Course: Virology

Introduction to virology

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MICROBIOLOGY

- Bacteriology Study of biology of "Bacteria".
- Mycology Study of biology of "Fungi".
- Parasitology Study of biology of "Parasite" or "Protozoan".

Virology – Study of???????

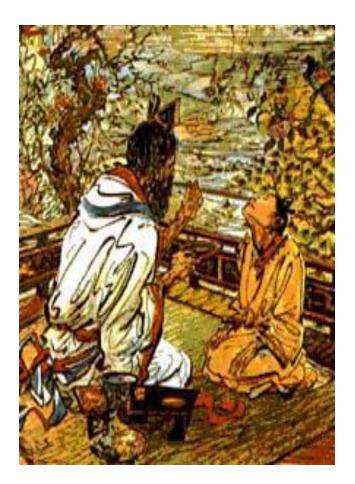
Microbiology cont....

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. 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.

 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.

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.

 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).

 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.

- 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 defintions 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 defintions 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 posttranslational processing

Thank you