

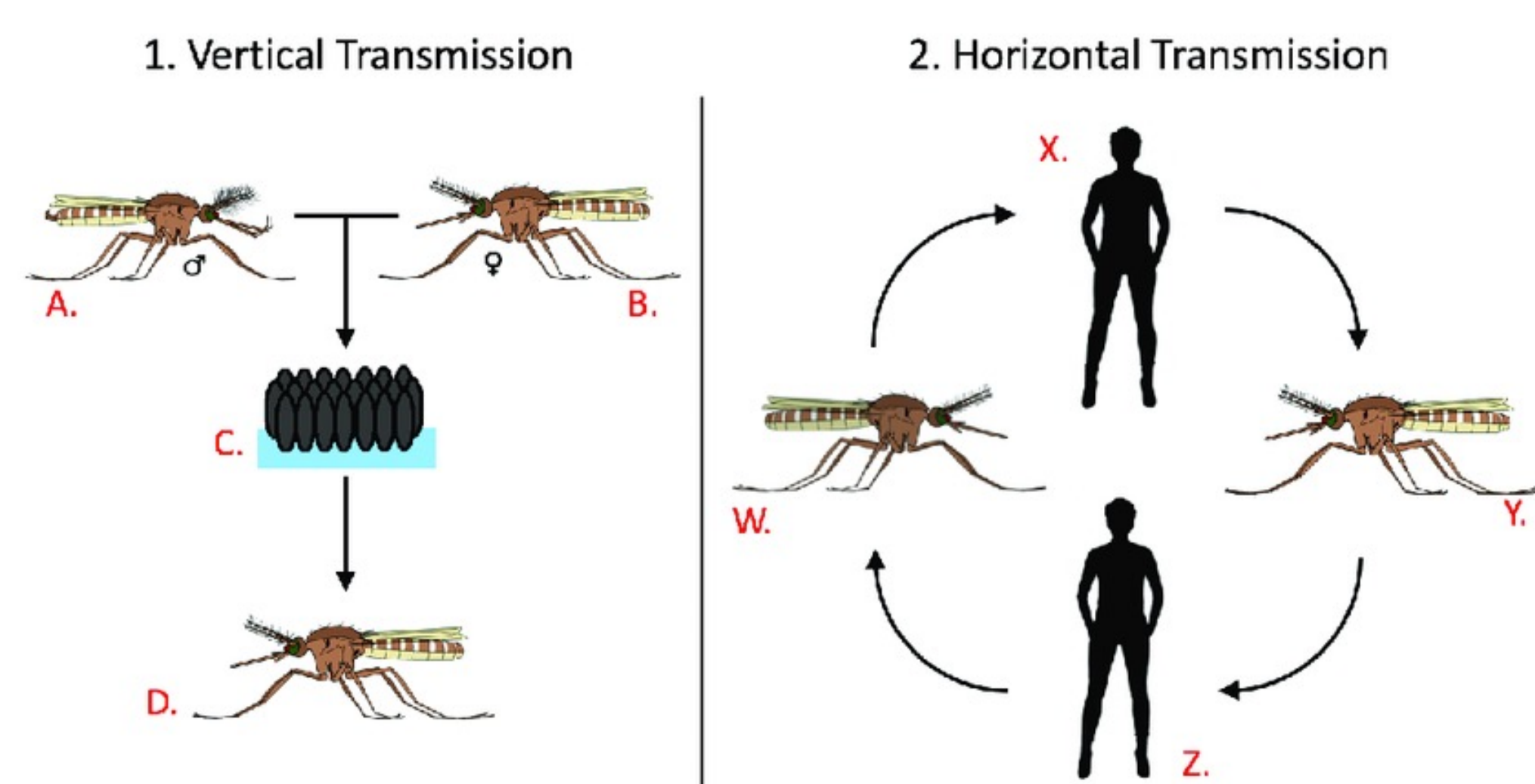
# Transmission and Polymorphisms of Culex Flavivirus in Wild-Caught Culex Mosquitoes from Cleveland, Ohio



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## BACKGROUND

- Mosquito-borne viruses<sup>1</sup>
  - Arbovirus: virus spread through the bite of an infected arthropod
  - Insect-specific virus (ISV): virus that only infects invertebrates
- Culex Flavivirus (CxFv) is an ISV in the *Flavivirus* genus (this genus contains both arboviruses and ISVs)<sup>2</sup>
  - single-stranded positive-sense RNA virus typically vectored by arthropods<sup>2</sup>
- Transmission of arboviruses and ISVs is dependent on the life cycle of the mosquito



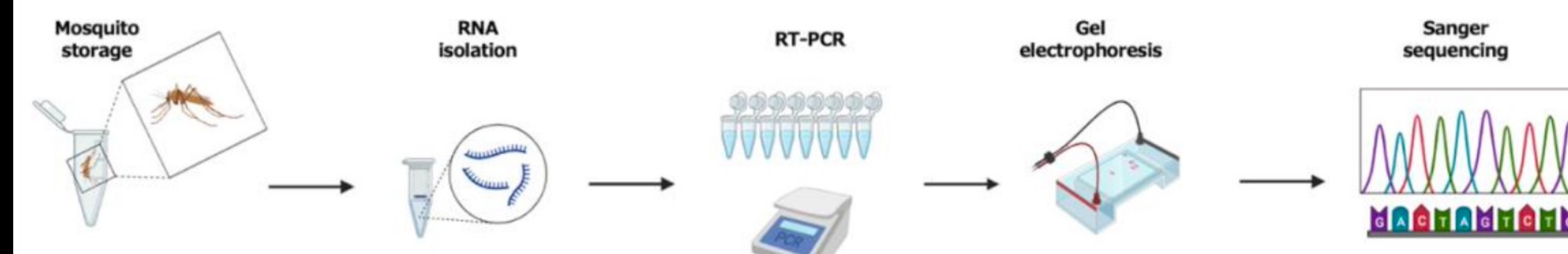
**Figure 1: Viral transmission modes.** Vertical vs. horizontal transmission. Vertical transmission is more relevant when studying ISVs, while horizontal transmission is useful for tracking arboviruses.<sup>3</sup>

- Polymorphisms can be identified and studied by looking at how CxFv is transmitted amongst mosquito species
- Studying transmission modes and polymorphisms is essential for furthering the world's understanding of mosquito-borne viruses and their evolution

## OBJECTIVES

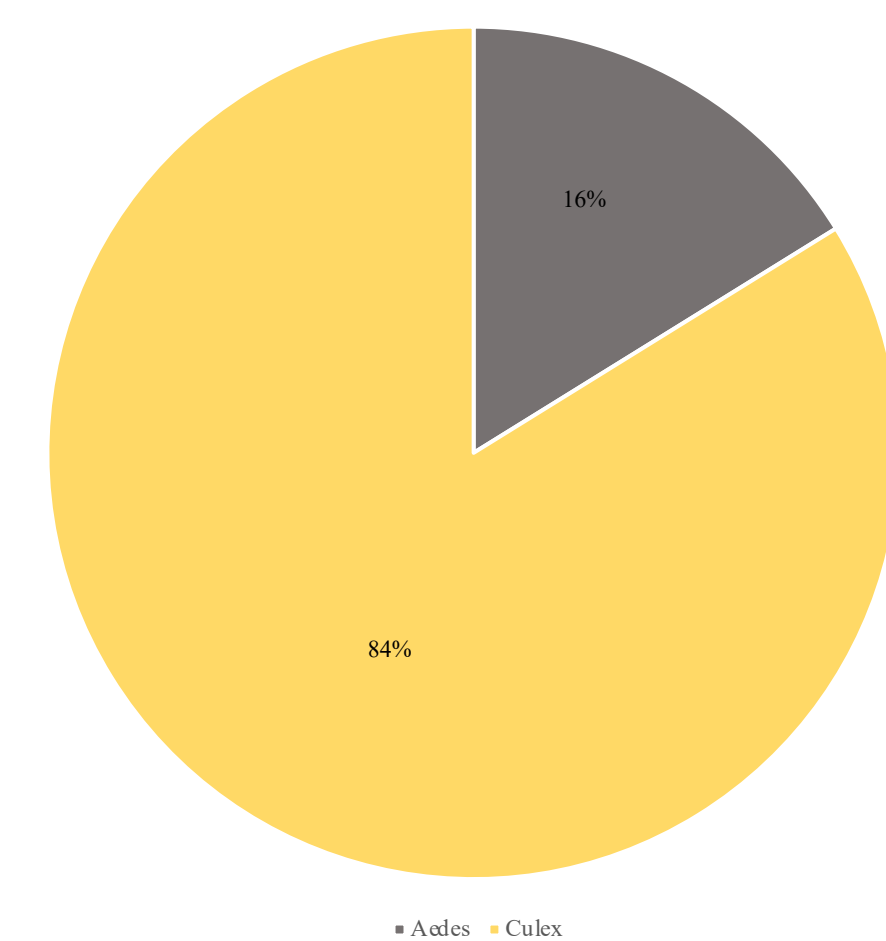
- Determine the abundance of mosquitoes in Cleveland, Ohio.
- Determine the mode of transmission of CxFv in the mosquitoes caught in Cleveland.
- Identification of CxFv polymorphisms.

## METHODOLOGY

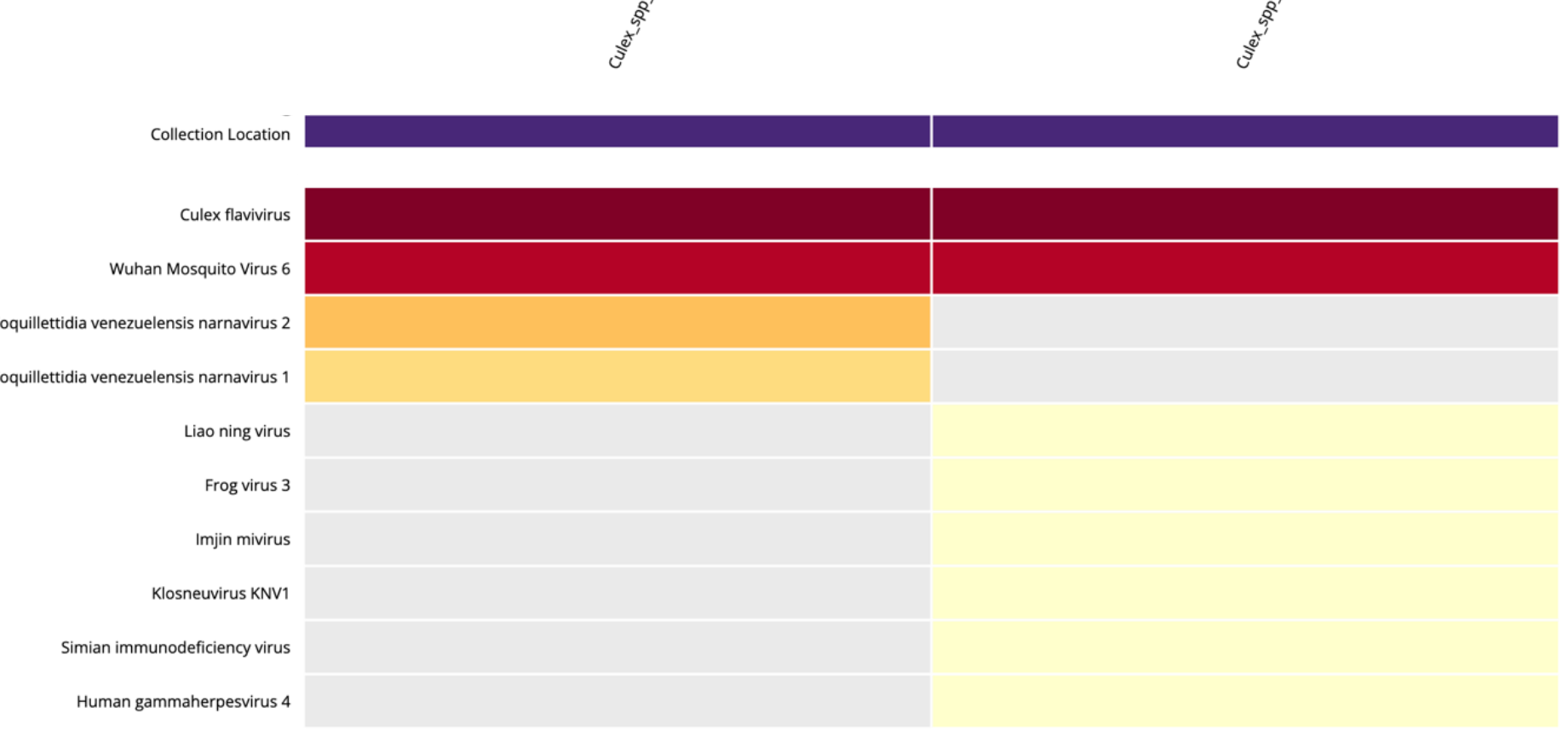


- Collection was done using gravid traps between June-August
- Bioinformatic analyses were conducted on the sequencing data using SnapGene Viewer, CZ-ID, NCBI, and phylogeny.fr

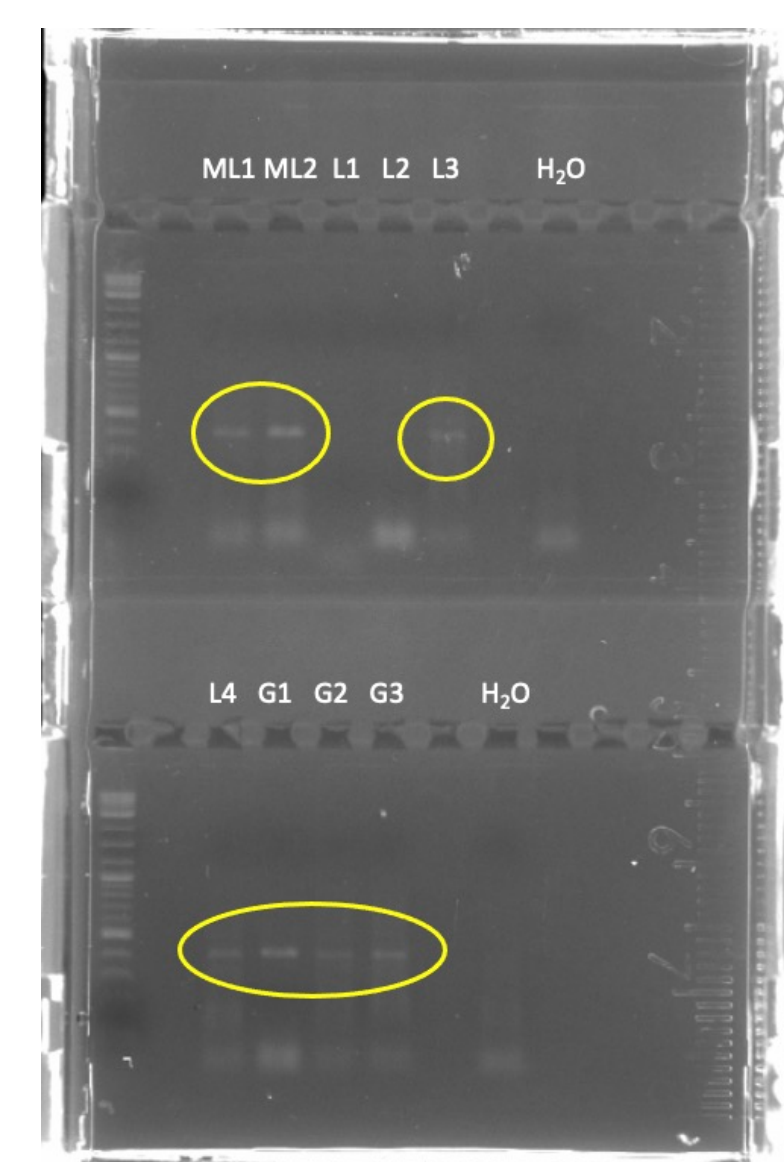
## RESULTS



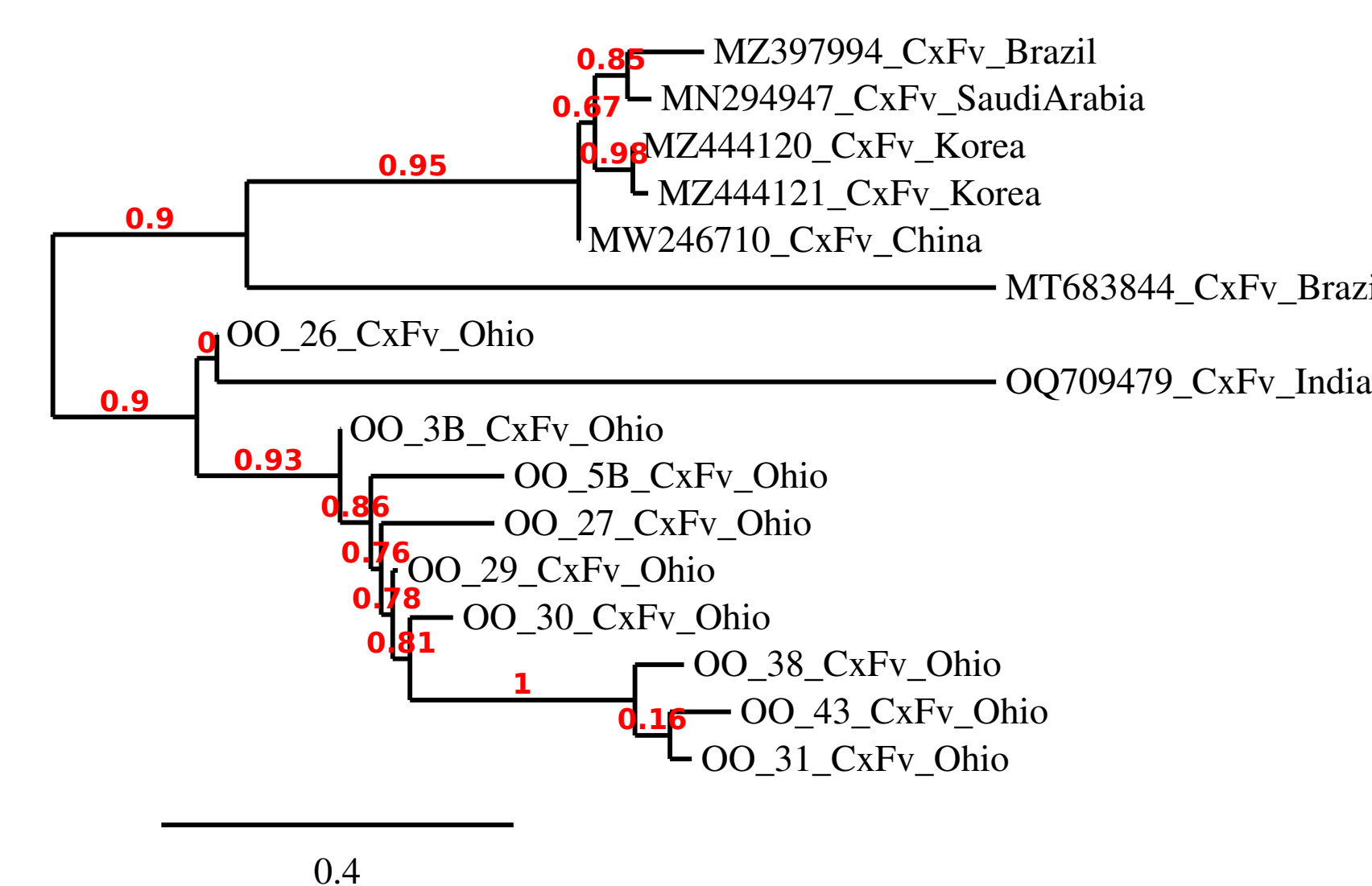
**Figure 2: Prevalence of mosquito species in Cleveland, Ohio.** The majority of the mosquitoes collected from Cleveland were *Culex*.



**Figure 3: Heat map of Culex Flavivirus.** Culex flavivirus has the highest intensity in both sample sets and is the most prevalent in each.



**Figure 4: Gel image of positive CxFv products from RT-PCR from mosquito larvae.** Shows CxFv is vertically transmitted.



**Figure 5: Phylogenetic analysis of Culex flavivirus strains.** Analysis of CxFv strains from other countries and samples from this study from Cleveland, Ohio. Shows high similarity amongst OO samples.

	3B	5B	26	27	29	30	31	38	43
3B		80%	71.14%	81.72%	93.04%	86.74%	54.15%	61.37%	52.47%
5B			63.16%	73.85%	82.91%	78.29%	52.31%	80%	51.31%
26				74.17%	72.86%	72.11%	35.57%	46.98%	33.81%
27					81.56%	79.44%	52%	58.46%	48.81%
29						91.64%	56.14%	62.68%	53.60%
30							62.50%	66.98%	58.31%
31								89.46%	91.42%
38									85.76%
43									

**Table 1: Nucleotide sequence alignment similarity percentage between each sample.**  
\*yellow represents highest sequence similarities, blue represents lowest sequence similarities

## DISCUSSION

- Previous studies have shown that *Culex* species are present in Cleveland, Ohio. This study corroborates these results with 84% of the mosquitoes caught being *Culex*<sup>4</sup>
- CxFv had a 40% prevalence in the samples, which is lower than most other studies
- High sequence similarities between the samples from Cleveland, Ohio suggest a low evolution of CxFv in this area
- CxFv was determined to be vertically transmitted by analyzing mosquito larvae<sup>5</sup>
- Polymorphisms were random and no conclusive patterns were observed when sequences were translated<sup>6</sup>

## ACKNOWLEDGEMENTS

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- Figure 6. Vertical vs. horizontal transmission. 1. Vertical... *ResearchGate* [https://www.researchgate.net/figure/Vertical-vs-horizontal-transmission-1-Vertical-transmission-Either-one-or-both-parent\\_fig2\\_365489658](https://www.researchgate.net/figure/Vertical-vs-horizontal-transmission-1-Vertical-transmission-Either-one-or-both-parent_fig2_365489658).
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