

A Revision and Phylogeographic Study of *Liocranoides* (Araneae: Zoropsidae)

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Biodiversity in the Appalachian Mountains



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Introduction to Speciation

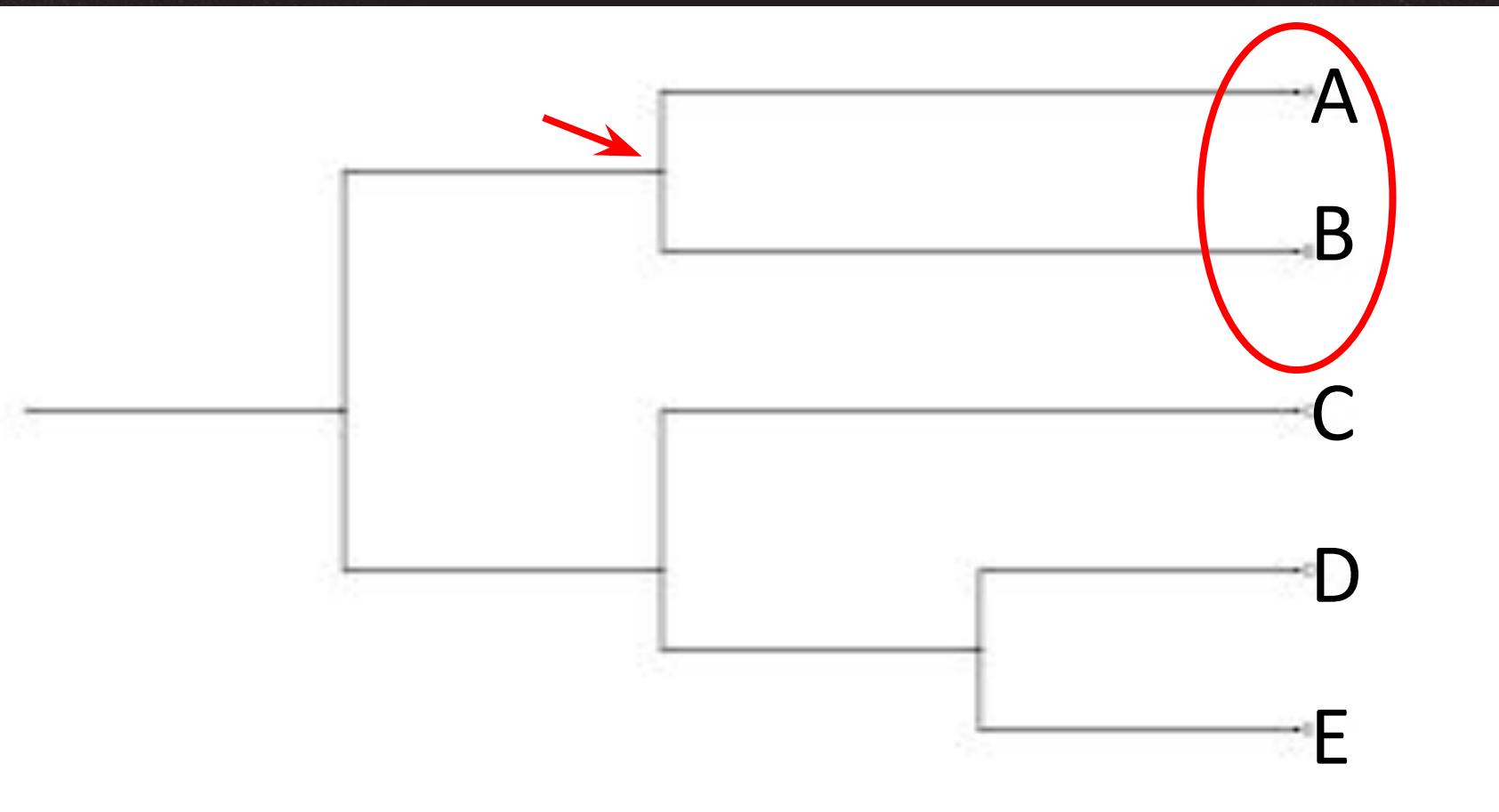
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WHAT IS BIOGEOGRAPHY?



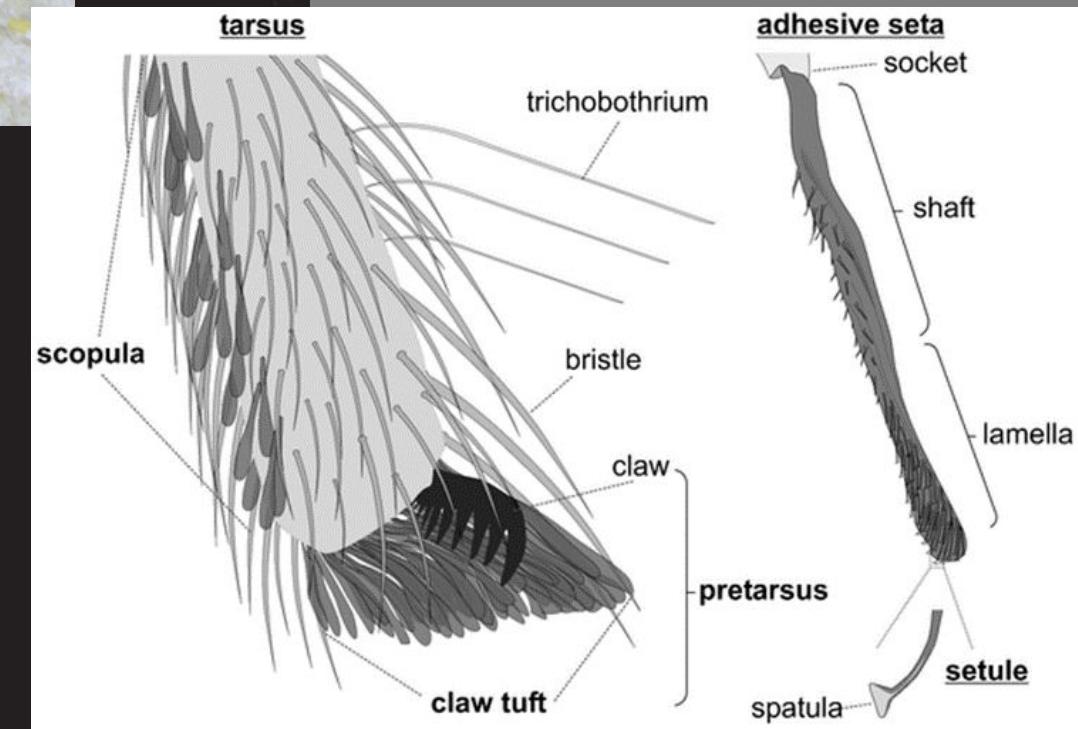
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How Do We Represent Species Relationships?





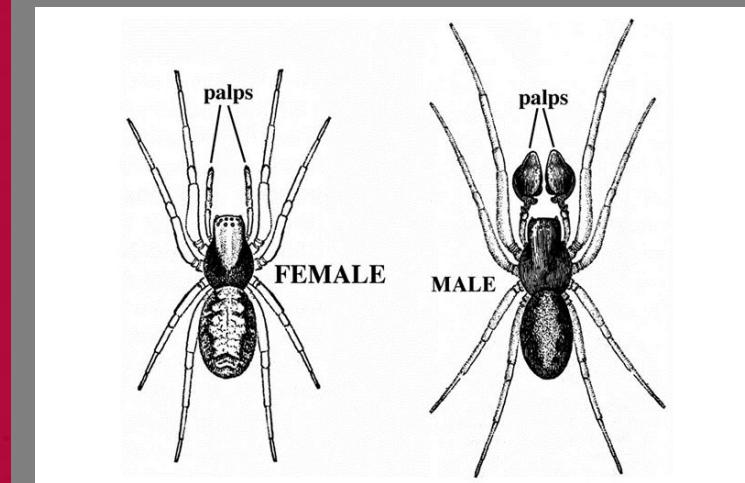
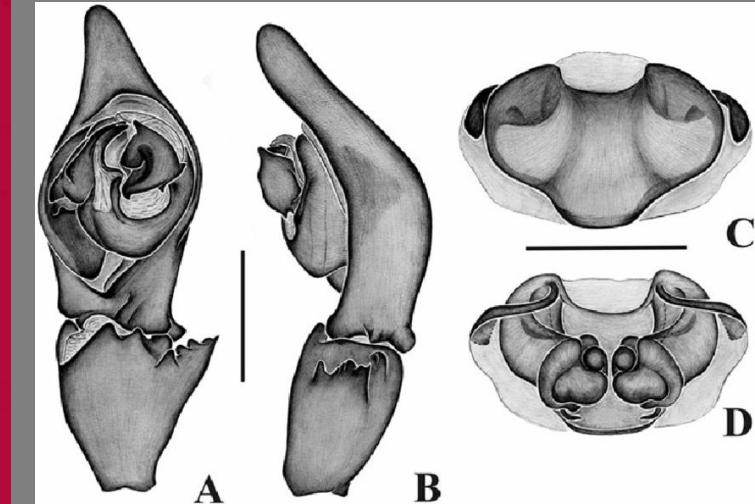
Introduction: *Liocranoides*



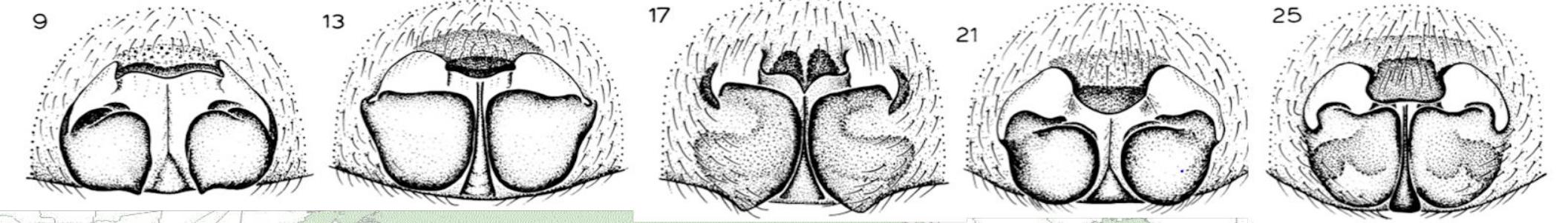
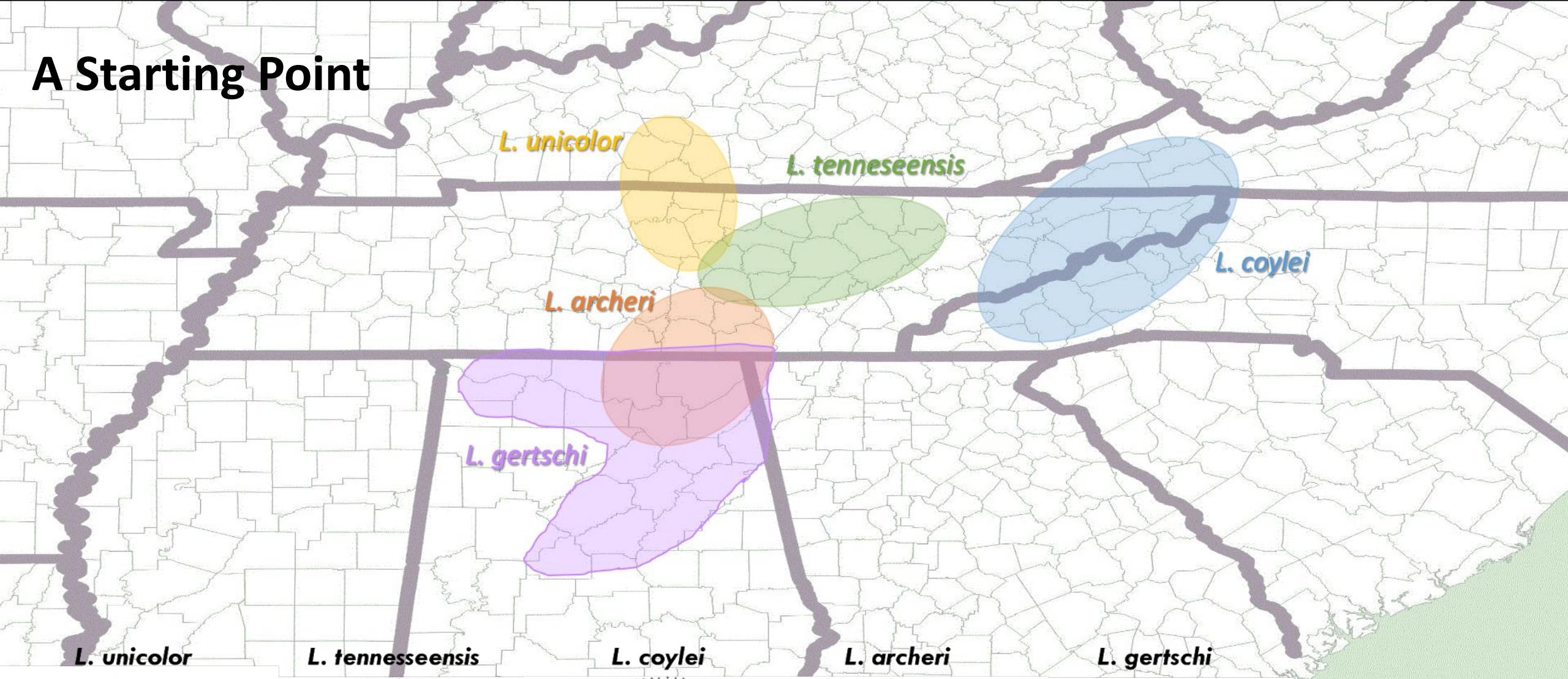
How can we determine species relationships?

Two methods:

1. Morphological Differences
1. Genetic Differences



A Starting Point

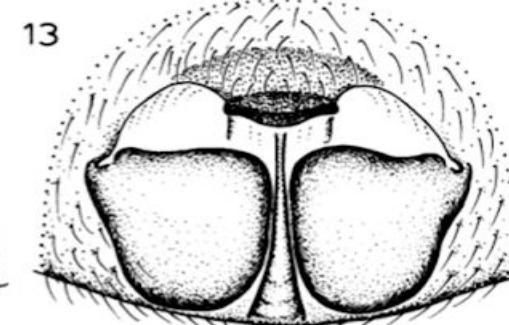


Platnick 1999

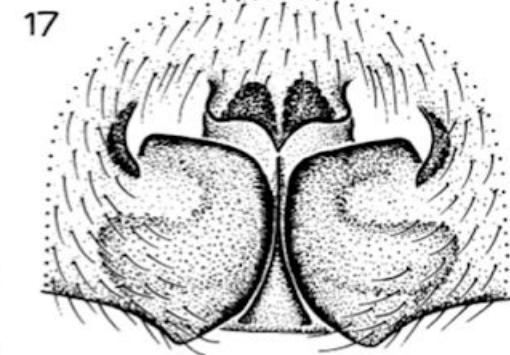
L. unicolor



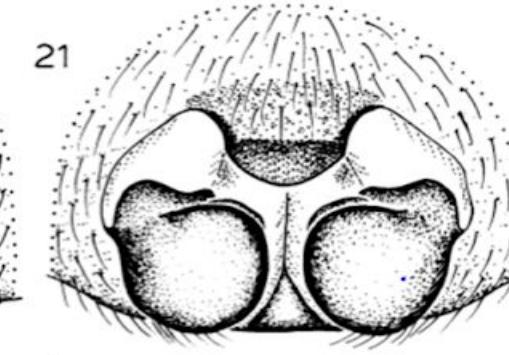
L. tennesseensis



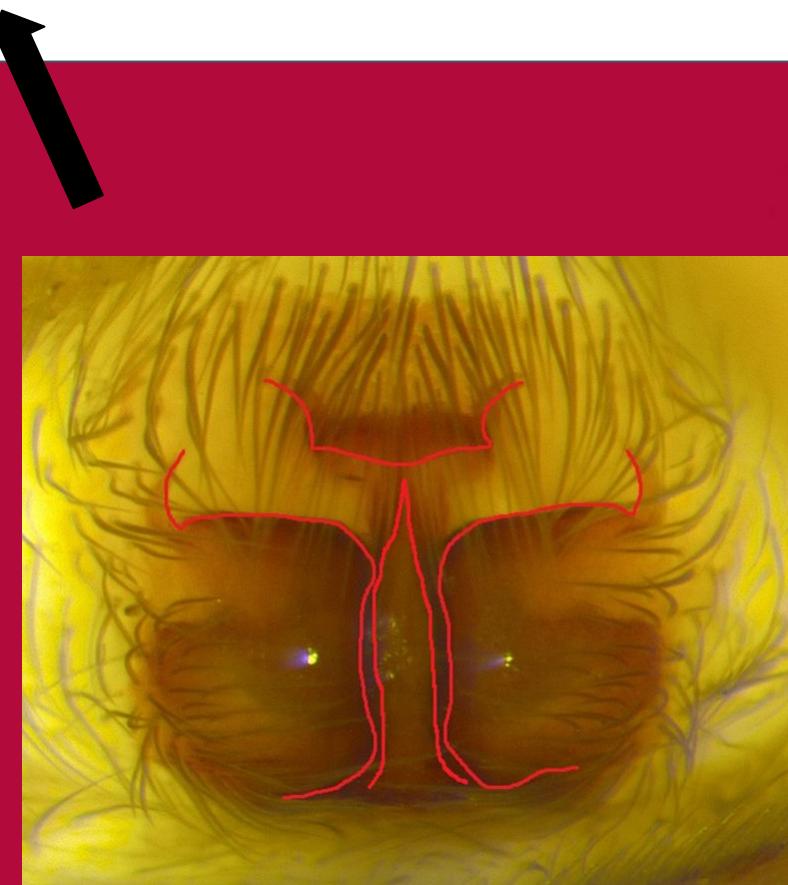
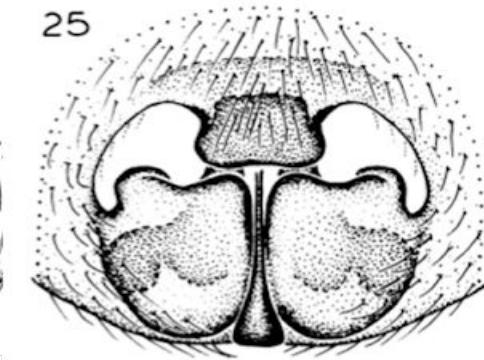
L. coylei



L. archeri



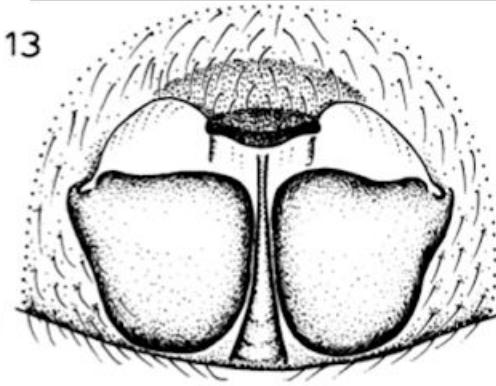
L. gertschi



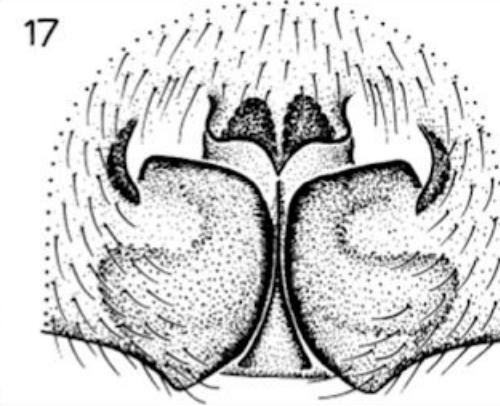
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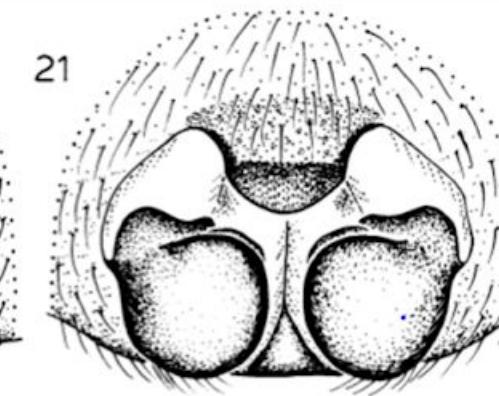
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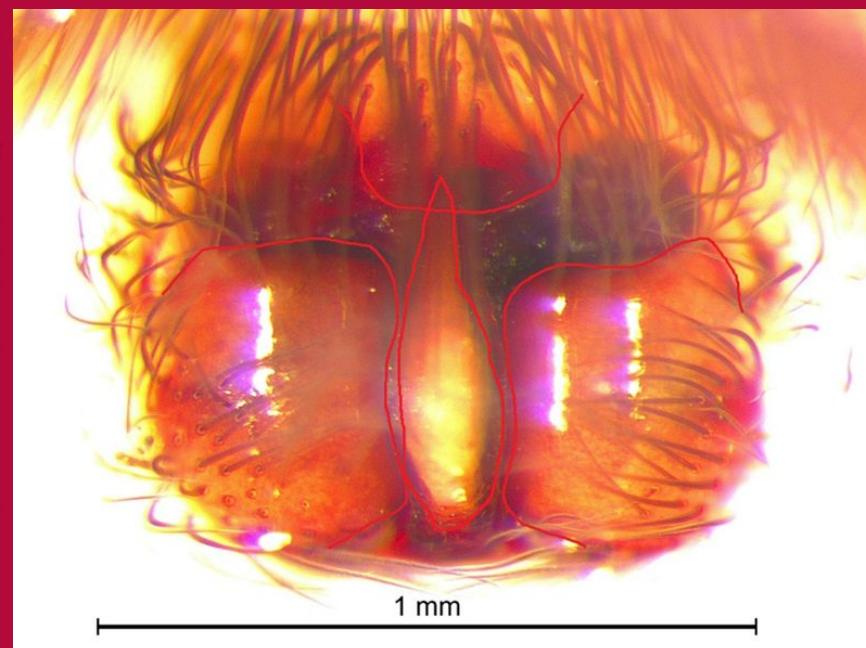
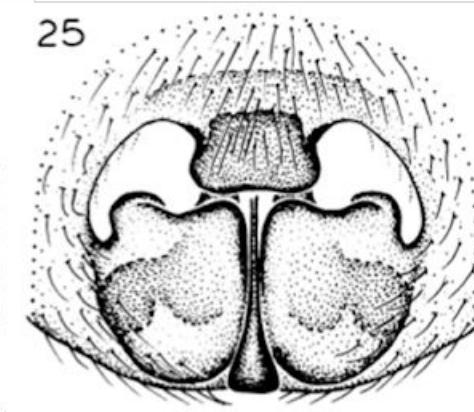
L. coylei



L. archeri



L. gertschi

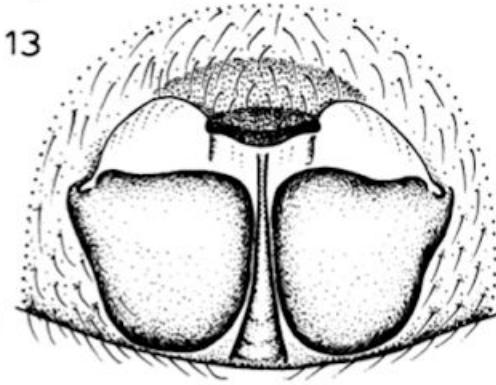


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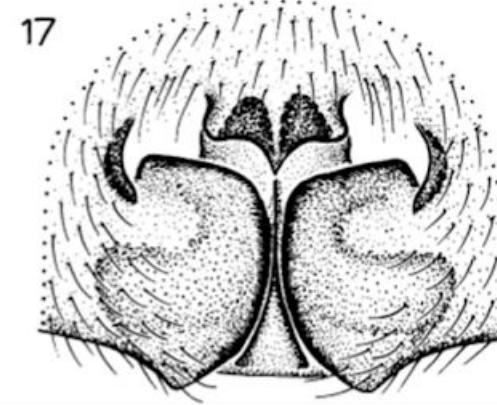
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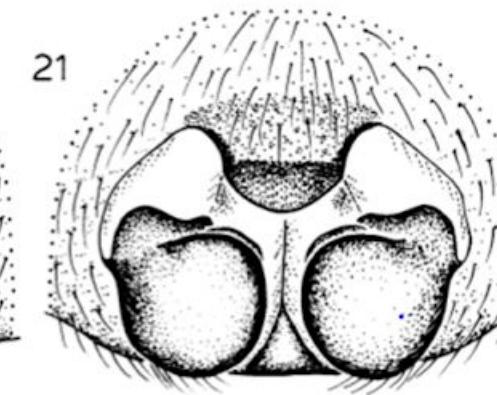
L. tennesseensis



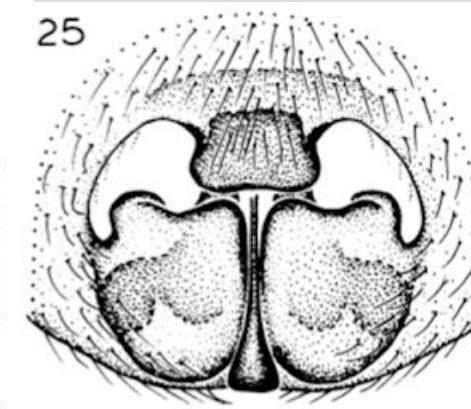
L. coylei



L. archeri



L. gertschi



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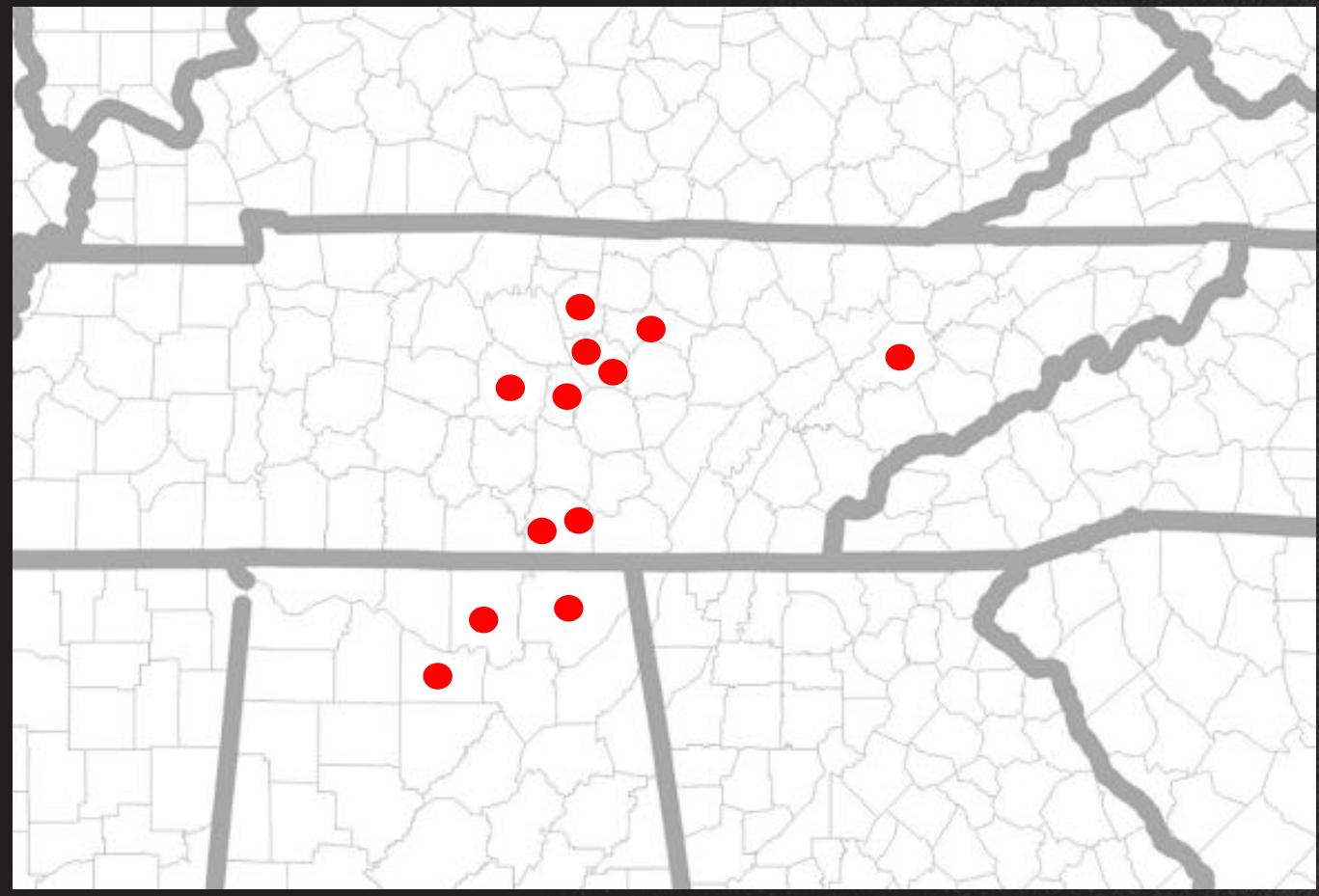
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Our Question: What is the phylogenetic relationship among *Liocranoides* from various caves, and how do these species relate biogeographically?

Caves Sampled



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Methods

Looked at four genes that coded for the following:

1. A histone Protein (H3)
2. DNA between the large and small ribosomal subunit genes (ITS2)
3. The small ribosomal subunit (18S)
4. The large ribosomal subunit (28S)

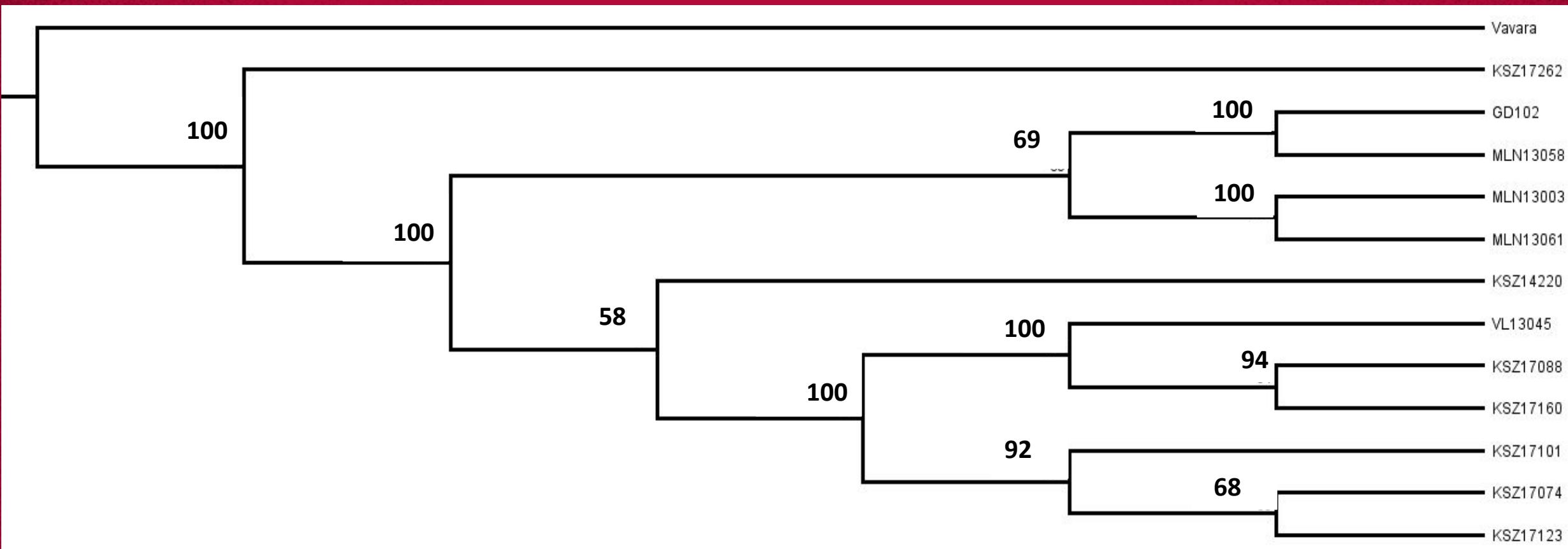


Methods

1. **Extracted DNA** – Used Qiagen DNeasy Blood & Tissue Kit
2. **PCR for all Four Genes** – Using primer pairs purchased from IDT
3. **Gel Electrophoresis** – Determine whether or not the gene was amplified
4. **Purification** – Used QIAquick PCR Purification Kit
5. **Sequencing** – Done by Genewiz
6. **Sequence Alignment, concatenation, and tree creation**
 - Done with Geneious Prime.
 - Confidence of nodes determined by bootstrapping with 100 replicates.

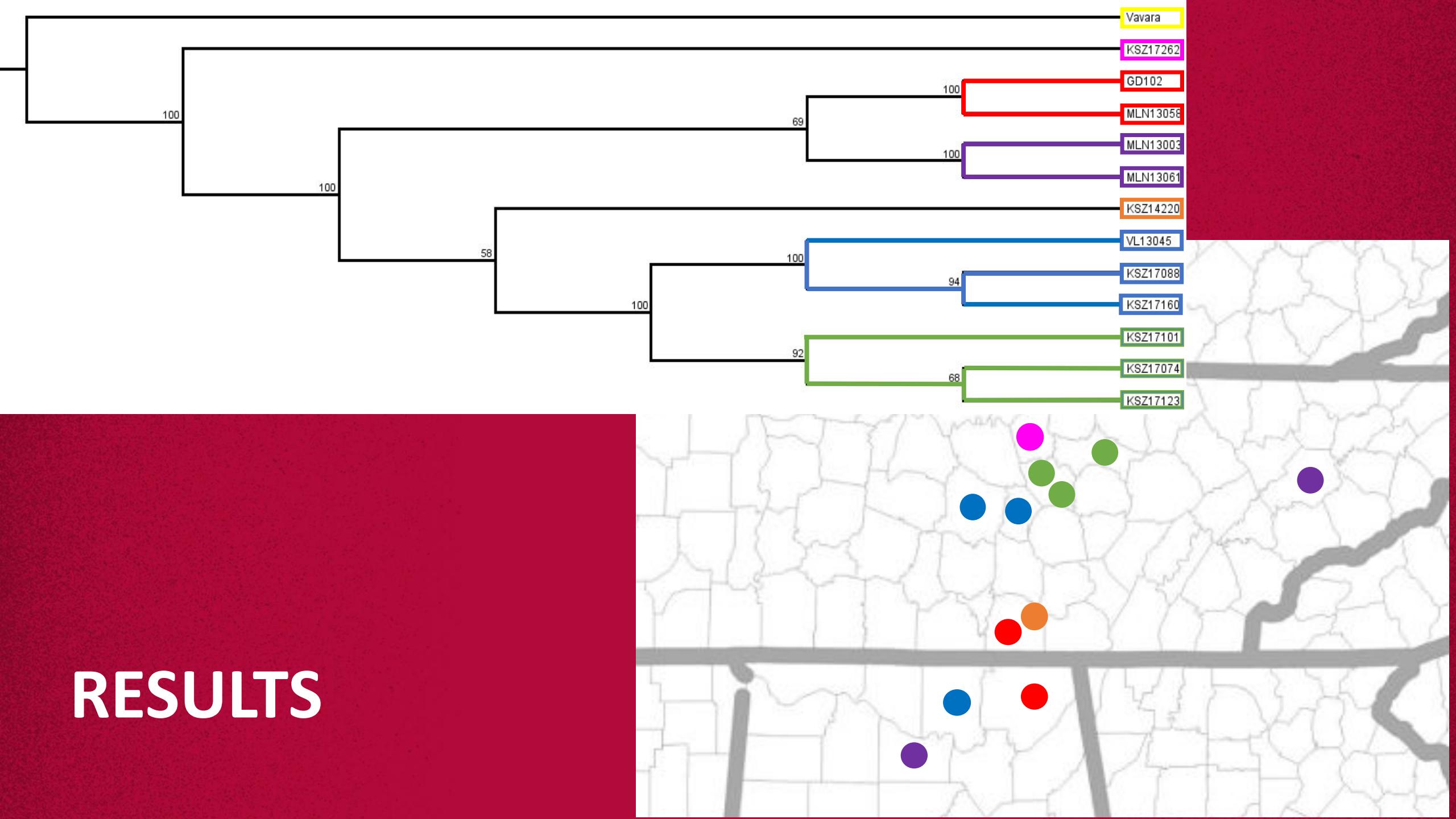


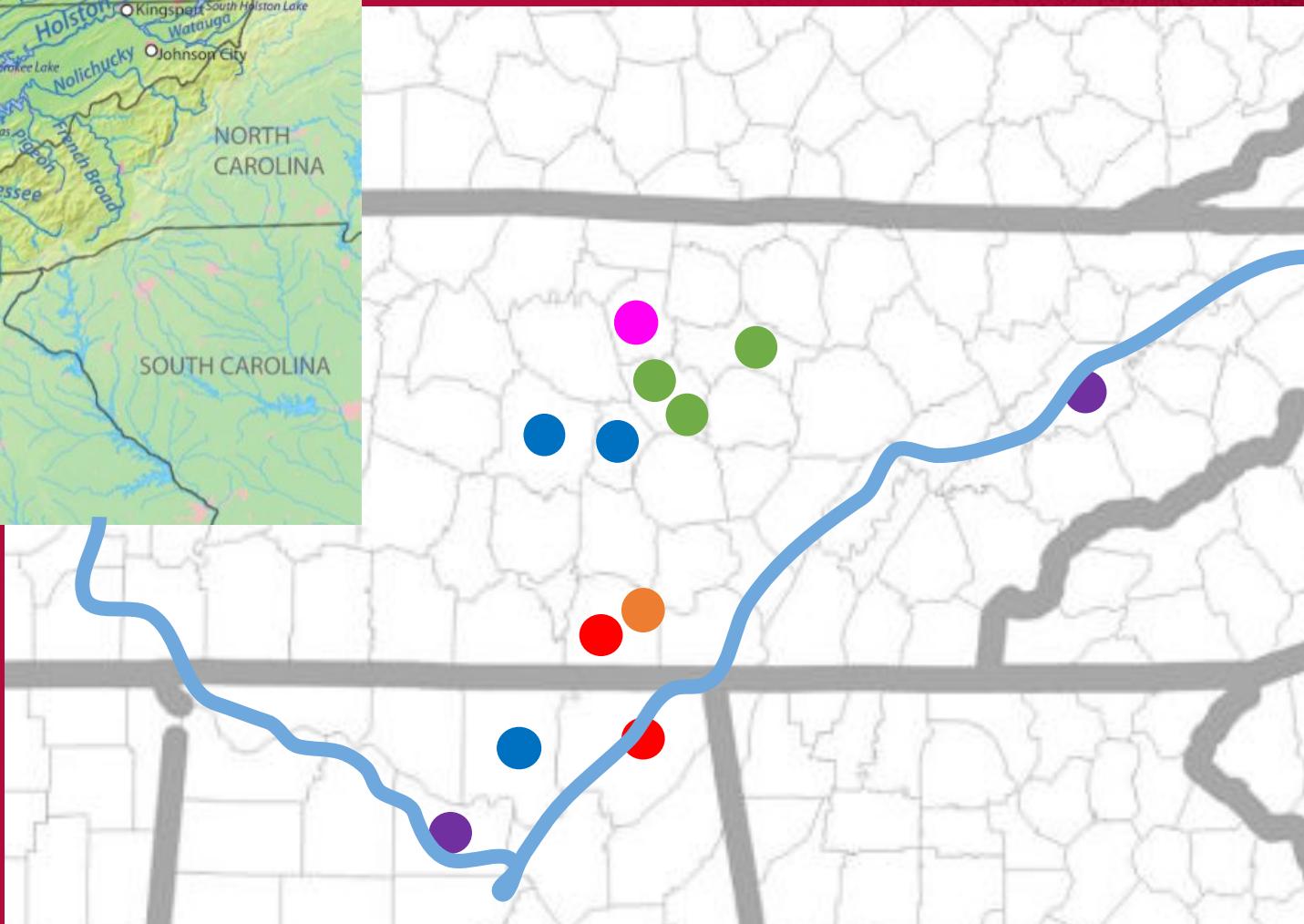
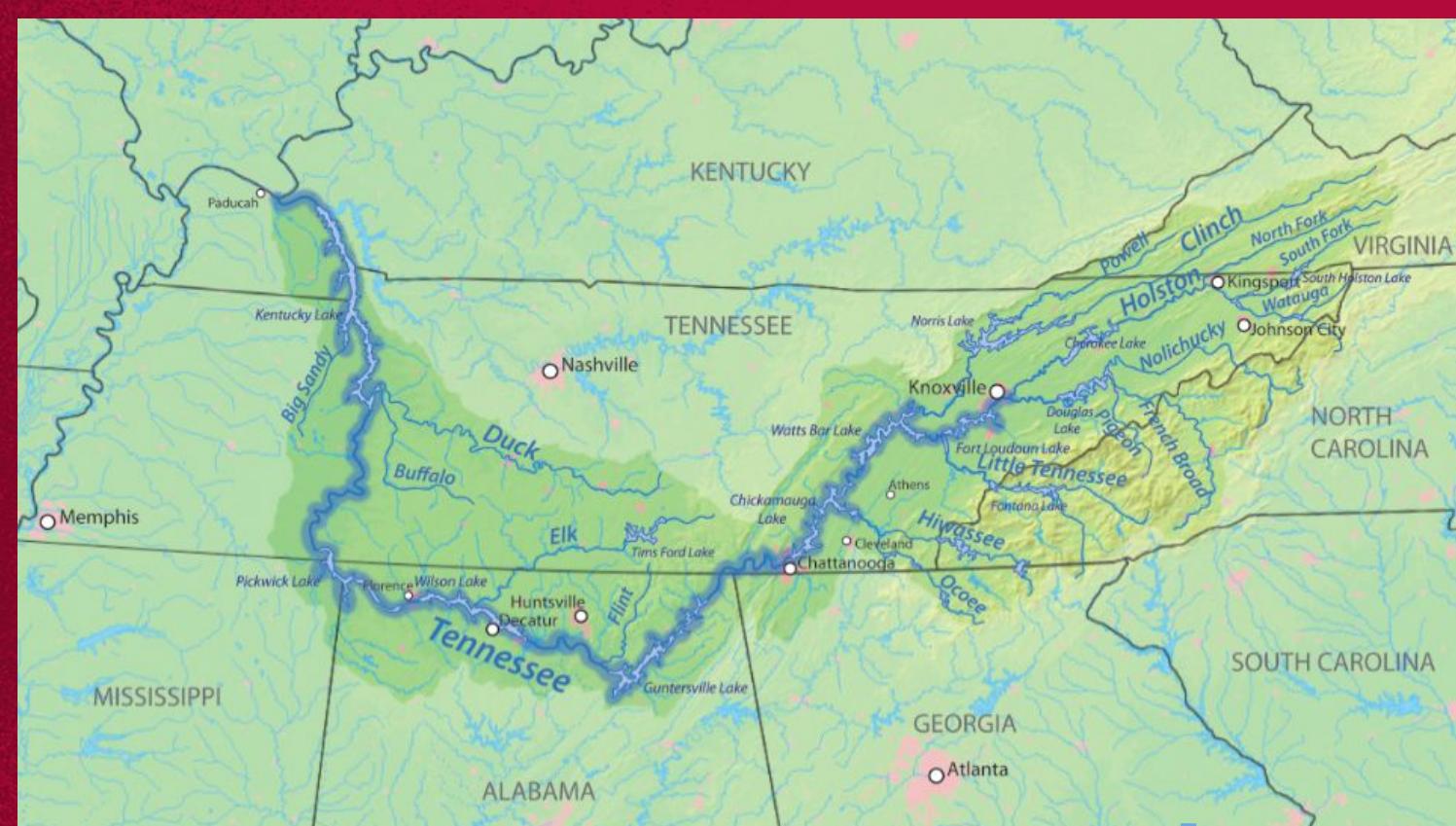
RESULTS



Phylogenetic tree with associated bootstrap values for sequenced specimens

RESULTS





RESULTS

- High diversity within this genus
- Phylogenetics gives us the opportunity to better understand the relationships within the genus
- Able to use data to show biogeographic patterns



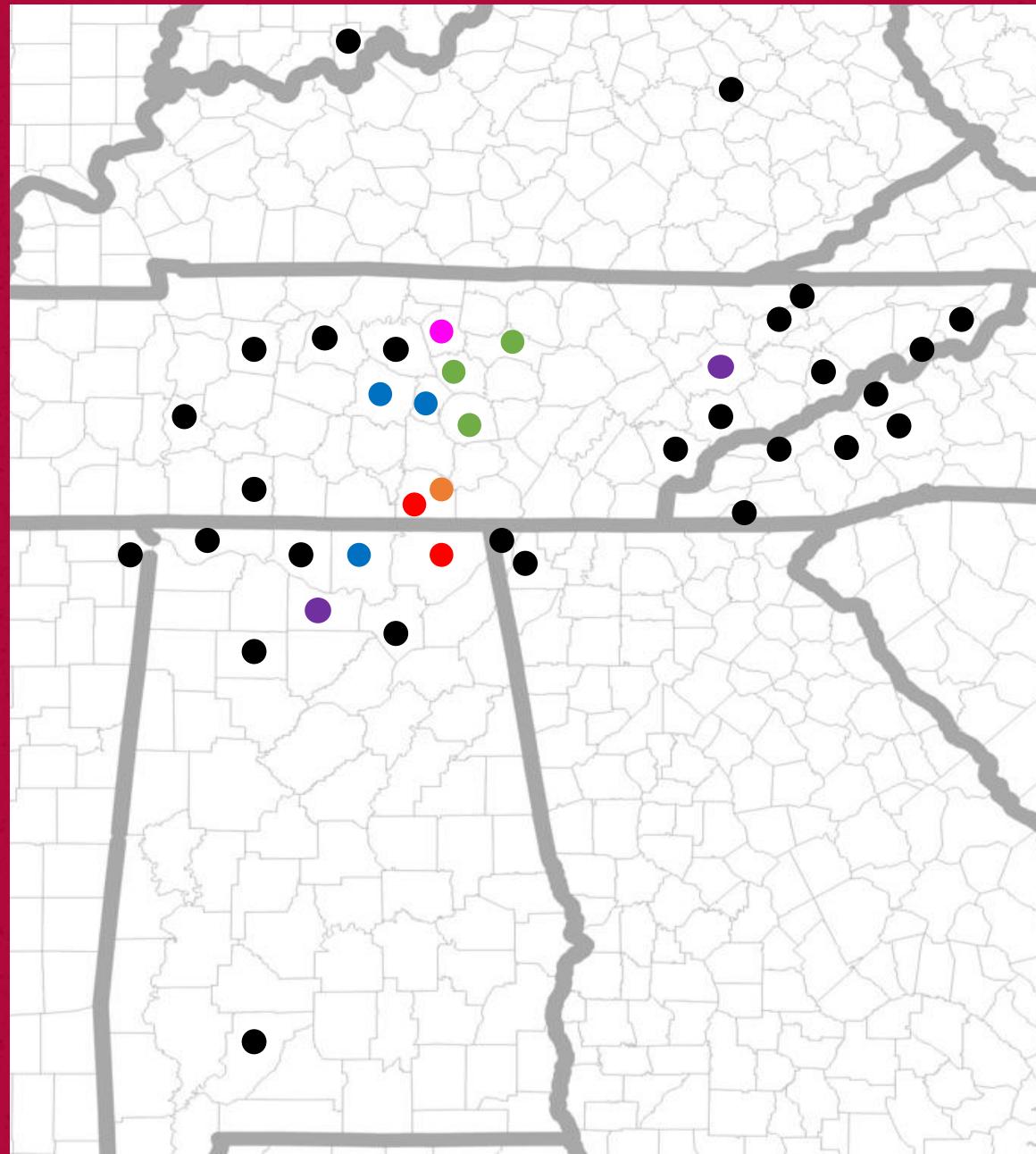
Conclusions

What's Next?

- Continue molecular work on specimen in *Liocranoides*
- Increase sampling volume and range to include more species from more areas in phylogenetic tree
- Use morphology of specimen to reinforce molecular findings



Sample	Date collected	State
KSZ17-025	5/23/2017	Tennessee
KSZ17-072	7/24/2017	Tennessee
KSZ17-074	7/12/2017	Tennessee
KSZ17-087	7/24/2017	Tennessee
KSZ17-088	7/14/2017	Tennessee
KSZ17-101	7/12/2017	Tennessee
KSZ17-123	7/12/2017	Tennessee
KSZ17-160	7/21/2017	Tennessee
KSZ17-190	7/29/2017	Tennessee
KSZ17-191	7/29/2017	Tennessee
KSZ17-216	8/2/2017	Tennessee
KSZ17-262	8/8/2017	Tennessee
KSZ17-290	10/12/2016 6/2/2017	Tennessee
WC13-166	16-Jul-13	TN
WC13-166	16-Jul-13	TN
WC13-188	22-Jul-13	TN
WC13-210	4-Aug-13	TN
WC13-210	4-Aug-13	TN
WC13-210	4-Aug-13	TN
KSZ14-260	28-Sep-14	TN
KSZ14-220	29-Mar-14	TN
KSZ13-203	31-Jul-13	TN
KSZ13-160	11-Jun-14	GA
KSZ15-316	19-May-15	GA
KSZ15-316	19-May-15	GA
KSZ15-344	21-May-15	GA
GD 101	21-Jul-09	TN
GD 47	22-Jun-09	TN
GD 102	22-Jul-09	TN
GD 106	21-Jul-09	TN
GD 113	26-Jul-09 12-Aug-09	TN
MLN13-061	23-Aug-13	AL
MLN13-058	12-Aug-13	AL
MLN13-006	5-Jun-13	TN
MLN12-046	18-Oct-12	TN
MLN13-003	16-May-13	TN
MLN13-003	16-May-13	TN
LADC1	November ?, 2008	TN
LAKC1	November ?, 2008	TN
LAKC2	November ?, 2008	TN
LAMC2	21-Jul-09	TN
LAMC4	21-Jul-09	TN
LAMC5	21-Jul-09	TN



Acknowledgements

University of
Indianapolis

Emily Stern

Dr. Brian
Patrick

Dr. Dan Proud

Dr. Norm
Platnick



Platnick N. 1999. A Revision of the Appalachian Spider Genus *Liocranoides* (Araneae: Tengellidae). American Museum Novitates. 3285: 1-16