

Genetics of Virus

- **Obligate intracellular parasites** that depend on host cell for:
 - **Enzymes** for metabolic processes such as DNA replication such as DNA polymerases
 - **Machinery** for **protein synthesis** such as **ribosomes**
 - **Building blocks** such as **amino acids** and **nucleotides** due to lack of means of nutrition
 - **ATP** as a form of **energy** due to inability to carry out cellular respiration
- Can only reproduce within a **living host cell**
- Termed as **virions** in **extracellular** states
 - Metabolically inert, does not carry out respiratory/biosynthetic functions
 - Structure by which the virus genome is carried from one cell to another
- Viruses are **infectious particles** which are **active** as **intracellular virus** state, or **inactive** as extracellular **virion** state, as opposed to living or non-living

Are viruses living or non-living?

Living:

- Viruses can reproduce
 - They have genetic material (DNA/RNA)
 - Encoding genes necessary for reproduction
 - In intracellular states within compatible host cells
- Viruses can evolve with their host
 - Viruses acquire genes from host cells
 - Genetic recombination and horizontal gene transfers result in changing viral genomes
- Viruses can react to environmental stimuli (such as radiation, chemicals and heat)

Non-Living:

- Able to exist in a metabolically inert state for extended periods of time
- Lack protoplasm and organelles
- Extracellular state: do not grow, obtain nutrition, respire, reproduce, synthesise proteins or excrete

Basic Structure:

- **Genome** comprising of RNA or DNA
- **Capsid** comprising of protein subunits, capsomeres (protein coat)
- **Envelope** (in envelope viruses) comprising phospholipids from host cell

Structure	
Viral Genome	• Either DNA or RNA, but not both • Can be circular, linear, single-stranded or double-stranded • Contain genes for: ○ Synthesising viral capsid and genetic material