

BIO 226N
STUDY GUIDE
VIROLOGY

I. Discovery – Ivanowski, 1892, Tobacco Mosaic Virus
Löffler & Frosch, 1898, Foot & Mouth Disease Virus
D'Herelle & Twort, 1915-17, Bacterial viruses, Bacteriophage,
Phage.

II. Differences between bacterial viruses and Bacteria.

Phages	Bacteria
A. Size- smaller	larger
B. RNA or DNA chromosome	DNA – chromosome RNA – [mRNA, tRNA, rRNA]
C. Capsid	Cell wall and cytoplasmic membrane
D. Grow only in living cells	Grow in growth medium
E. Direct synthesis of components which then assemble	Binary Fission

III. Virulent Bacterial Viruses (e.g. T4)

A. Structure

- B. Lytic growth cycle -
1. adsorption – attachment (receptors)
 2. injection of genetic material, penetration (0-1 min)
 3. Synthesis of components (1-20 min)
Transcription
Translation – host enzymes
Replication
Host energy
 4. Maturation (20-30 min)/Assembly
 5. Lysis – Lysozyme; release of ~200 phages

- C. Growth in plaques – Enumeration
Host, Lawn, Confluent growth, plaques

IV. Temperate phages (lambda) λ

- A. Lytic growth or Lysogeny;
B. Lysogeny – attachment, injection, integration, repressor
Prophage, passive replication with bacterial chromosome.
Lysogenic, Lysogen.
C. Induction of the prophage, inducing agents, excision of the prophage and lytic growth

V. Animal viruses

A. Differences between bacteriophage and animal viruses

1. Presence of envelope
2. Host Entry: a. Endocytosis, vesicle
b. Fusion with host membrane & uncoating
3. Virus exit – budding of envelope viruses
4. Cytopathic effect
5. Long latent period
6. Tissue tropism
7. Some RNA viruses replicate through DNA intermediate and integrate DNA into host chromosome

B. Virus growth in the lab

1. Living Animals
2. Embryonated eggs
3. Tissue culture/cell culture; contact inhibition; plaques

C. Tumors & Viruses (Neoplasm)

Benign

Malignant (Metastasis)

Carcinoma – epithelial cells

Adenocarcinoma – epithelium of glands

Sarcoma – connective tissue

Leukemia – white blood cells

1. Causes – mutations/viruses
Carcinogens, oncovirus, oncogene, proto-oncogene; growth hormones, hormone receptor proteins, cell cycle control proteins.
Mouse mammary tumor virus (MMTV), Bittner 1936.
2. Transformation of cultures animal cells
Rous sarcoma virus, cells growing in monolayers, contact inhibition;
Retroviruses RNA → RNA/DNA hybrid → DNA → Provirus
3. Human Tumors & Viruses
 - a. Epstein Barr virus (EBV) – Infectious Mononucleosis
Burkitt's Lymphoma, Nasopharyngeal carcinoma.
 - b. Herpes Simplex I & II –HHVI and HHVII
Fever blister; stress; genital herpes (cervical carcinoma?)
 - c. Human T-cell leukemia (Retrovirus)
HTLV-I, HTLV-II