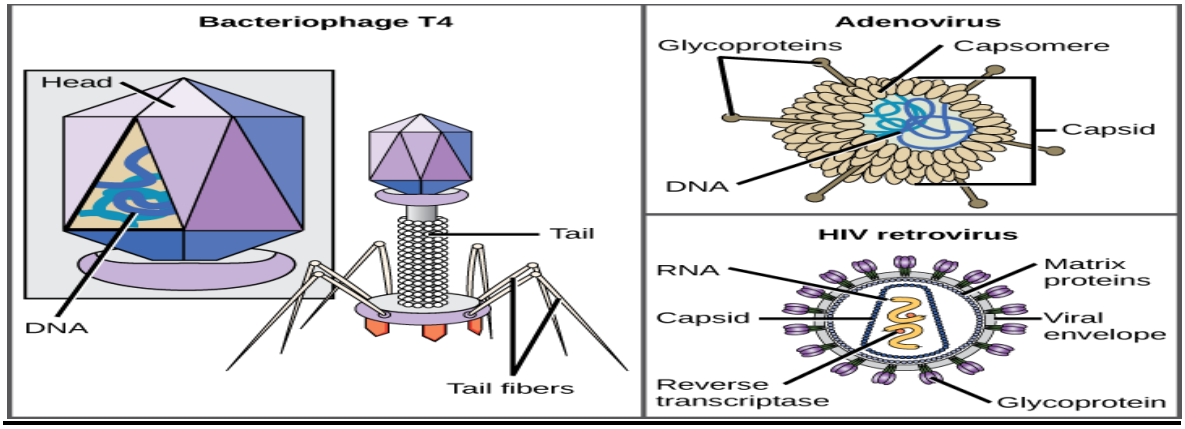
Viral genome oragization



Compaction mass = various activities such as replication and transcription(accomodate transition between inactive or active states.

Condensed state of nucleic acid results from its binding to basic proteins(+)charge neutralize =(-) charge.

The structure of the nucleoprotein complex is determined by the interaction of the protein with the DNA or RNA.

1. Packaging of chromatin is flexible.
2. Time of division = even more tightly packaged and individuals chromosomes become recognizable.

Viral genome are packaged into their coats: the length of DNA that can be incorporated into a virus is limited by the structure of the head shell.

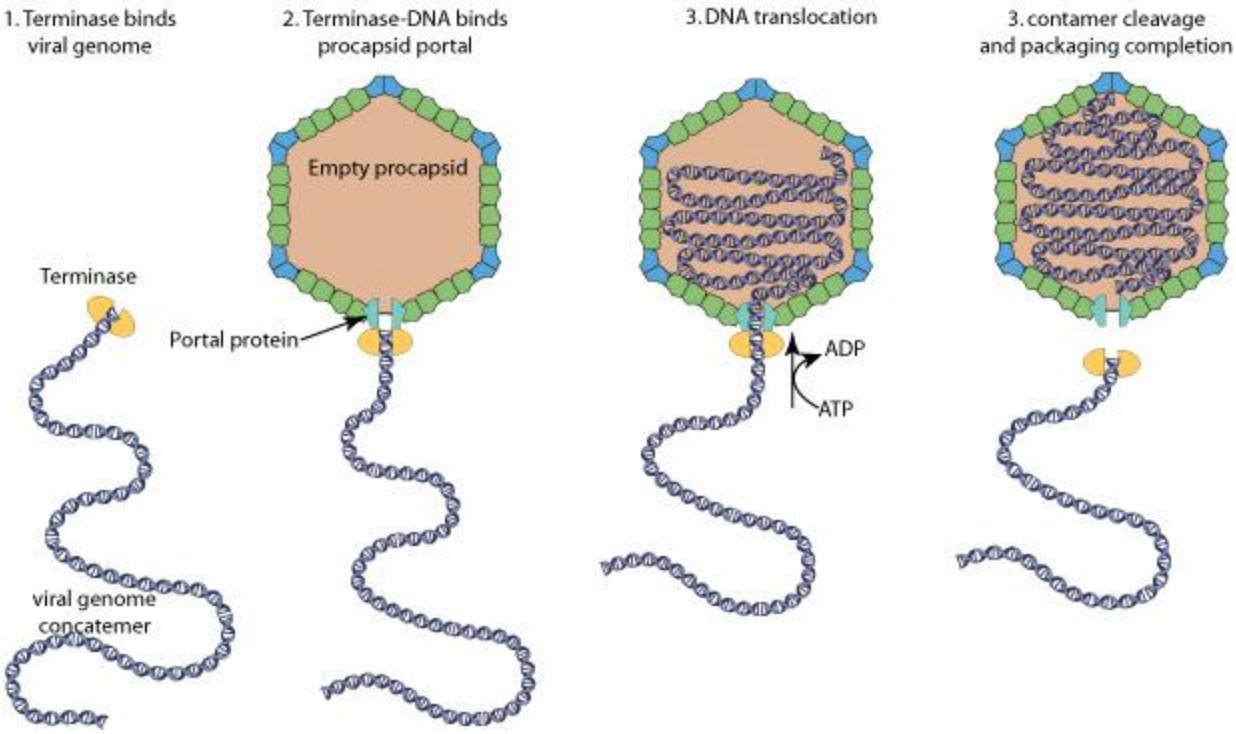
1. Nucleic acid within the head shell is extremely condensed.
2. Filamentous RNA viruses condense the RNA genome as they assemble the head shell around it.
3. Spherical DNA viruses insert the DNA into a preassembled protein shell.

From the perspective of packaging the individual sequence, there is an important difference between a cellular genome and a virus.

DNA viruses genome packaging

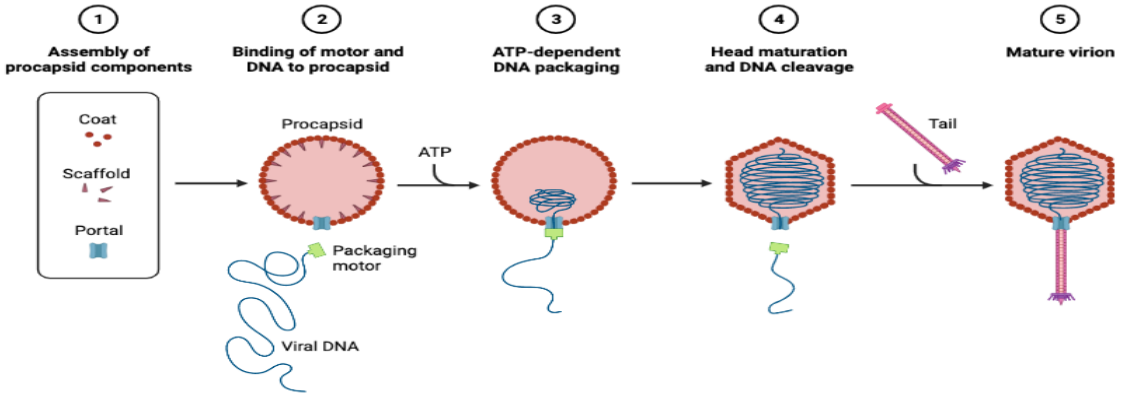
Spherical capsid of DNA viruses(assembled) →empty headshell is assembled from a small set of protein → duplex genome inserted into the head, accompanied by a structural change in the capsid →start with headshell contain a protein ‘core’ → converted to an empty headshell of more distinct shape.

Schematic diagram of genome packaging in dsDNA viruses



DNA viruses assembly

Head is sealed by the addition of tail → dsDNA(hairly rigid rod) →compressed into a compact structure to fit within the capsid →packaging involves a smooth wiling →into head or required abrupt bends.



DNA viruses genome organization

1. Inserting DNA(involves) reaction a. Translocation b. condensation
2. Both are energetically unfavourable.
3. Translocation active process DNA driven into head by a ATP-dependent mechanisms.
4. Common mechanism used replicate by a rolling circle mechanism to generate long tail that contain multimers of the viral genome.