

Characterizing a Novel Fungal Lineage in Boreal Soil

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Introduction

Mycology

- Fungi do a variety of essential tasks for their environment
 - Alaska treeless without fungal symbionts (8)
 - including giving plants mineral nutrients and water, and decomposing plant matter (2)(5)
- Fungi play a pivotal role in carbon stability
- Mycology is in its cataloging phase: Of an estimated 1.5 million fungal species only 5% have been formally described. (1)

Detection of Divergence in a Novel Fungal Lineage in Boreal Forest

- Lineage highly divergent from known taxa.
- Of five novel lineages found previously discovered by Dr. Lee Taylor, we further characterized the diversity within one of the five novel lineage.

Research Questions

- Is there diversity within this lineage?

Methods

- Ran a whole Genome Amplification of .25 gram of soil core sample
- Cloned specific fungal lineage
- Used Sequencher along with BLAST Trim Vector to clean up DNA sequences.
- Constructed a phylogeny of clone samples

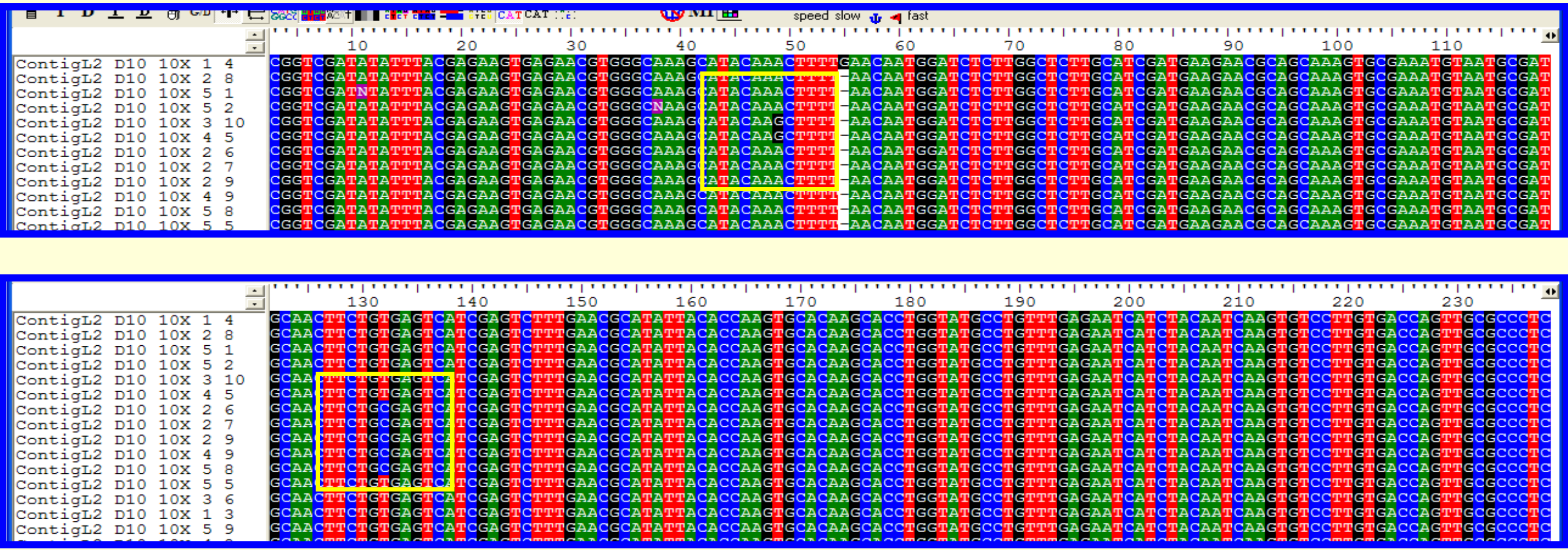


Figure 2. Clone Sequences from single soil core . Note: Transition mutations in yellow boxes.

Results

- Appears to be three different taxa in .25 gram soil core. (See Fig 3)
- Number of clones within each clade is 26, five, and two.
- The intraspecific sequence similarity of these clones is 99.66%.
- From the original sequence of the same site there was a 98.3% sequence similarity.
- The base pair mutations in these taxa are transitions: the group of five having a C instead of T and the group of two having an A instead of G as compared to the original sequence. (See fig 2)

Note: The branches of the phylogenetic tree do not represent time in this diagram but instead mutational divergence. The biological time it took for these mutations is unknown and impractical to illustrate for our purposes.

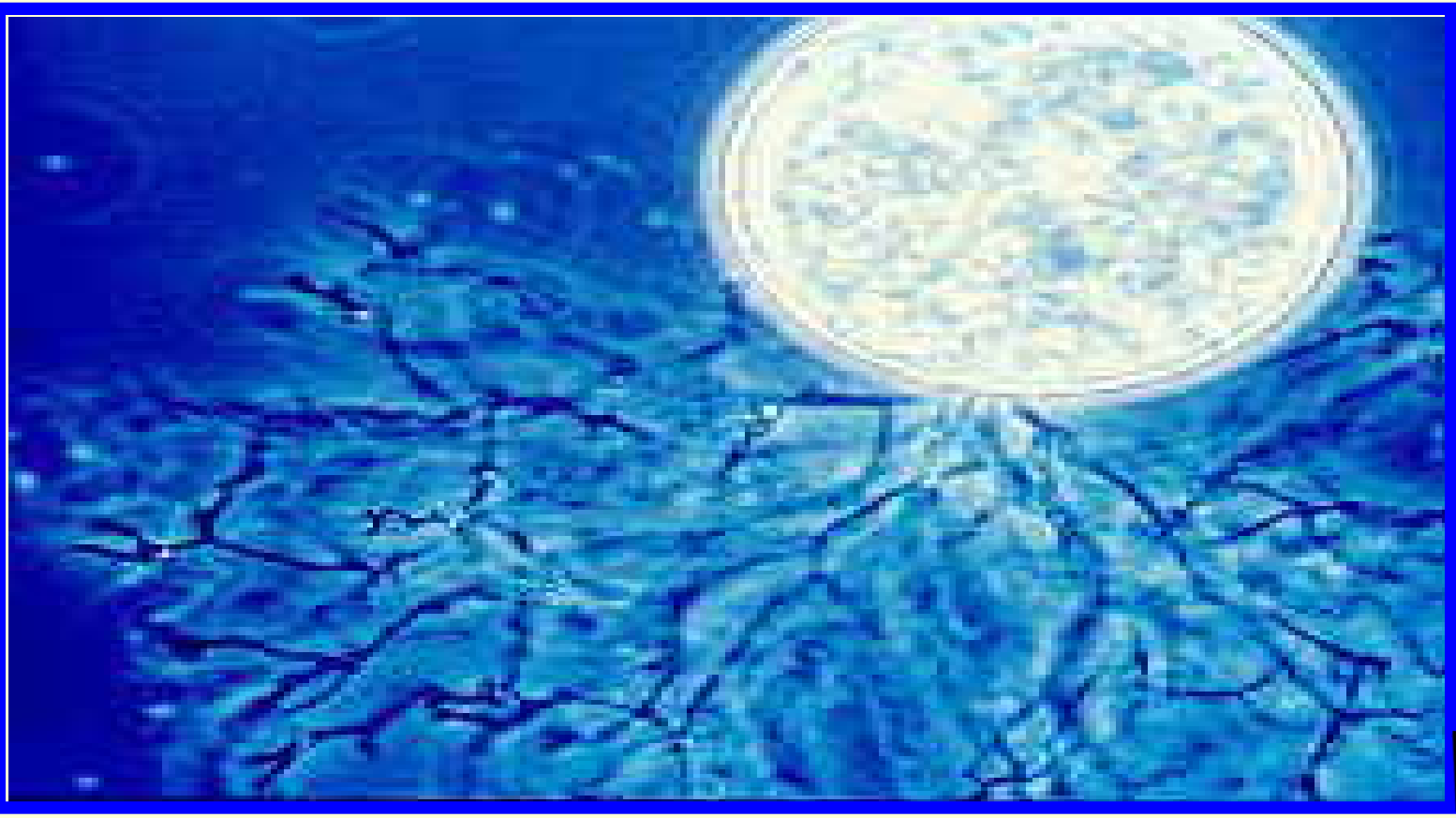


Figure 3. Chytridiomycota - Chytridiales - eucarpic thallus of *Rhizophydium*

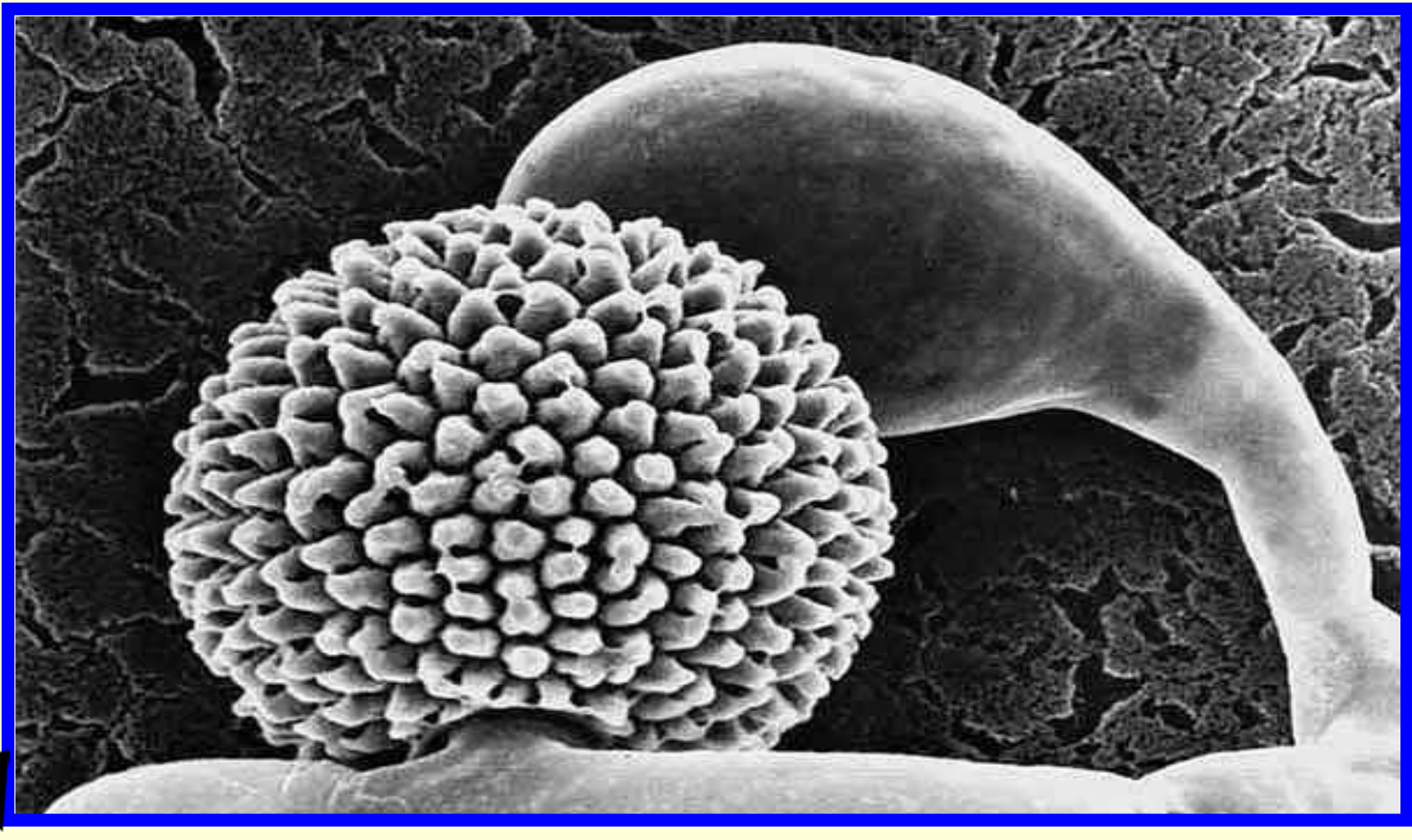


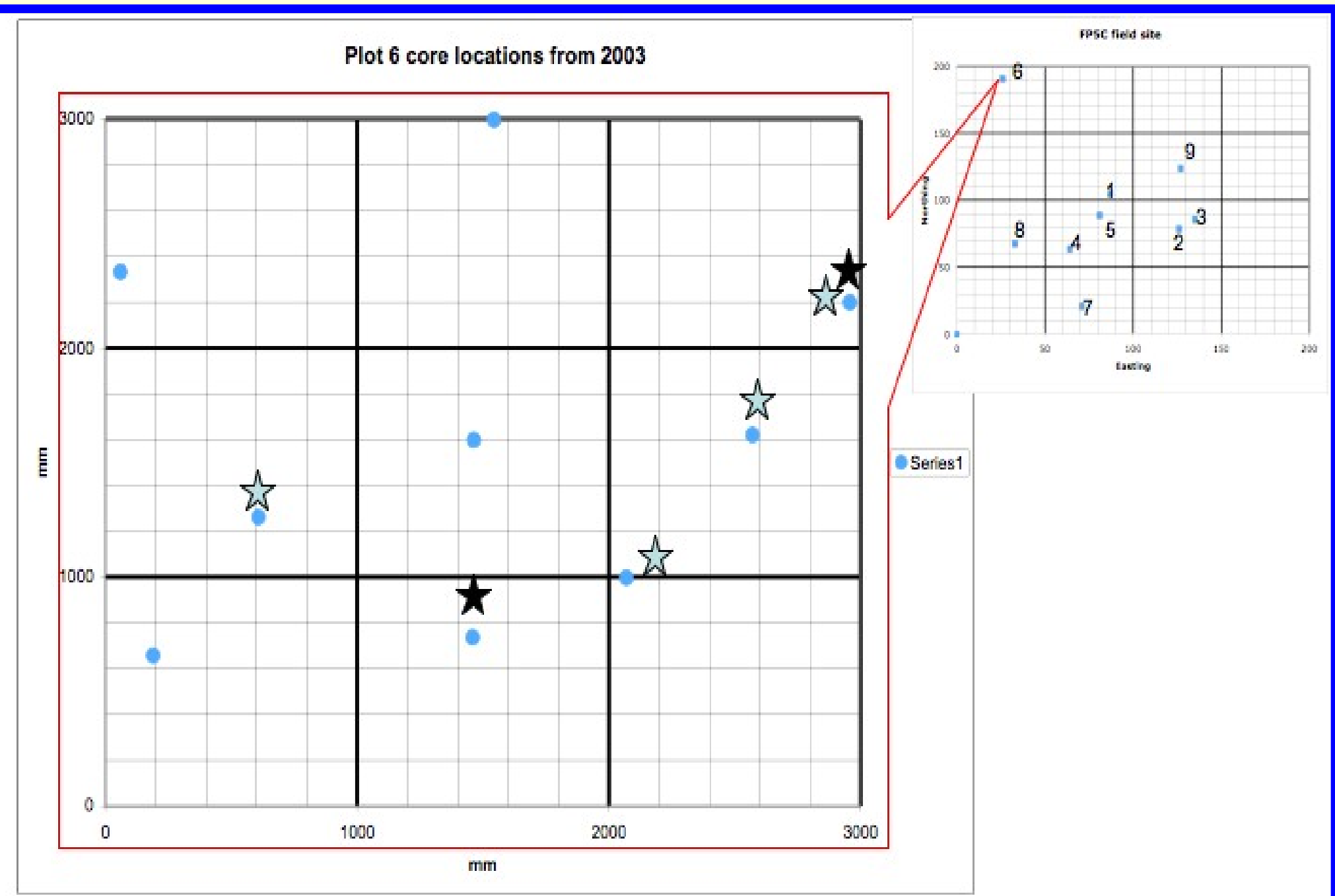
Figure 4. Zygo Spore: Zygomycetes

Conclusion

- Singles Core variation: leads to believe more diversity within site(s)
- Multiple clones for each taxon: not likely Taq error
- Future Direction: test for diversity in other 9 sites (See fig 1)

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Other locations:
"L2" = ★ And is also@ plot 1 cell 7
"L4" = ☆ And is also@ plot 1 cell 7, plot 2 cell 6, plot 9 cell 9

Figure 1. Black Spruce site, black stars represent our novel taxon of interest.

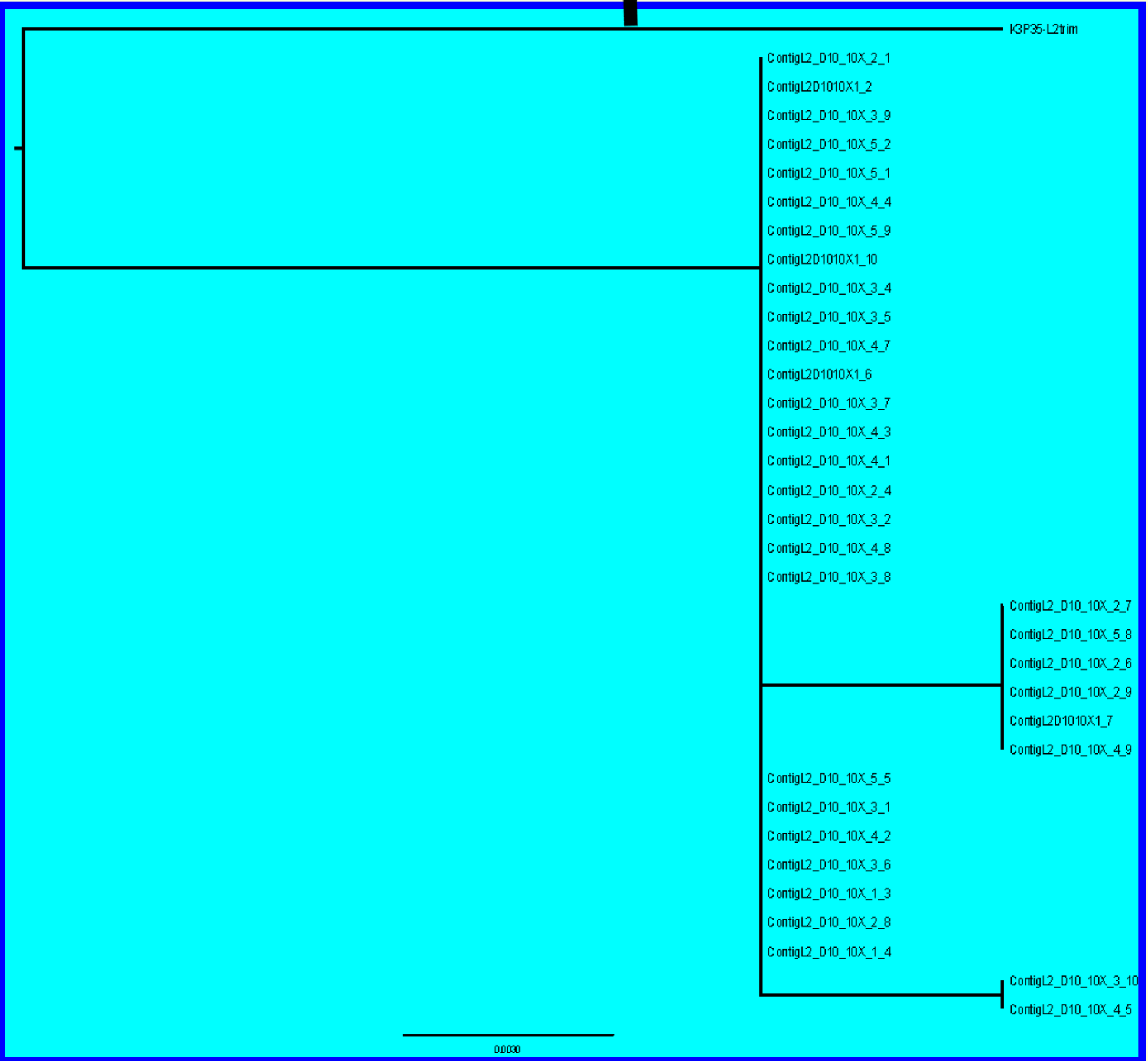


Figure 5. Phylogeny constructed from a single soil core clone library. Different clades represent same taxon represented by multiple clones.

References

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