

# Lecture 11

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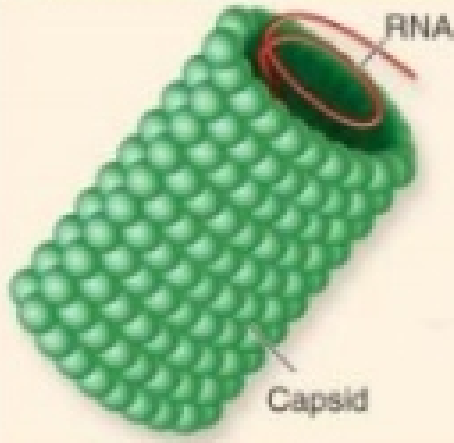
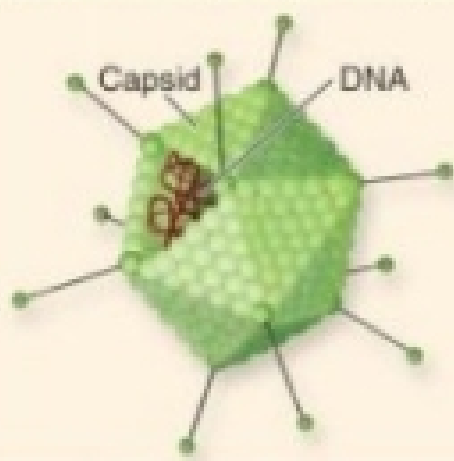
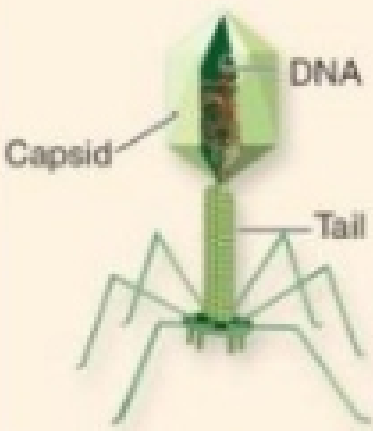
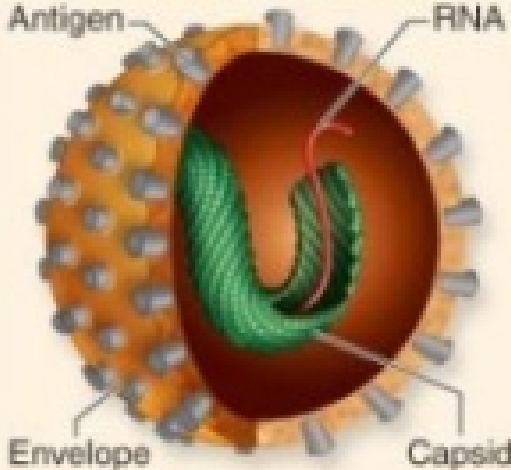
*Based on Dr. Poulin's Lectures*

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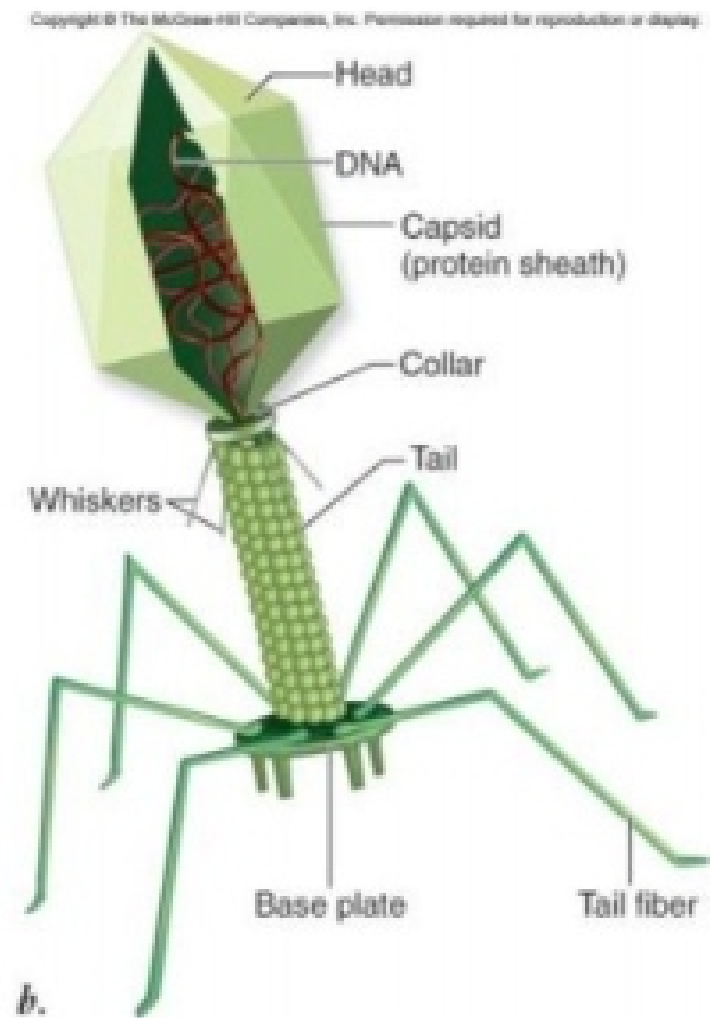
## Evolutionary Biology

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- Life has two characteristics
    - 1.) Organized
    - 2.) Replicates Itself
  - Lots of Scientists find it hard not to treat viruses like living things.
  - Open question as to whether or not they are alive.
  - Facts of viruses
    - o Have a protein coat aka (Capsid)
    - o Inside Capsid is a core of nucleotides
    - o Nucleotides are informs of DNA or RNA, never both. (Animals have both)
    - o Circular or linear genetic material
    - o Single stranded or double stranded
  - Virus particles are not cells
    - o No cytosol
    - o No plasma membrane
    - o No other cellular structure to identify as cells
  - Viruses are definitely not cells
  - Individual virus particles are called (Virions)
    - o Virion - Individual virus particle
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- *Some scientists argue viruses aren't alive because they require a host*
  - *Viruses are highly organized, even though they aren't cellular organisms.*
  - *Use the same kind of genetic storage as living things.*
  - *Replicate (With help)*
  - *Mutate*
  - *Evolve*
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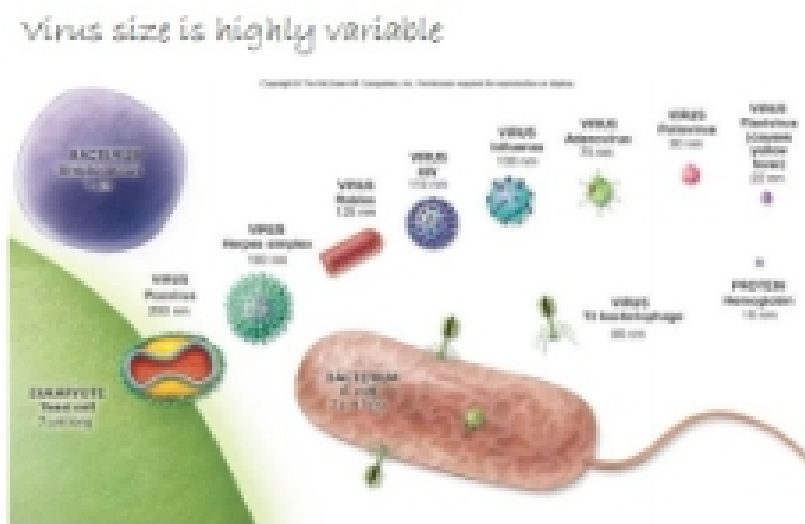
- Viruses are highly organized, very recognizable.
- Can't replicate genetic material on their own.
  - o Require host cells to replicate their genes for them
    - Calls into question whether or not they are alive
  
- Viruses do evolve independently of other organisms
  - o Respond to selective pressure from host as well as the outside world
  
- Viruses come in many shapes and sizes
  - o Viral shapes:
    - Helical Capsid
    - Icosahedral Capsid
    - Icosahedral head, Helical tail
    - Helical capsule within envelope
  
- Almost all viruses have an overall shape either in 1 of 2 forms

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Structure		Structure	
Virus	Plant virus (TMV)	Virus	Animal virus (Adenovirus)
Viral shape	Helical capsid	Viral shape	Icosahedral capsid
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Structure		Structure	
Virus	Bacterial virus	Virus	Animal virus (Influenza)
Viral shape	Icosahedral head: helical tail	Viral shape	Helical capsid within envelope

- o Helical
  - o Icosahedral
    - Icosahedron - geometric solid with 20 equilateral triangular facets
    - Maximizes internal capacity of the structure without dramatically increasing size (holds more in less space)
- Complex Viruses are binal (binal shape)  
(Like binary = two)
- o Have both Icosahedral and helical element



- Virus size is highly variable
- o Ex) Bacteriophage is only 4 times the size of a single hemoglobin protein
  - o Virus size does not affect how dangerous they can be to host



- Virus replication is parasitic