

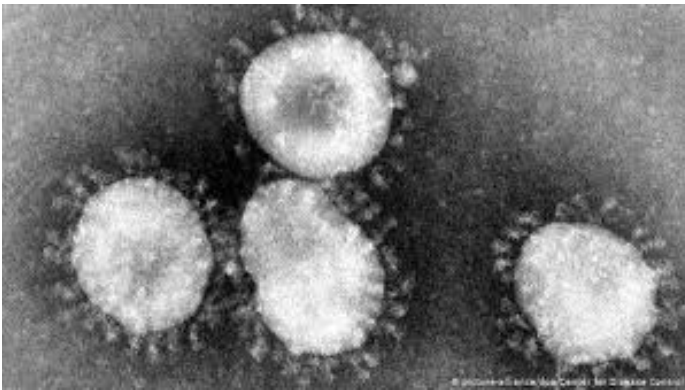
A fluorescence microscopy image showing several cells. The nuclei are stained blue, and the cytoplasm and extracellular space are filled with a dense network of green and red fluorescent signals, likely representing viral particles or cellular components.

CORONAVIRUSES: Emerging pathogens

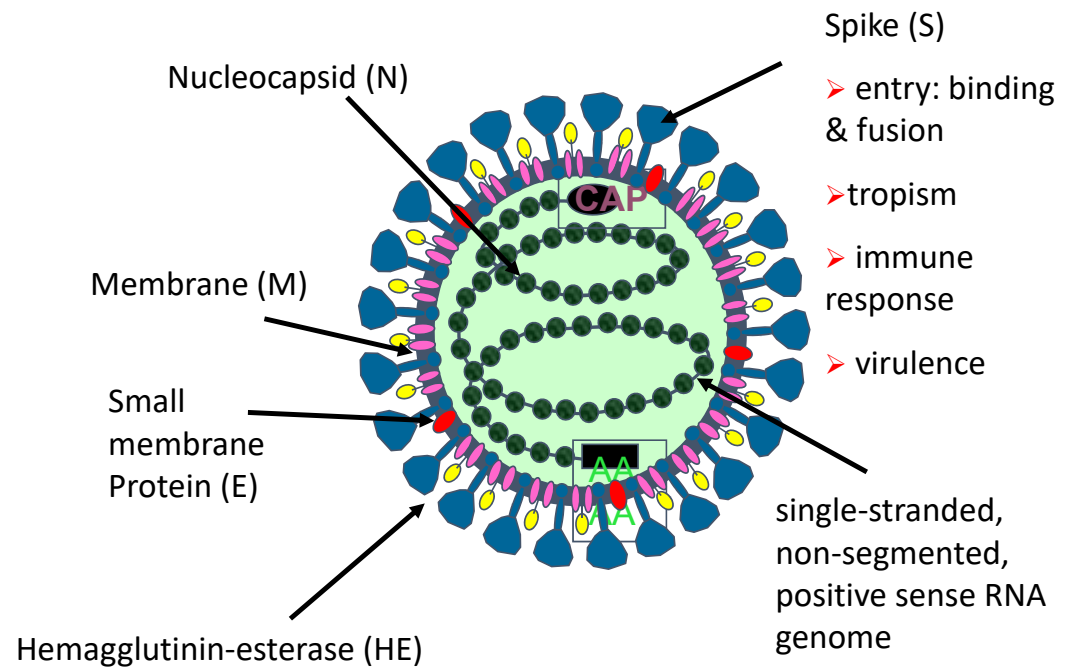
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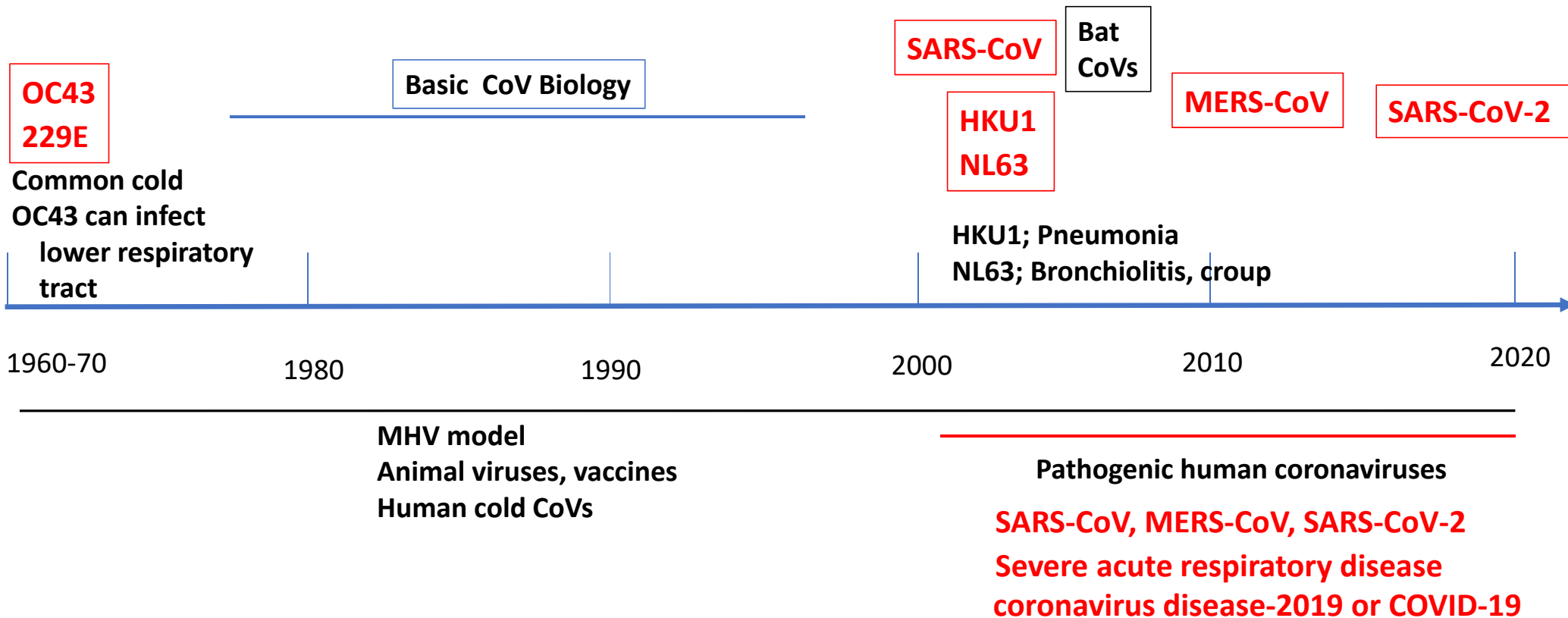
Coronavirus virion



Coronaviruses are a family within the Nidovirus order; named for the nested subgenomic mRNAs generated during infection



Coronavirus Timeline



SARS-CoV interspecies transmission



Horseshoe bat

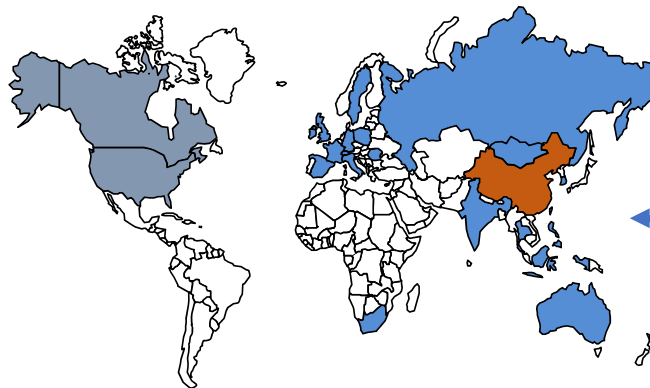


Civet



Human

Human to human
close contact



How many times did this happen?

Over in eight months,
8098 infections, 9.6% mortality
87% in China and Hong Kong

MERS-CoV interspecies transmission



Neoromicia capensis

Bat



Camel



Human

limited human
to human spread



Korea



Mostly in Arabian peninsula

Camels are a reservoir for MERS-CoV

Still new cases 2020

2428 cases, 35% mortality

SARS-CoV-2 interspecies transmission



Bat



Intermediate species
Malayan pangolin



Human



Human to human
spread

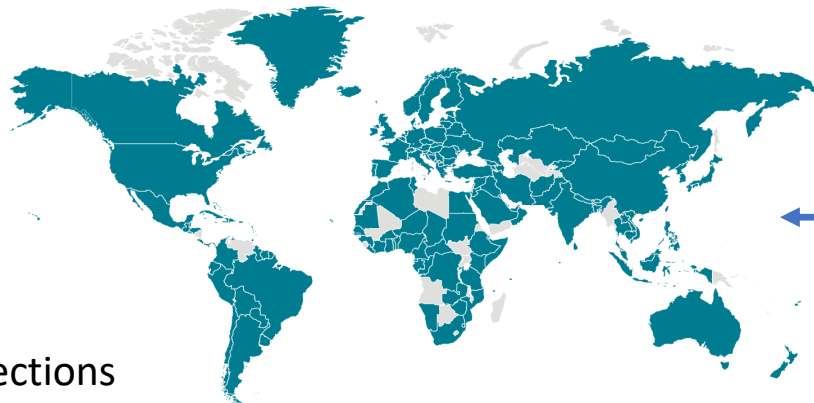
34.7 M
infections

1,030,880
deaths

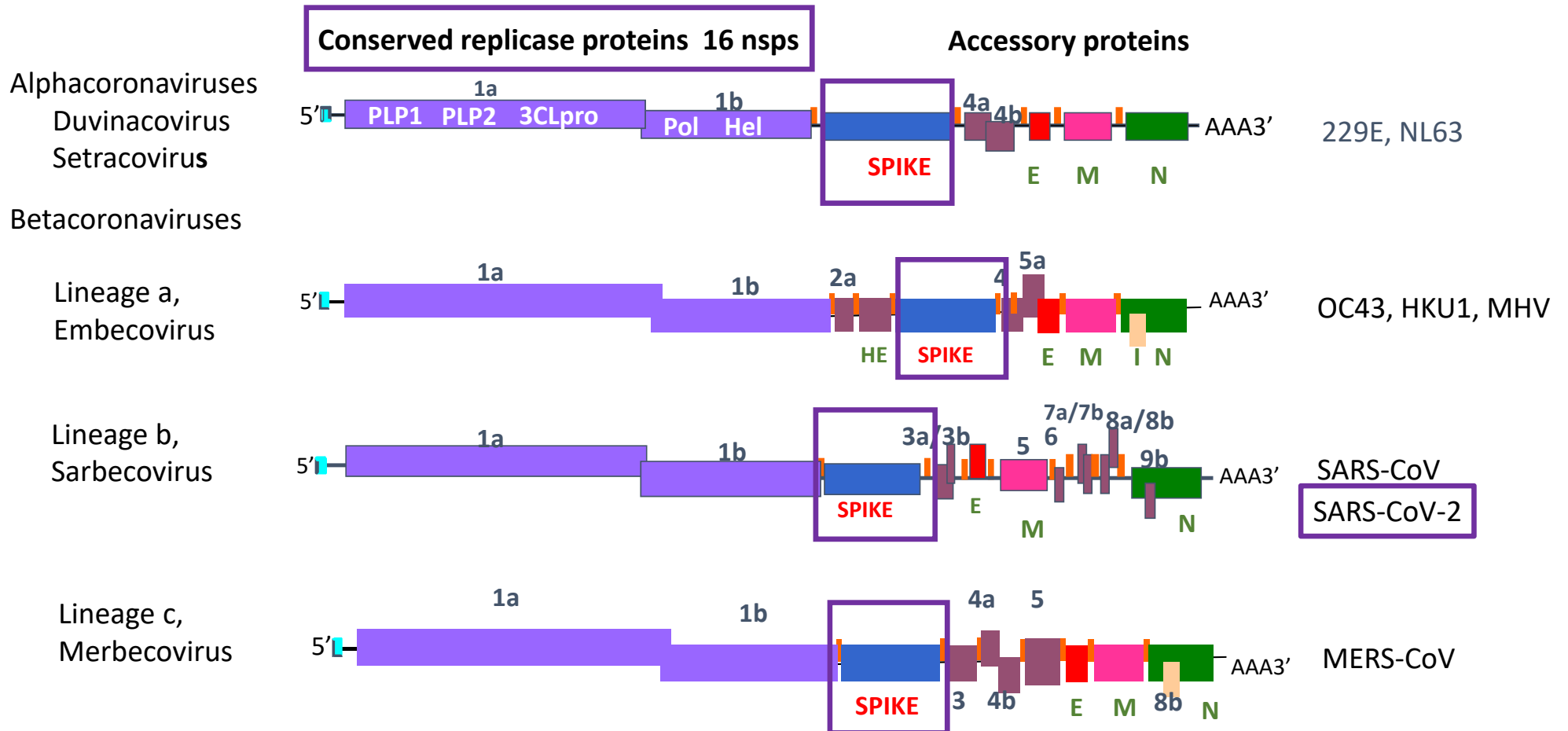
(10.02.20)

US

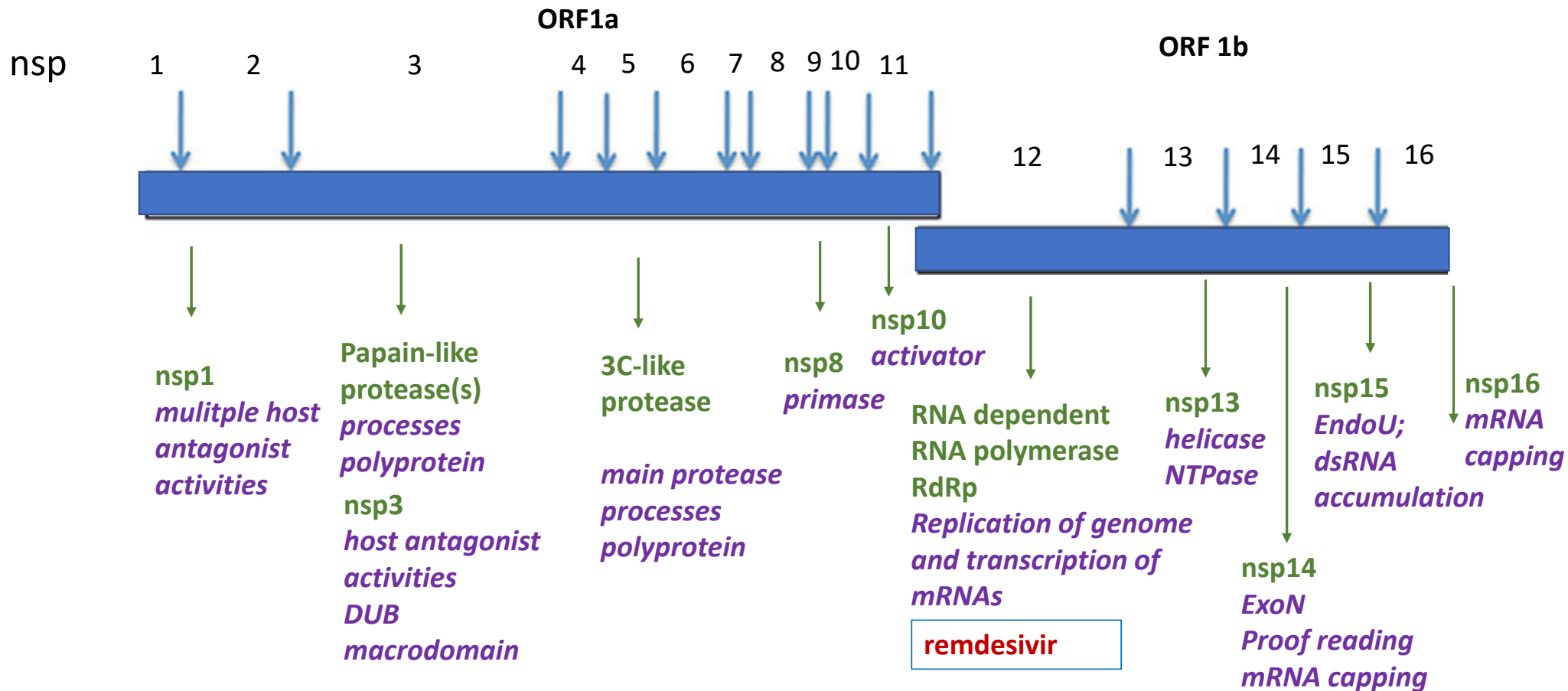
7.3 infections
209,318 deaths



Coronavirus genome structure



Coronavirus conserved proteases and replicase



How do we know SARS-CoV-2 was not engineered by humans?

- Similar viruses are found in bats
- It does not resemble any known recombinant viruses
- It seems impossible that anyone would know how to design a virus with the properties of SARS-CoV-2

For the future

- Vaccine development
- Develop antivirals for future outbreaks or spillovers
 - Spike protein RBD may differ while replicase proteins are conserved
- Continue to identify and characterize Coronaviruses and other viruses from bats and other species
- Support basic virology research