VMC 321:

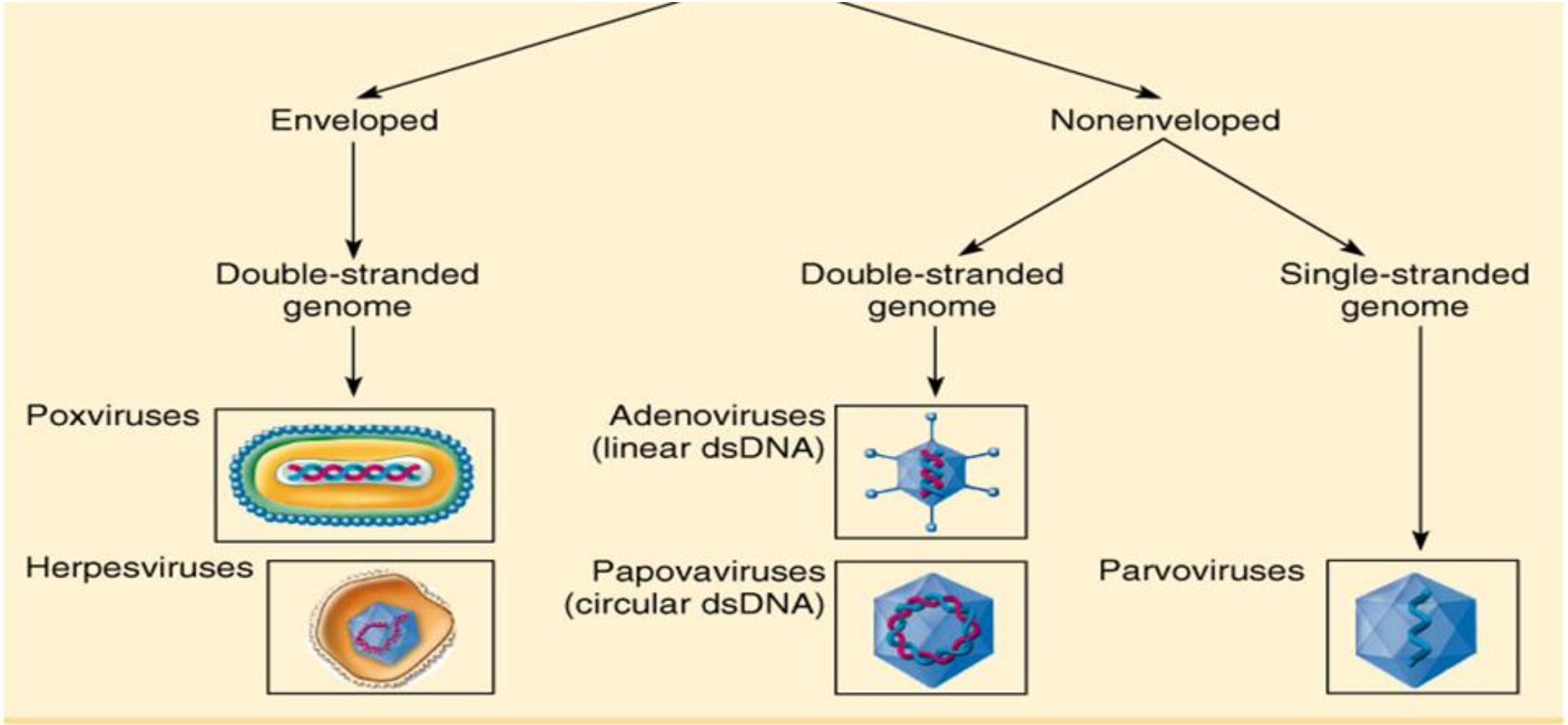
Systematic Veterinary Virology

Poxviridae

Outline

- ***Poxviridae***: Pox viruses of
- Cow- Cowpox virus, Buffalopox virus
- Sheep- Sheeppox virus
- Goat – Goatpox virus
- Fowl – Fowlpox virus

- Brief history
- **Classification**
- Characteristics viruses
- Laboratory diagnostic techniques
- Immunity to viral infections
- Systemic virology



Adapted from: *Poxviridae* from Buller et al., National Institute of Allergy & Infectious Disease, Department of Health & Human Services.

The family "*Poxviridae*" comprise of two subfamilies….

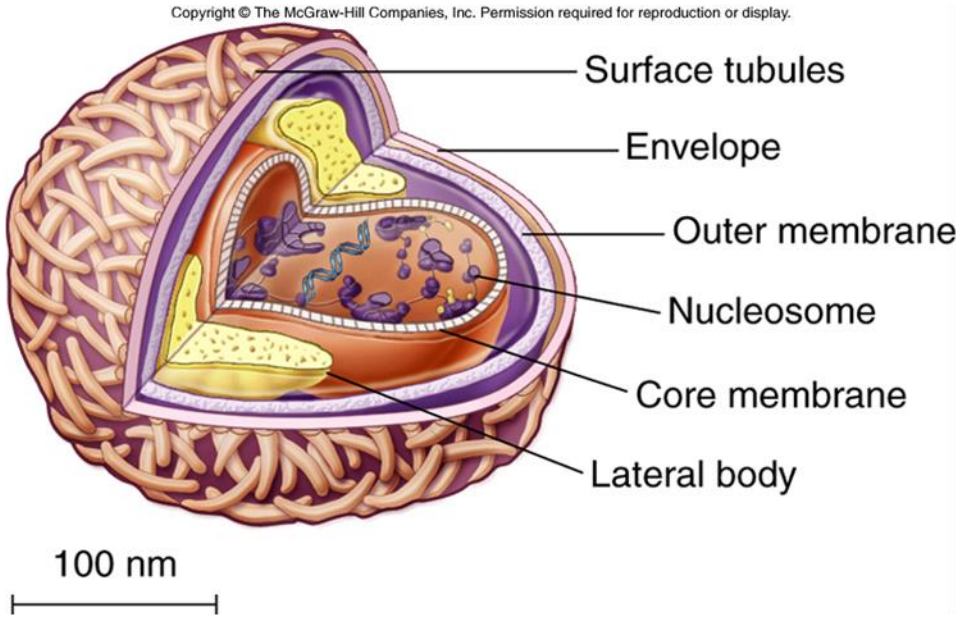
1. *Chordopoxvirinae*
2. *Entomopoxvirinae*

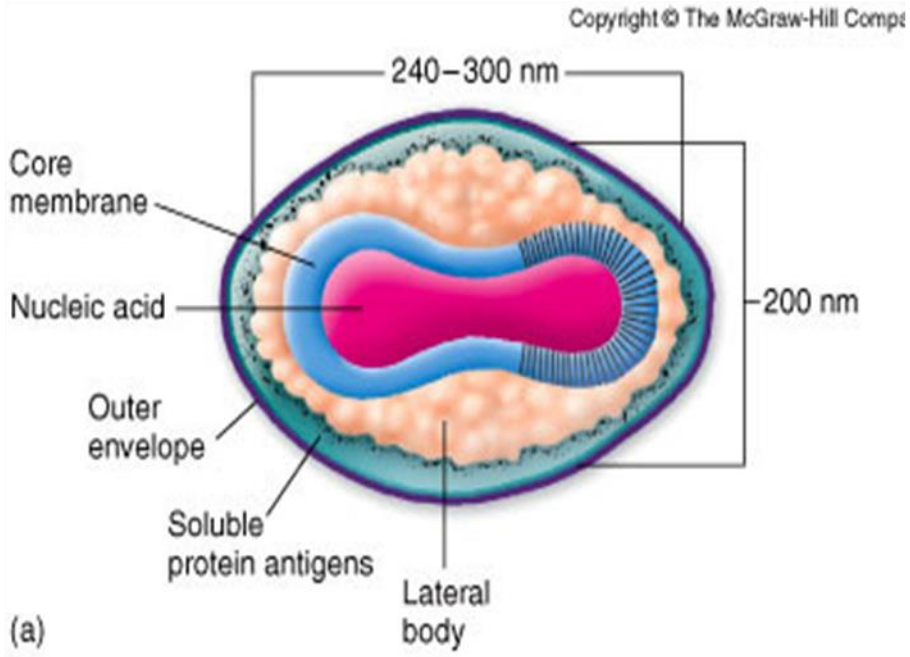
Family *Poxviridae* Classification

Subfamilies	Genera	Members
Chordopoxvirinae	Orthopoxvirus	Variola, vaccinia, cowpoxvirus ,Buffalopox monkeypox, camelpox
(vertebrates)	Parapoxvirus	Bovine popular stomatitis virus (Bovine pustular dermatitis virus), Orf virus (contagious ecthyma virus) Milker's nodule (paravaccinia or pseudo-cowpox) virus
	Capripoxvirus	Goatpox virus, sheeppox virus, Lumpy skin disease virus *(Neethling virus)*
	Leporipoxvirus	Hare fibroma, myxoma, rabbit fibroma, squirrel fibroma
	Suipoxvirus	Swinepox virus
	Avipoxvirus	Canarypox, fowlpox, pigeonpox, turkeypox, penguinpox
	Molluscipoxvirus	Molluscum contagium
	Yatapoxvirus	Tanapox, Yaba monkey tumor

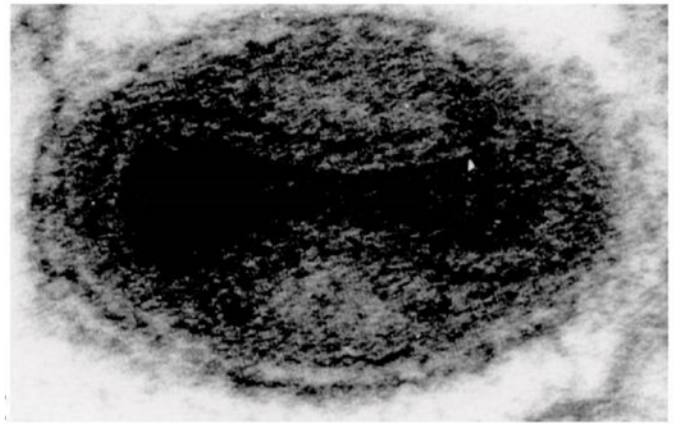
Morphology

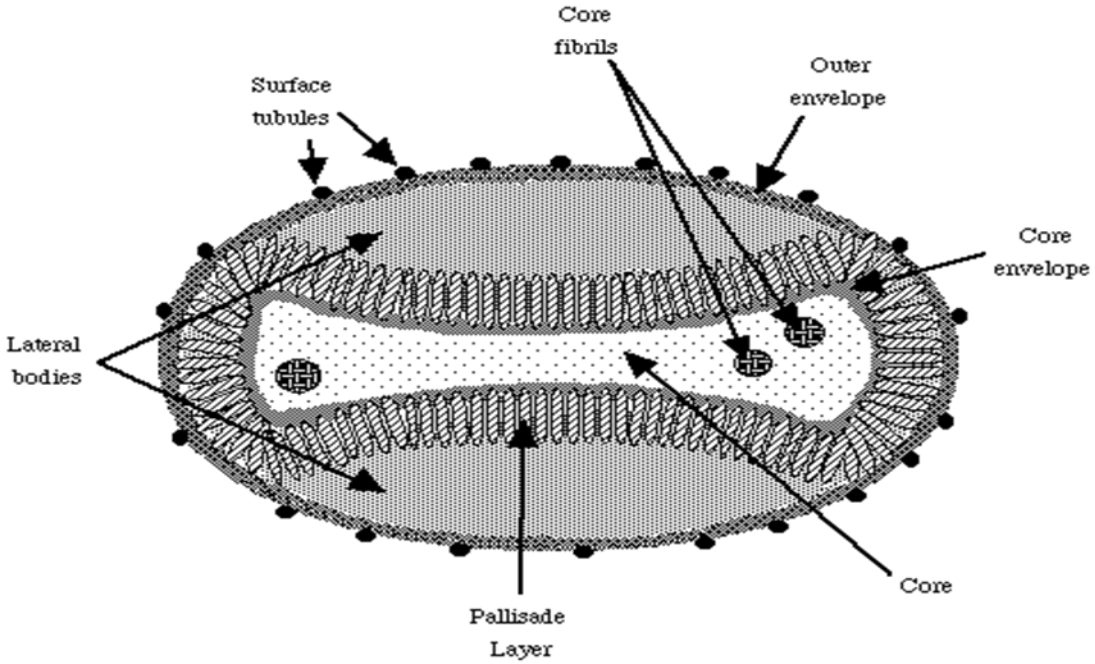
- The particles are extremely complex, containing many proteins (more than 100) and detailed structure is not known.
- Biconcave (dumbbell-shaped), with two "lateral bodies" (function unknown).





Properties





The outer surface is composed of lipid and protein which surrounds the core

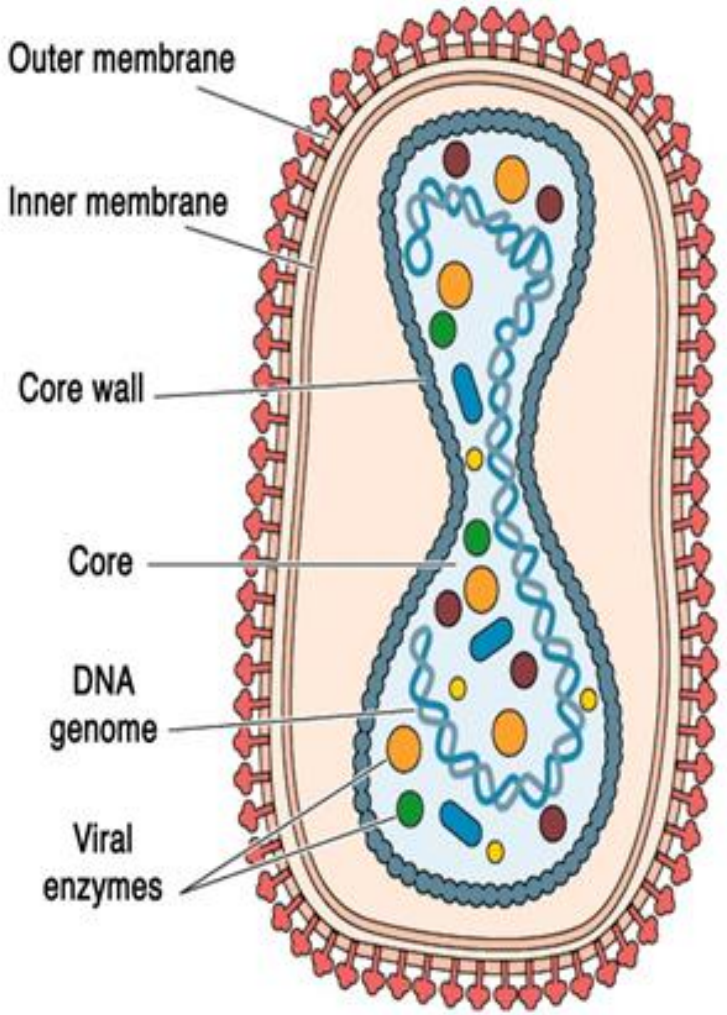
The core is composed of a tightly compressed nucleoprotein.

They have a double-stranded DNA (130 – 375 kb) genome contained in a helical nucleocapsid structure seen as a dumbbell shape.

Outside of which are several virus-encoded proteins in structures referred to as 'tubules'(mesh-like coat.)

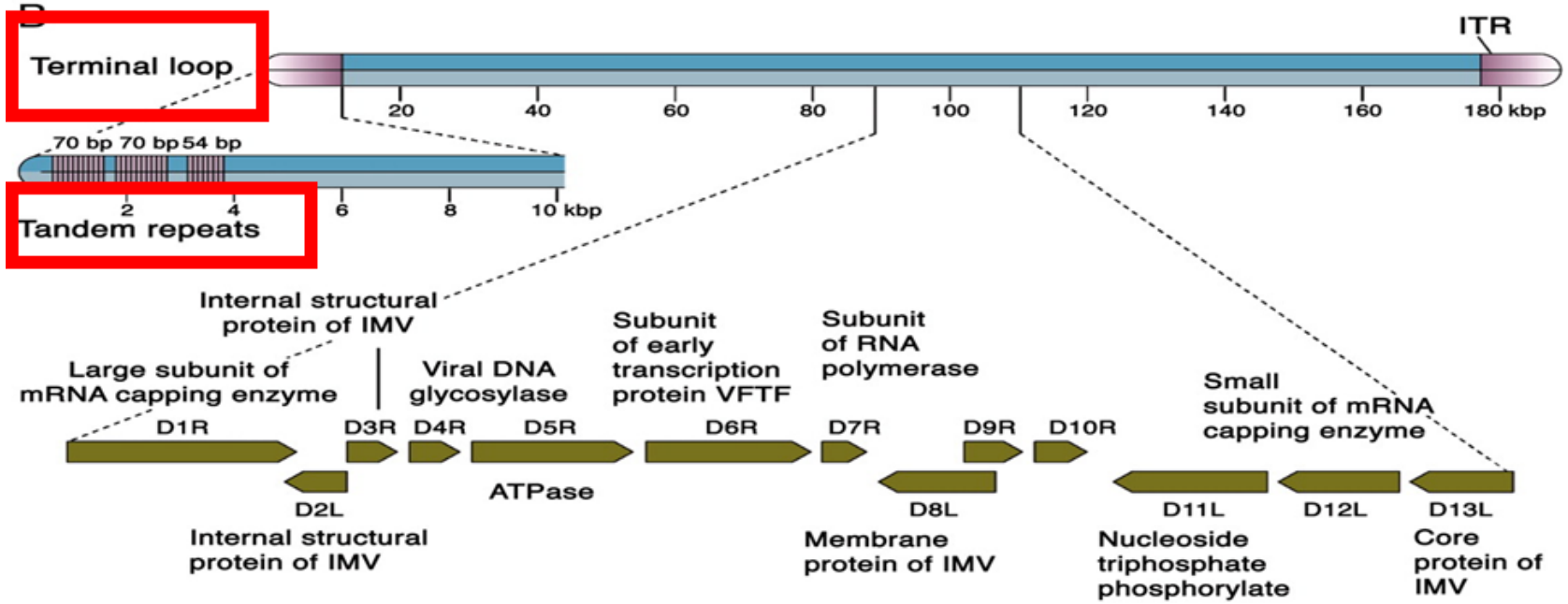
This particle is referred to as an intracellular infectious virion.

- Linear, d/s DNA of 130-300kbp (cross-linked ends).
- No know origins
- Replication in cell cytoplasma
- Encodes all transcription and replication enzymes needed for viral gemone



Genome

- Ends of genome consist :
  1. a terminal hairpin loop (no free ends)
  2. with several tandem repeat sequences
  3. this arrangement is found at the ends of chromosomes



Replication

2. Initial Uncoating

The viral core particle **(CORE)** is released into the cytoplasm

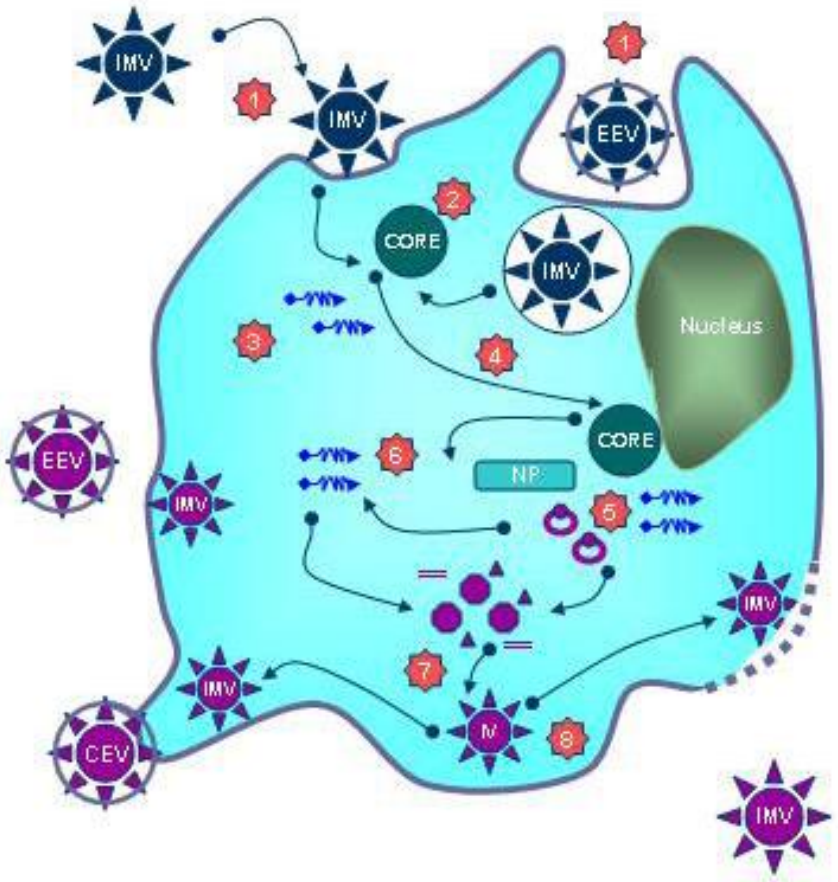
It containing:

1.viral genome,

2.viral DNA-dependent

RNA polymerase

3. other enzymes

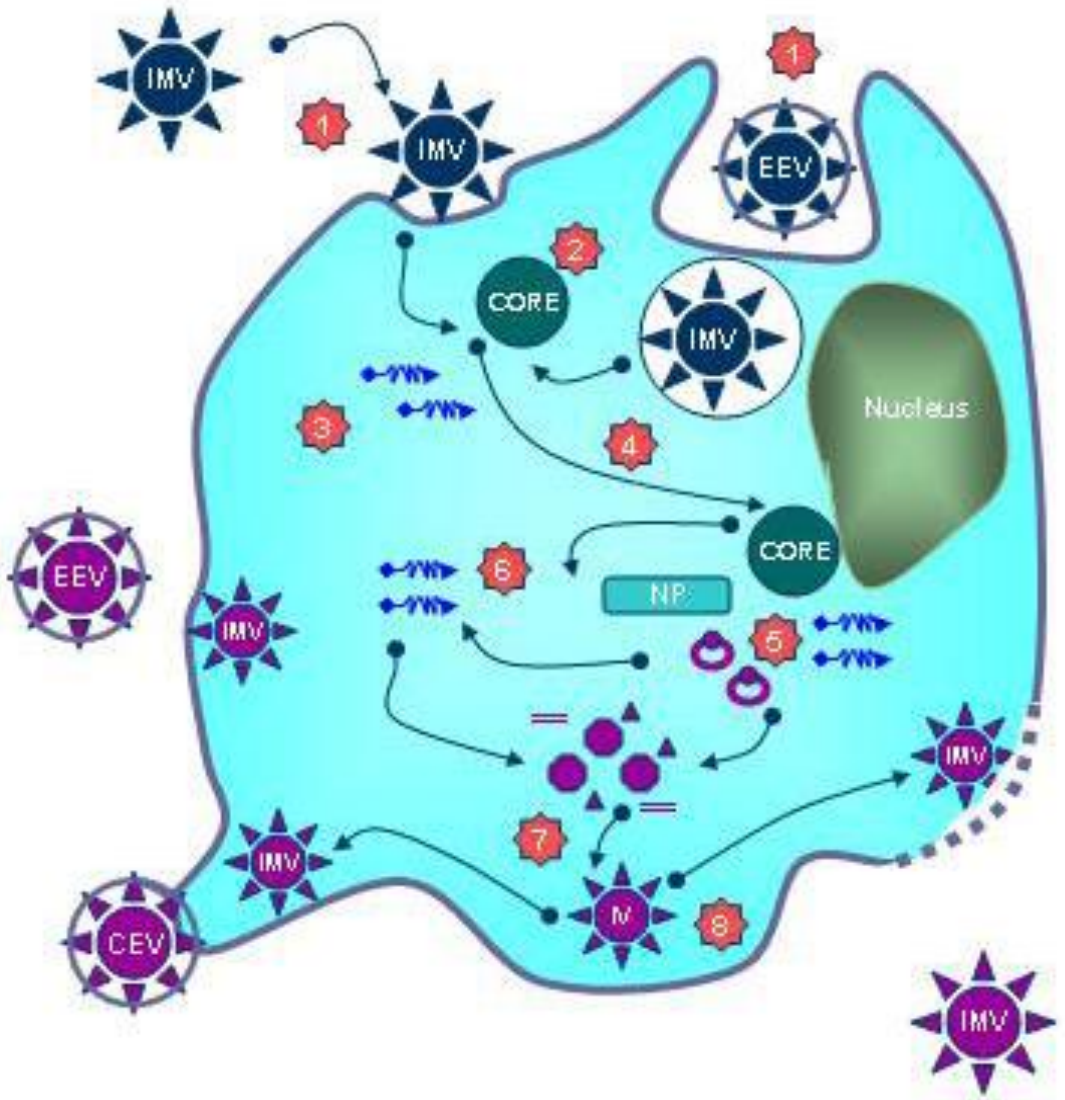


Replication

3. Early Transcription

Early genes are immediately transcribed.

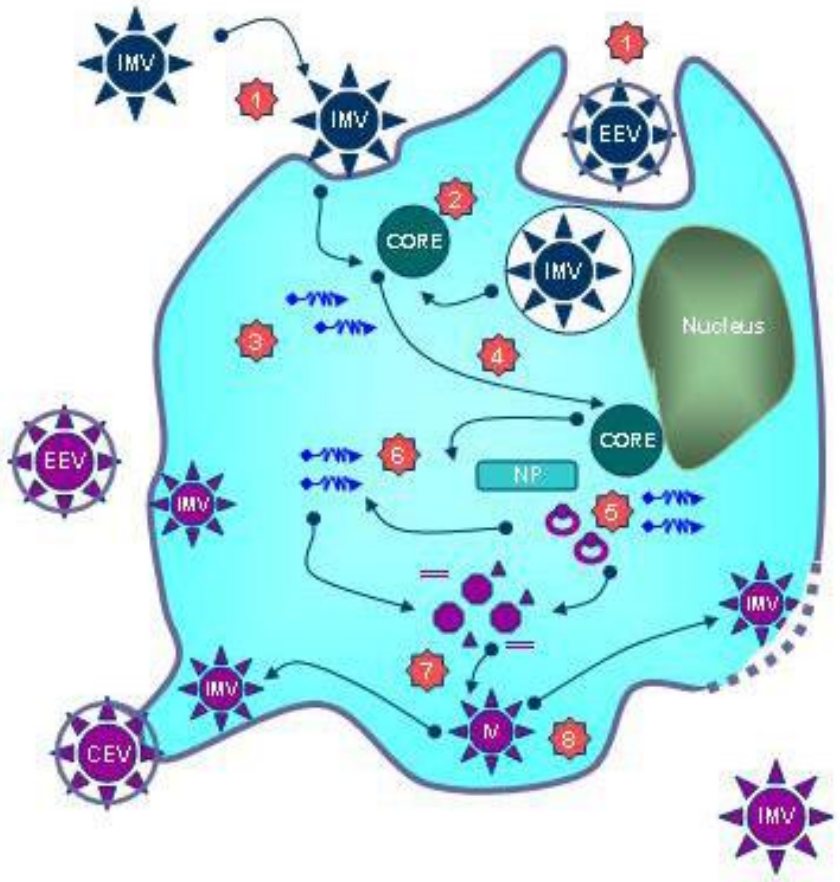
It including immunomodulatory proteins, enzymes, and replication and transcription factors



Replication

4.Translocation

The viral core particle translocates to the outside of the cell nucleus.

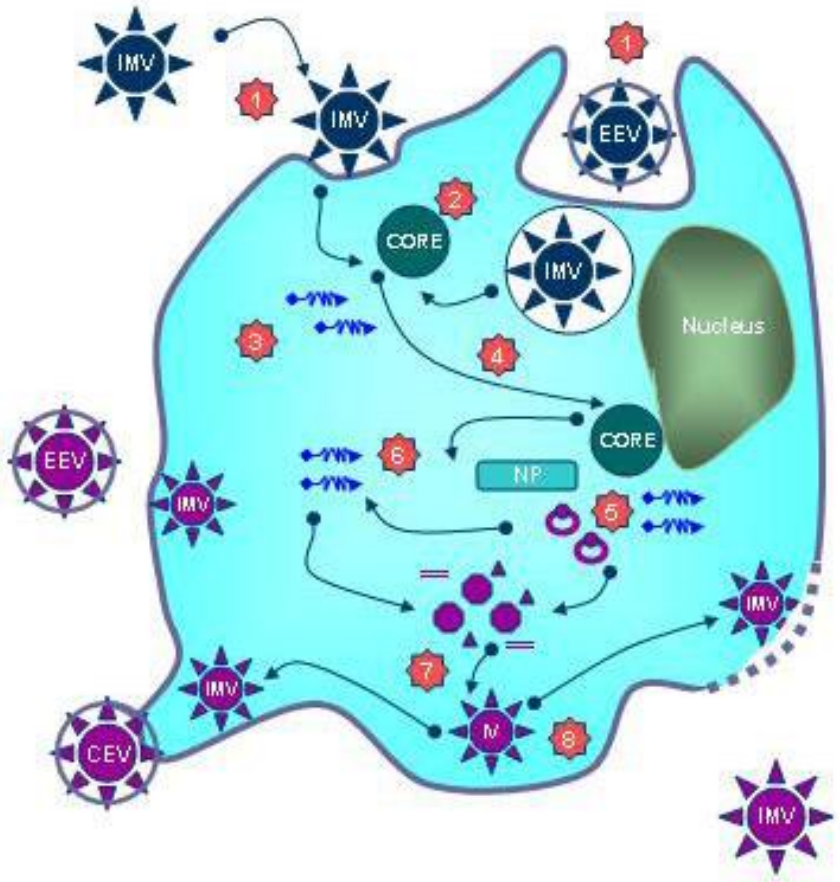


Replication

5. Secondary Uncoating

The viral nucleoprotein (NP) complex, which contains the **viral genome**, is released.

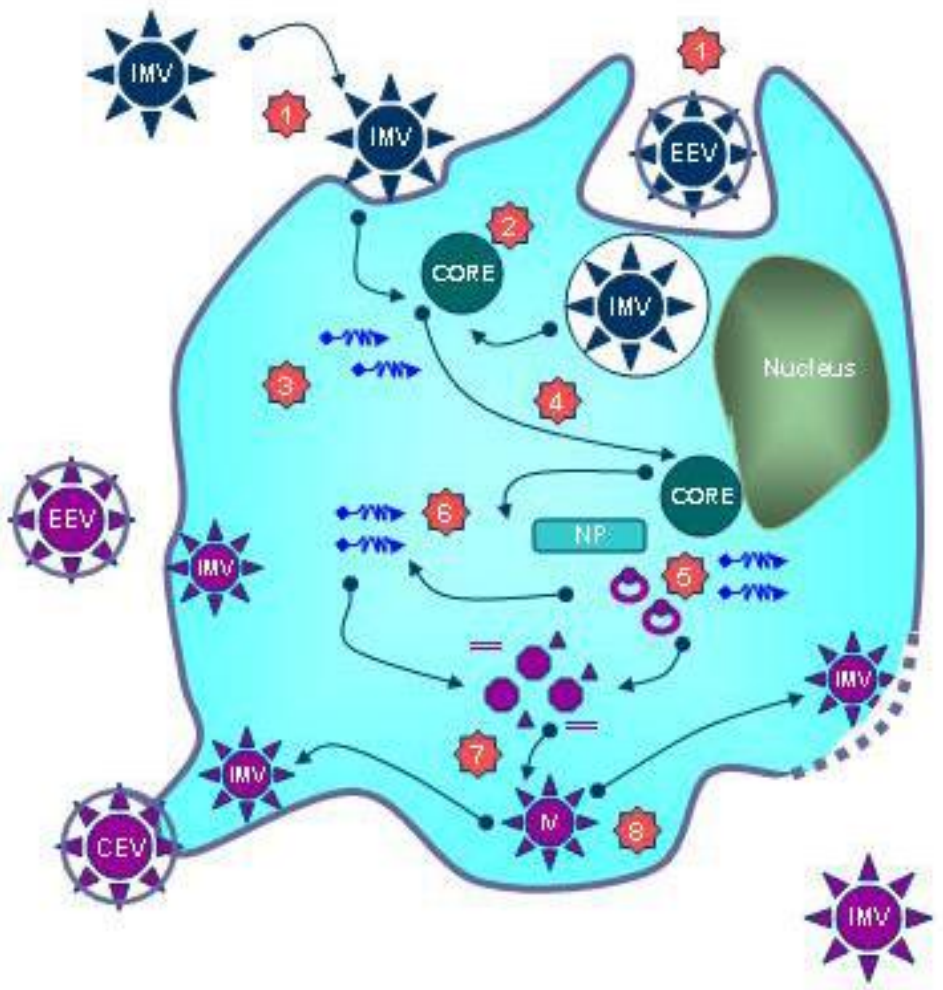
The viral genome is replicated 、transcription and translation of intermediate genes .



Replication

6. Late Transcription

The viral **late genes** (coding for structural proteins, enzymes, and transcription factors) are transcribed and translated.

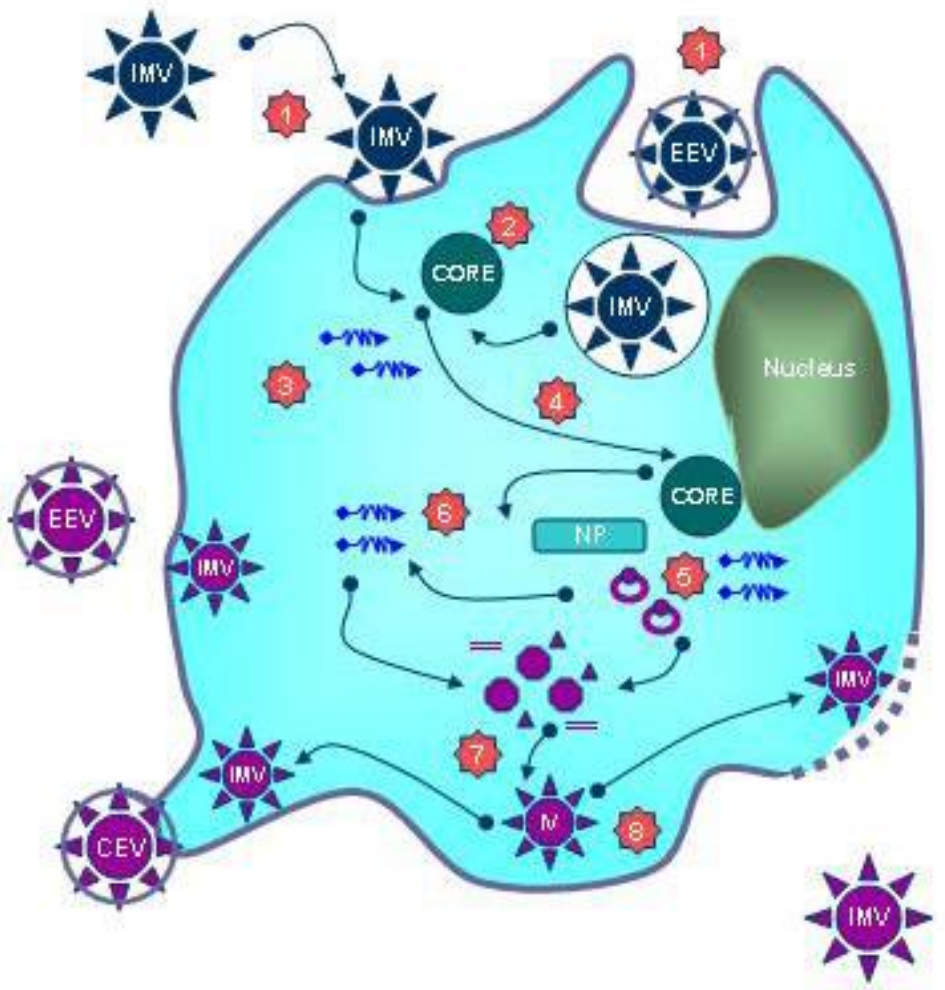


Replication

7. Assembly
Concatemeric intermediates are resolved into **linear double-stranded DNA**

And packaged with late viral proteins into **immature virions (IV).**

IVs mature into **IMVs** via an undescribed mechanism which may include processing of the IV through the Golgi apparatus.

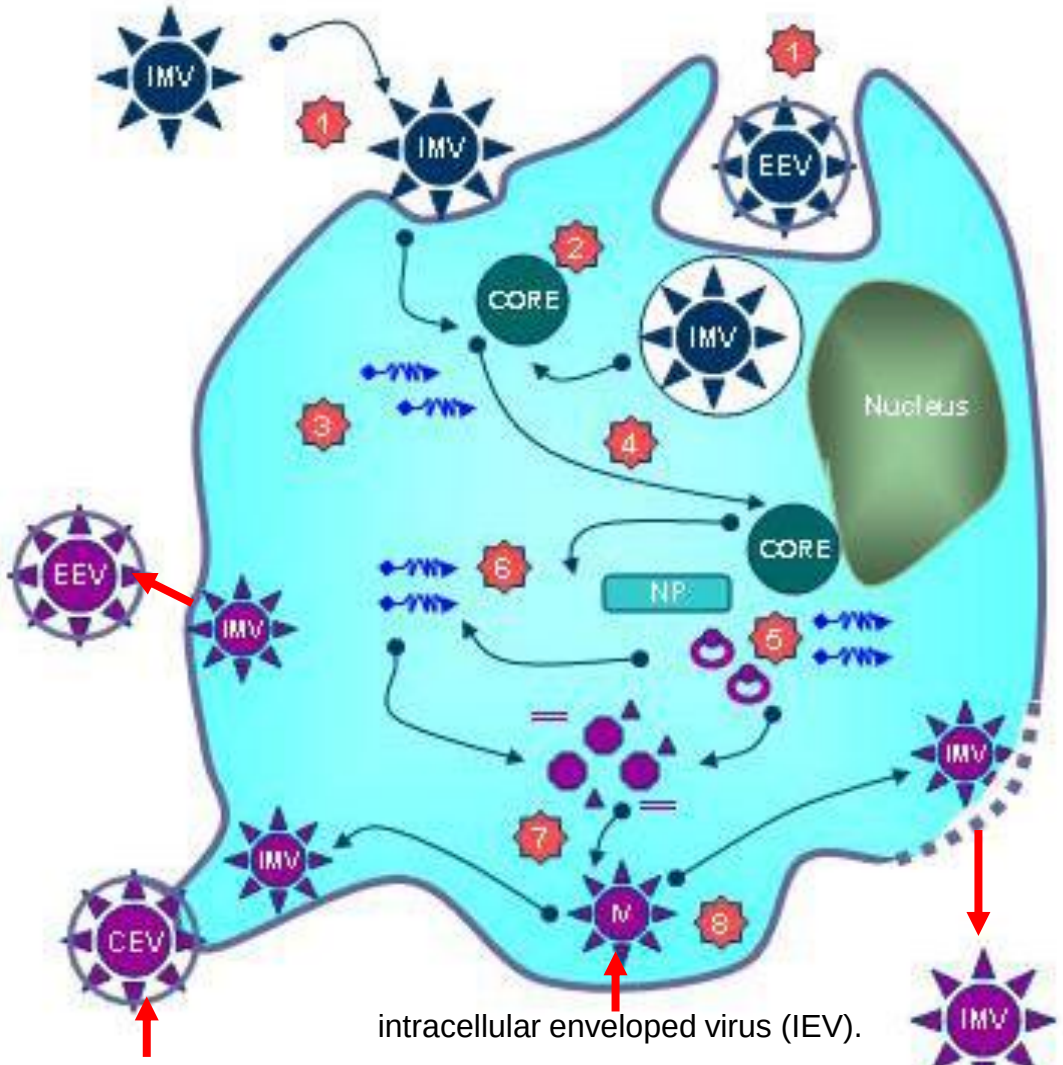


Replication

8. Release

The IMVs are transported to the periphery of the cell where they are released in one of three ways.

1. IMVs released via cell lysis remain IMVs
2. IMVs can bud through to the cell surface, picking up a viral envelope from the cell plasma membrane.
3. IMV can bud through the plasma membrane picking up an envelope and becoming an EEV.



cell-associated enveloped virus (CEV)

intracellular enveloped virus (IEV).

intracellular mature virus (IMV)

Thanks