



Using CO1 and DNA barcoding to identify caddisflies (Trichoptera)

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Figure 1. *Hydropsyche betteni*

Abstract

Through the help of DNA identifier mitochondrial gene cytochrome oxidase subunit 1 (CO1) and DNA barcoding. We were able to identify different genera and species of caddisflies. Most types of caddisflies are pollution sensitive. Caddisfly larvae are widely used to measure water quality. Samples were collected from sites along Johnson and Seeley Creeks, where the class identified the samples, extracted DNA, and amplified the DNA using PCR. Next, we used gel electrophoresis and PCR cleanup. We sent the DNA to Wayne State University for sequencing which allowed us to view the sequence alignments and identify their species through building a phylogenetic tree. Seven different species (*Hydropsyche betteni*, *Cheumatopsyche analis*, *Cheumatopsyche oxa*, *Cheumatopsyche wrighti*, *Chimarra obscura*, *Ceratopsyche bronta*, and *Ceratopsyche sparna*) were collected from these Rouge River sites in 2013 and 2015. These results indicated that we found four different genera of caddisflies.

Introduction

This poster discusses the procedure that we did to collect caddisfly larvae. Caddisfly larvae are good water quality indicators and are easy to sample and identify. The goal of this work was to use the information we gathered to make a phylogenetic tree of caddisflies from all class sites to see how closely related they are.

Methods

- Gathered and identified specimens from Johnson and Seeley Creeks
- Extracted the DNA
- Amplified DNA using PCR amplification
- Gel electrophoresis and PCR cleanup
- Sent DNA to Wayne State University for sequencing
- Used sequence alignment to identify genera and species of caddisflies
- Built a phylogenetic tree using information from GenBank and sequence alignment
- Built a phylogenetic tree with the entire class data

Results

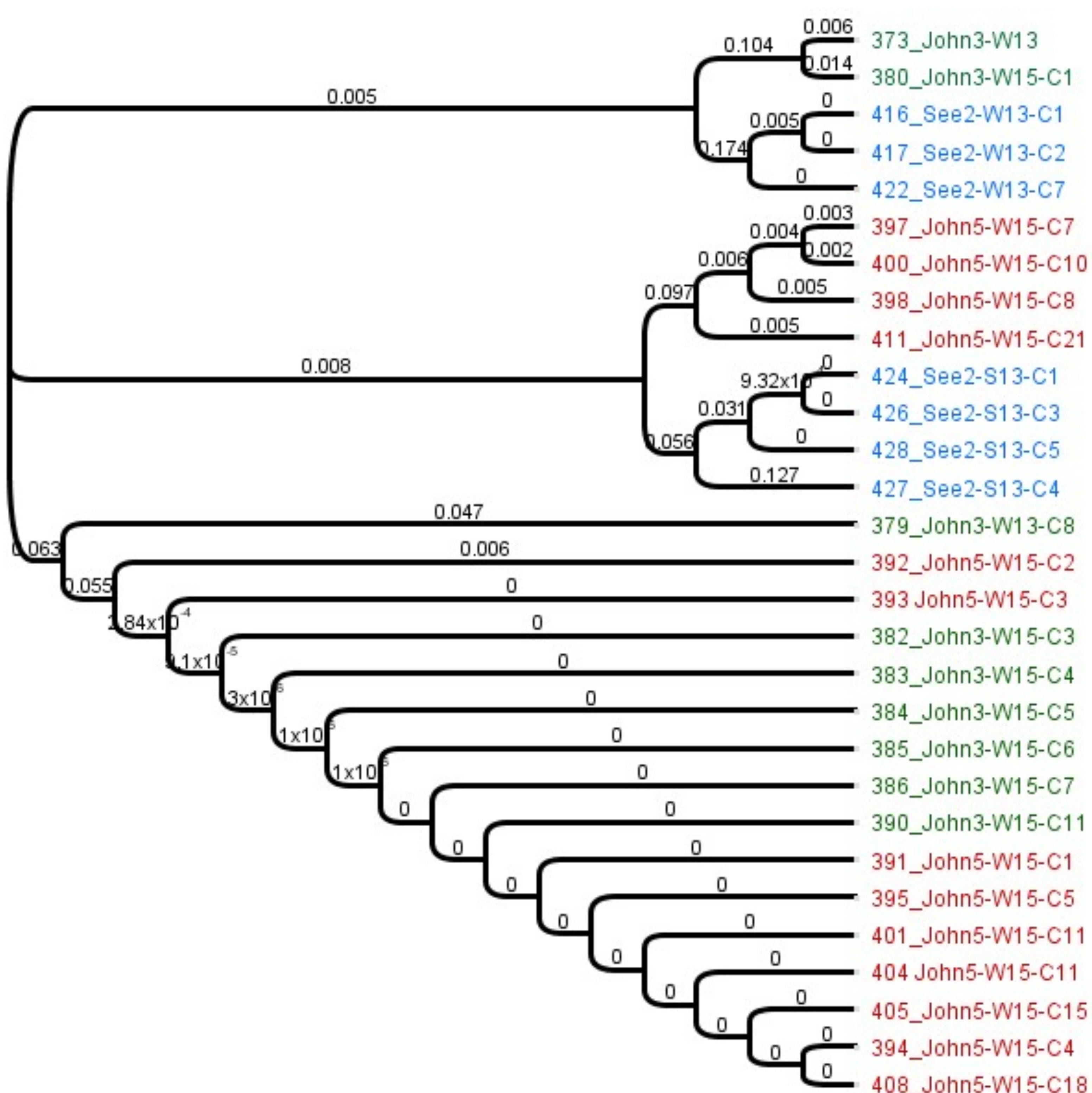


Figure 2. This phylogenetic tree shows how closely related each site's specimens are.

Results (continued)

We found that we had mainly two types of caddisflies, *Hydropsyche betteni* and *Cheumatopsyche analis*, collected from the John 3 site from 2013 and 2015. Our amplified DNA was sent to WSU for Sanger sequencing. The DNA sequences were analyzed using Geneious followed by BLAST, comparing our specimens to others in the DNA Barcode library. Our sequences showed high degree of similarity to the specimens in the DNA Barcode library. The tree below (Fig. 3) shows that most of the species closely related came from the same site. Also, two additional species were identified from the overall class data, which were *Chimarra obscura* and *Ceratopsyche bronta*.

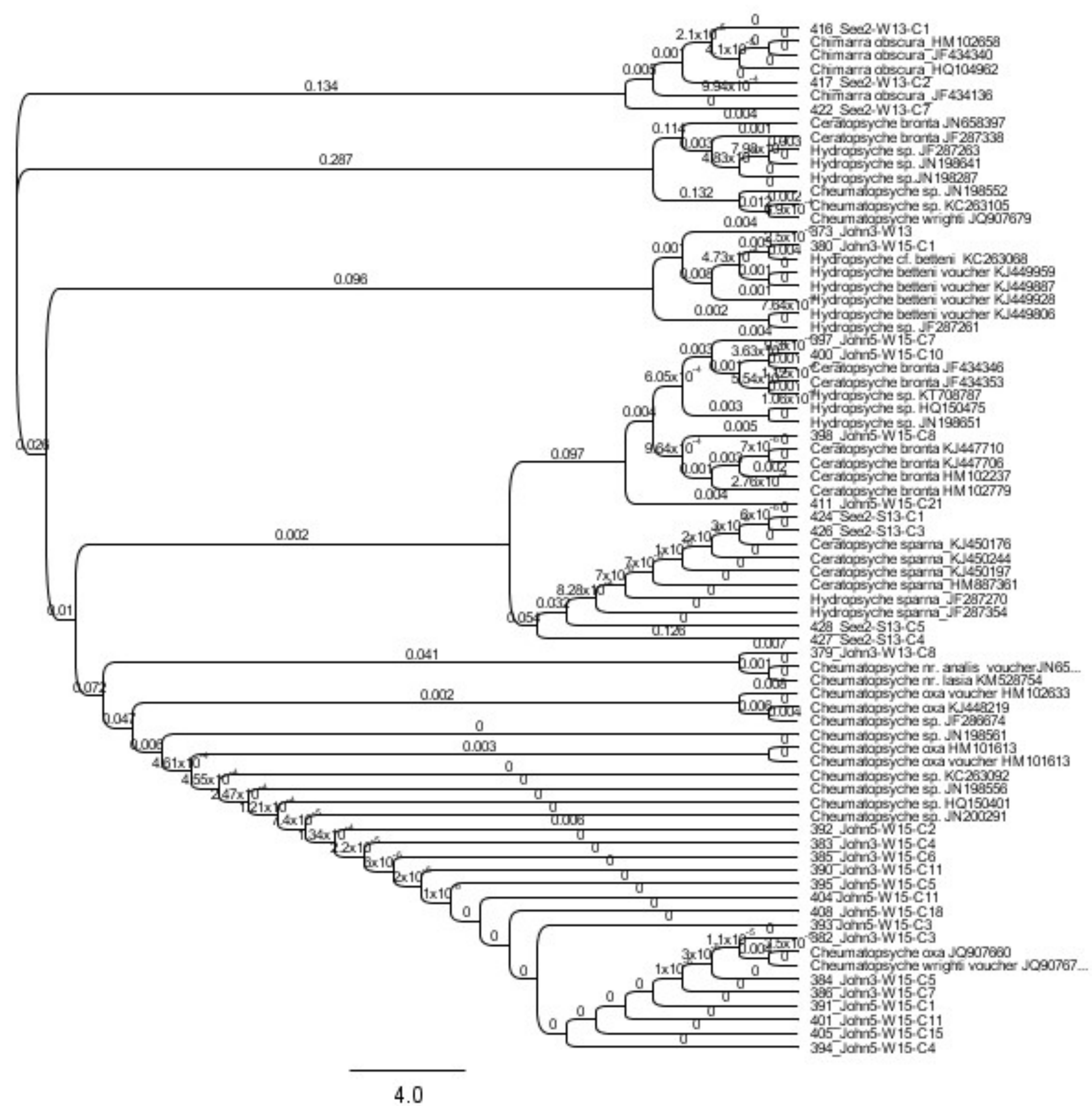


Figure 3. This phylogenetic tree shows the names of the species samples from each site was closely related to. It is easy to see whether they are in the same taxonomic group or not.

Discussion

By using the mitochondrial gene cytochrome c oxidase, we were able to use DNA barcoding to identify four genera of caddisflies: *Hydropsyche*, *Cheumatopsyche*, *Chimarra*, and *Ceratopsyche*, representing six different species (*H. betteni*, *Cer. bronta*, *Cer. oxa*, *Che. analis*, *Che. wrighti*, and *Chi. obscura*).

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References

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