

Course: Virology

Introduction to virology

Dr.K. Sathiyamurthy
Assistant Professor
Department of Biomedical Science
Bharathidasan University

MICROBIOLOGY

- **Bacteriology** – Study of biology of “Bacteria”.
- **Mycology** – Study of biology of “Fungi”.
- **Parasitology** – Study of biology of “Parasite” or “Protozoan”.

Virology – Study of???????

Microbiology cont....

**Virology – “Study of a VIRAL
PARTICLE or AN
AGENT” called as
VIRION.**

**(Virus is a non-living chemical agent
when it is present outside living
host or organisms)**

History of Virology

- Smallpox was endemic in China by 1000BC. In response, the practice of variolation was developed. Recognizing that survivors of smallpox outbreaks were protected from subsequent infection, **variolation involved inhalation of the dried crusts from smallpox lesions like snuff, or in later modifications, inoculation of the pus from a lesion into a scratch on the forearm of a child.**



Landmarks in Virology

**Introduction of concept of
'filterable agents' for plant
pathogens by Mayer,
Ivanofsky, Beijerinck in late
1880's.**

Landmarks in viro cont....

- In 1886, the Dutch chemist **ADOLF MAYER** showed that **Tobacco Mosaic Disease (TMD)** was transmissible from a **DISEASED PLANT** to **HEALTHY PLANT**.
- In 1892, Russian bacteriologist **DIMITRI IWANOSKI** filtered the **SAP (Sap is the life's blood of a plant)** of diseased plants through a **PROCELAIN FILTER** that was designed to retain bacteria.

Landmarks in viro. cont....

He found that the infectious agent had passed through the minute pores of the filter.

When he infected healthy plants with the filtered fluid, they contracted TMD.

Landmarks in viro. cont....

- First filterable agent from animals **“foot and mouth disease virus”** is described by Loeffler and Frosch in 1898.
- **First human filterable agent “yellow fever virus”** is described by Reed in 1901.
- **Linkage of viruses with cancer is described by Ellerman and Bang (1908) and Rous (1911).**

Landmarks in viro. cont....

- By the 1930s, scientists had began using the word virus – A Latin word for **poison**.
- The nature of viruses remained elusive until 1935 when **WENDELL STANLEY** an American Chemist, isolated **TOBACCO MOSAIC VIRUS** paved the way to carryout chemical and structural studies on purified virus first time.

Landmarks in viro. cont....

- Description of bacteriophages (Twort and D'Herelle in 1915)
- Visualization of viruses by EM and x-ray crystallography (1939, 1941)
- Development of tissue culture systems (Sanford, Enders, Gay, Eagle 1948-1955); growth of poliovirus in culture
- Discovery of many agents; explosion in molecular biology (past 45-50 years)

VIRUS - DEFINITIONS

- **Virus particle or virion**
 - Infectious agent composed of nucleic acid (RNA or DNA), a protein shell (capsid) and, in some cases, a lipid envelope
- **Capsid**
 - Protein coat that surrounds the viral nucleic acid
 - Composed of repeating subunits called capsomeres
 - Have either icosahedral or helical symmetry
- **Nucleocapsid**
 - Complete protein-nucleic acid complex

Virus definitions cntd....

Satellite or defective viruses

- Viruses which require a second (helper) virus for replication
 - Example: hepatitis delta virus requires hepatitis B

Viroids

- Small, autonomously replicating molecules
- Single stranded circular RNA, 240-375 residues in length
- Plant pathogens

Virus definitions cntd....

Prions

- Not viruses
- Infectious protein molecules responsible for transmissible and familial spongiform encephalopathies
 - e.g., Creutzfeldt-Jakob disease, bovine spongiform encephalopathy (vCJD in humans)
- Pathogenic prion protein PrP^{Sc} formed from normal human protein, PrP^{C} , through post-translational processing

Thank you