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 togethr
7. **Viral Exit** => mature virons 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 sod.

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 types of mechanisms by which this is achieved:

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!

1.4 | Uncoating

After the virus enters the cell, the lipid/protein shell on the outside must be shred to be able to release the additional DNA.

- 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 polymeraese; but the source and mechanism is dependent on viral genome structure/composition

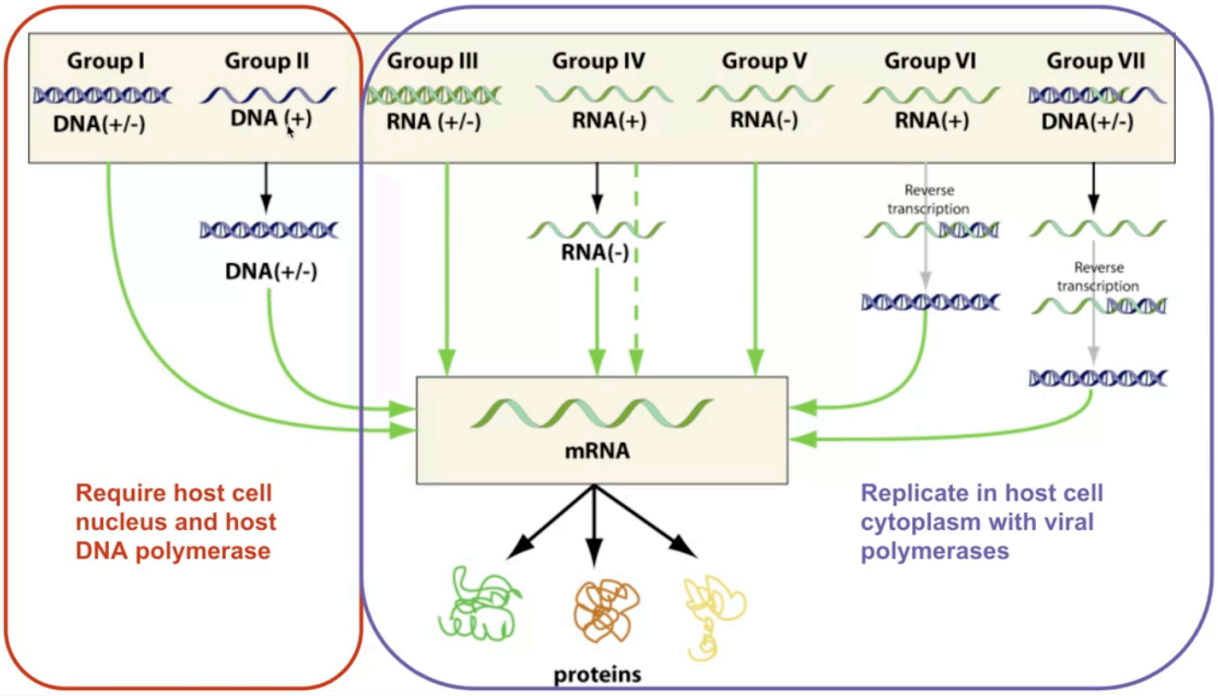

Figure 1: Screen Shot 2020-10-12 at 11.04.53 PM.png

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

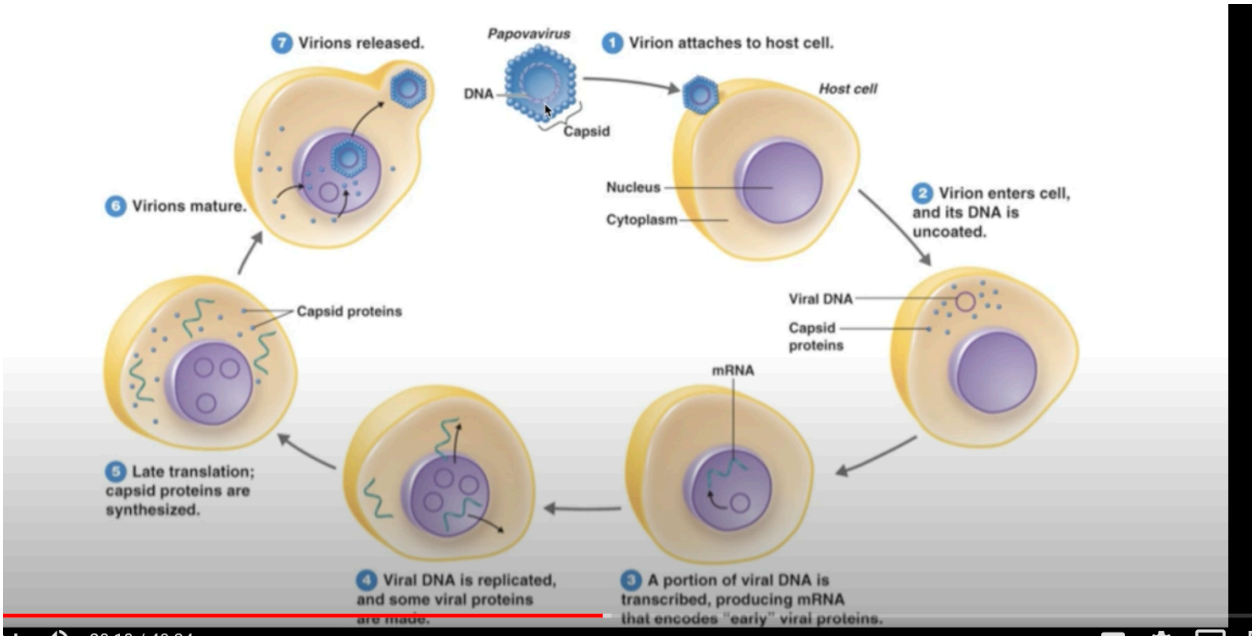

Figure 2: Screen Shot 2020-10-12 at 11.09.46 PM.png

RNA Viruses

How are viral mRNAs produced from the viral genome?

Packaging Does not require ATP. Just sealed in.

Viral Exis Lysis

Replicate so much that the membrane burst.

Budding

Trigger…

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