

Source: [KBhBIO101Viruses](#)

# 1 | Virus Infections and Lifecycle

## 1.1 | Viral Life Cycle, an Overview

1. **Attachment** => protein contact between virus and host
2. **Viral entry** => entering the cell
3. **Uncoating** => shedding the protein layer
4. **Biosynthesis** => make baby viruses
  1. Genome Replication: transcribe DNA/RNA
  2. Genome Expression: read DNA/RNA to make proteins
5. **Genome integration** => retrovirus only — put the viral gene into the genetic sequence of the actual cell
6. **Assembly** => put it all together
7. **Viral Exit** => mature virions leave

## 1.2 | Viral attachment

To be able to enter a cell, viruses have to do something to stick to it. B/c otherwise they would just be stuck in the bloodstream and be very sad.

Most viral attachment processes is done in two different steps:

1. Attachment: adhere roughly to random sugar proteins
2. Binding: roll over slowly, and bind to the entry receptor it needs

*Note! Both of these processes will require specific protein “spikes” that are specifically designed to stick to the host cell. This is what causes the organism-specific responses to viruses.*

## 1.3 | Viral Entry

In this step, the sticky virus on the surface of the cell gets into the cell. There are three different type

### 1.3.1 | Direct Injection/insertion

- Insert genome through the bi-layer
- Leave the rest behind

### 1.3.2 | Endocytosis

- Trick the host cell into introducing the virus as food
- Endocytosis!
- Bam

### 1.3.3 | Fusion

- Virus fuse with cell membrane
- Shed the protein coat once in
- Shazam!

## Uncoating

- Virus triggers *early endosome*
  - Causes pH dependent protein denaturation
  - Causing the capsid to fall apart
  - Triggering *late endosome* => releasing genome

## Viral Replication Key questions:

- **How are viral mRNAs produced from the viral genome?** => virus will hijack the ribosomes in the host cells. So, it is more important to ask how the mRNAs are produced to tell ribosomes what to do
- **What serves as the template for viral genome replication** => replication will need a polymerase; but the source and mechanism is dependent on viral genome structure/composition

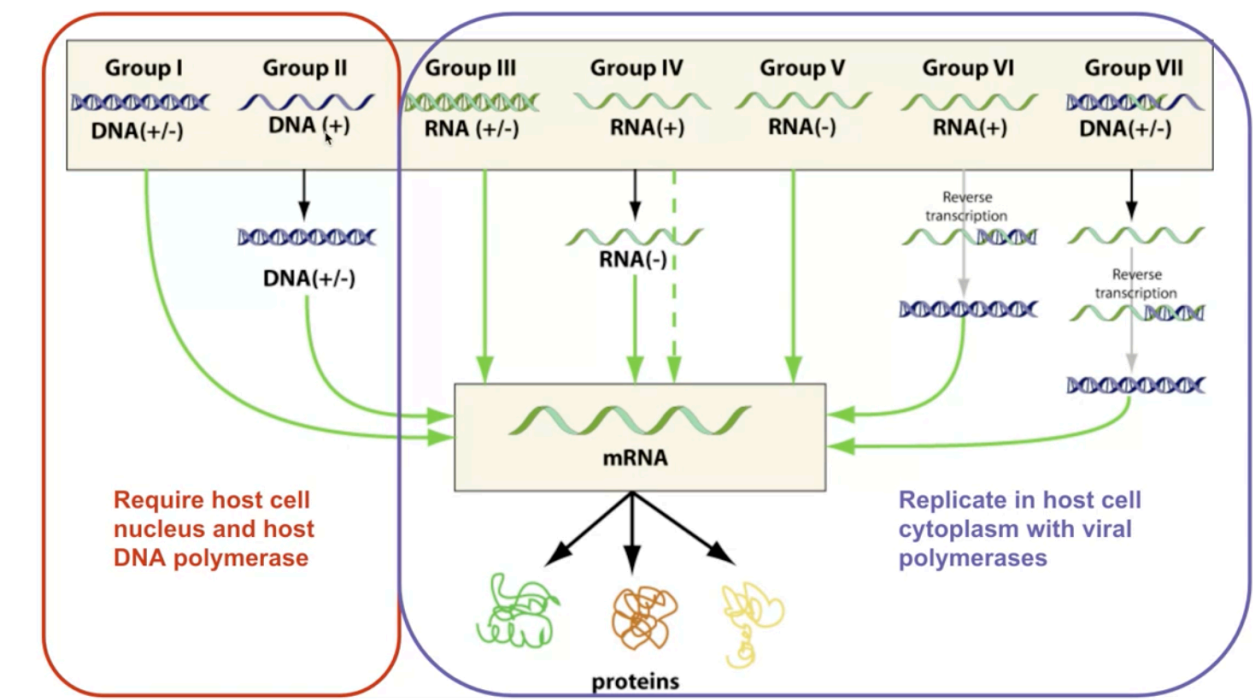


Figure 1: Screen Shot 2020-10-12 at 11.04.53 PM.png

## DNA Viruses

*How are viral mRNAs produced from the viral genome?*

- Viral DNA enters, through RNA polymerase II in the host cell, mRNA is produced
- mRNAs then read by ribosomes, and there we go

*What serves as the templates for viral genome replication?*

- Viral DNA serves as template for host cell DNA polymerase
- Viral genome copied repeatedly
- Virus, then, **will be replicated within the nucleus** due to it needing the polymerase to copy DNA

Except! Poxviridae carry their own polymerase, so they replicate in the cytoplasm.

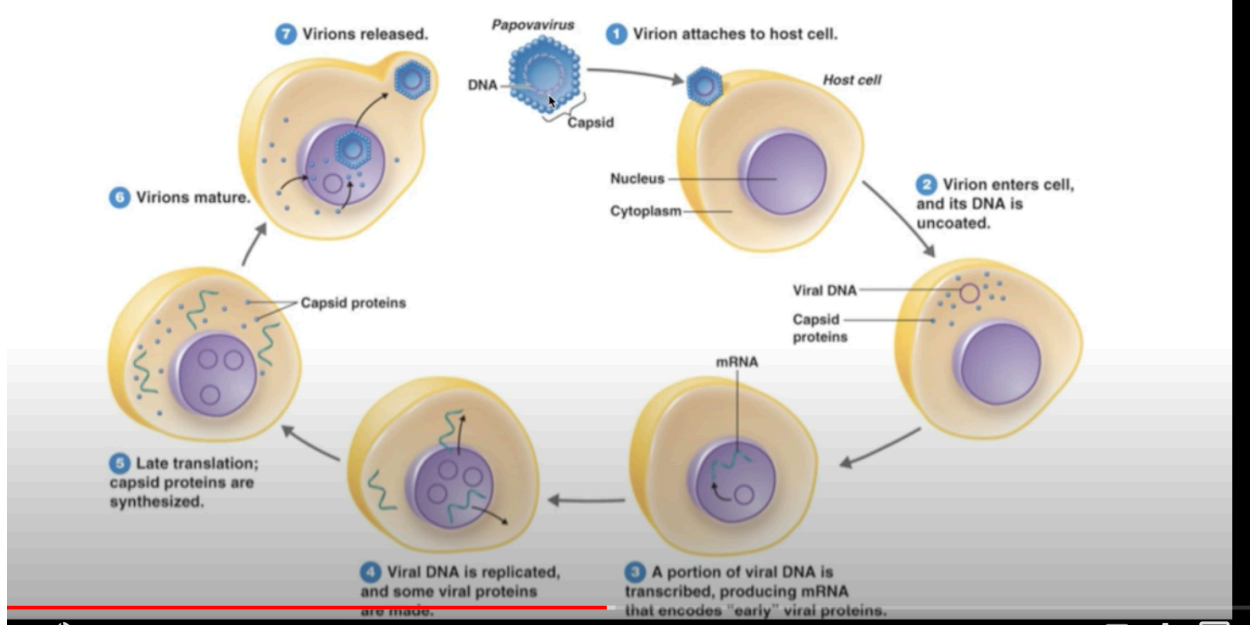


Figure 2: Screen Shot 2020-10-12 at 11.09.46 PM.png

## RNA Viruses

*How are viral mRNAs produced from the viral genome?*

**Packaging** Does not require ATP. Just sealed in.

## Viral Exits Lysis

Replicate so much that the membrane bursts.

## Budding

Trigger...

- Trigger exocytosis
- Meanwhile, send virus's own spikes to the membrane
- On exit by exocytosis, steal a part of the newly-spikey membrane with it to serve as new casing