Coronavírus

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08.05.2020

Classificação dos coronavírus

Taxonomia

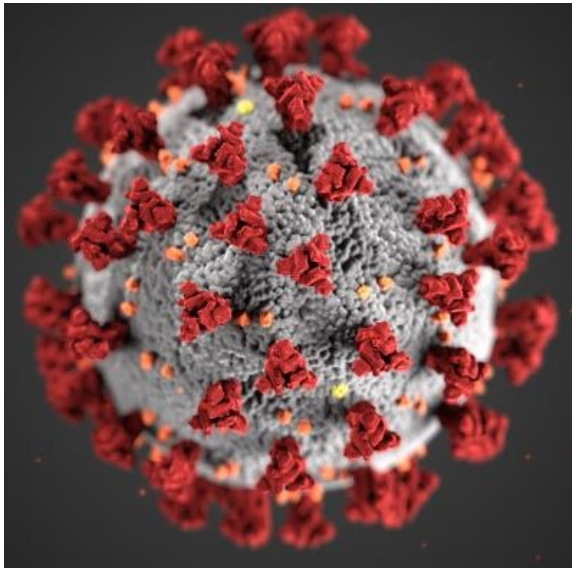
- Ordem *Nidovirales* (8 subordens, 14 famílias, 109 espécies)
  - Subordem *Cornidovirineae* (1 família)
    - Família *Coronaviridae* (2 subfamílias, 5 géneros, 46 espécies de vírus)
      - Subfamília *Orthocoronavirinae*
        - Géneros:

          Alphacoronavirus

          Betacoronavirus

          Deltacoronavirus

          Gammacoronavirus



Public Health Image Library (PHIL), by A. Eckert & D. Higgins

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CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Table 1. Coronavirus genus, species, and virus abbreviations.

Genus	Species
Alphacoronavirus	Feline Coronavirus (FCoV)
	Transmissible Gastroenteritis Virus (TGEV)
	Porcine Epidemic Diarrhea Coronavirus (PEDV)
	Human Coronavirus 229E
	Human Coronavirus NL63
Betacoronavirus	Bovine Coronavirus (BCoV)
	Mouse Hepatitis Virus (MHV)
	Human Coronavirus OC43
	Human Coronavirus HKU-1
	Severe Acute Respiratory Syndrome Coronavirus (SCoV)
	Middle East respiratory Syndrome Coronavirus (MERS-CoV)
Gammacoronavirus	Infectious Bronchitis Virus (IBV)
Deltacoronavirus	Bulbul Coronavirus HKU11

in Ujike M & F Taguchi, 2015

Coronavírus “humanos” (HCoVs)

HCoVs endémicos (reduzida patogenicidade):

- HCoV-229E (1967)
- HCoV-NL63 (2004)
- HCoV-OC43 (1966)
- HCoV-HKU1 (2005)

HCoVs epidémicos (elevada patogenicidade):

- SARS-CoV (2002/2003, ~8100 casos, 9,5% mortalidade)
- MERS-CoV (2012-, ~2500 casos, 34,4% mortalidade)
- SARS-CoV-2 (2019-, >3,6 milhões de casos, ~6,9% mortalidade)

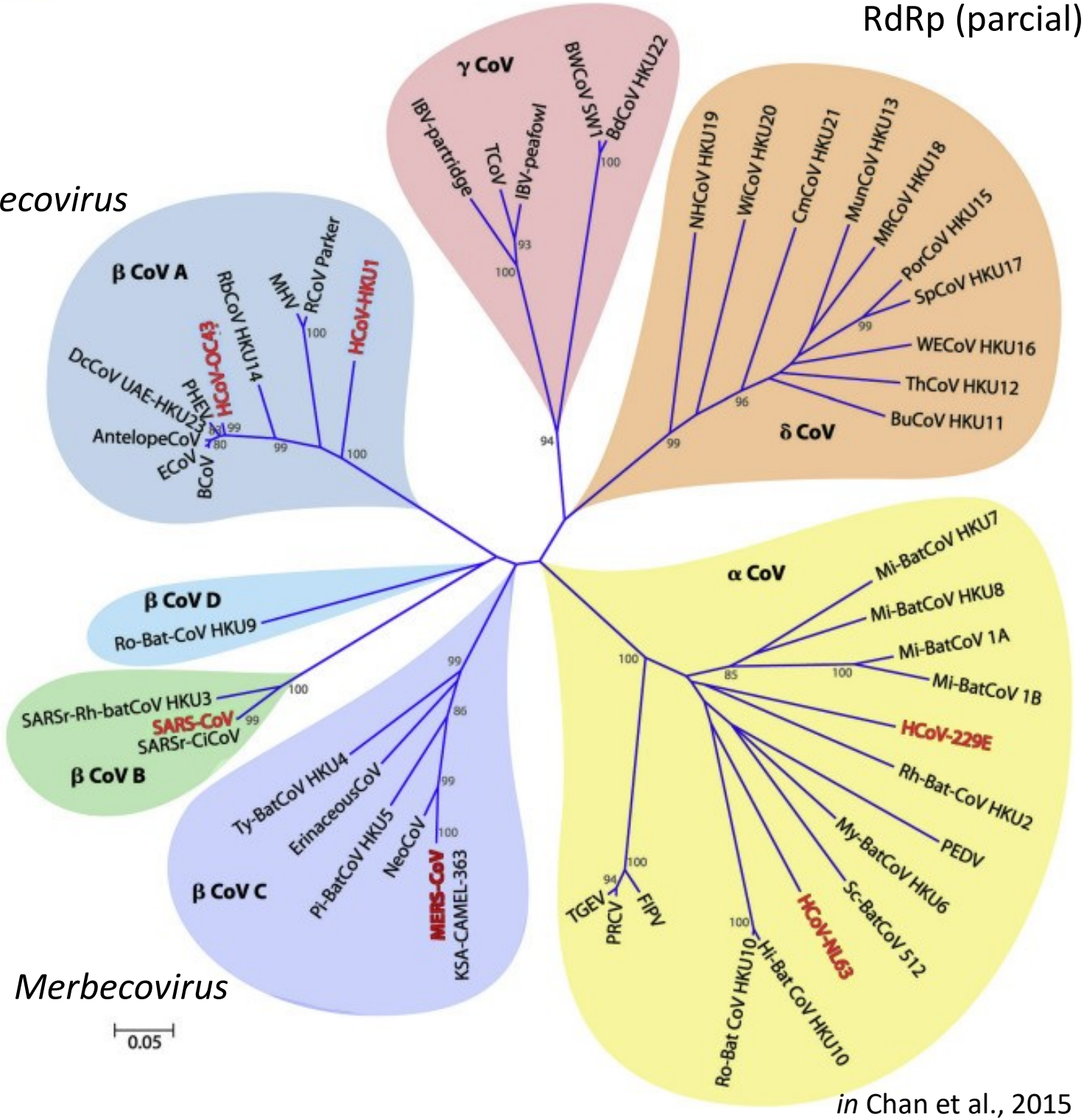
RdRp (parcial)

Relações filogenéticas entre os coronavírus

Embecovirus

Sarbecovirus

Merbecovirus



in Chan et al., 2015

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Ecologia dos coronavírus epidémicos

Rhinolophidae

Paguma larvata

Camelus dromedarius

Manis javanica

?

https://en.wikipedia.org/

Homo sapiens, de Wikimedia Commons, the free media repository

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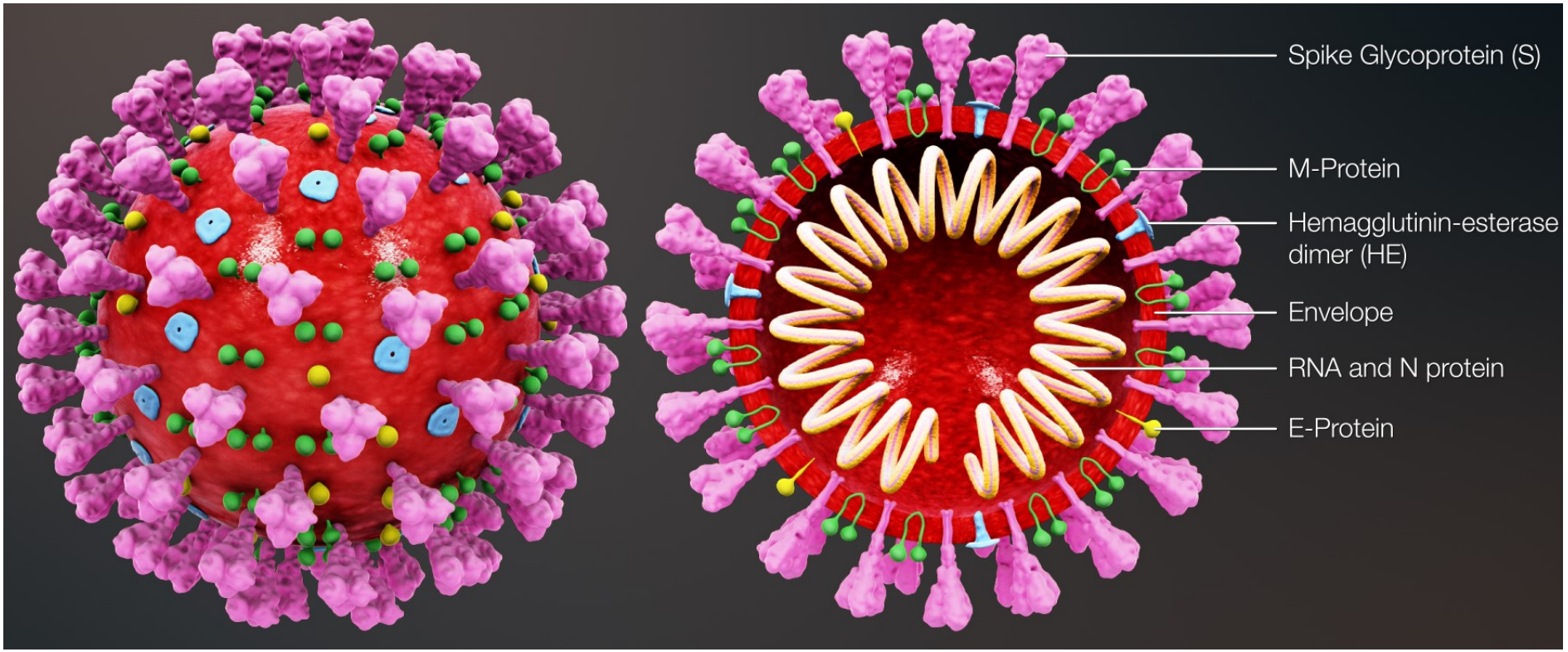
Morfologia dos coronavírus

Virião



Scientific Animations™
We make you look *good*

- Partícula viral esférica e flexível
- ≈ 100 - 150 nm de diâmetro
- Com invólucro lipídico
- Nucleocápside de simetria helicoidal
- Genoma monomérico de RNA

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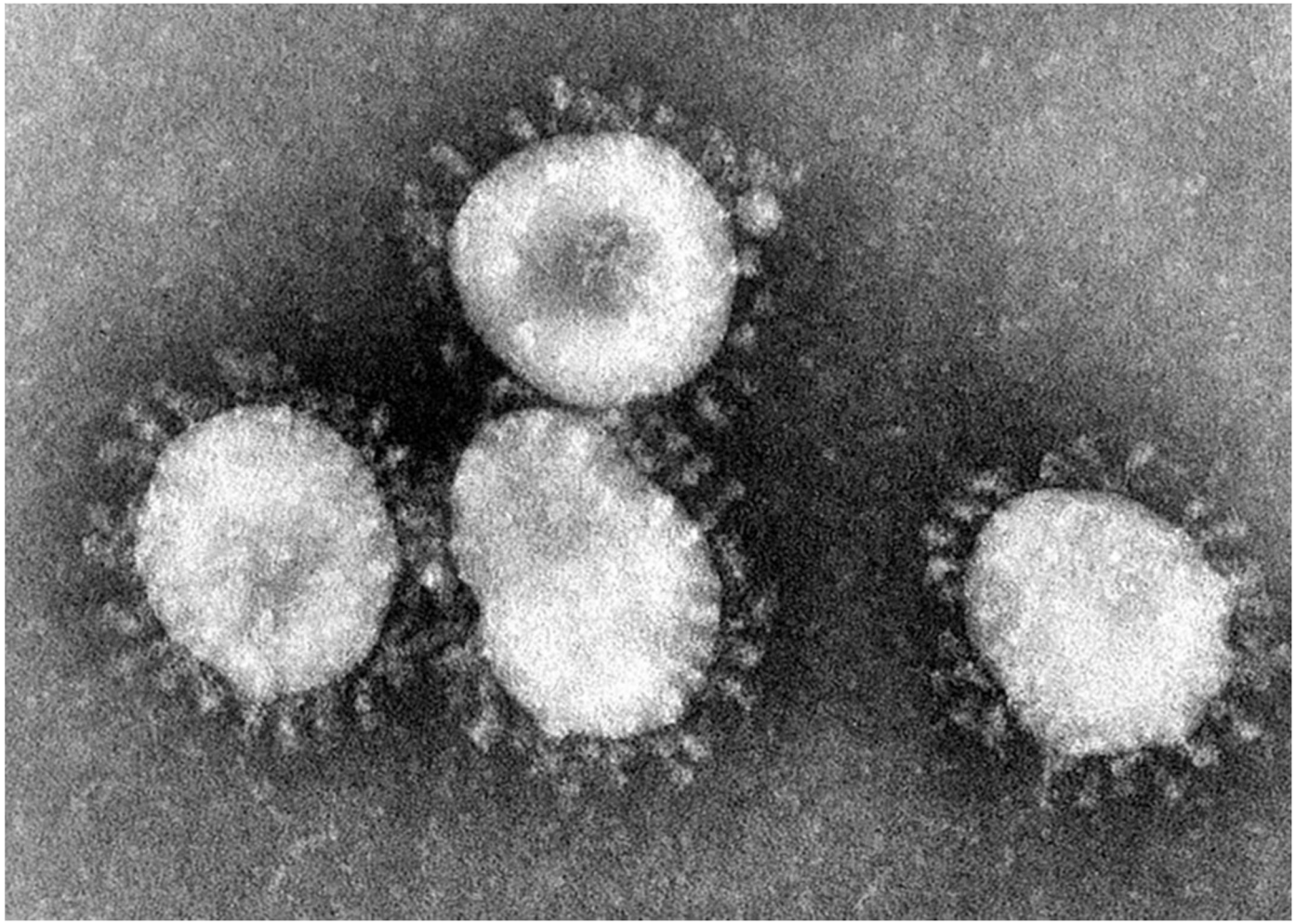
Morfologia dos coronavírus

Virião



Fotografia de microscopia electrónica de transmissão revelando a morfologia ultraestrutural característica dos coronavírus (SARS-CoV).

https://en.wikipedia.org/wiki/File:Coronaviruses_004_lores.jpg

Morfologia dos coronavírus

A Novel Coronavirus from Patients with Pneumonia in China, 2019

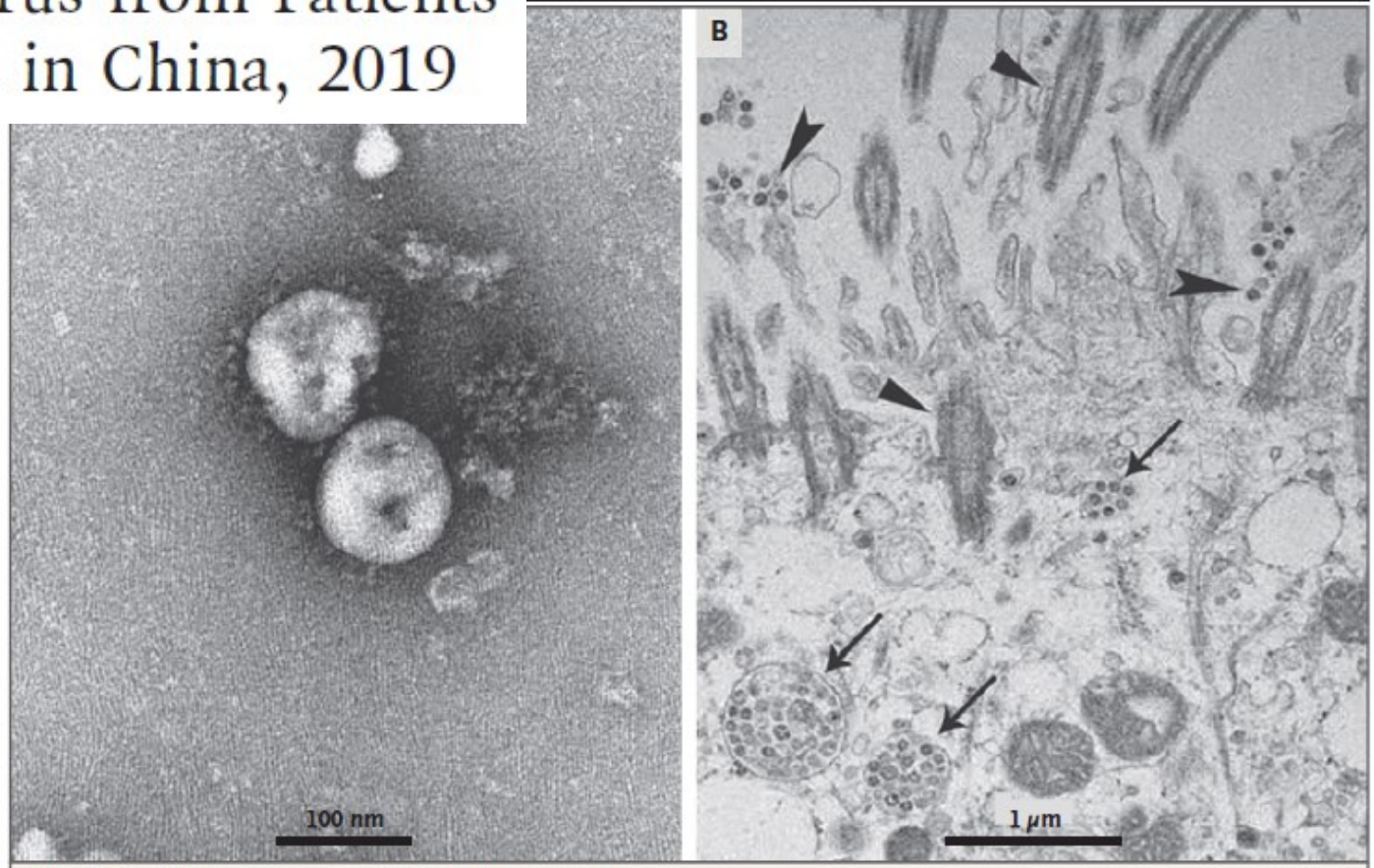
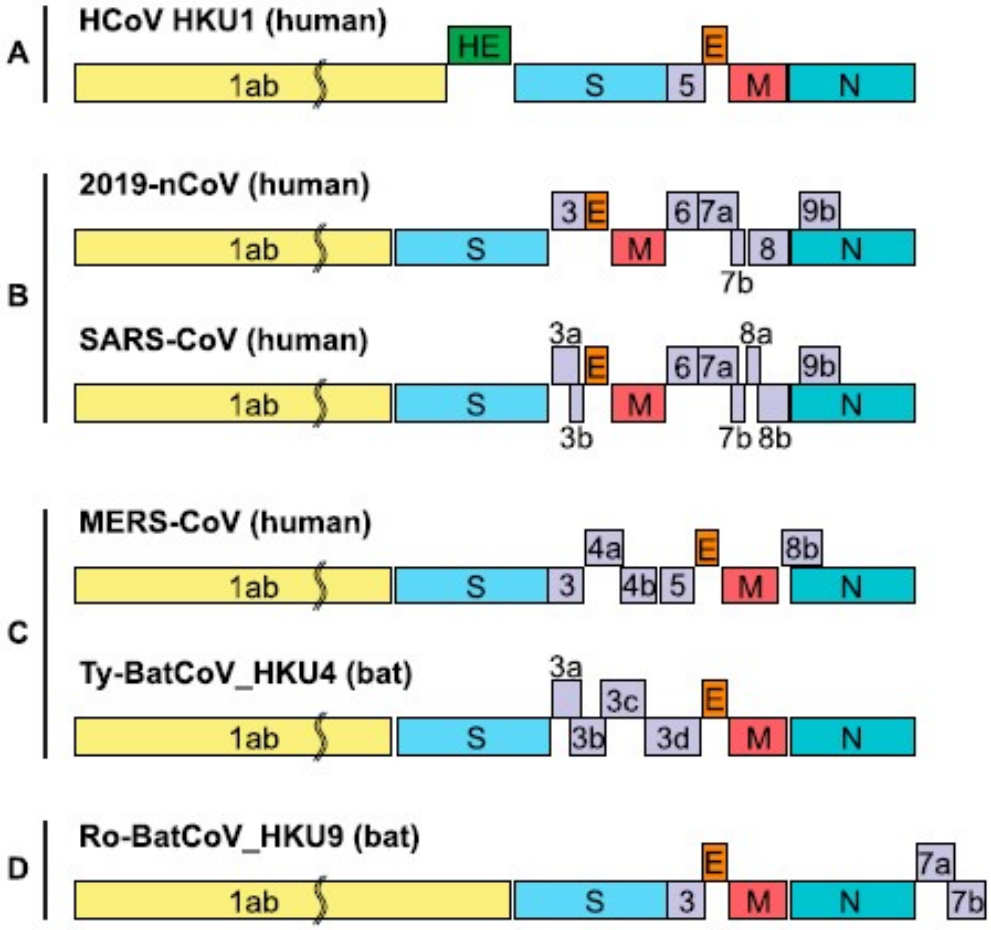


Figure 3. Visualization of 2019-nCoV with Transmission Electron Microscopy.

Negative-stained 2019-nCoV particles are shown in Panel A, and 2019-nCoV particles in the human airway epithelial cell ultrathin sections are shown in Panel B. Arrowheads indicate extracellular virus particles, arrows indicate inclusion bodies formed by virus components, and triangles indicate cilia.

in Zhu et al., 2020

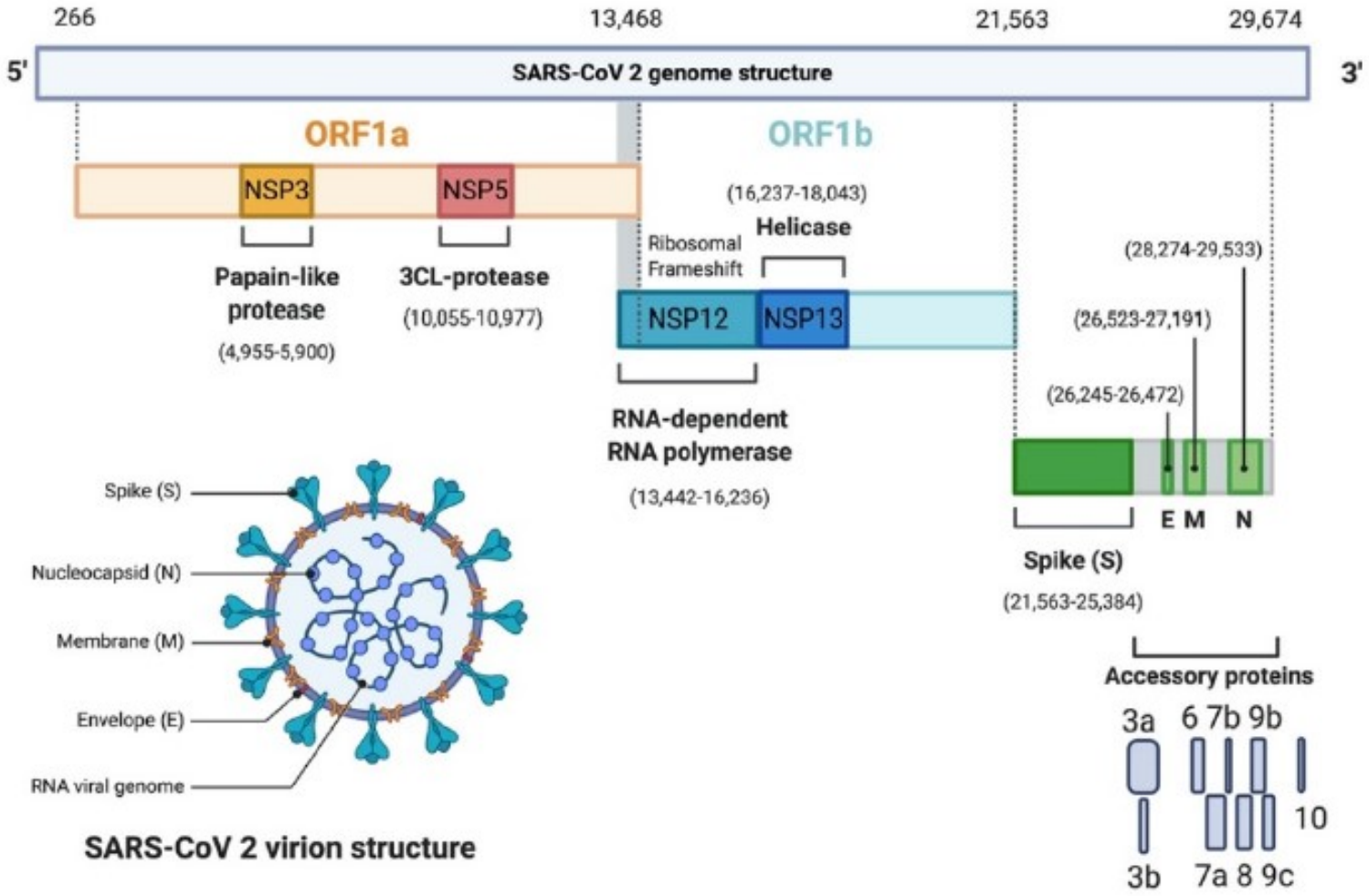
Genoma dos coronavírus



- RNA, linear, monomérico, não segmentado, de cadeia simples e polaridade positiva
- ≈ 30 kb
- Codifica 20-30 proteínas distintas

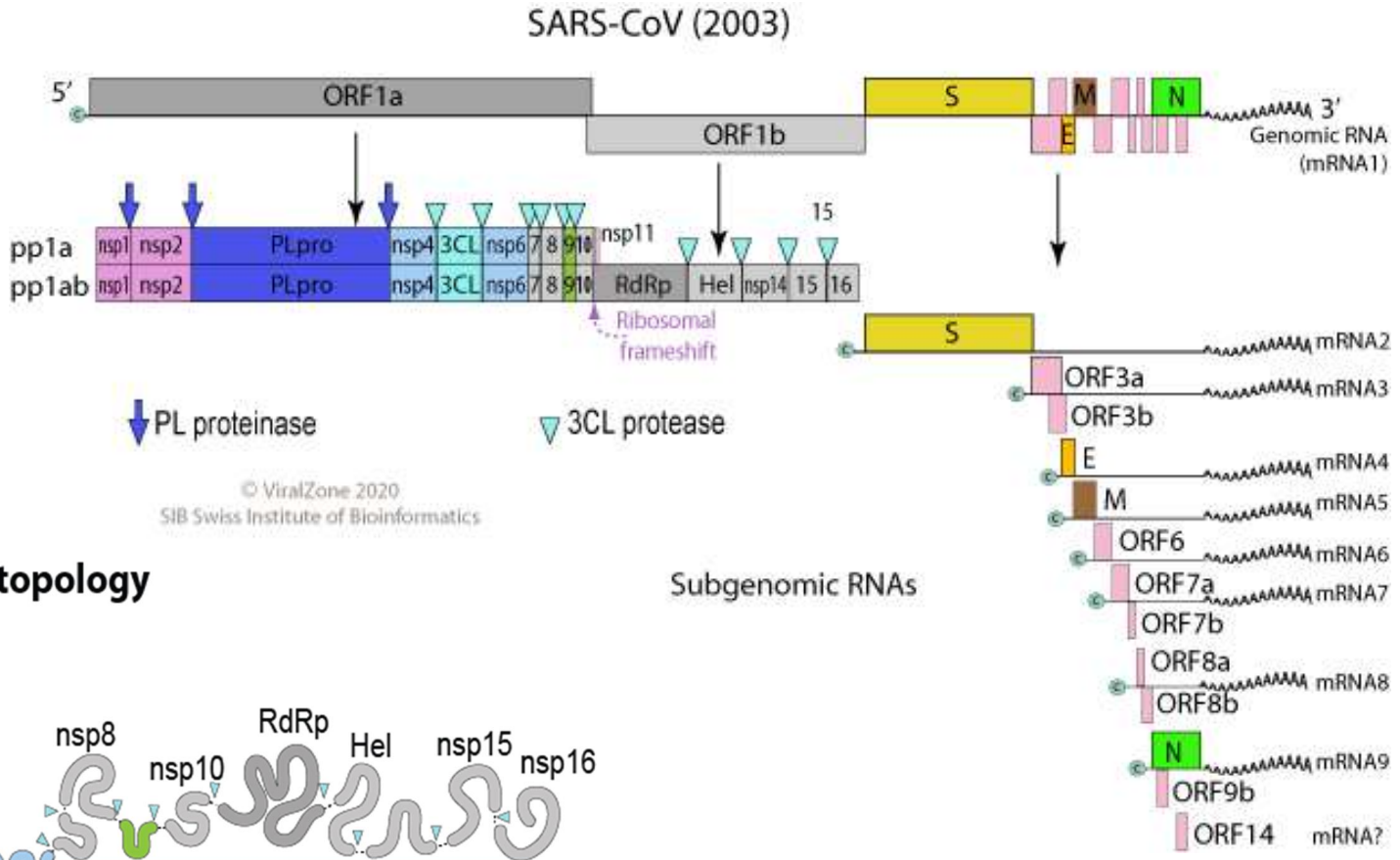
in Chan et al., 2020

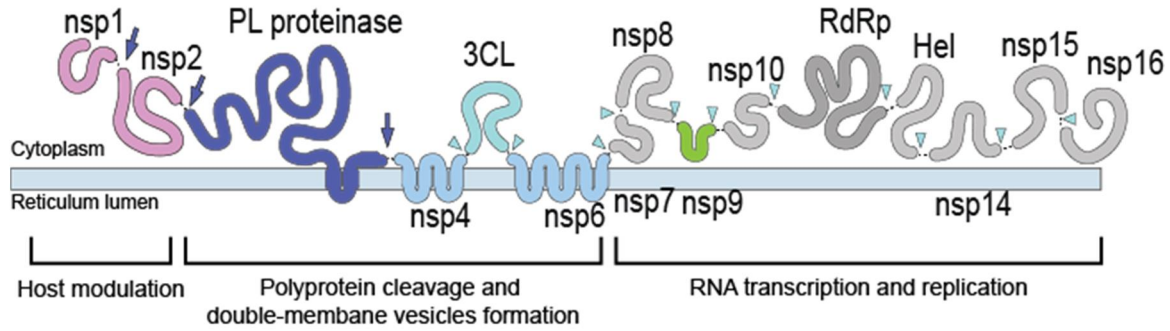
Genoma dos coronavírus



in Alanagreh et al., 2020

Genoma dos coronavírus





"…a nested set of mRNAs."

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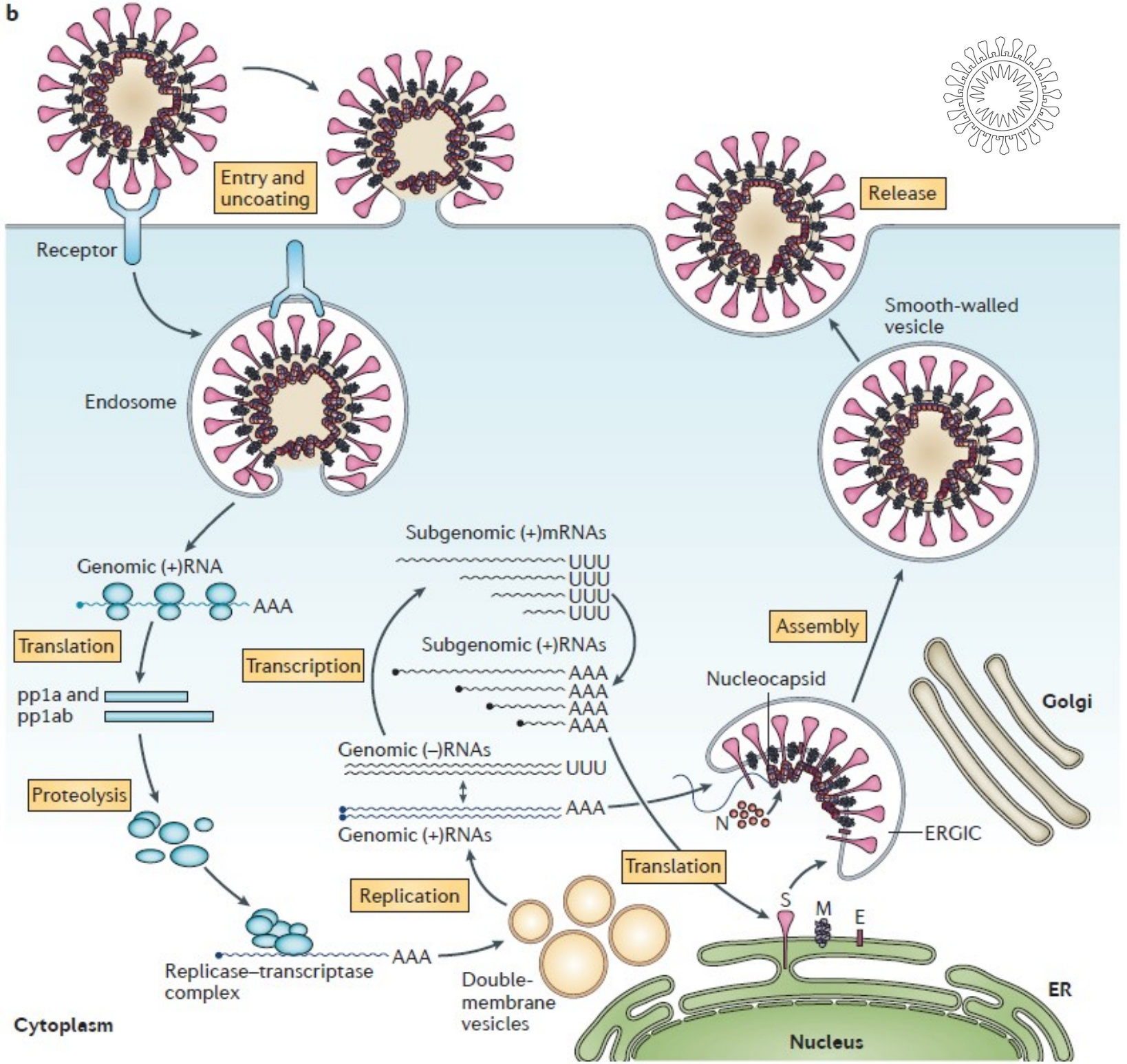
Ciclo replicativo



in De Wit et al., 2016

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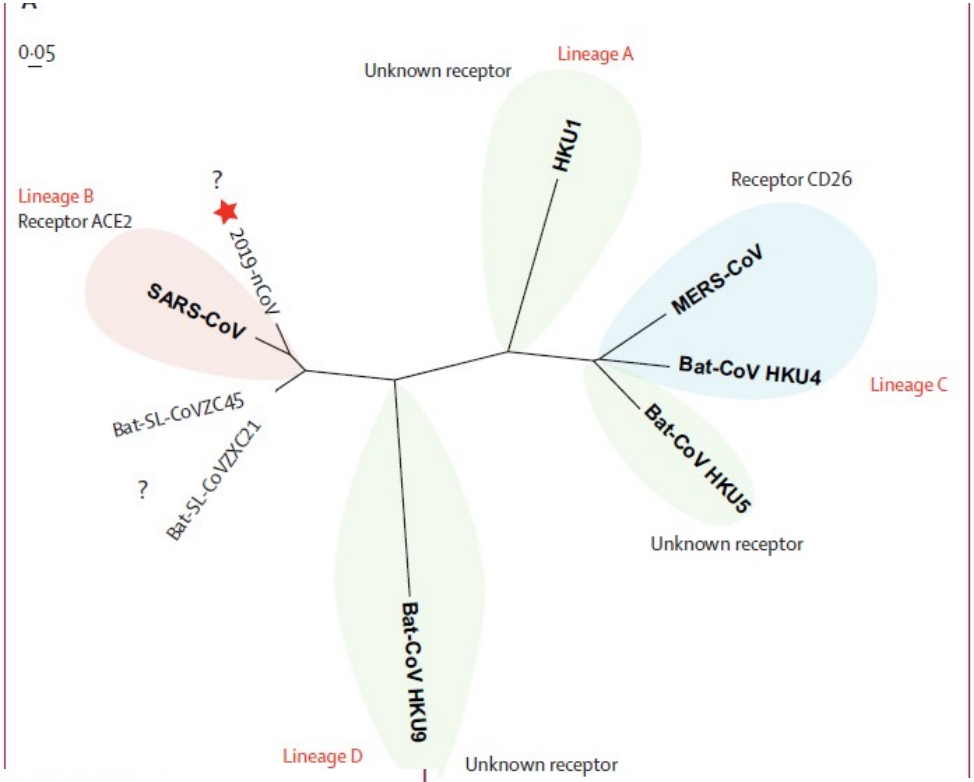
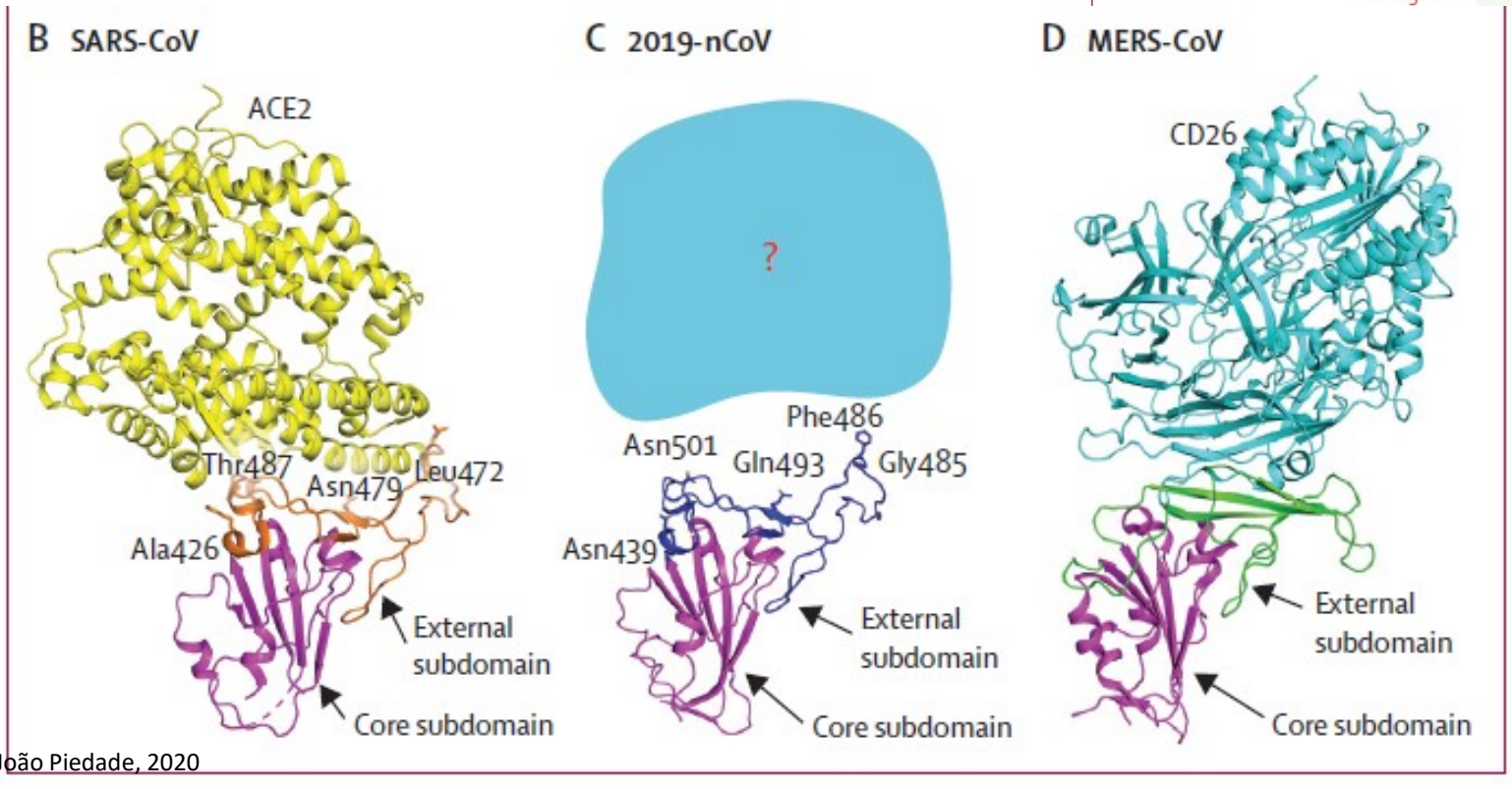
Receptor celular

SARS-CoV – ACE2 (enzima conversora da angiotensina 2)

MERS-CoV – CD26 (dipeptidil peptidase-4, DPP4)

SARS-CoV-2 – ACE2 (+ integrinas?)





in Lu et al., 2020