

# DNA Barcoding Caddisflies from the Rouge River Watershed using the CO1 gene

Wilson, E. R.; Cebrero-Moreno, K. Y.; Landis, G. N.; Goldsmith, C. M.  
Natural Sciences Department, Marygrove College



## Introduction

Biologists confront a planet populated by millions of species and it is nearly impossible to identify them all morphologically. DNA barcoding not only helps researchers speed identification, but it also helps them construct phylogenetic hypotheses ("trees"). The main reason for collecting caddisfly larvae was that they are easy to identify when sampled and are good water quality indicators. Caddisflies like to live in clean oxygenated water, so the more caddisfly larvae found in rivers/streams it will then indicate the water quality as clean.

## Methods

- Gathered specimens from Seeley Creek, Rouge River Watershed
- Identified the gathered specimens
- DNA extraction
- Amplified DNA using PCR
- Gel electrophoresis & PCR cleanup
- Sent DNA to Wayne State University for sequencing
- DNA Barcoding: sequencing, editing chromatograms, contig building, BLAST, sequence alignment, and tree building



Figure 1. Identifying and classifying caddisflies

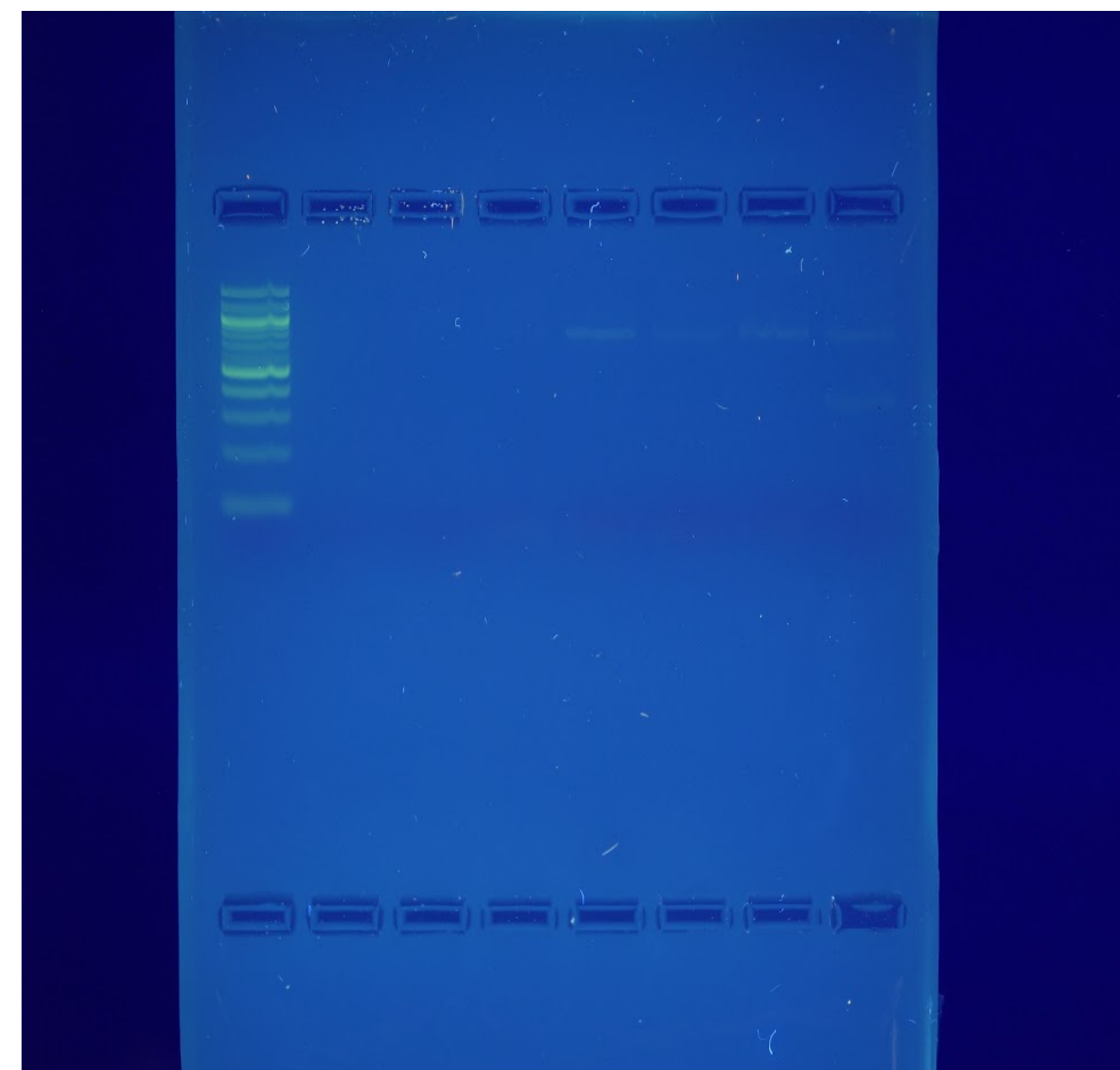


Figure 2. Gel electrophoresis results

**Reference:** Fusaro A. 2016. "Aquatic Ecosystems" slides. BIO 151, Marygrove College, Detroit, MI.

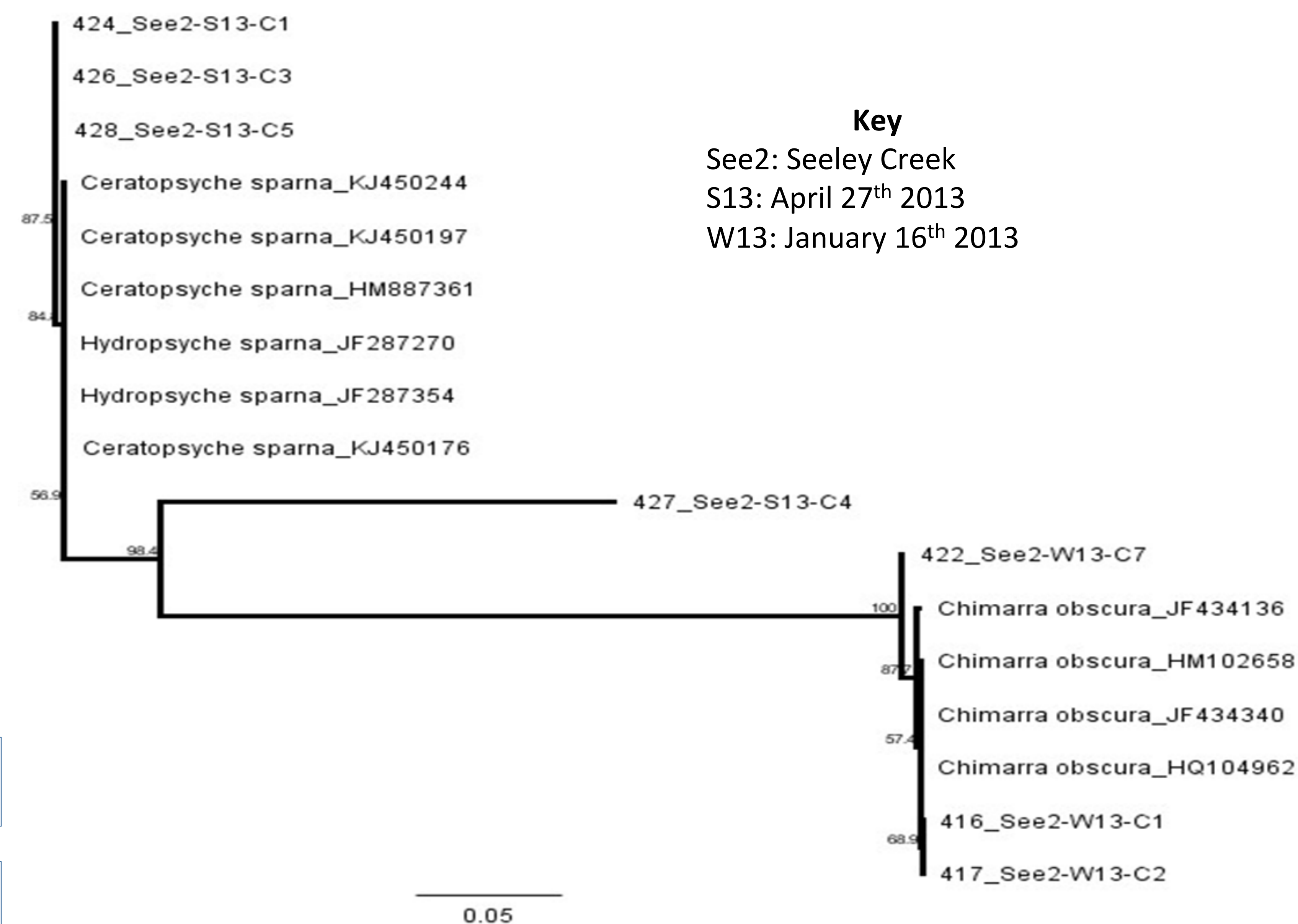


Figure 3. Phylogenetic tree of caddisflies found with a BLAST comparison from Seeley Creek, site 2, winter and spring 2013

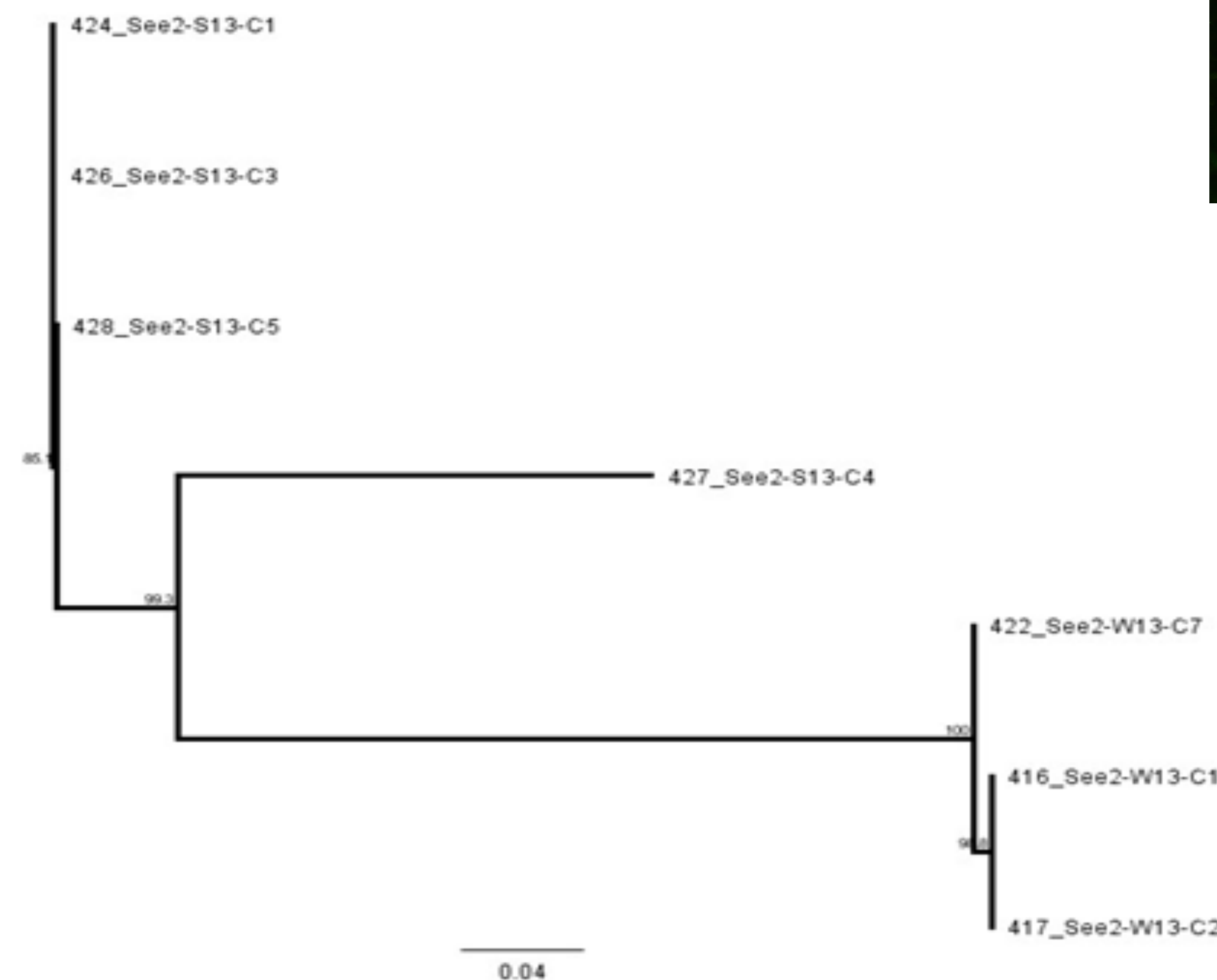


Figure 4. Phylogenetic tree that can compare Seeley Creek, site 2, winter and spring 2013 specimens, including sample 428

## Results

Our group started with 16 samples of caddisflies from Seeley Creek with a mixture of samples from January 16<sup>th</sup> 2013 and April 27<sup>th</sup> 2013. By the end of our research project we ended up with 7 different caddisfly samples for which we found a matching species through the GenBank database.

- 417** : 100% match to *Chimarra obscura*
- 416**: 99.4% match to *Chimarra obscura*
- 424**: 100% match to *Ceratopsyche sparna*  
99.8% match to *Hydropsyche sparna*
- 422**: 99% match to *Chimarra obscura*
- 426** : 100% match to *Ceratopsyche sparna*
- 427**: 98.9% match to *Hydropsyche sparna*  
98.9% match to *Ceratopsyche sparna*
- 428**: 100% match to *Ceratopsyche sparna*



Sample 428



Sample 427



Sample 422

## Discussion

In further studies we will upload our information to the GenBank & BOLD databases.

This will help researchers obtain more biological knowledge, which will then help to innovate and become more conscientious with their work.

## Acknowledgements

This research project would not have been accomplished without the help of the Friends of the Rouge, Clinton River Watershed Council, and Wayne State University. We would like to thank all these groups along with the funding provided by NIH to conduct our research.