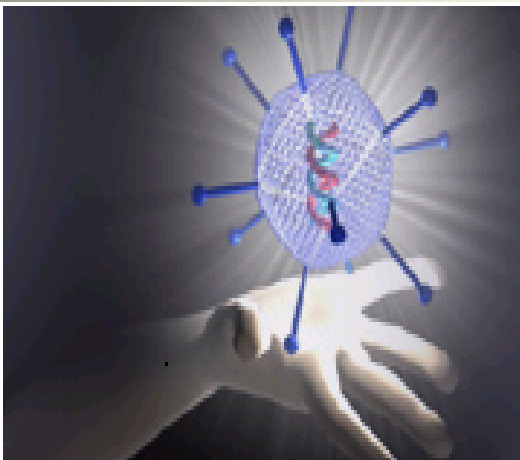
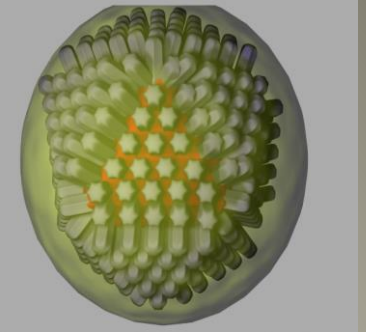


VIRUSES



WHAT IS A VIRUS?



- Virus in Latin means poison.
- Viruses are infectious organisms, when compared to other infectious organisms are small-sized objects simple configuration.
- Viruses range in size from about 30 nm to about 450 nm, which means that most of them cannot be seen with light microscopes.
- Vary greatly in appearance and size
- Viruses are not considered living cells, but large, complex molecules.

The study of Virus : Virology

Who do viruses infect?

Viruses usually infect a specific host including:

Viruses infect *Bacteria*

These viruses are called bacteriophages

Viruses infect *Plants*

E.x Tobacco Mosaic Virus

Viruses infect *Animals*

E.x common cold

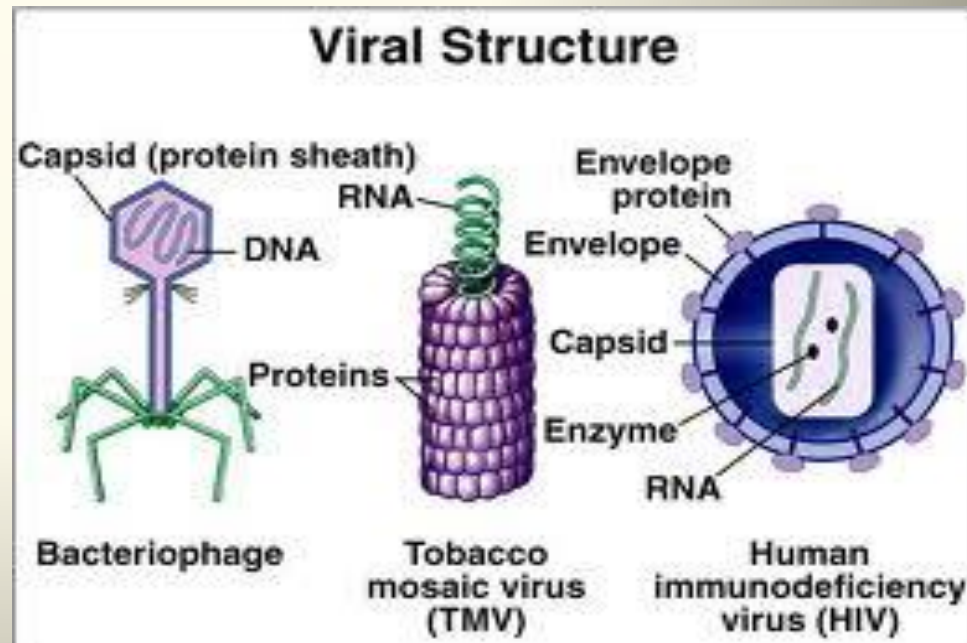
Viruses infect *fungi*

Viruses infect *human*

E.x. influenza virus

Structure of Virus

- * All viruses contain **nucleic acid**, either DNA or RNA (but not both)
- * **protein coat**, which encases the nucleic acid.
- * Some viruses are also enclosed by an envelope of **fat and protein molecules**.



Virion

Virion Structure:

Virion: a complete virus particle

Envelope: Lipid and protein membrane

Tegument: Amorphous layer between envelope and capsid

Capsid: Symmetrical protein layer around genome or core

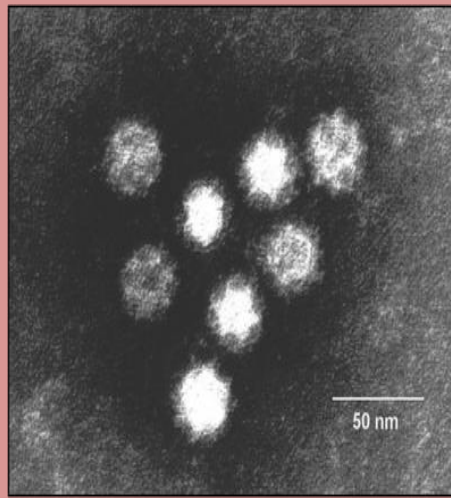
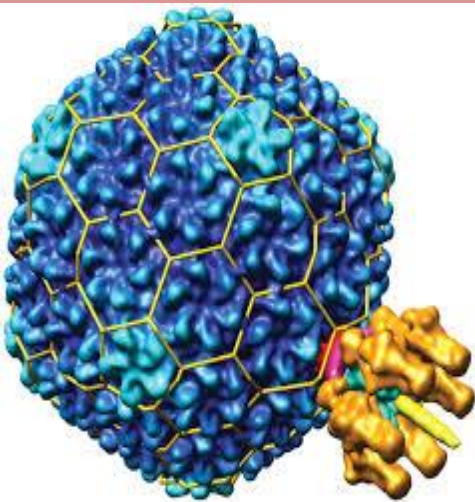
Core: Genome and associated proteins

Viral Structure-Symmetry

Icosahedral

Constructed of 20 equilateral triangular faces

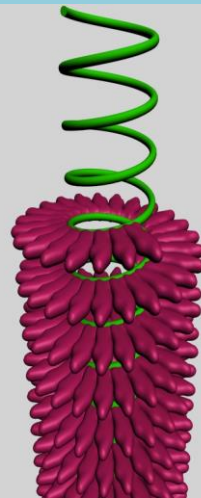
E.g. Adenoviruses



Helical

Tubular construction with the subunits arranged around the nucleic acid in a coil

E.g. Tobacco Mosaic Virus(TMV)

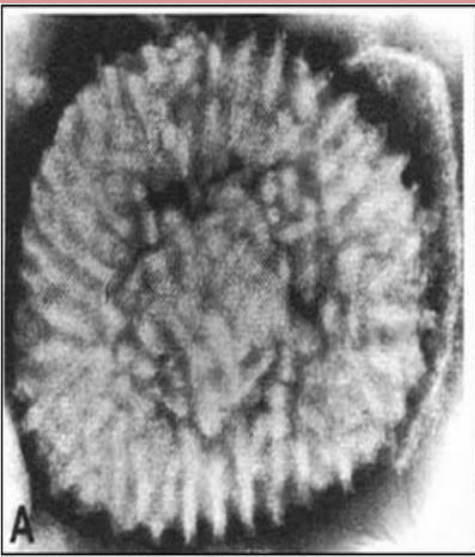


Viral Structure (no symmetry organized)

Complex

Not fully understood

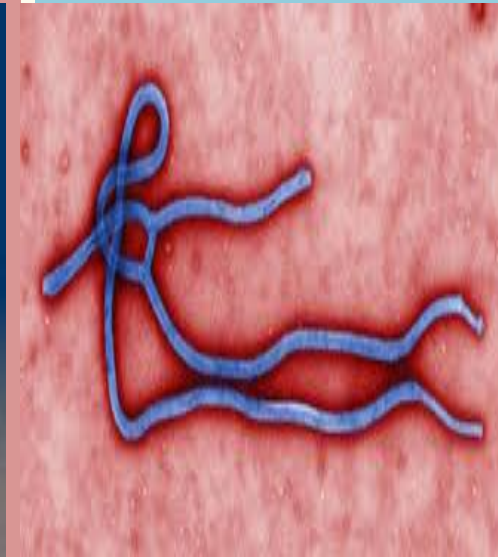
e.g. smallpox virus



Filamentous

Pleomorphic

e.g. ebolavirus



Chemical Structure of the Genome

Most viruses have either RNA or DNA as their genetic material

The nucleic acid may be single or double stranded.

Chemical Structure-Proteins

Structural

Important for viral stability and attachment

Non-structural

Enzymes involved in viral replication

Antibodies are generally formed against the structural proteins.

How do viruses replicate?

There are five steps in the viral life cycle:

Attachment – A virus comes into contact with a host cell and attaches specific spots on the cell called **receptors**.

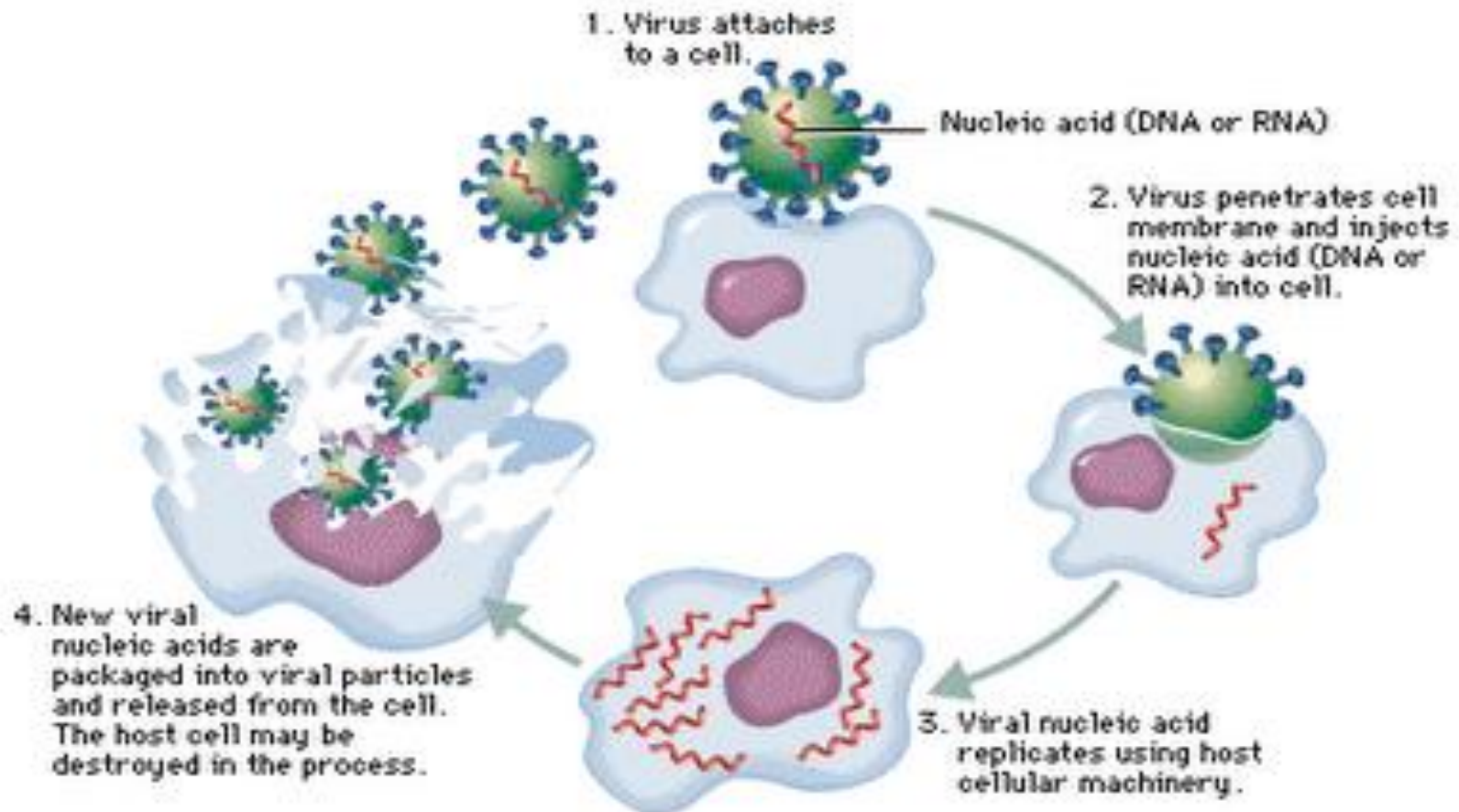
Entry – The virus secretes chemicals that weaken the host cell wall. Once a weak spot on the cell wall is made, DNA or RNA is injected through.

Replication – When inside a cell, the virus takes over and instructs the host cell to make more viral DNA and proteins

Assembly – Cellular activity of the host cell help assemble new viruses until the host cell is filled with new viruses.

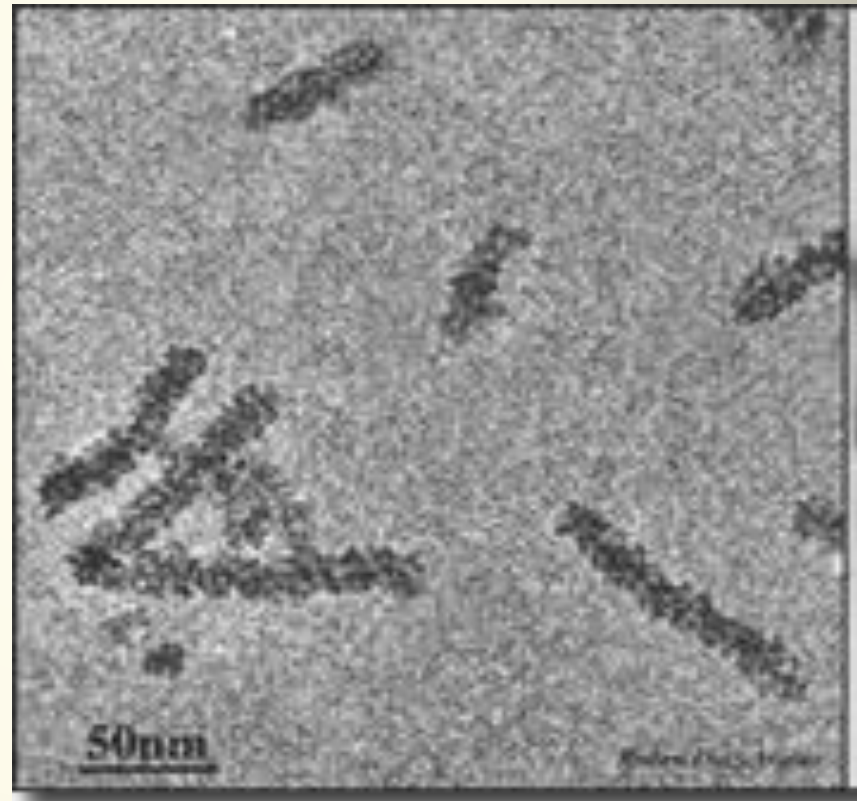
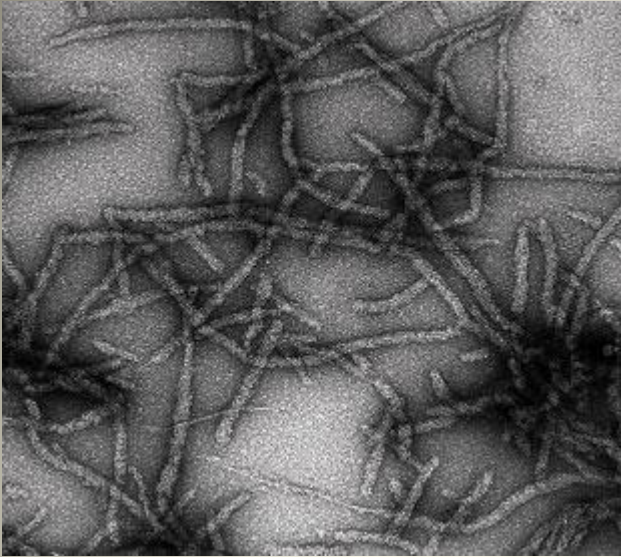
Release – When assembling is complete, the virus particles release enzymes that digest the host cell wall. The new virus particles released go to infect new cells where the cycle is repeated.

viral life cycle



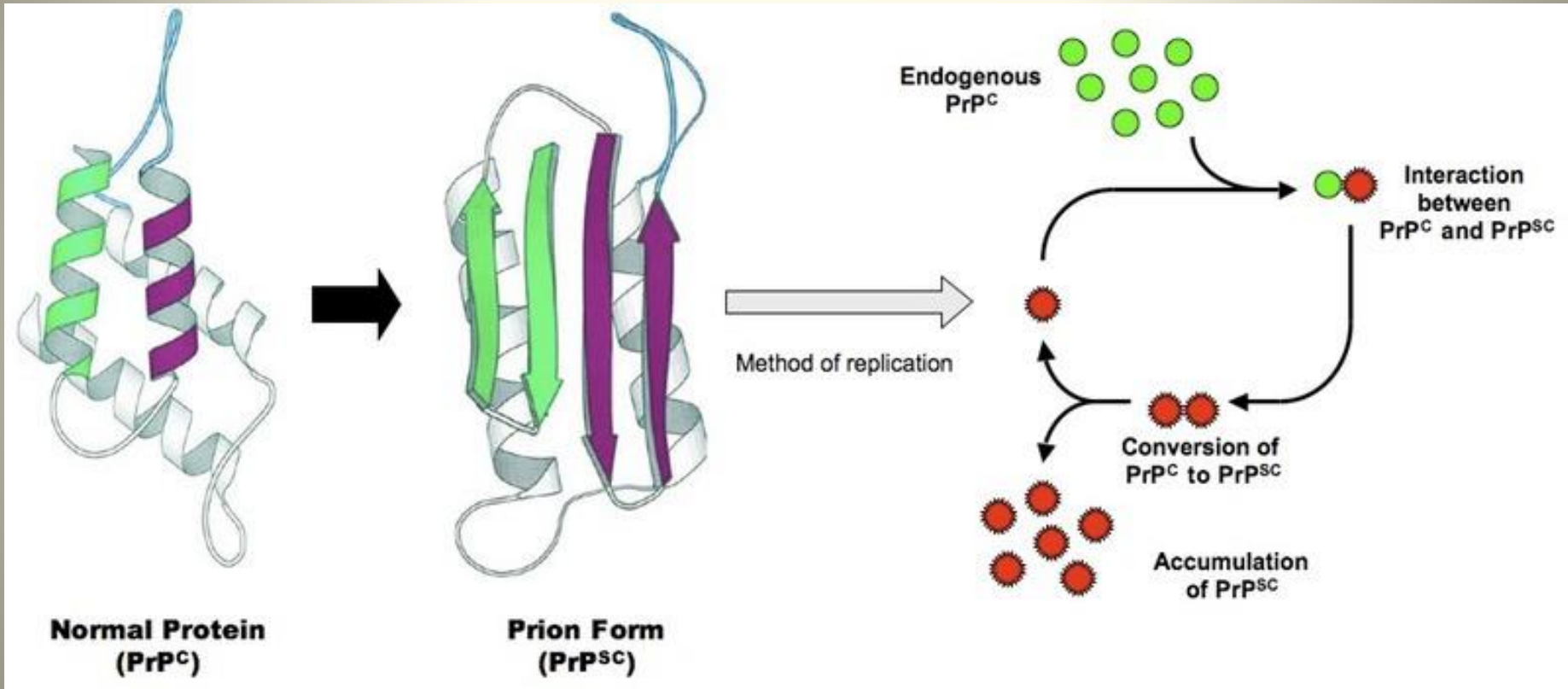
Prions

- called because they are proteinaceous, are infectious particles
- smaller than viruses
- lacking nucleic acids (neither DNA nor RNA).
- Obligate intracellular parasite
- Prions have been held responsible for a number of degenerative brain diseases, including mad cow disease



infectious prion particles extracted from yeast cells, as revealed by an electron microscope

Folding and Replication of Prion Protein



Viroids

- Viroids are plant pathogens: small, single-stranded, circular RNA particles.
- They do not have a capsid or outer envelope, but, as with viruses, can reproduce only within a host cell.



Potato spindle tuber viroid