

The Root of all Weevils

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Introduction:

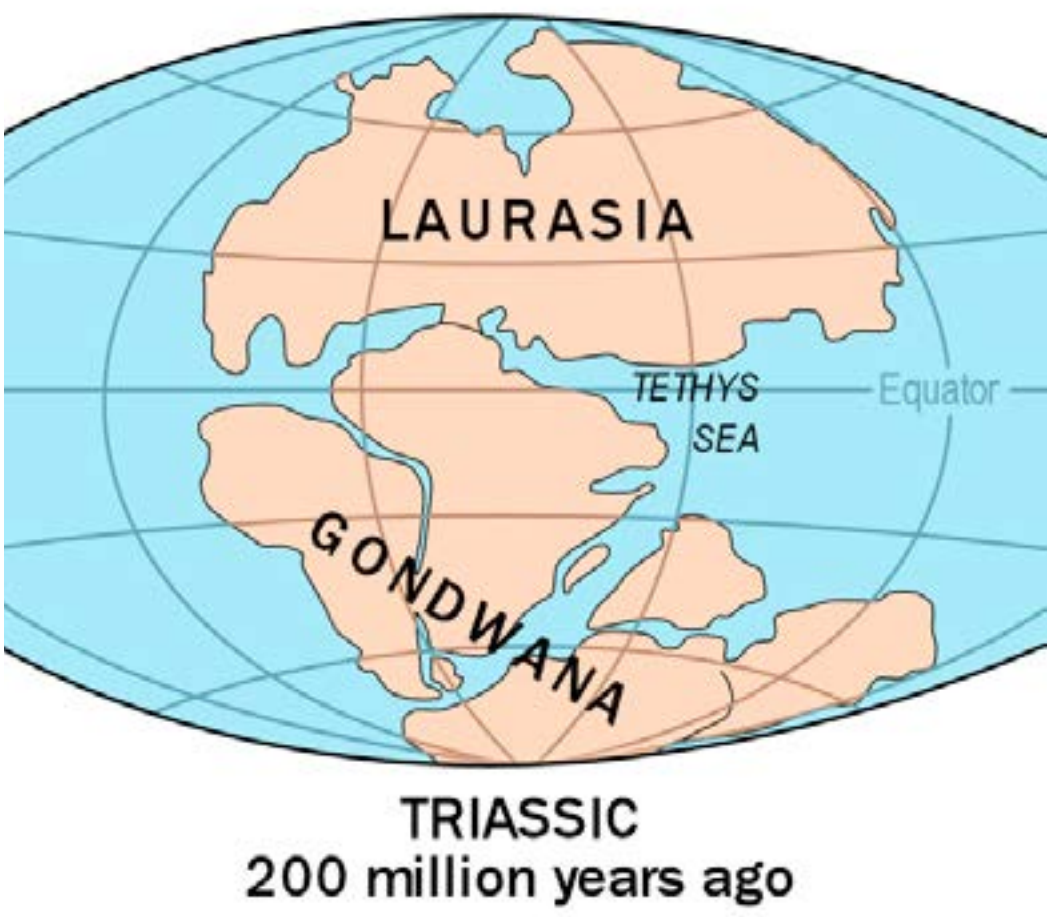
Weevils are the largest family of beetles. The most well-studied genera of weevils are *Anthonomus*, the Boll Weevil genus, and *Curculio*, the nut and flower weevils. Both clades feed on a diverse range of host plants, including tea, hazlenut, and cotton, and vary in range size and geographic distribution.

Questions:

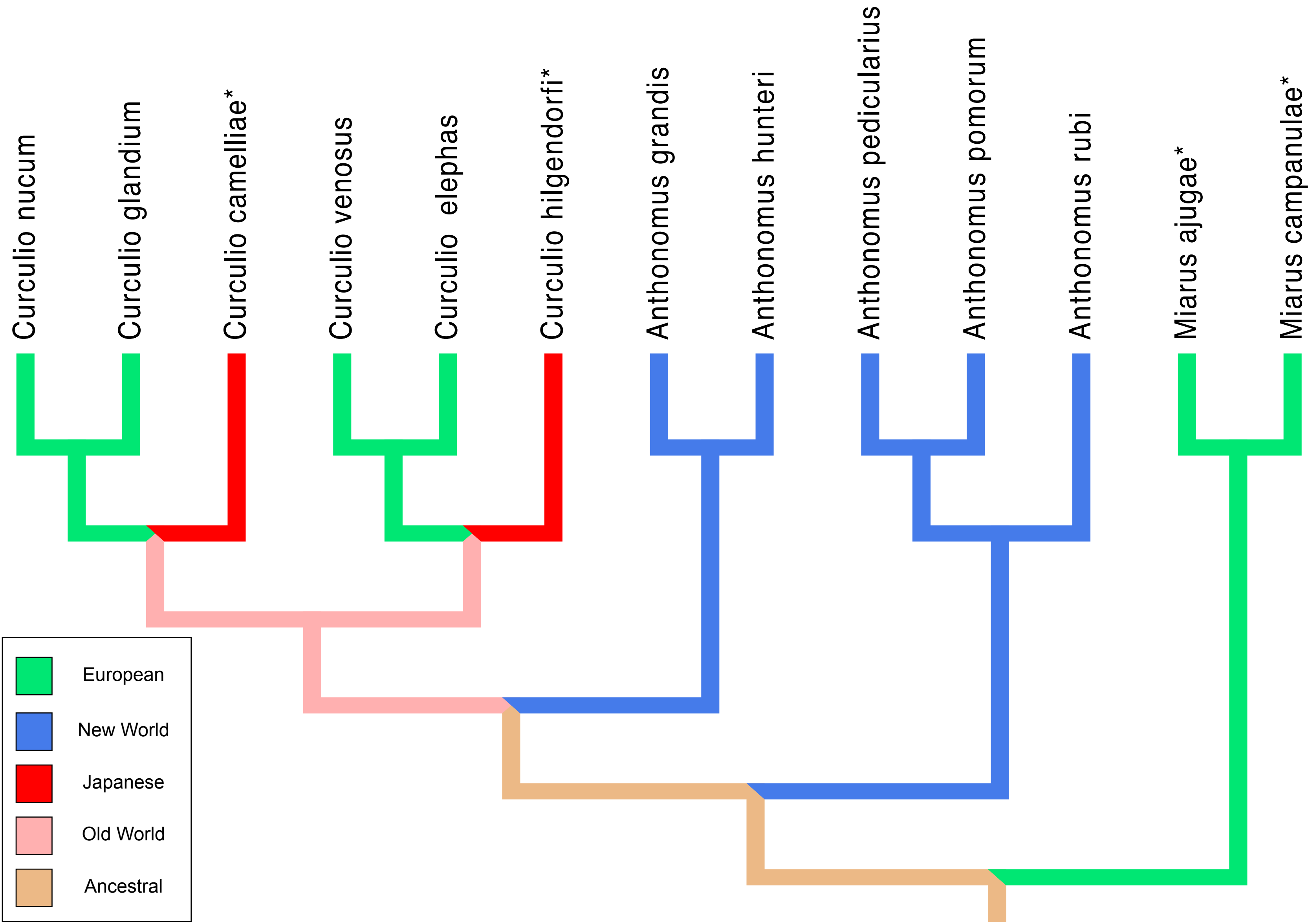
- Have there been any unusual selective pressures on weevils?
- What did weevil dispersal look like?
- Is *Anthonomus* a monophyletic group?

Pairwise t-tests of physical traits:

Test Variable:	P Values: (Significance indicated by an *)	T-Charts:
Canonical <i>Anthonomus</i> vs Boll Weevil group (Proboscis length/ Body Length Ratio)	Prob > t = 0.3839	
Curculio vs Boll Weevil group (Proboscis length Body Length Ratio)	Prob > t = 0.0004**	
Curculio vs Canonical <i>Anthonomus</i> (Proboscis length/Body Length Ratio)	Prob > t = 0.0384*	
Canonical <i>Anthonomus</i> vs Boll Weevil group (Body length/Elytra Width Ratio)	Prob > t = 0.4453	
Curculio vs Boll Weevil group (Body length/ Elytra Width Ratio)	Prob > t = 0.0179*	
Curculio vs Canonical <i>Anthonomus</i> (Body Length/Elytra Width Ratio)	Prob > t = 0.3497	

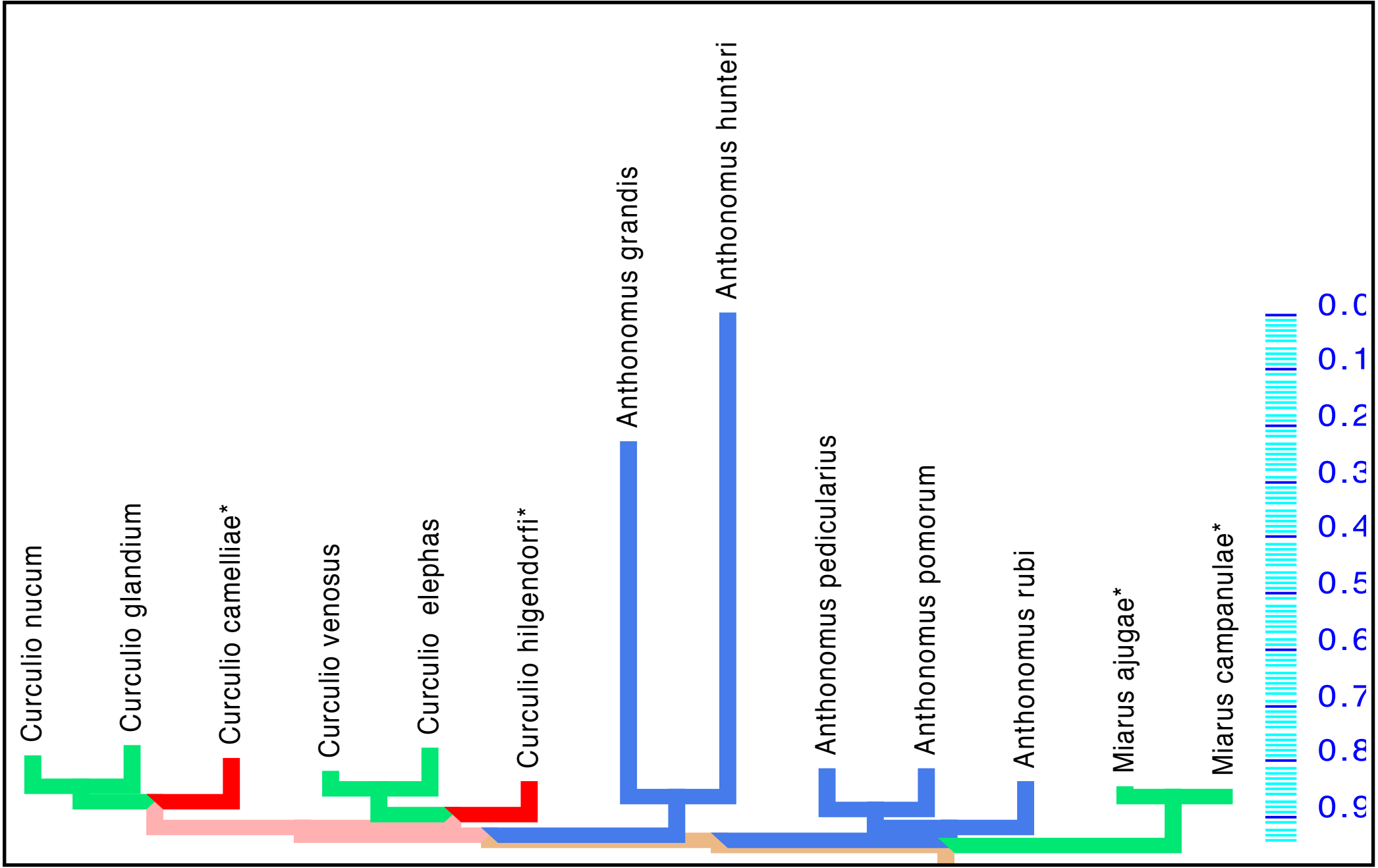


Weevil feeding

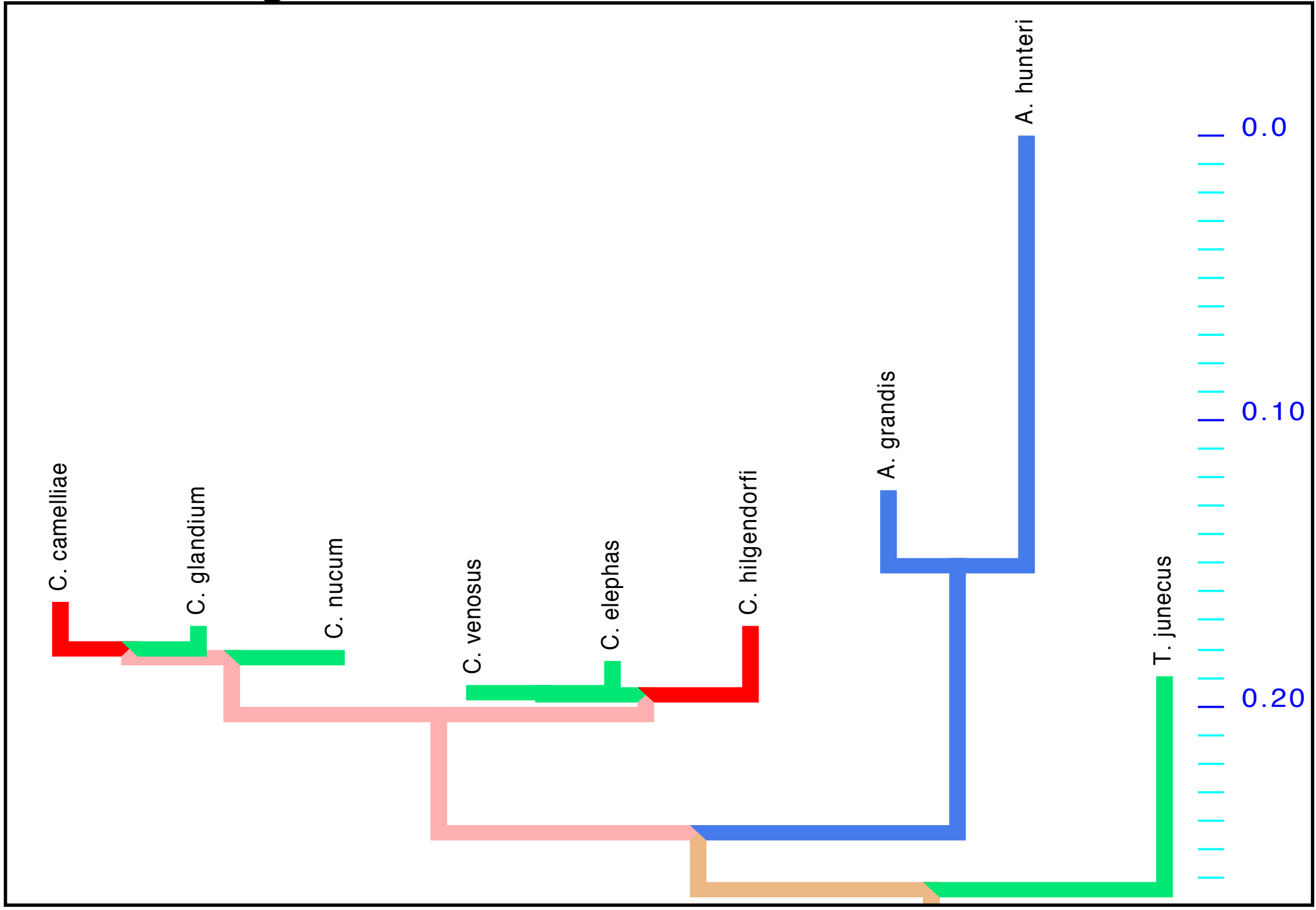


Results:

- Despite currently sharing geographic ranges and distinct phenotypes, some *Anthonomus* groups are more closely related to their cousins on the other side of the world than to their geographic neighbors.
- The most recent common ancestor of the Curculionids we studied probably lived on the supercontinent Laurasia.
- *Anthonomus* is currently classified by phylogeography, supported by significant differences in traits between old world species and the *Anthonmus* species.
- However, our phylogenetic data, reinforced by evidence from both nuclear and mitochondrial genes shows that *A. hunteri*
- Both *A. hunteri* and *A. grandis* have experienced extreme genetic changes compared to other species
- *A. grandis* and *A. hunteri* are quite different from each other genetically, despite the lack of physical differences.
- Our genetic phylogeny tells a different story than phylogeography and phenotypic trait analysis, namely that *A. hunteri* and *A. grandis* are more closely related to the old world *Curculio*.



Phylogeny based on Mitochondrial COI. Boll Weevil group has diverged farther from its ancestors than other extant species, as illustrated by branch length.



Phylogeny based on nuclear gene eEF1a1. Data from this gene produced the same relationships as found with mitochondrial data for species for which data was available.

Conclusions:

- The Boll Weevil subgroup has experienced rapid evolution relative to other weevils.
- All Weevil groups studied likely had a common ancestor in Laurasia
- *Anthonomus* is a paraphyletic group

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