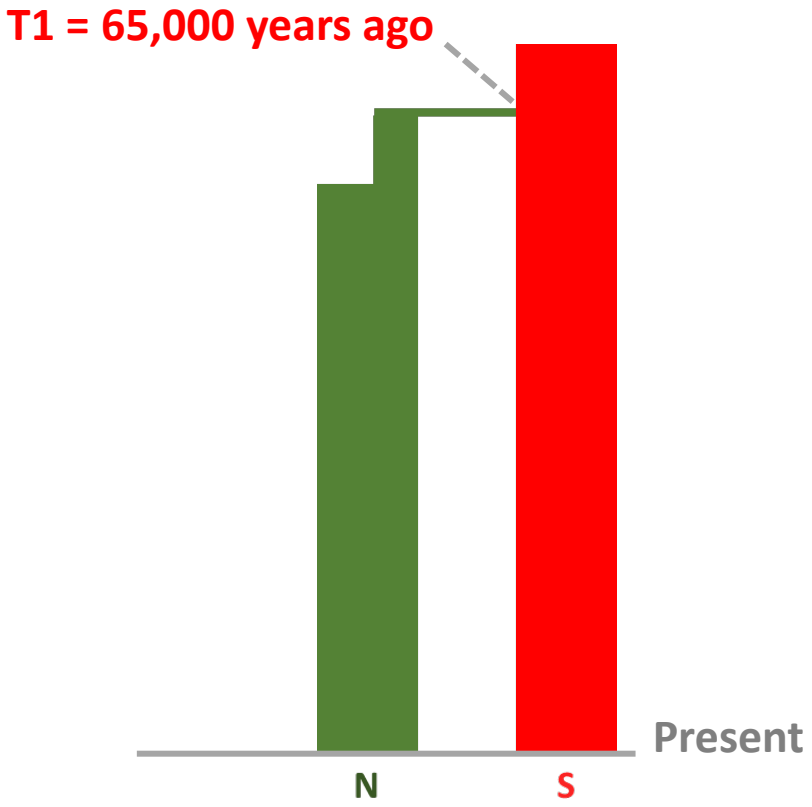


Did distributional change affect genetic divergence of *flavipes*?

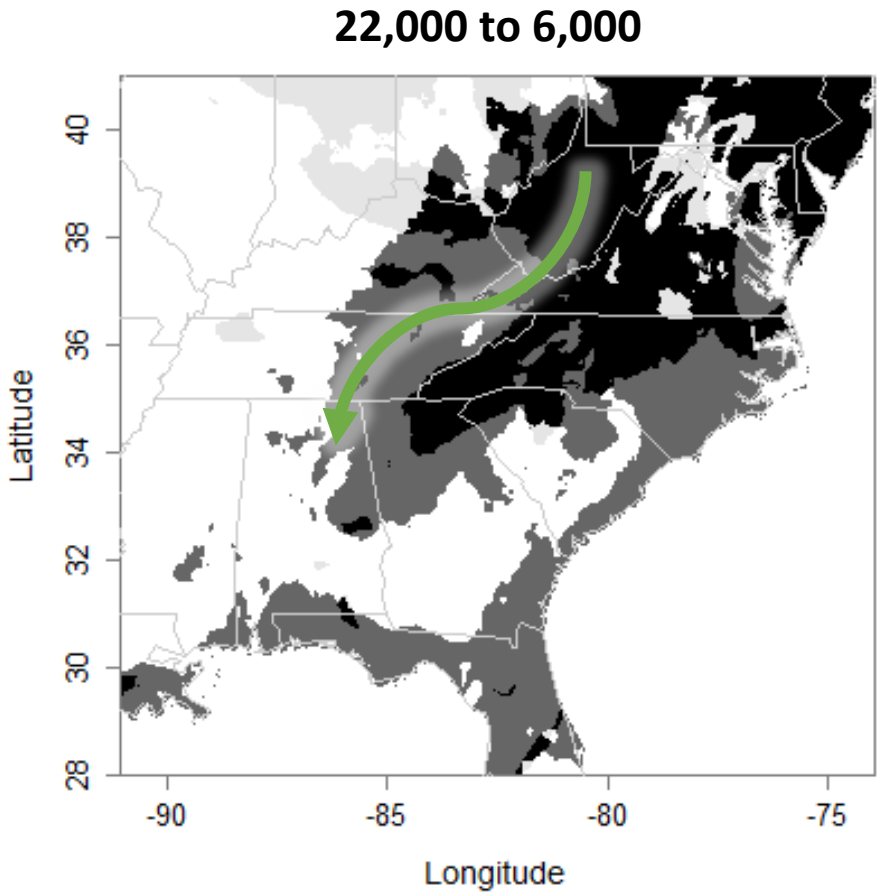


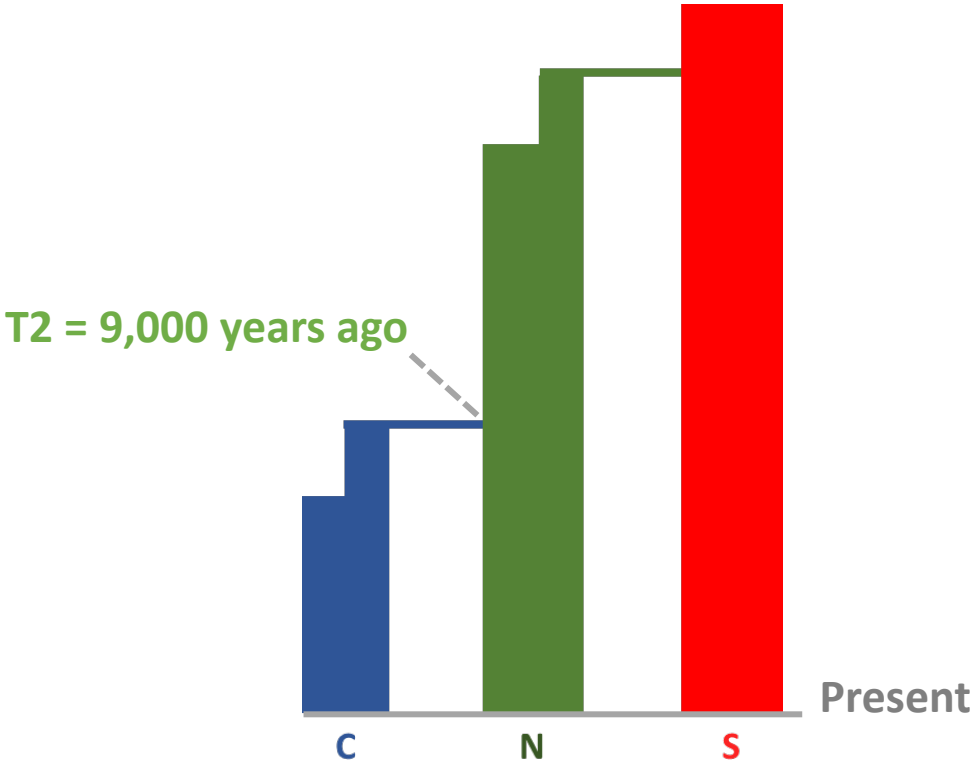
Distributional Shift: South-to-North



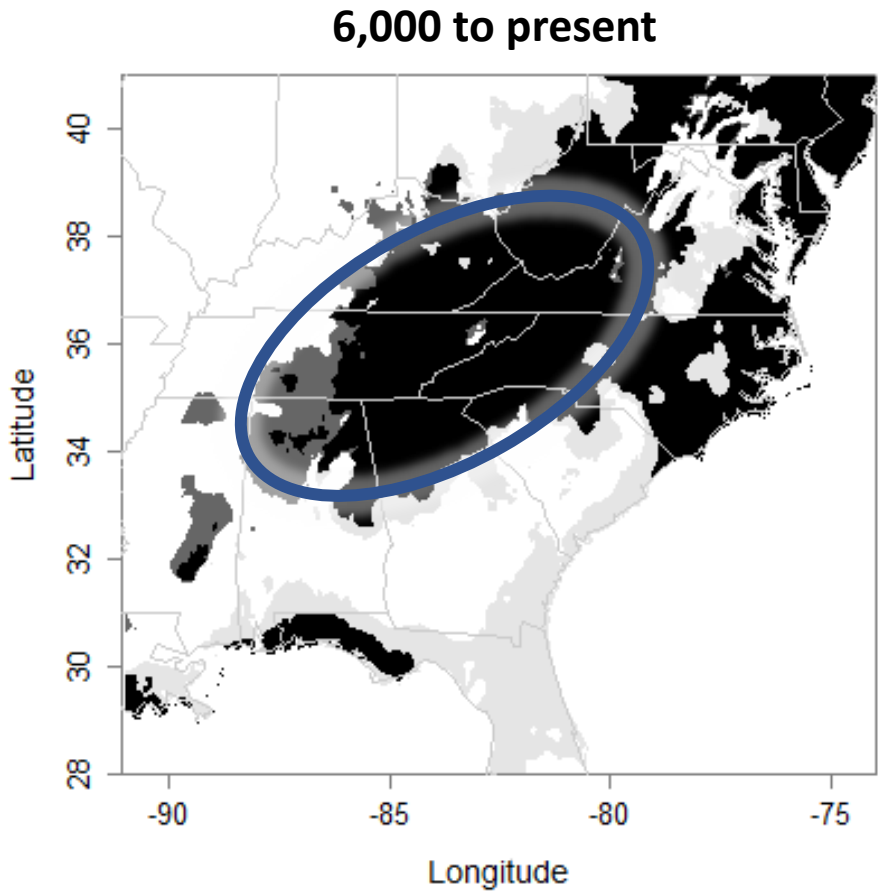


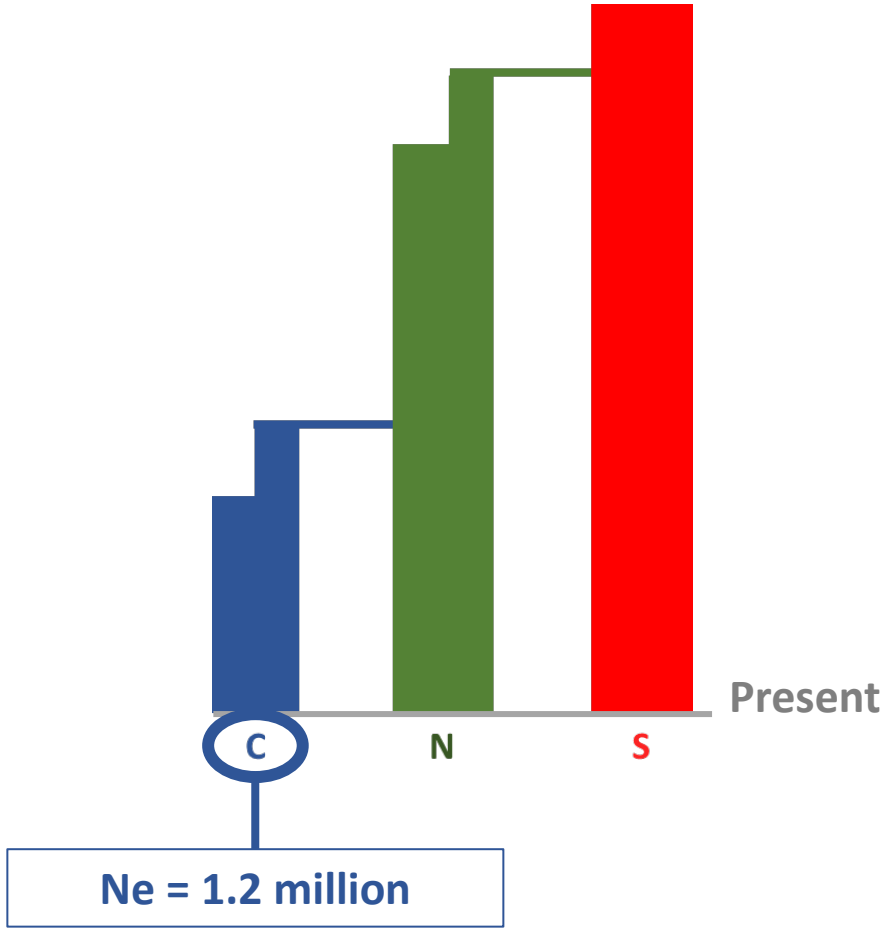
Distributional Shift: North-to-Center





Central Expansion





Correspondence between distributional change and genetic divergence