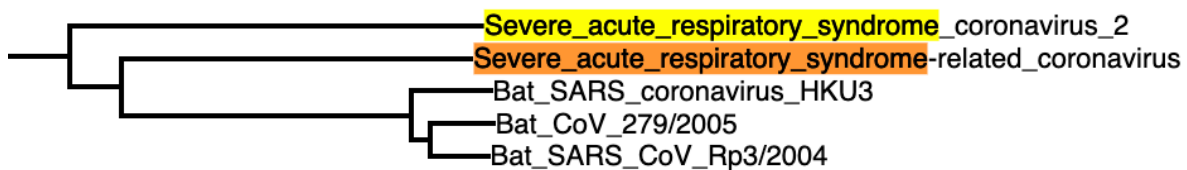


Bioinformatics – COMP40400
Assignment 2 – Coronavirus Discovery
Conor Heffron
ID: 23211267

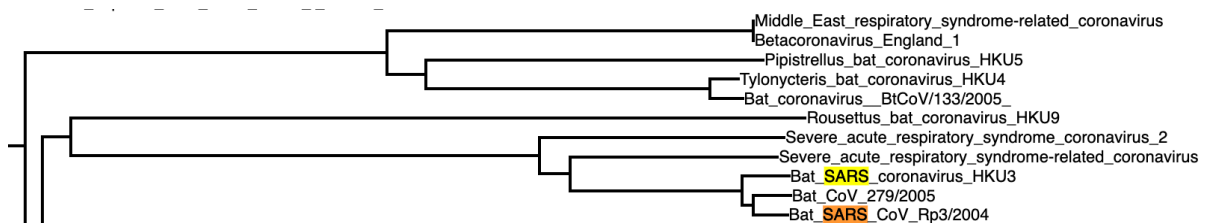
1. Look at the tree and see if you can draw some conclusions about the new Coronavirus.

- Initially, the virus is closely related to SARS and viruses found in Bats.
- 'Severe_acute_respiratory_syndrome_coronavirus_2' is directly related to the 'Severe_acute_respiratory_syndrome-related_coronavirus' which in turn is closely related to and a vehicle to branch off to the Bat viruses that are related to SARS.
- The 'Betacoronavirus_England_1' is at a similar level in the tree (L 3 approx.) but it appears to be quite a bit different at a more granular level so I have excluded from snapshot below.



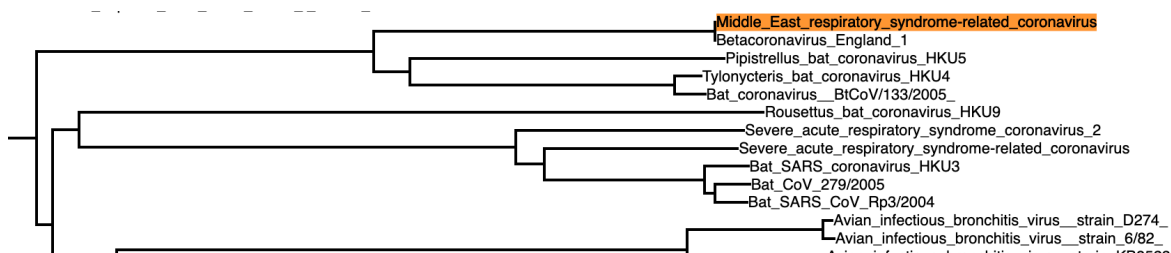
2. What is its relationship to the 2002/3 SARS virus (should have a similar name but without the trailing "_2")?

- 'MERS' & 'Betacoronavirus_England_1' is related at a higher level (earlier branch off) but again the "Severe_acute_respiratory_syndrome_coronavirus_2" is most closely related to 'Severe_acute_respiratory_syndrome-related_coronavirus' followed by the 'Bat_SARS_CoV_Rp3/2004', 'Bat_CoV_279/2005' & 'Bat_SARS_coronavirus_HKU3' viruses.



3. What about MERS (Middle Eastern Respiratory Syndrome)?

- The 'middle_east_respiratory_syndrome-related_coronavirus' (MERS) is most closely related to the 'Betacoronavirus_England_1'.
- 'Severe_acute_respiratory_syndrome_coronavirus_2' & 'Severe_acute_respiratory_syndrome-related_coronavirus' are a bit more distant or appear to diverge away from MERS, padded by Bat and Bird (at a lower section) related diseases.



4. What about diseases in other species like bats, or pigs, or birds?

- If we look beyond human viruses, there are several other categories or species with relevant diseases here.
- This includes:
 - o Feline (cats), canine (dogs), porcine (wild pigs or pig like), murine (mice & rats), rousettus / pipistrellus / tylonycteris / scotophilus (Bats or similar), avian (birds), and bovine (cattle, buffalo, bison etc.)
- I would like to give a general trace of species by disease (excluding humans) from origin to most recent.
- General trace by species of the diseases listed by tree provided:
 - o Feline (cats) / Canine (dogs) / Porcine (wild pigs / pig like) -> Rousettus / Pipistrellus etc. (Bats) / Avian (birds) -> Murine (mice & rats) -> Bovine (cattle etc.)
 - o In short: Cats/Dogs/Pigs -> Bats/Birds -> Mice/Rats -> Cows

5. If you were to guess which other (non-human) species the new Coronavirus came from based on this tree, what would you say?

- If I was to speculate, I think it most likely has origins with cat or dog like animals and/or bats.
- I think this is interesting because I know a possible culprit is the Pangolin which is both cat, dog, and bear like but is like an anteater in appearance.
- In addition, Pangolins appear like scaly Anteaters which in turn are closer to bats and part of the same diverse lineage called 'Laurasiatheria'.
- The virus was first found in these animals which are a delicacy in China (which is a point of controversy) which might be how the virus was transferred from animal species to humans and mice / pigs.
- I believe there is large similarities between Humans, Mice and Pigs at a genetic level, However, I do not think the diseases listed are likely to have originated with Humans or Mice / Rats / Pigs.
- However, Porcine viruses are common at level 2 and level 3 of this tree so cat/dog/pigs for Coronavirus (whereas Bats appear to be the strongest possibility for virus origin of SARS).

For Reference (Full Tree):

