

**CORONAVIRUS**

# Cryptic transmission of SARS-CoV-2 in Washington state

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# GOAL: How was SARS CoV-2 introduced in the U.S?



Visiting Family  
in Wuhan back  
to Snohomish  
County, WA

# Gap in Knowledge: How was SARS CoV-2 Transmitted in Washington State?



Animated Map: <https://nextstrain.org/community/blab/ncov-cryptic-transmission/wa-clade>



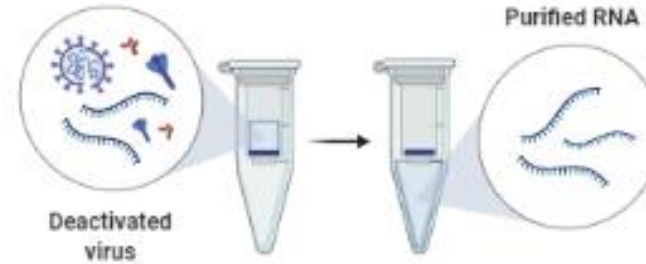
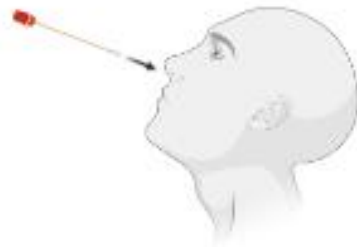
# How did they plan to track the outbreak?

## COVID-19 Diagnostic Test through RT-PCR

1 Nasopharyngeal swab <15 min

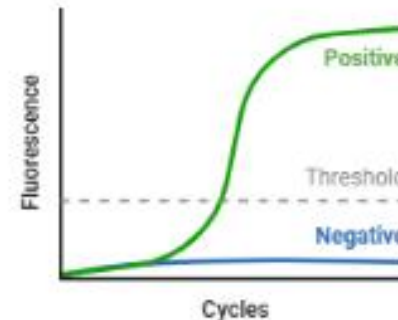
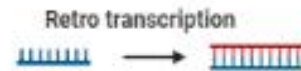
2 Collected specimen 0-72 h

3 RNA extraction ~45 min



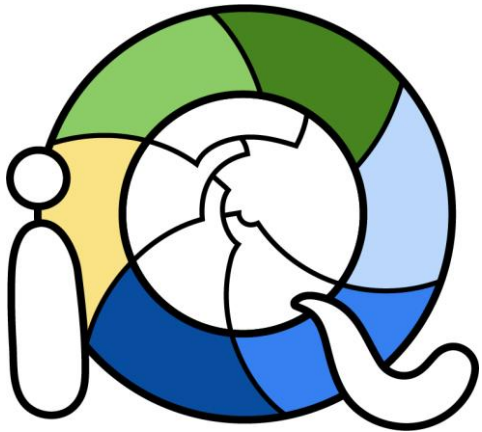
4 RT-qPCR ~1 h per primer set

5 Test results real-time



illumina®

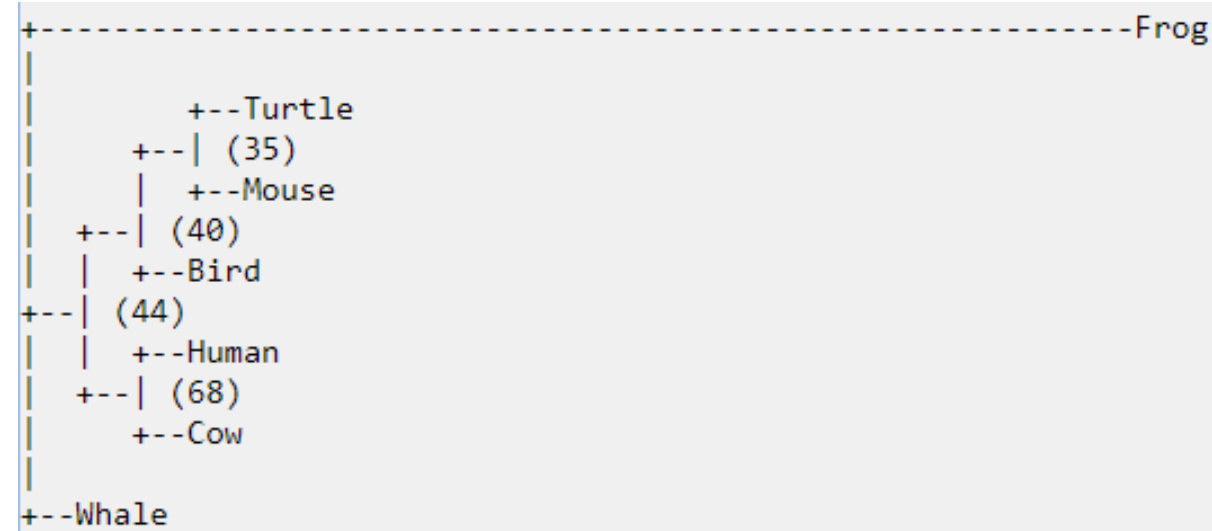
# What were the steps used to assemble the phylogenetic trees?



IQ TREE

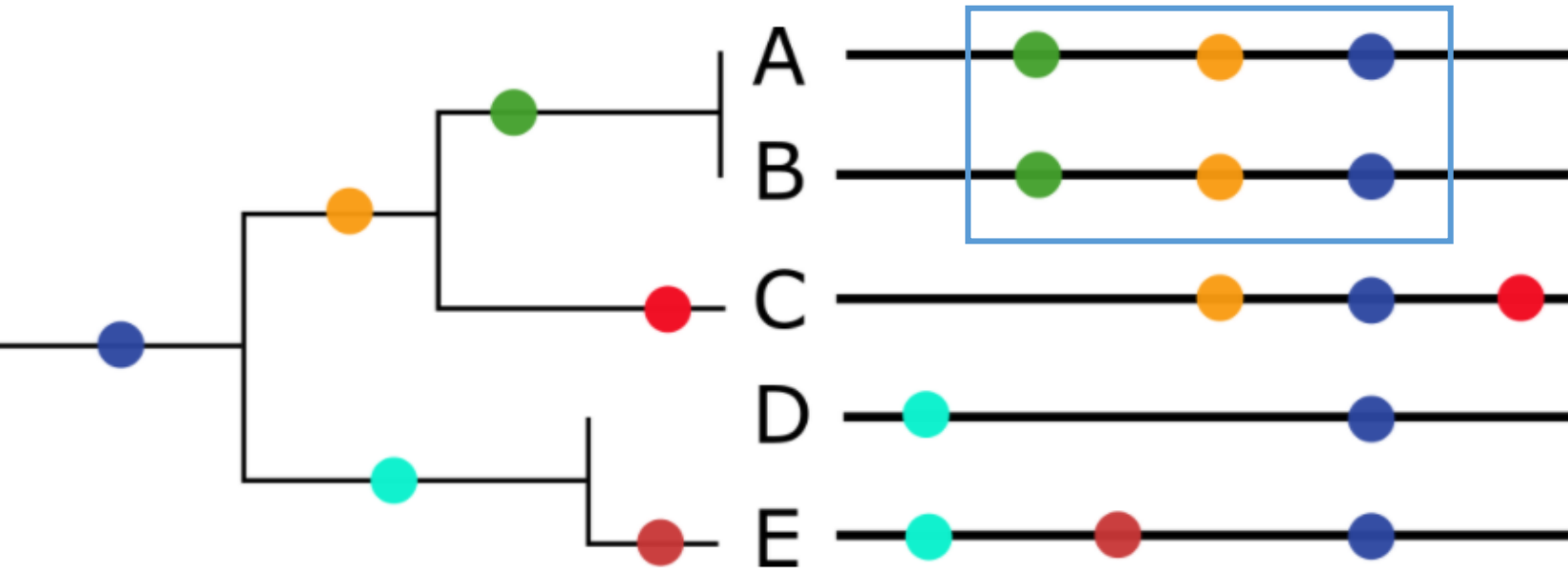
```
>Frog
AAATTTCCTGTGATTCAGCAGTGAT
>Turtle
CTTCCACACCCCAGGACTCAGCAGTGAT
>Bird
CTACCACACCCCAGGACTCAGCAGTAAT
>Human
CTACCACACCCCAGGAAACAGCAGTGAT
>Cow
CTACCACACCCCAGGAAACAGCAGTGAC
>Whale
CTACCACGCCCCAGGACACAGCAGTGAT
>Mouse
CTACCACACCCCAGGACTCAGCAGTGAT
```

**FASTA**



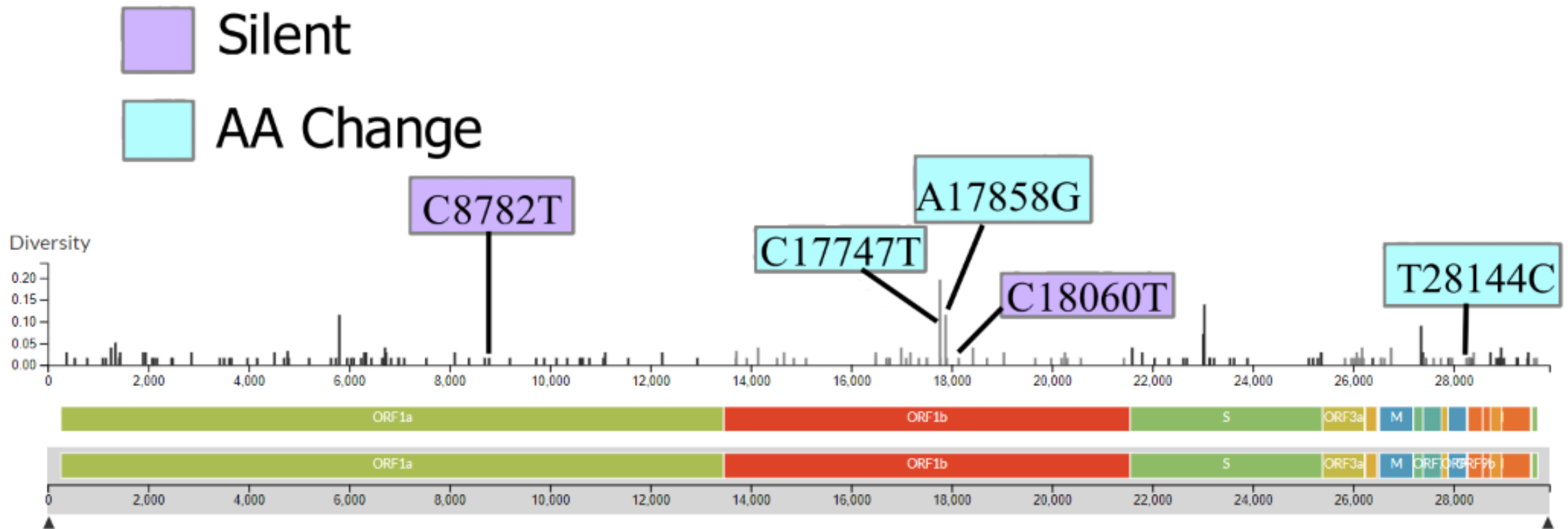
**Tree**

# How can phylogenetics be used to track SARS CoV-2 mutations?

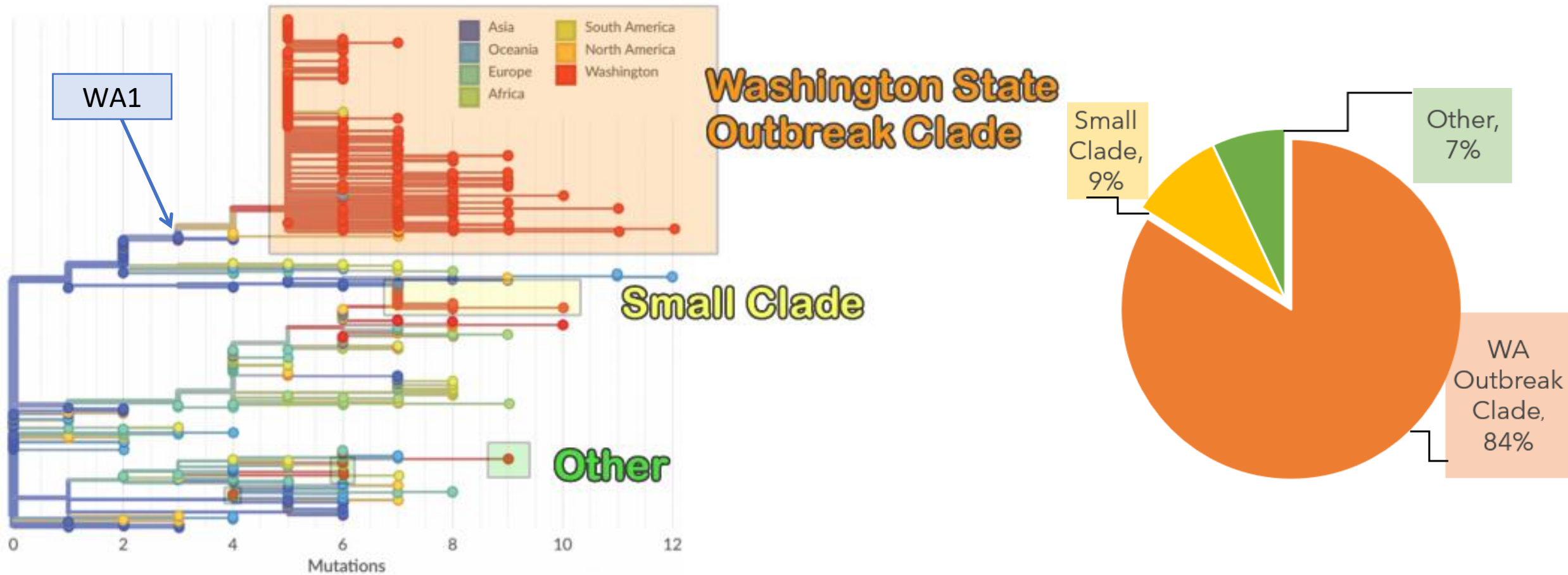


More replication opportunities = more mutations

# Where were the mutations located in the genome?



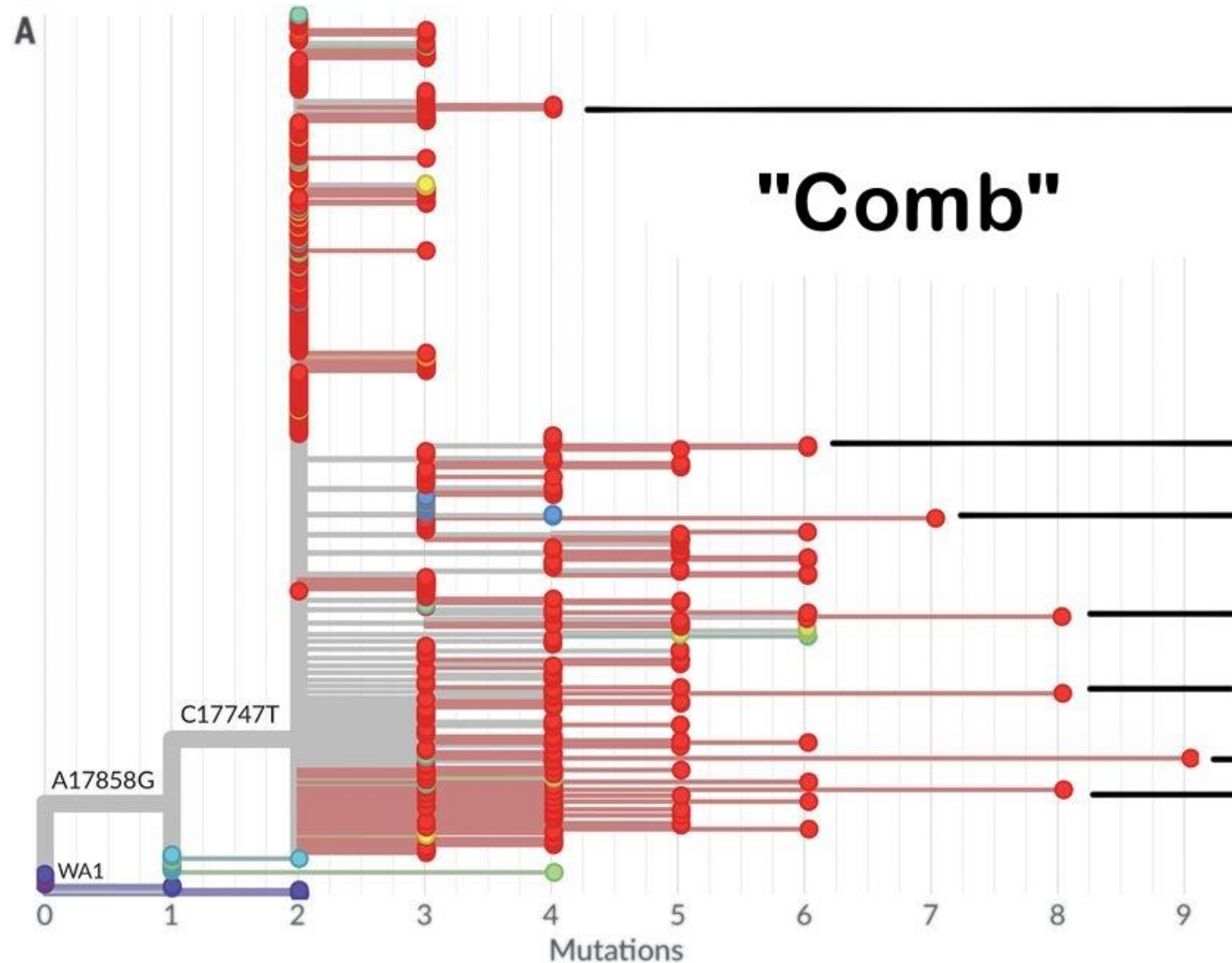
# Fig 1: What is the Washington State Outbreak Clade?



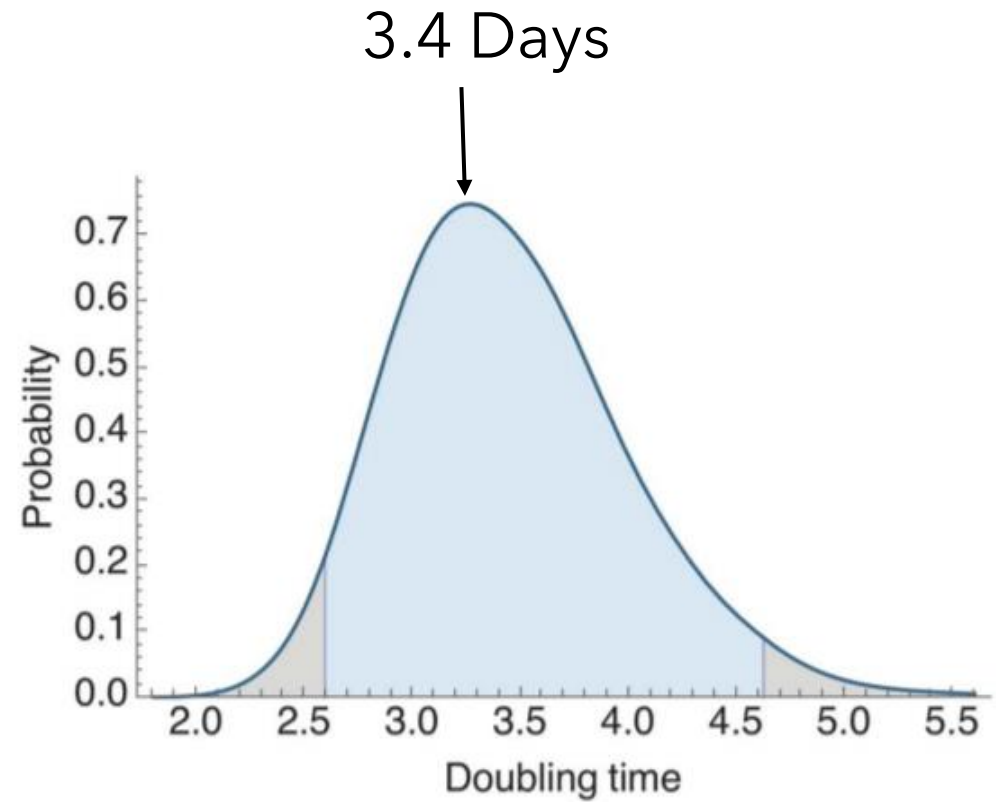
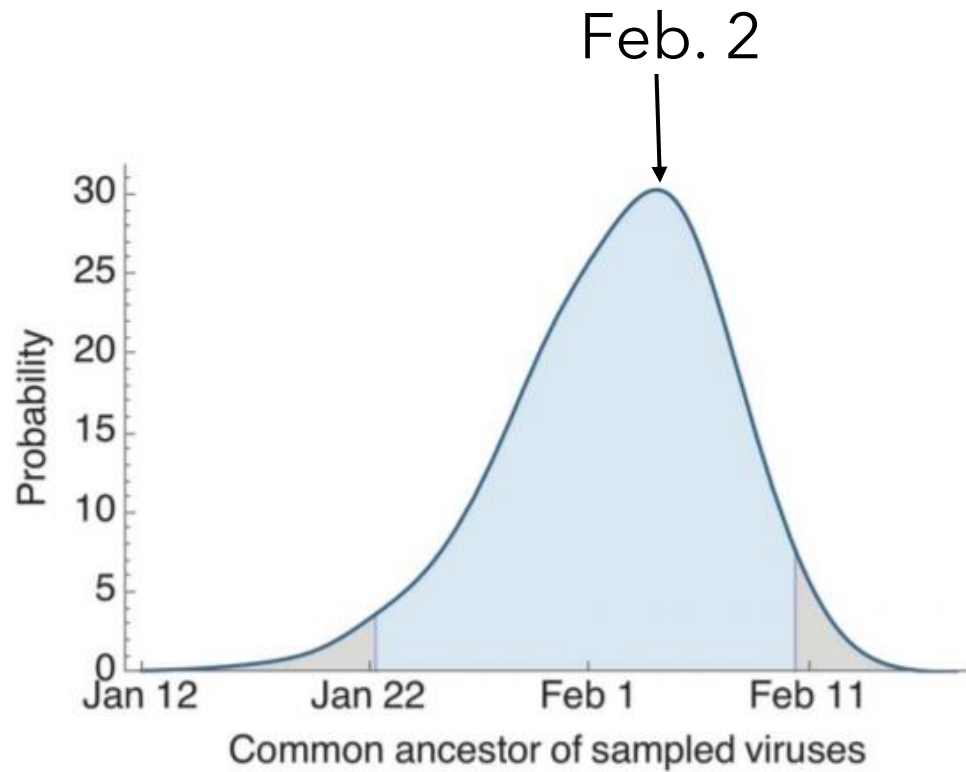


# Fig 2A: What does the Washington State clade tell us about SARS CoV-2 spread in WA?

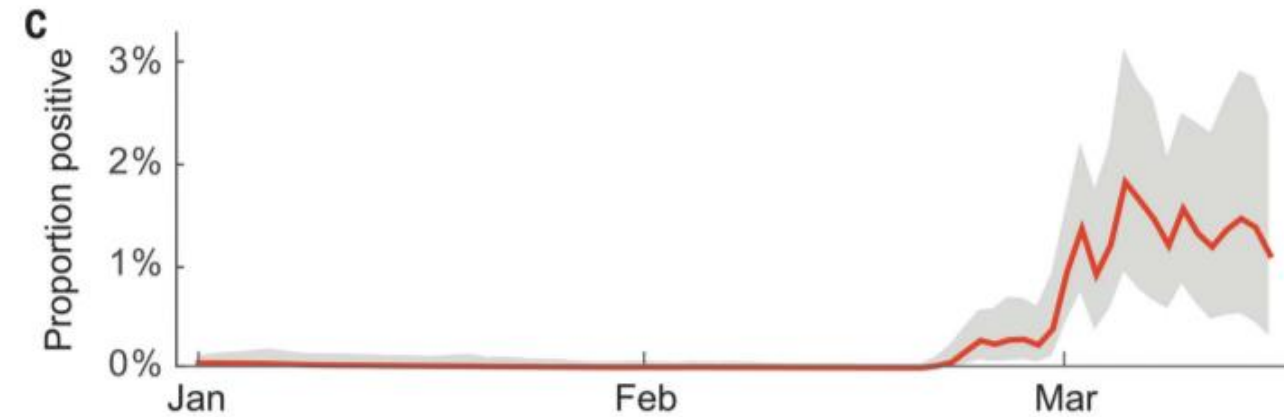
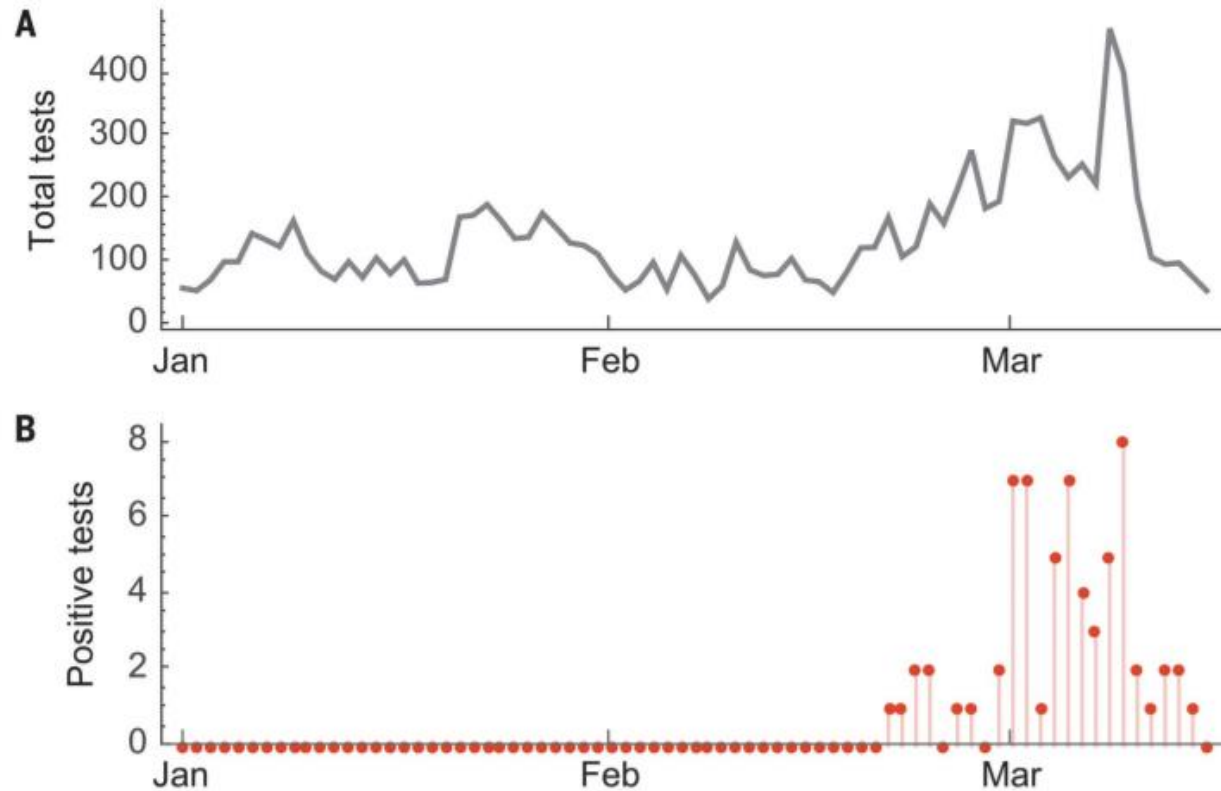
Rapid  
Exponential  
Growth



## Fig 2B: When did the Washington Clade start?



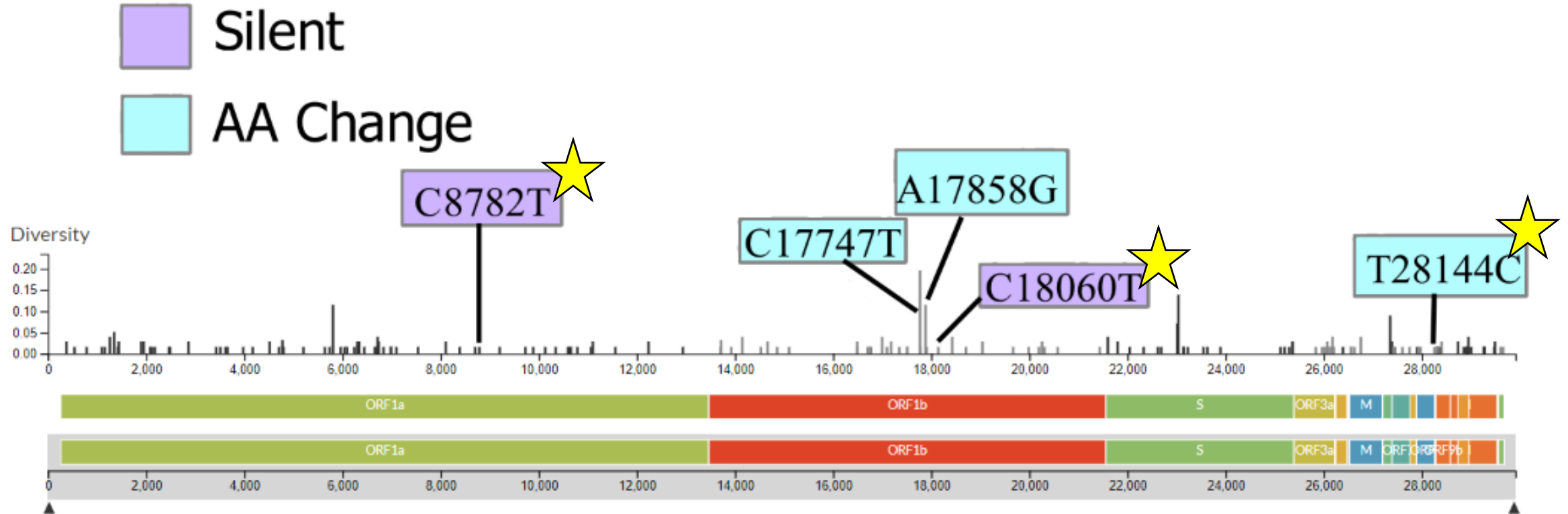
# Fig 3: Can we estimate community prevalence of SARS CoV-2 to the end of March?



5,112 total samples and 65 came back positive.

Prevalence estimated to be 1.1%

# \* How can we know transmission started with a single introduction event?

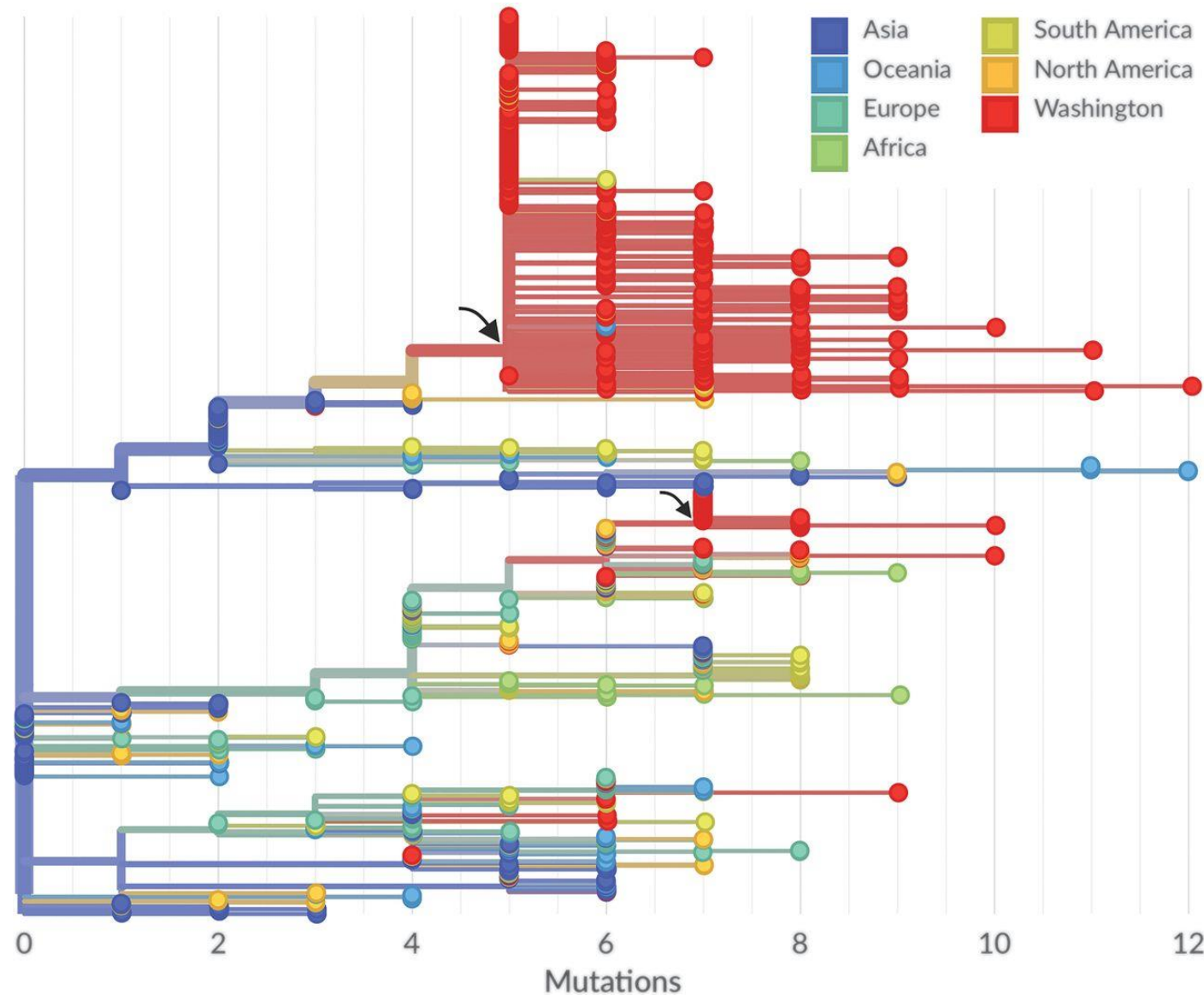


# Summary

Early transmission of SARS CoV-2 in Washington can be traced back to an individual introduction event (WA1) thanks to specific, unique mutations found in the Washington State Outbreak Clade.

The Washington State Outbreak Clade saw exponential growth, with a doubling rate of 3.5 days.

The community prevalence of SARS CoV-2 from can be estimated to be 1.1% from February 21 to March 15

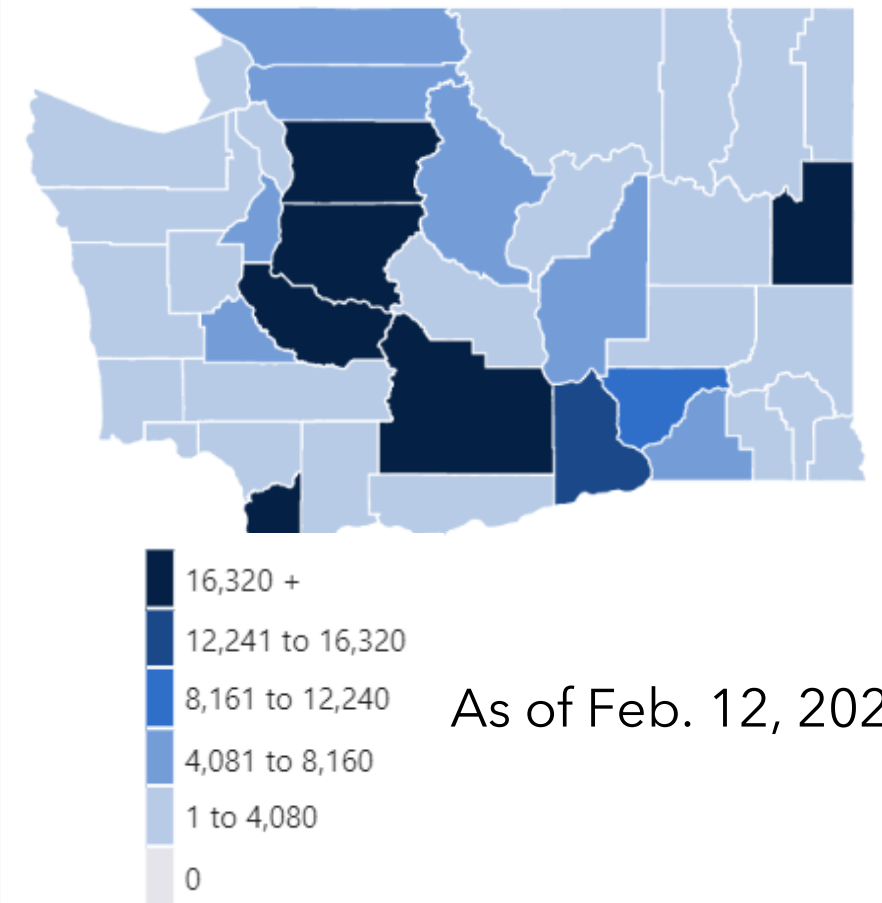




# How did SARS CoV-2 affect Washington State?



Confirmed Cases	<b>311,288</b>
Probable Cases	<b>16,759</b>
Total Cases	<b>328,047</b>
Hospitalizations	<b>18,643</b>
Deaths	<b>4,675</b>
Percent of Deaths (deaths/total cases)	<b>1.4%</b>
Total Molecular Tests	<b>4,896,154</b>
Number of Vaccine Doses Given	<b>1,057,844</b>

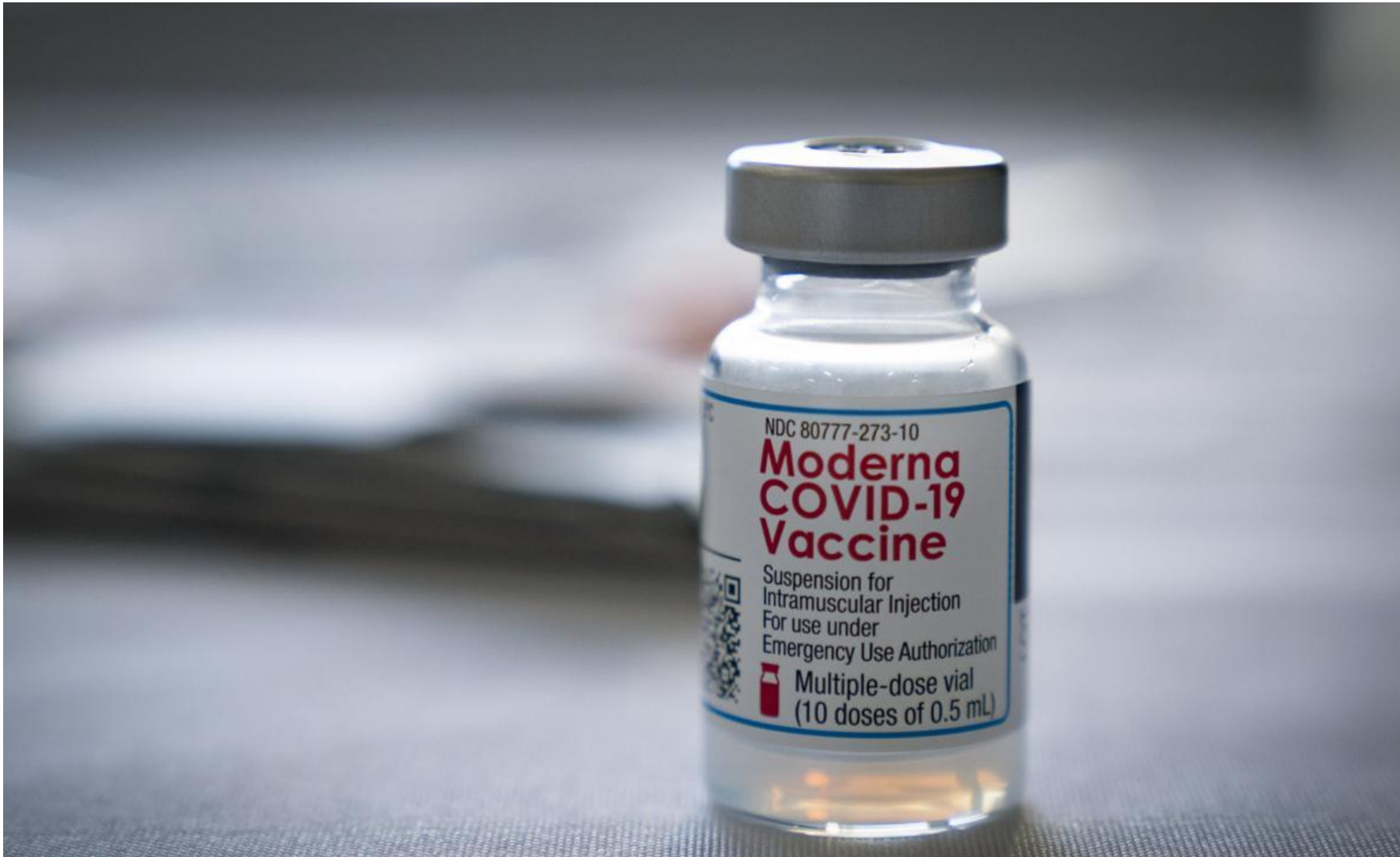


As of Feb. 12, 2021

GIF: Washington State with words "Stay Home Save Lives"

<https://giphy.com/gifs/stay-home-save-lives-shelter-in-place-f4DCVRe3S2pWNFb5Yq>

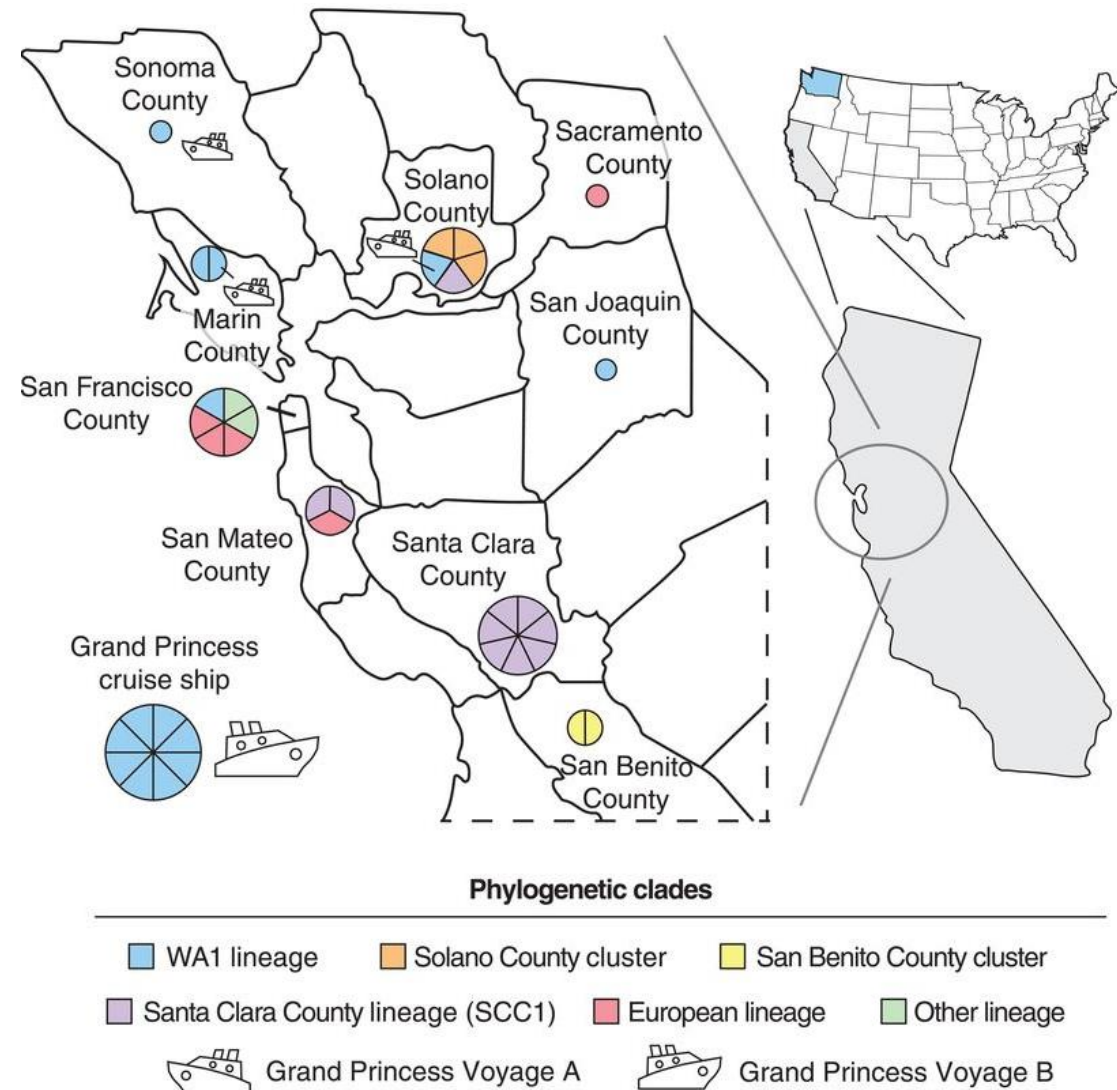
# How did the introduction of SARS CoV-2 impact the U.S.?



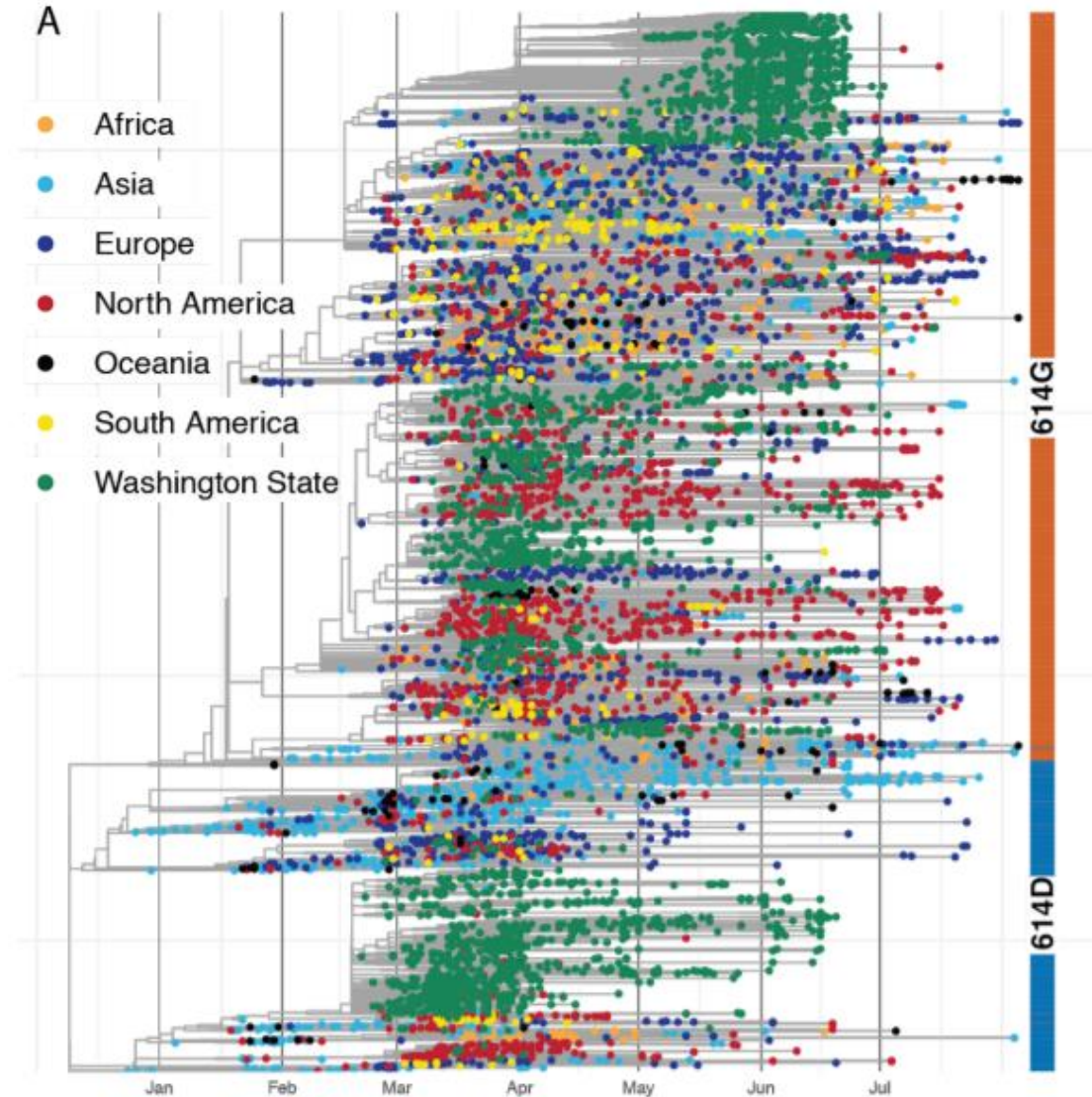
Animation:  
Timeline of  
COVID in U.S.

# \*How far has the WA1 Strain Spread?

California, Connecticut,  
Minnesota, New York, North  
Carolina, Virginia, Utah,  
Australia, and the Grand  
Princess



# **\*Why hasn't WA1 spread more?**



Amino Acid change from aspartate (D) (WA1) to glycine (G) at position 614.

# **\*What is Wisconsin's Role in Tracking the Pandemic?**

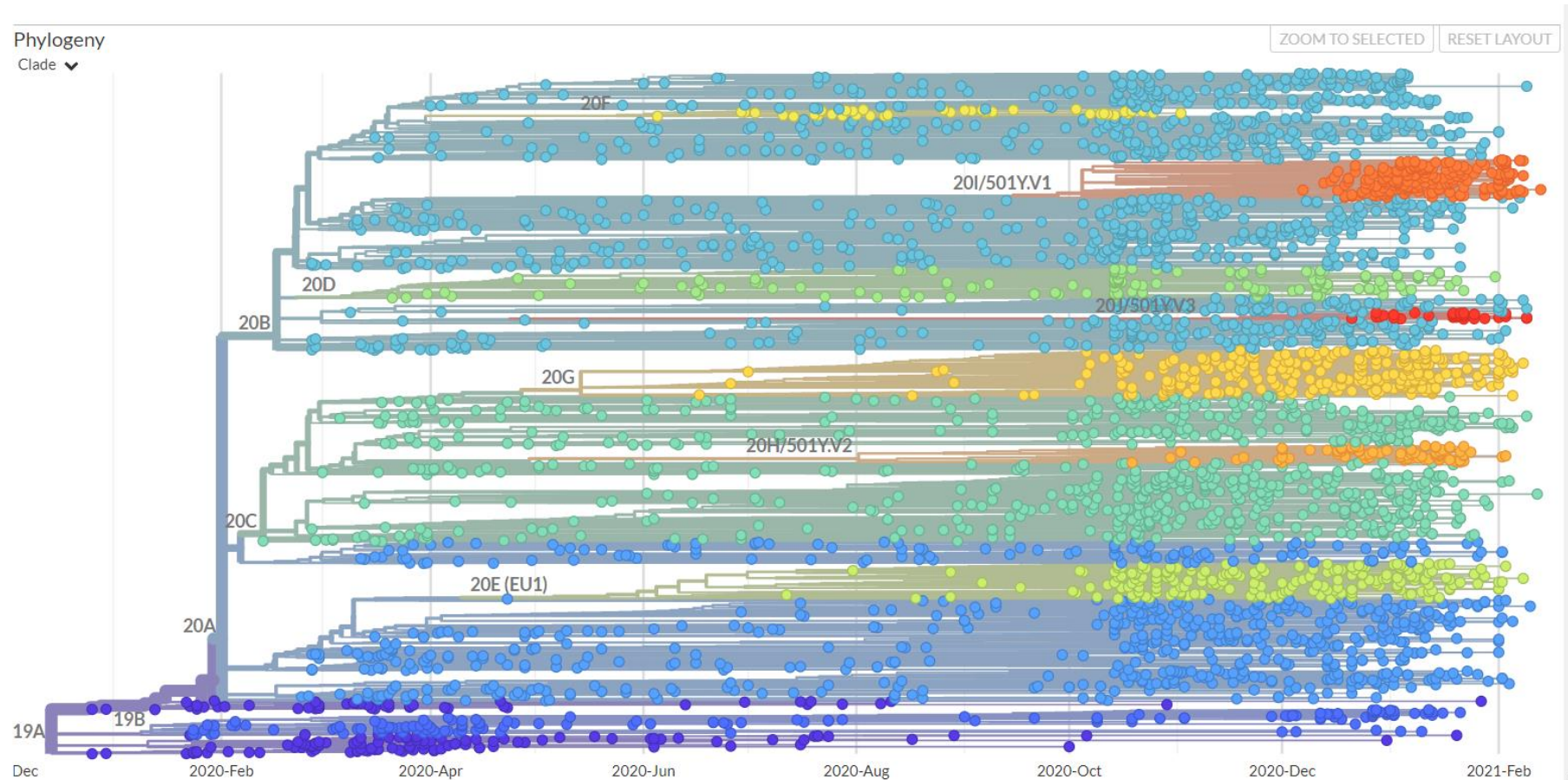


**WISCONSIN**  
UNIVERSITY OF WISCONSIN-MADISON

Only sequence 1%-5%  
of positive cases



# What is the current state of SARS CoV-2 phylogeny?



<https://nextstrain.org/ncov/global>

# What is the current state of SARS CoV-2 in the U.S in 2021?

97,309  
New Cases Reported

27,127,858  
Total Cases Reported

314,093  
High

104,217  
Current 7-Day Average

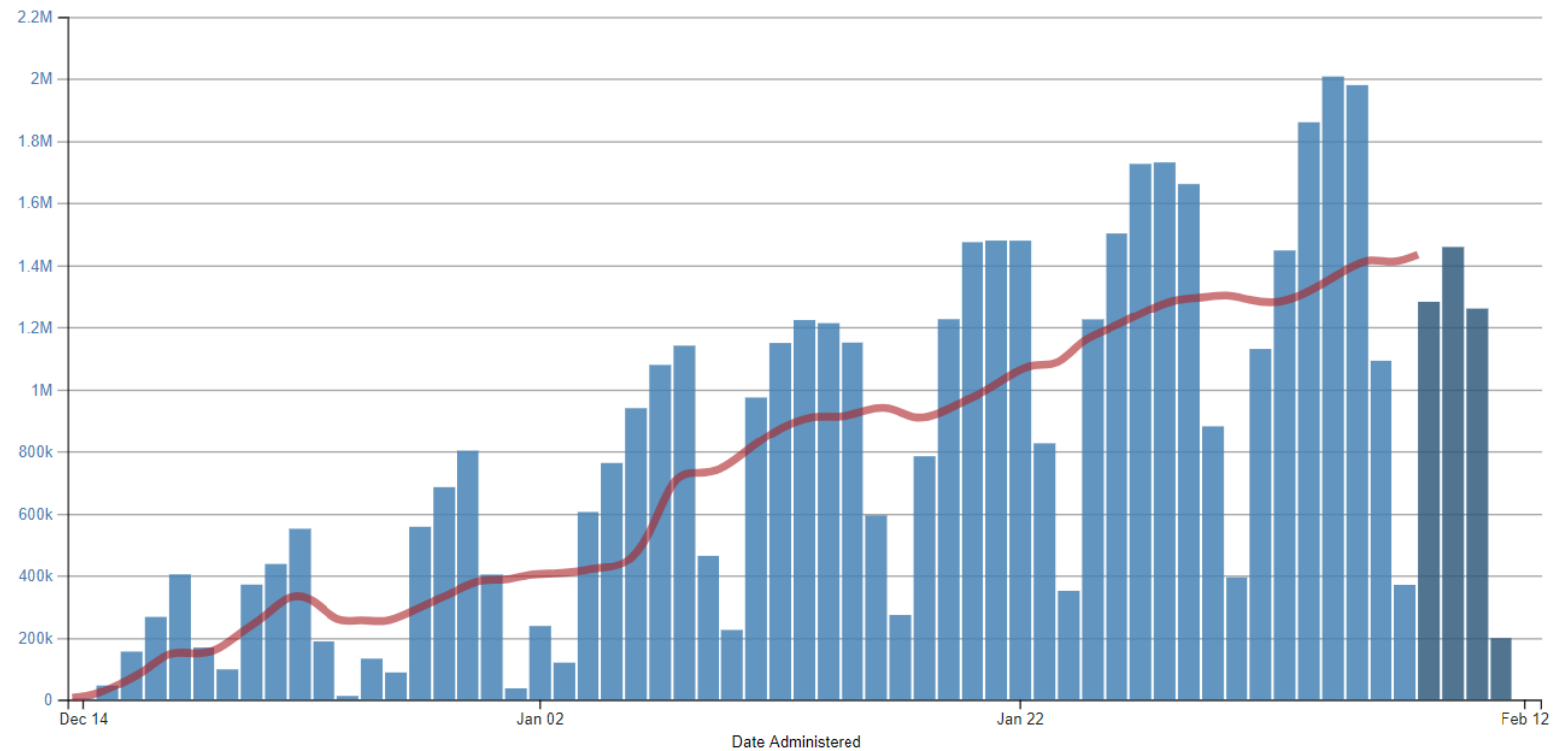
134,524  
Prior 7-Day Average

-22.5%  
Change in 7-Day  
Average

Feb 11, 2021

Feb 8 - Feb 11

Daily Count of Total Doses Administered and Reported to the CDC by Date Administered, United States



**Questions?**



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[f4DCVRe3S2pWNFb5Yq](https://giphy.com/gifs/stay-home-save-lives-shelter-in-place-f4DCVRe3S2pWNFb5Yq)

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