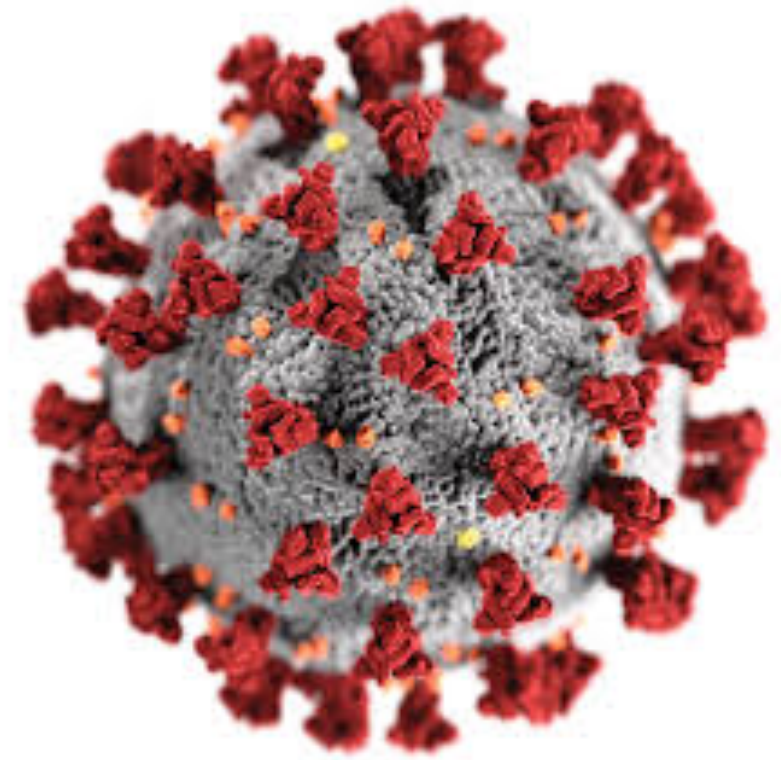
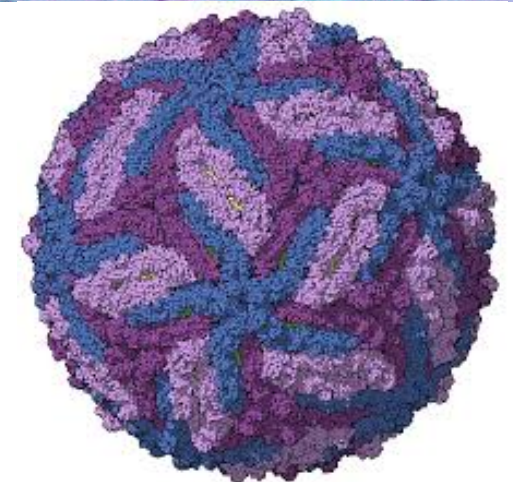
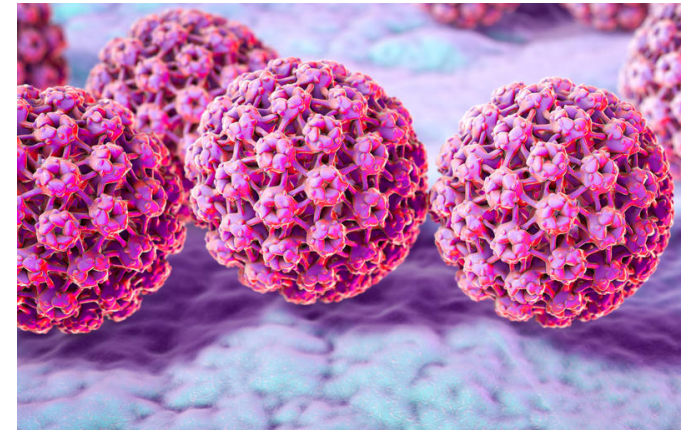
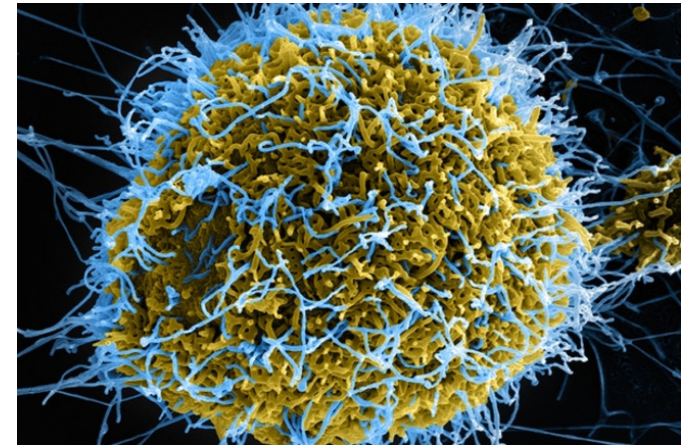


Brief excursus on Virus, COVID-19 and Vaccines

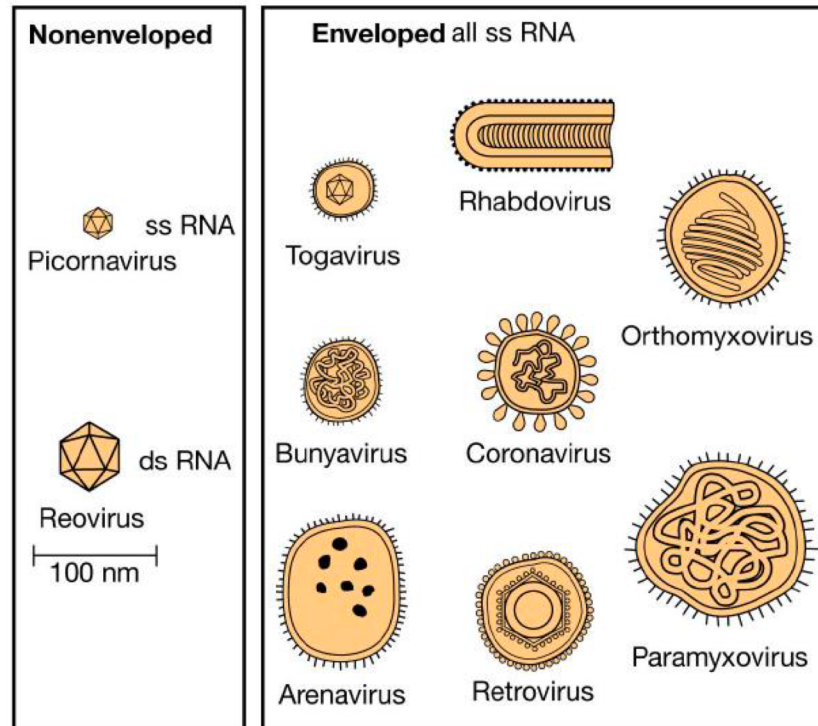


Viruses

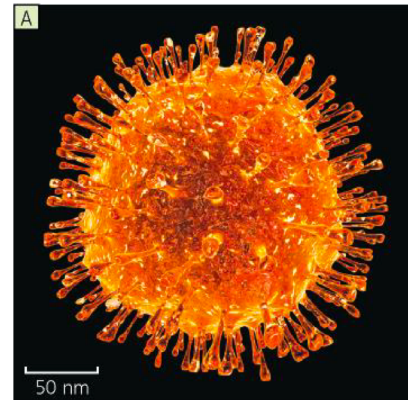
- Viruses are the most abundant microorganisms on earth
- Viruses are **obligate intracellular parasites**
 - They can survive and proliferate only by taking over (**hijacking**) a host cell machinery
- Viruses do infect every cell type:
 - Bacteria, archaea, protists, plants, fungi and mammals
- Viruses are essentially **a nucleic acid (core)** surrounded by **a protein-based envelope (capsid)**
- A virus is made up of **1 single nucleic acid**, either DNA or RNA (single- or double-stranded) - **not both**



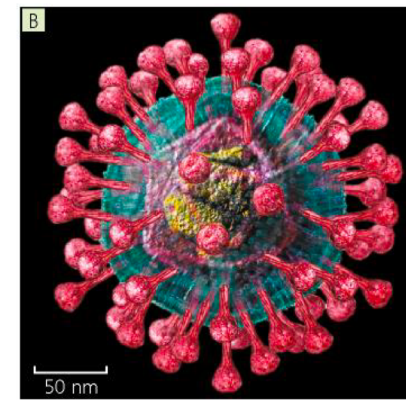
RNA viruses



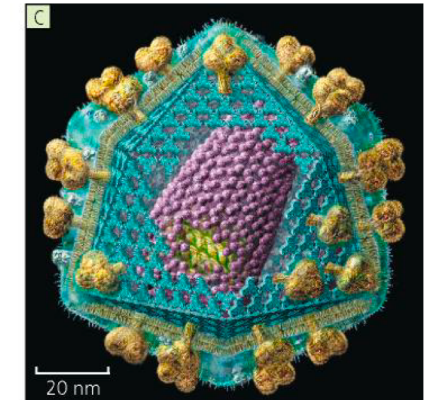
(b) RNA viruses



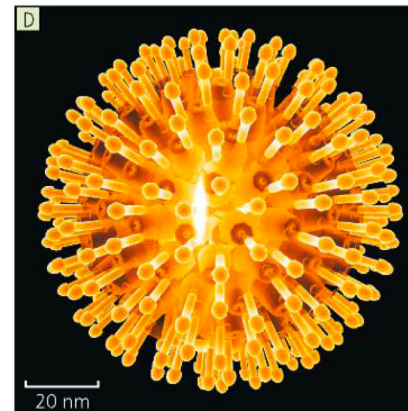
Un virus a filamento singolo di RNA antisenso: virus dell'influenza A, siglato H1N1, prevalente nel biennio 2009-2010; visto in superficie.



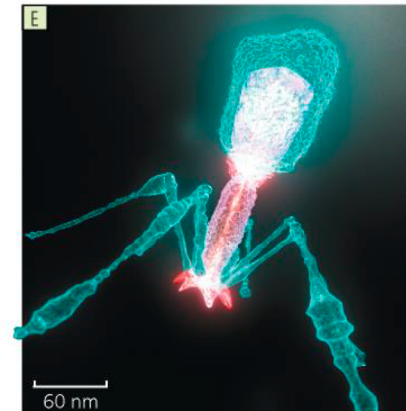
Un virus a filamento singolo di RNA a senso positivo: il coronavirus ritenuto responsabile della sindrome respiratoria acuta e severa (SARS); visto in superficie.



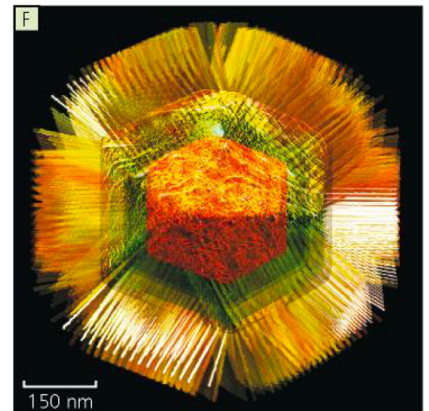
Un retrovirus a RNA: virus responsabile dell'immunodeficienza umana (HIV) che provoca l'AIDS; visto in sezione.



Un virus a doppio filamento di DNA: uno dei numerosi herpes virus (Herpesviridae). Nella nostra specie herpes virus differenti sono responsabili di molte infezioni cutanee, compresi varicella, herpes zoster, herpes labiale e herpes genitale (HSV1/2); visto in superficie.



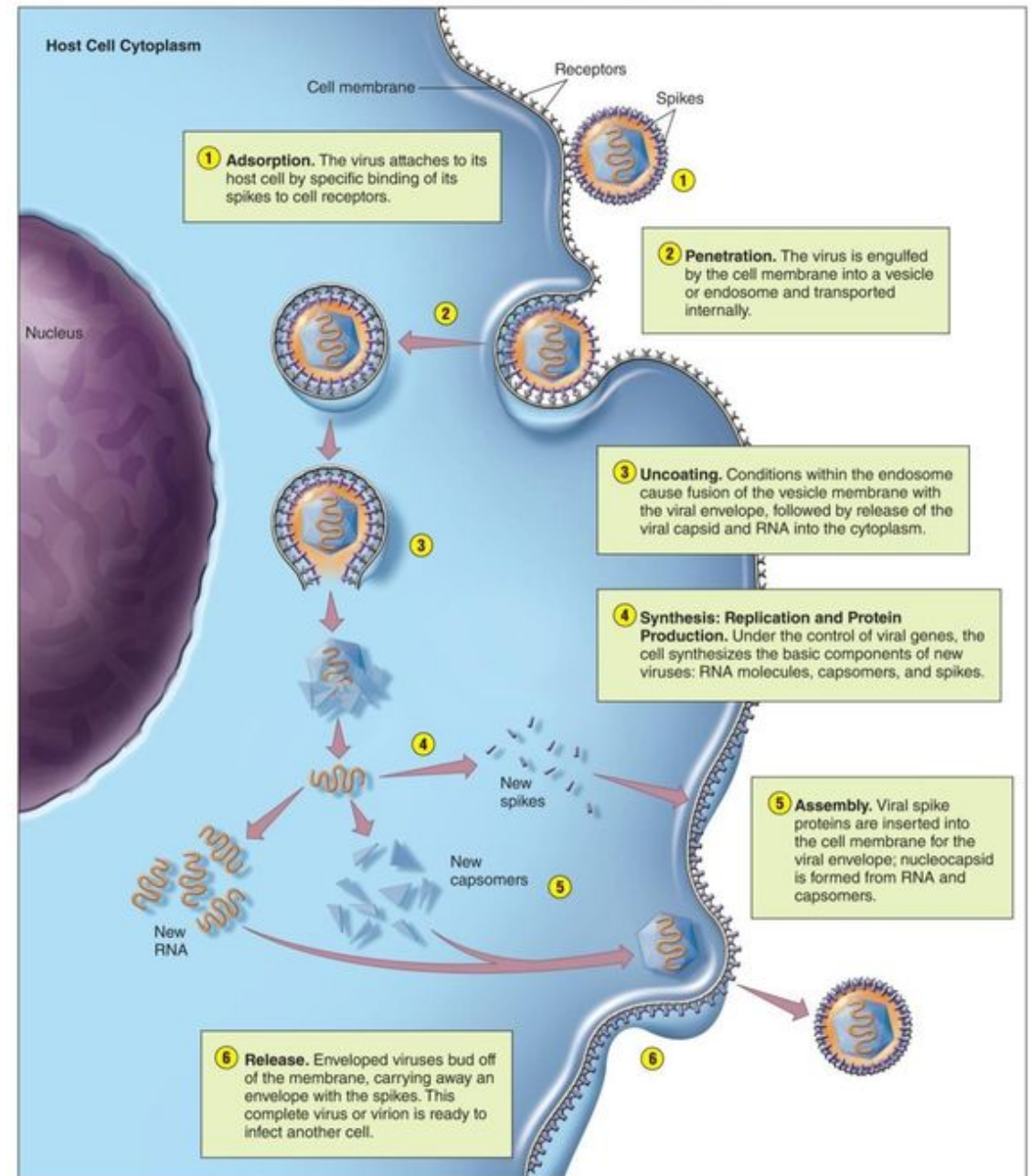
Un virus a doppio filamento di DNA: il batteriofago T4. I virus che infettano i batteri vengono denominati batteriofagi (o semplicemente fagi). T4 si attacca con fibre filiformi simili a zampe all'esterno della cellula ospite e inietta il proprio DNA nel citoplasma attraverso la "coda" (la struttura rosa nell'immagine).



Un mimivirus a doppio filamento di DNA: *Acanthamoeba polyphaga* (APMV) possiede un diametro superiore a quello di tutti gli altri virus conosciuti e un genoma più grande di quello di alcuni procarioti; visto in sezione.

Mechanism of viral replication

1. Attachment and adsorption (via spikes)
2. Penetration & Uncoating
3. Genome replication using host cell machinery
4. Assembly & maturation
5. Budding (release) from host cell



Coronaviridae

- Order: *Nidovirales*
- The viral genome is a **positive sense, single-strand RNA** (26–32 kb)
- Coronaviruses are coated particles typically decorated with large (~20 nm), club- or petal-shaped surface projections (spikes) reminiscent of the solar corona
- Coronavirus-associated diseases
 - Gastroenteric syndromes
 - Hepatic syndromes
 - Respiratory syndromes (upper and lower airways)
 - Multiorgan pathologies
- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a new virus that causes coronavirus disease 2019 (COVID-19), the respiratory illness responsible for the COVID-19 pandemic
- No cure for these pathologies
 - Ongoing
 - Vaccines
 - Drug repurposing

