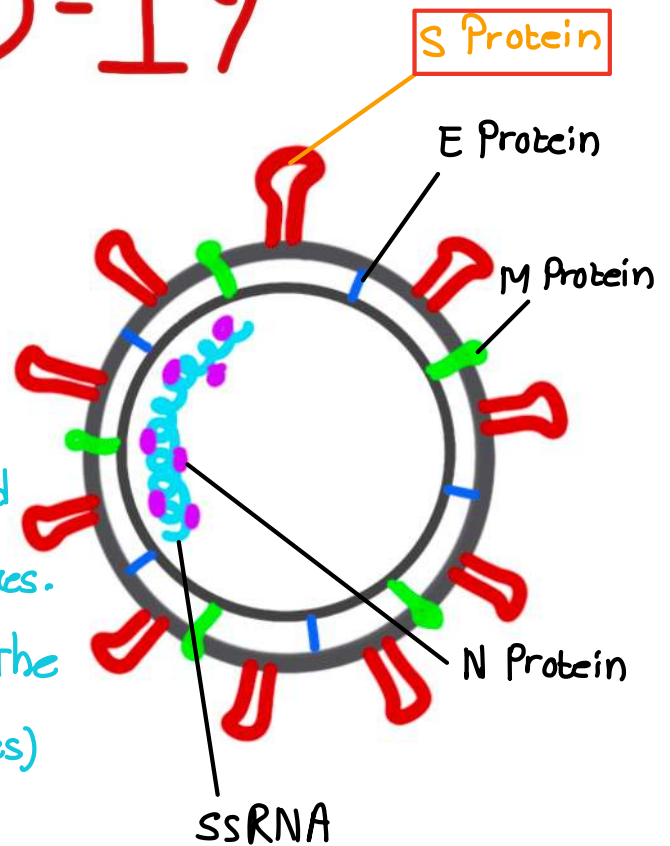


COVID-19

Coronaviridae is a family of viruses. They possess a single strand of RNA, their genetic material which contain information to produce copies of themselves. This is protected by a spherical protein envelope covered with spikes. They act as keys to enter a cell to multiply. The virus resembles the sun with its crown (flares) hence its name.



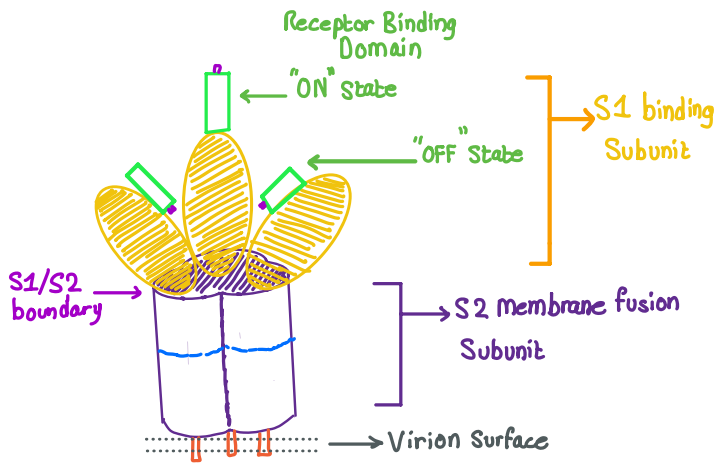
One subfamily is the Coronaviruses. They include members which cause infectious diseases in humans and birds. In humans, they account for 15% of common cold, Mild symptoms produced by HCoV-OC43 for example. They can also cause more severe symptoms like the COVID-19 caused by SARS-CoV-2.

Structure of the virion.

It is spherical with a diameter 400 times smaller than the diameter of a human hair. The S, E and M protein make up its envelope containing the ssRNA held by N protein. The more important structures are the ssRNA as it codes for the whole virion and the spike glycoprotein S which allows entry in the host cell. The Genome was sequenced to determine the code and electron microscopy used to determine the structure of the S Protein.

Mechanism of Cell entry.

Structure of S Protein



- The S protein is a homotrimer. It consists of 3 identical amino acid chains held together to form the structure.

- The S1 subunit hosts the Receptor Binding domain. It is specific and recognises the ACE 2 (Angiotensin-Converting enzyme 2). These enzymes remain on the surface of cells and present in higher quantities in the alveolar cells in lungs. This is why the lungs are affected. Also, the RBD of SARS-CoV-2 flip-flops between an on-state able to bind to ACE2 and an off-state, unable to. The S-protein was found to remain mostly in the off-state enabling some immune evasion.

- The S2 subunit enables the membrane fusion procedure to deliver the viral genetic code for multiplication. Since the viral genome is safely protected inside the virion, to transfer it to the outside (inside the cell), a set of molecular procedures must take place.

Priming Event and Molecular Gymnastics.