What is Omicron & how do we identify it?

And why is everyone so worried?

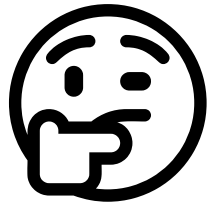
Emma B Hodcroft, PhD

Althaus Lab

50 YEARS ISPM BERN PREVENTION TODAY AND TOMORROW

UNIVERSITÄT BERN

nextstrain



What is a “variant of concern”, anyway?

Transmission → Sequences → Phylogeny

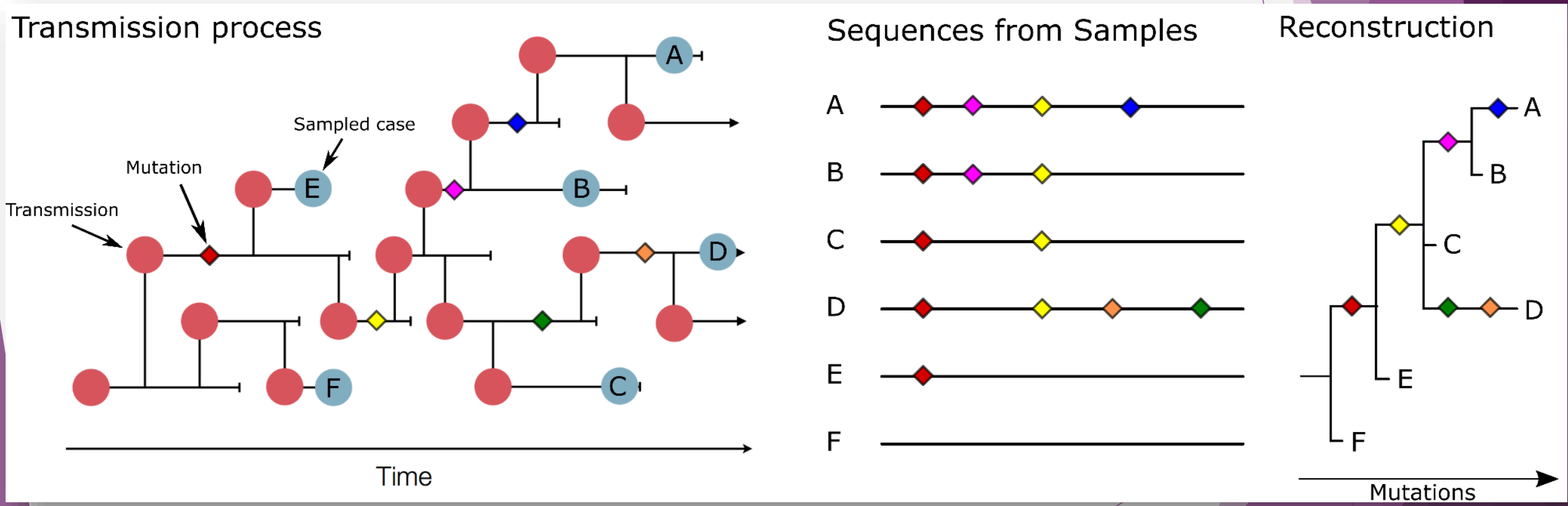


Image: Nextstrain 2020-2021

Variant of Concern:
A cluster of sequences with mutations we're concerned about

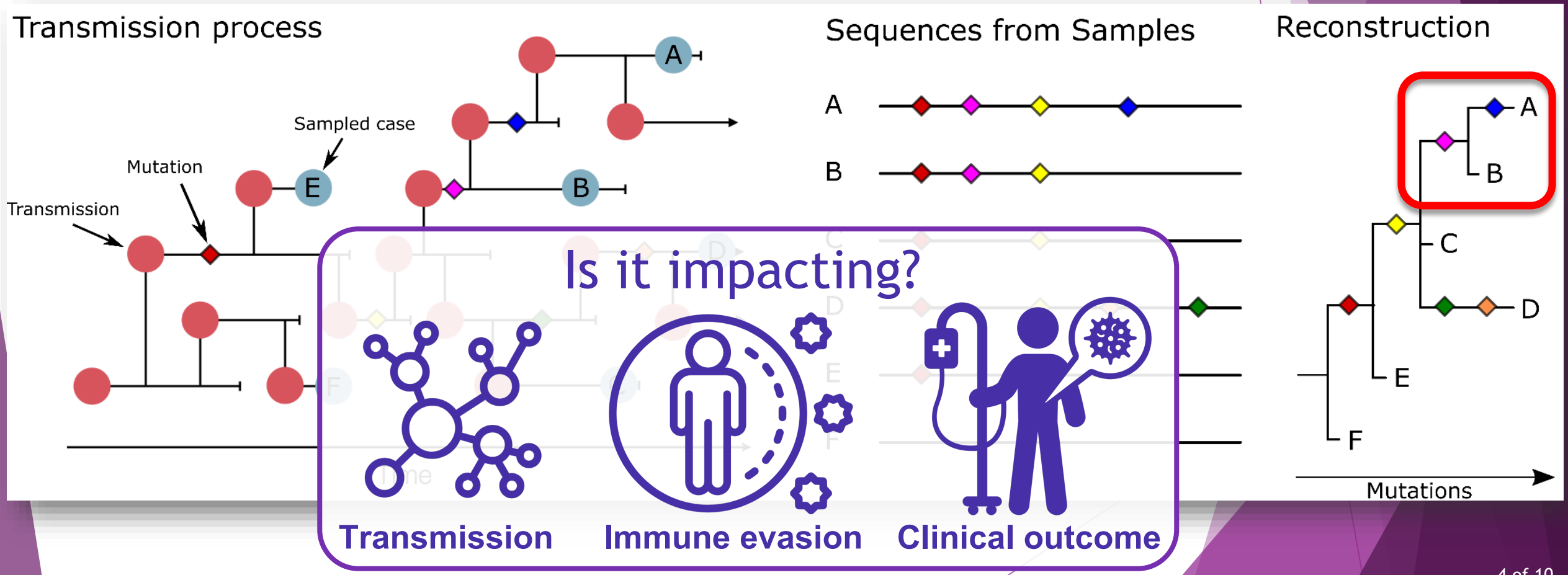
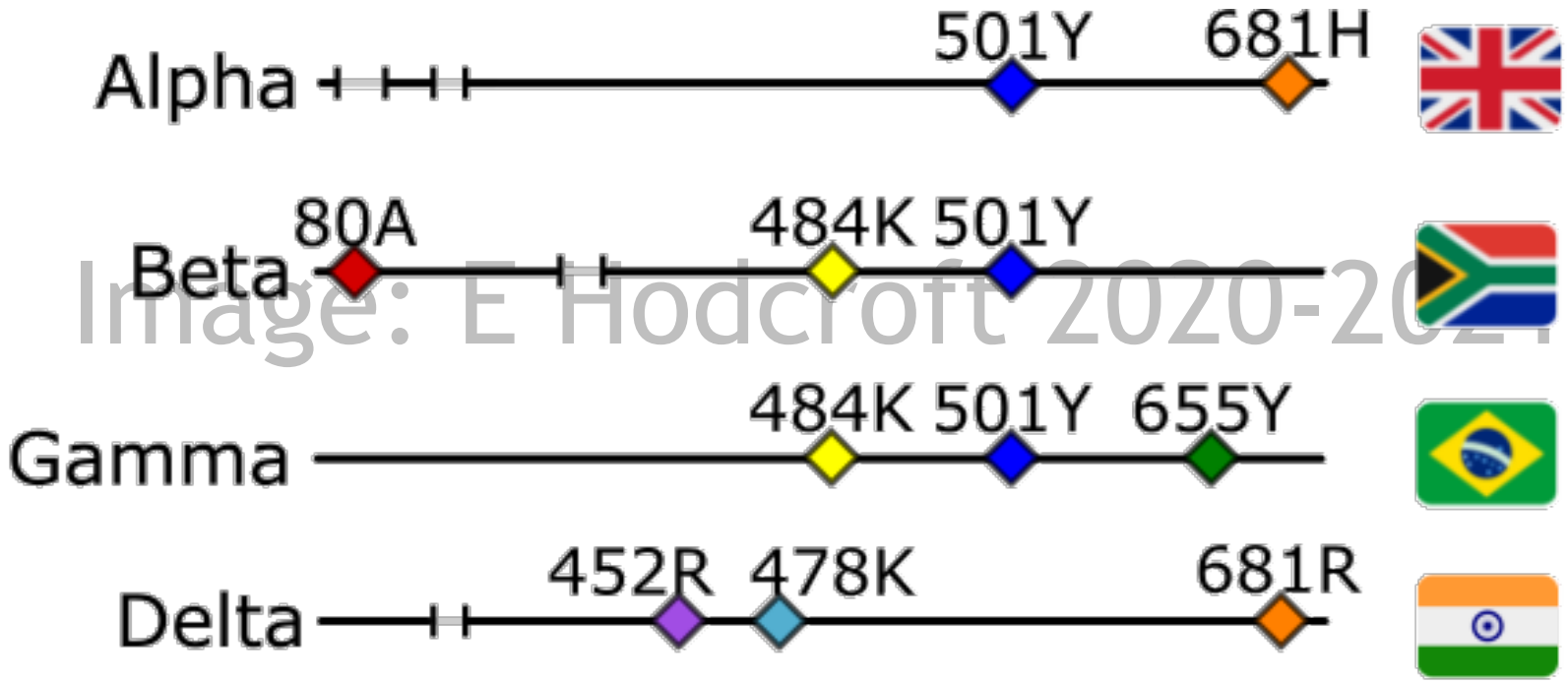


Image: Nextstrain & E Hodcroft 2020-2021

Identify & Track Variants by Mutations

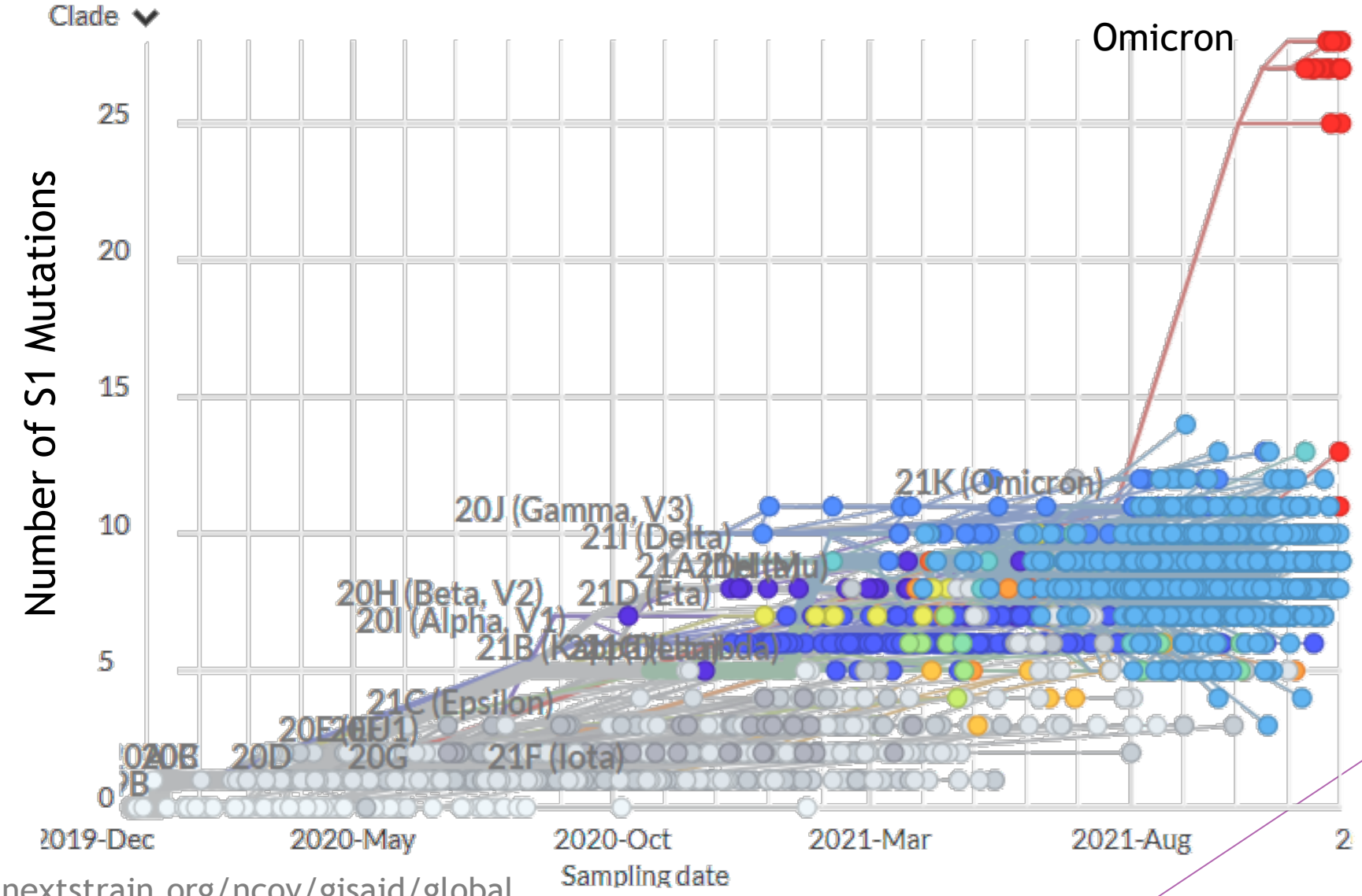


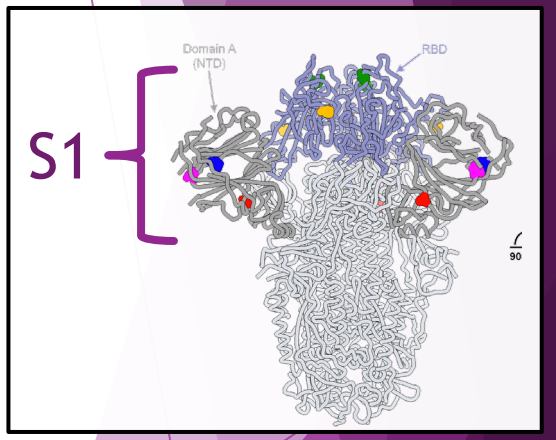
Not a complete representation of all spike mutations

Image: E Hodcroft 2020-2021

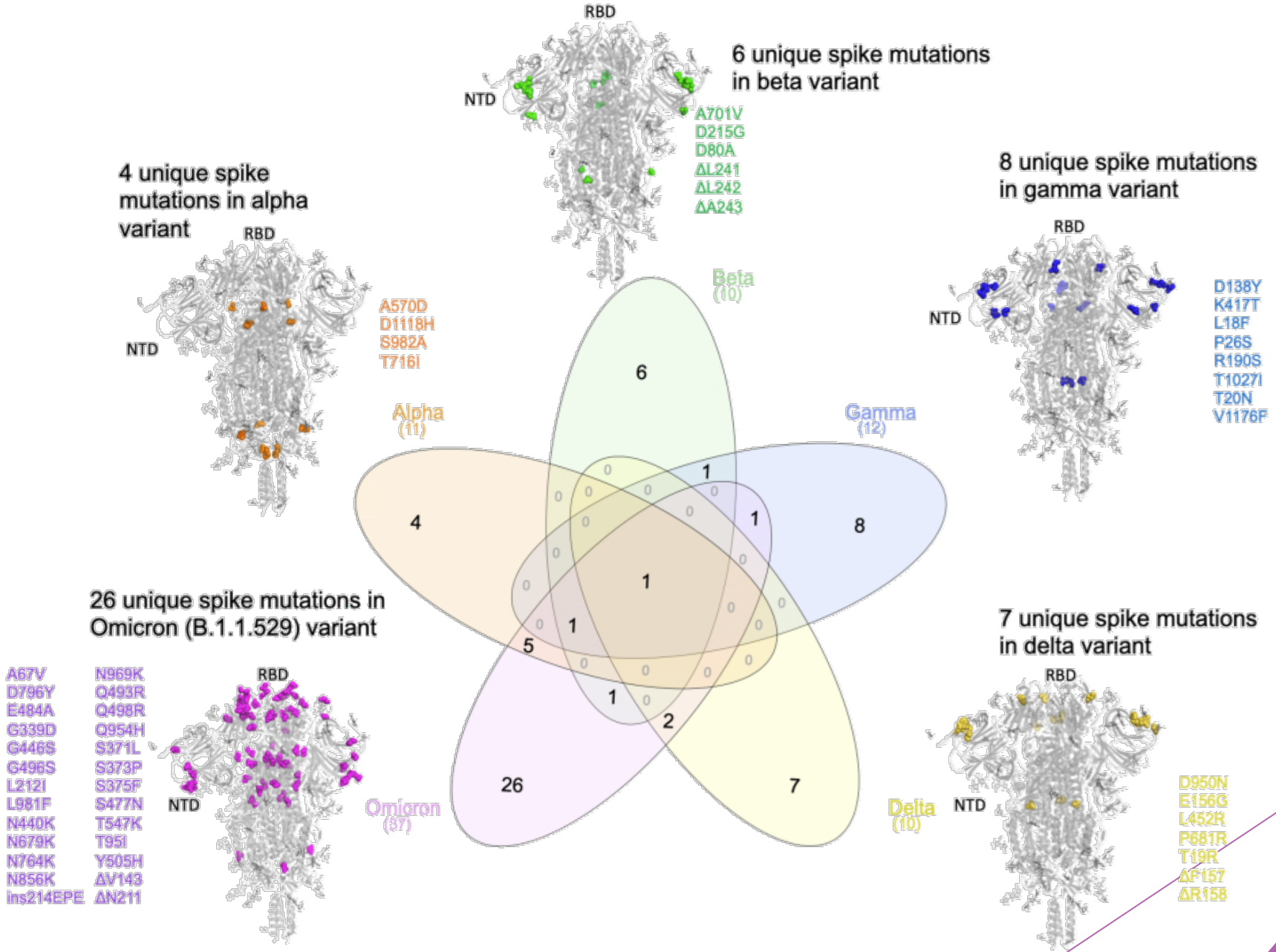
We've had other Variants of concern, why does everyone seem so worried this time?

Omicron has a worrying set of mutations - Particularly in concerning positions





nextstrain.org/ncov/gisaid/global



Venkatakrishnan *et al*, OSFPreprints 2021.

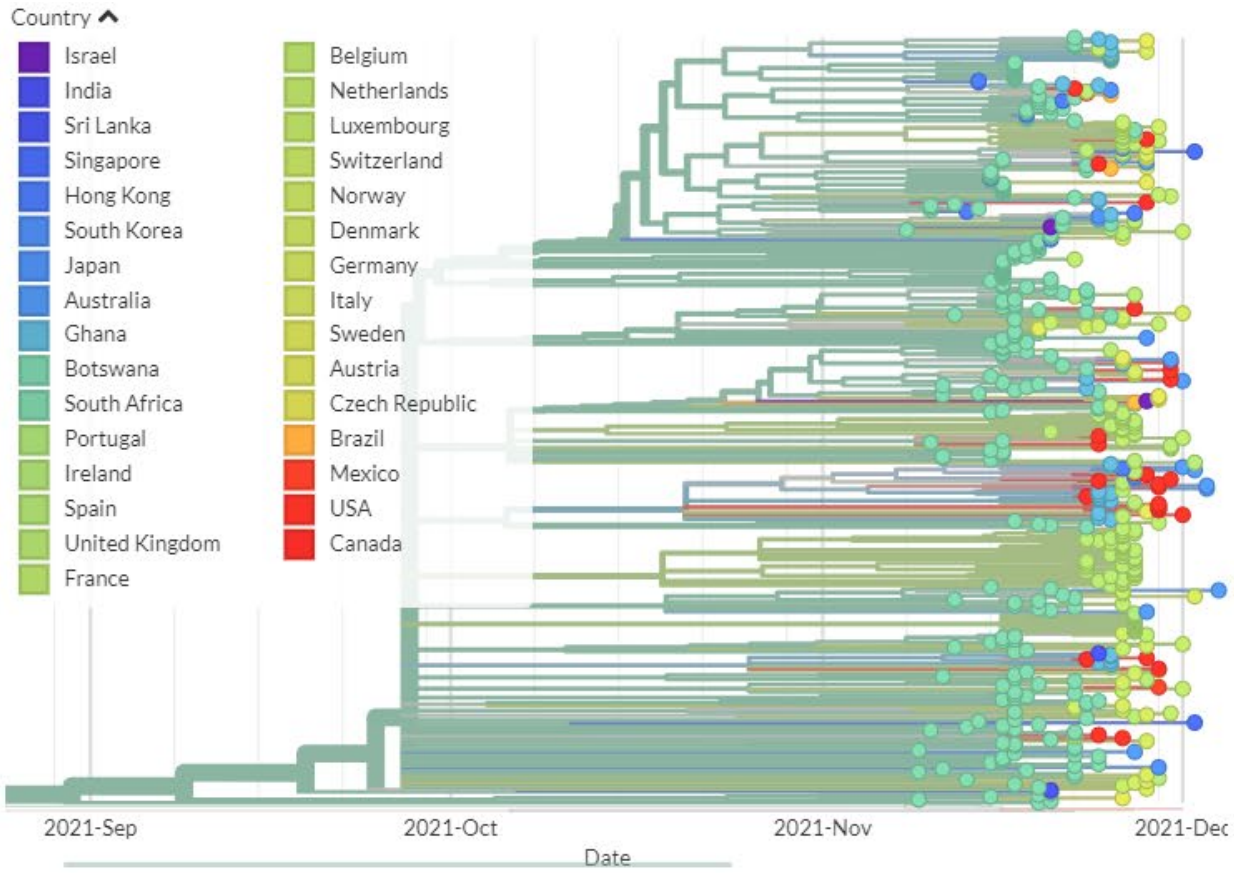
Where is Omicron in the world?

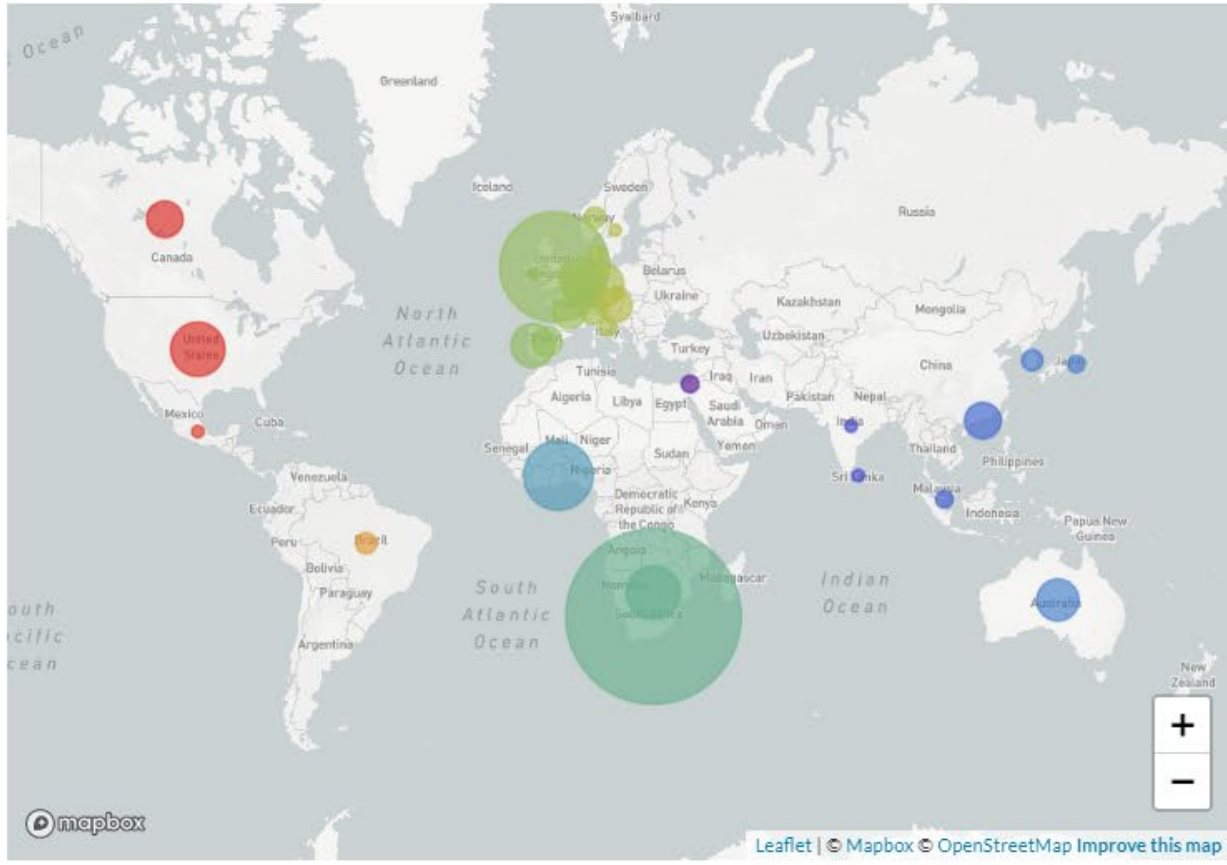
And how do we find it?

Omicron is being detected in increasing number of countries

bnonews.com/index.php/2021/11/omicron-tracker/

Omicron Sequences Around the World



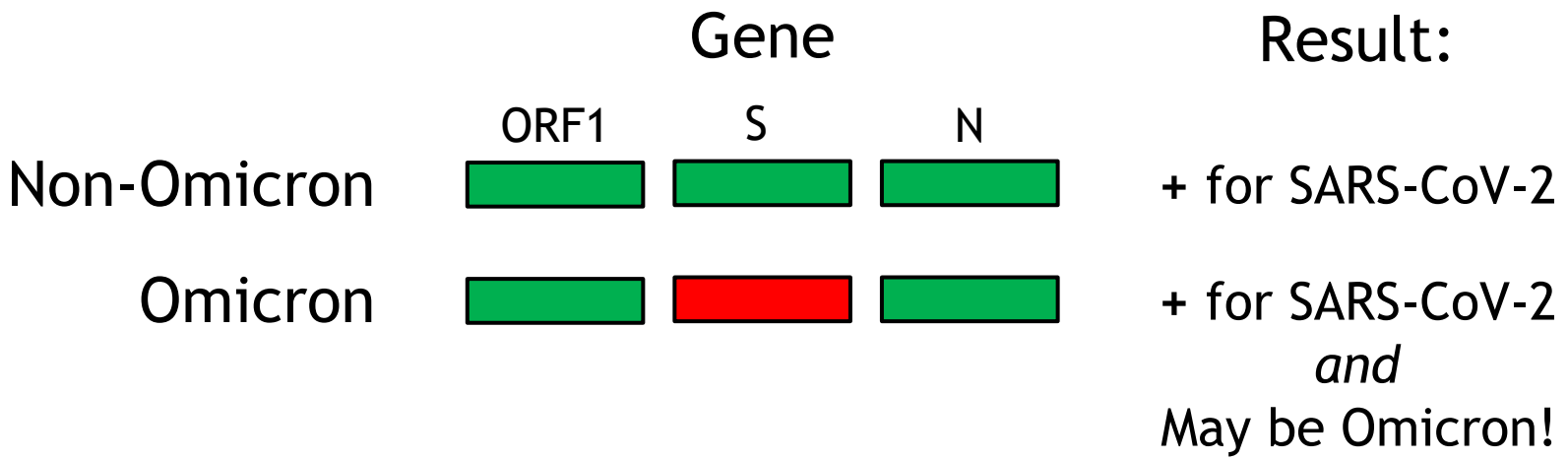


nextstrain.org/groups/neherlab/ncov/21K.Omicron

How can we find Omicron?

- Omicron has a tiny part of Spike missing *(S:69/70del)* which makes a particular sign on some PCR tests *("SGTF" or "S gene drop-out")*

Sequencing should still be used to confirm while Omicron is rare!



Caveats & details of SGTF are left out on this simplified slide!

Where did Omicron come from?

Omicron sits on a ‘Long Branch’ - Doesn’t have many ‘relatives’

- This makes it harder to tell how it has evolved

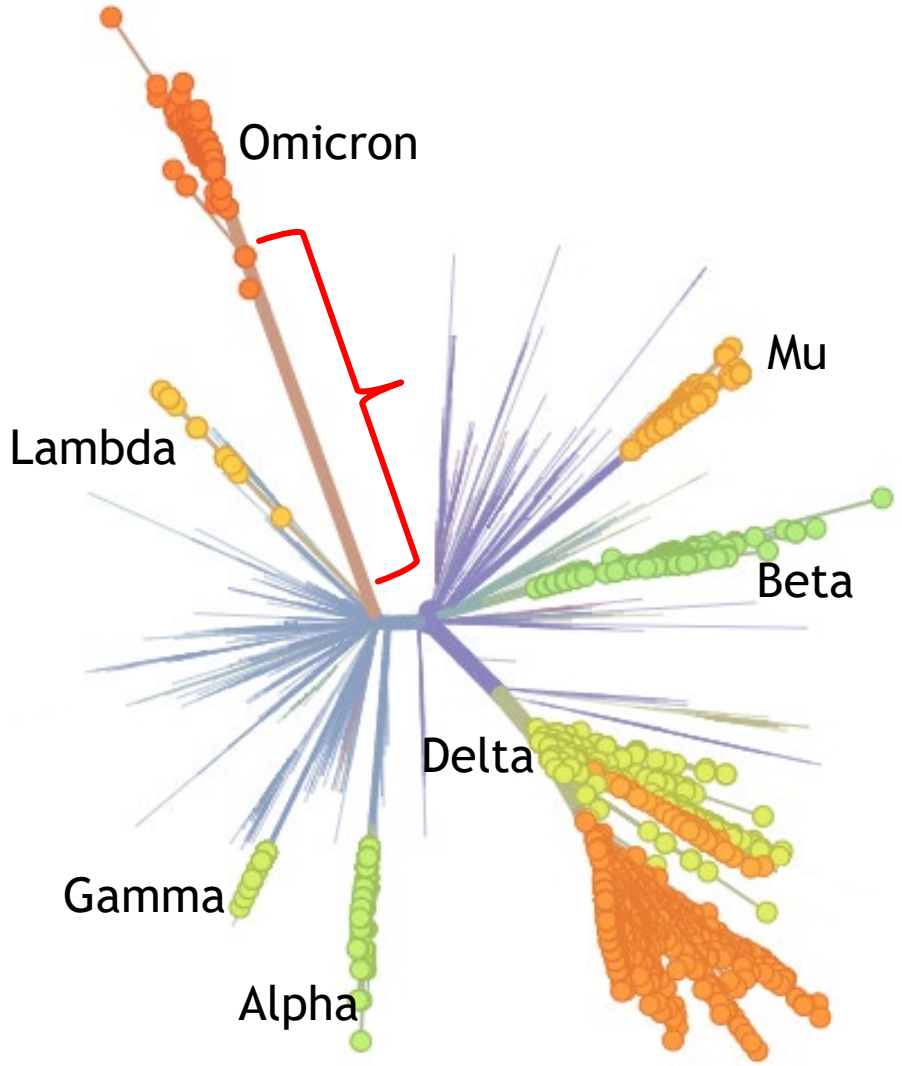
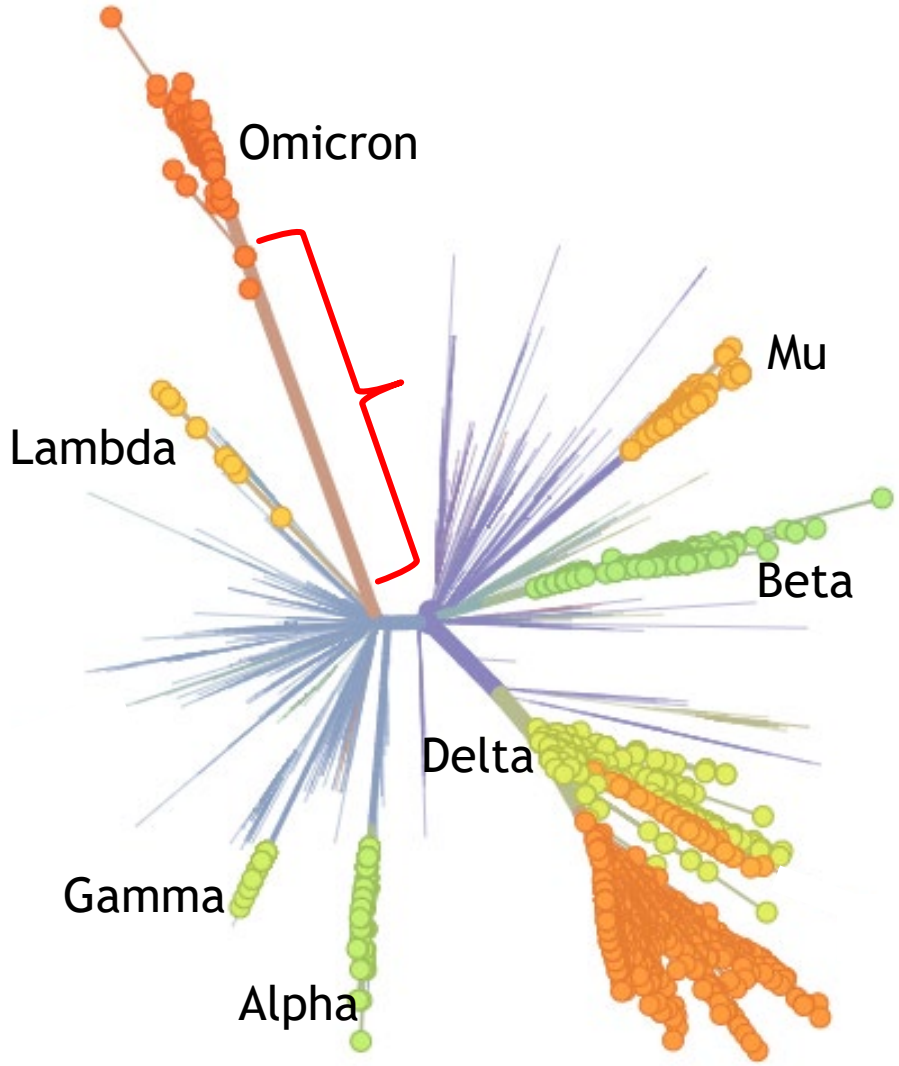


Image: nextstrain.org/ncov/gisaid/global

Omicron sits on a ‘Long Branch’ - Doesn’t have many ‘relatives’

- This makes it harder to tell how it has evolved
- Some theories:
  - Immunocompromised individual 😷
  - Undetected circulation 🤥
  - Animal reservoir 🐭
- Could also be a combination!
- Personally: 1 and/or 2 most likely



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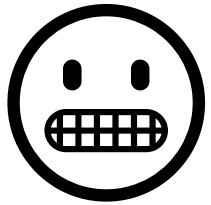

What about the ‘new’ Omicron we’ve heard about? (BA.1 & BA.2)

BA.2 is more like Omicron than anything else – but it's different

- The first Omicron sequences were BA.1
- Only recently did we identify BA.2, which is similar

- We don't yet know if they will have the same *phenotype* (impact on how the virus behaves)

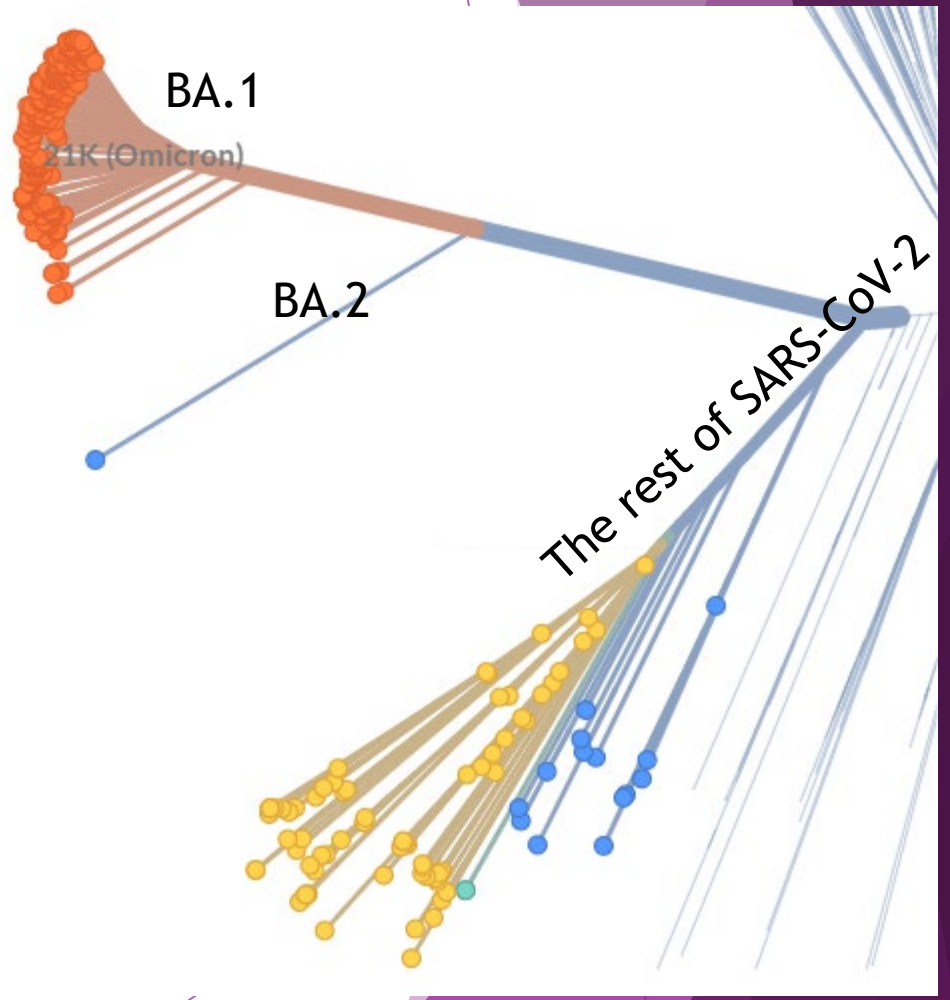

Image: nextstrain.org/groups/neherlab/ncov/21K.Omicron/2021-12-02

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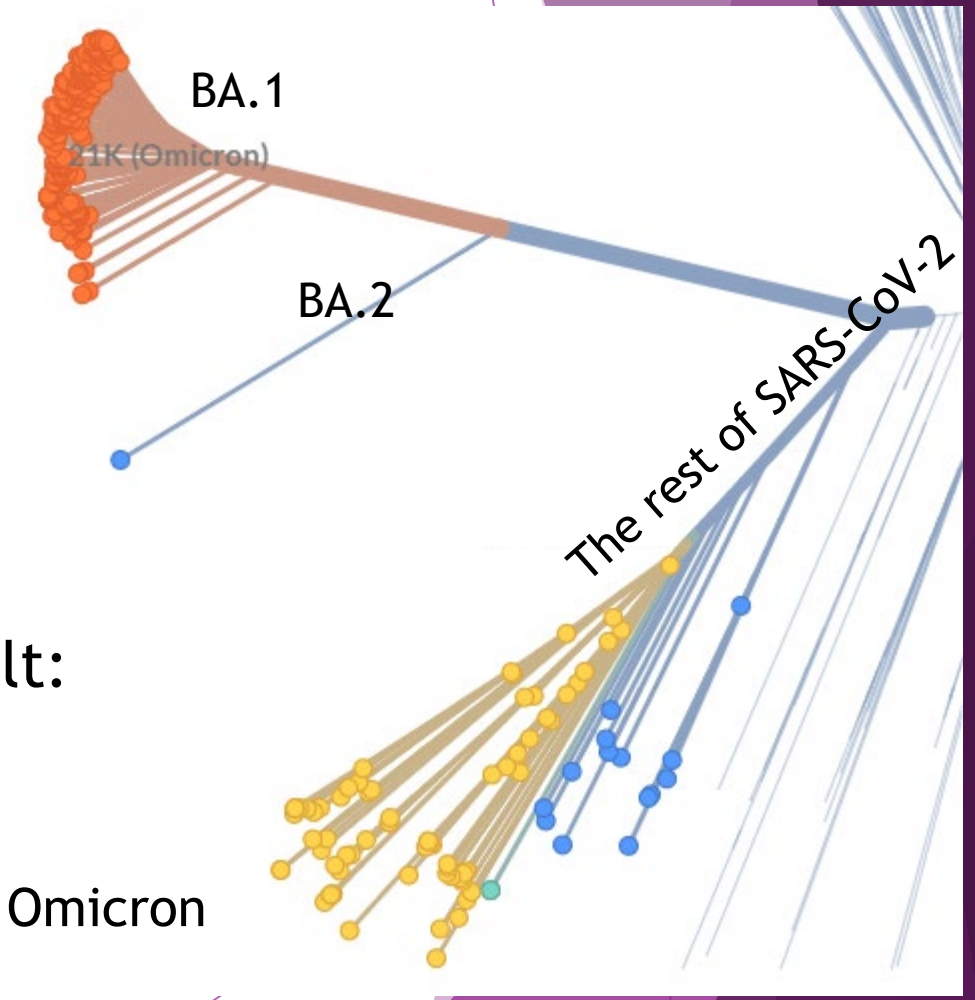

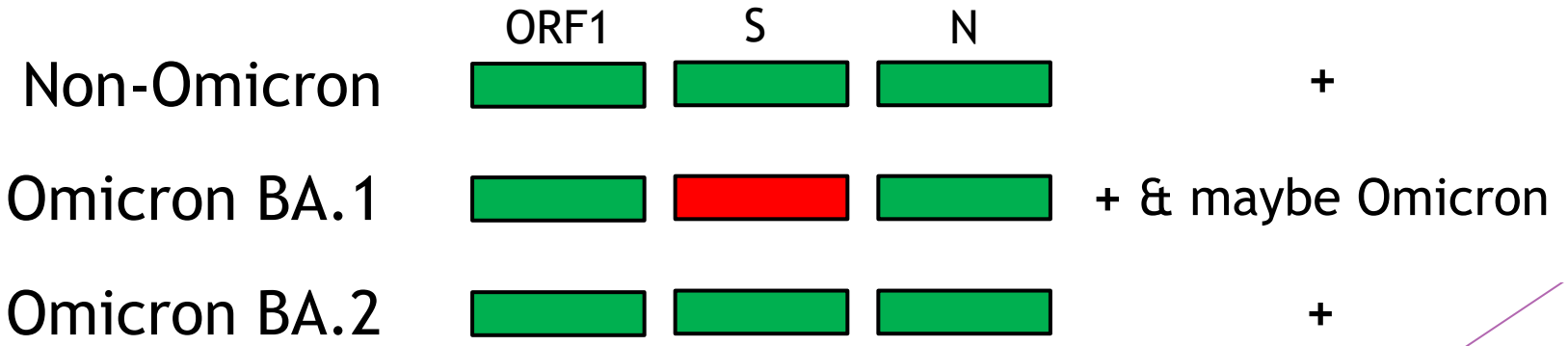

Result:

+

+ & maybe Omicron

+

Image: nextstrain.org/groups/neherlab/ncov/21K.Omicron/2021-12-02

Key Points

- Omicron has more mutations in Spike than we've seen in other variants
  - Could impact transmissibility, clinical outcome, immune evasion
- Omicron is now found worldwide & spreading locally
- We don't know much about Omicron's history or where it came from
- Omicron is now divided into two lineages
  - Too early to know if they behave differently