

INTRODUCTORY VIROLOGY

Sub code: 16SCCM34

2 marks :-

1) History of virology:

Scientist Name : Edward Jenner

Year : 1776

Contribution : He was an English physician.

He collected Pusule fluid from a milkmaid suffered from Caopox and injected into a teenage boy James phippes. That boy developed fever and head ache and recovered fully. Then Jenner inoculated Phippes with live smallpox Pusule but he did not developed Small Pox. This process was called Vaccination. It was possibly the first research in virology.

2) Viral envelope:

Many animal viruses and some Plant viruses have an extra covering around the capsid. This covering is called envelope. It is, about 10-15 nm in thickness. Envelope is made up of lipoproteins and glycoproteins. It, acquire their membrane, by budding through cell membrane.

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3) Nucleic acids :

Viruses are exceptionally flexible with respect to the nature of their genetic materials. They have all 4 possible nucleic acid types.

* ds DNA * ds RNA

* ss DNA * ss RNA

All the four types are found in animal and plant viruses. Phages contain DNA as the genetic material.

4) carbohydrates :

Carbohydrates are the sugars, starches and fibers found in fruits, grains, vegetables and milk products. Though often maligned in trendy diets, carbohydrates - one of the basic food groups are important to a healthy diet. They are monosaccharides, disaccharides, oligosaccharides, polysaccharides, nucleotides.

5) classification of viruses :

Viruses are unique group of infectious agents. They have been classified in several ways. They were grouped according to tropism. For eg; Human viruses were classified

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Intro -

- * Dermotropic viruses (eg. Small pox virus)
- * Neurotropic viruses (eg. Poliomyelitis virus)
- * Pneumotropic viruses (eg. Common cold virus)
- * Viscerotropic viruses (eg. Hepatitis virus).

b) Assay :

The analysis of a sample to determine the presence of virus particles and relative proportion of those particles in the sample is called virus assay.

7) Types of Assay Method :

Virus Assay Methods are of two types.

They are,

- * Direct virus assay
- * Virus infectivity assay.

8) Separation of Assay :

Infected patch on the tissue or the body is called as local lesion assay.

It may be vesicle or blebs or pustule.

Animal and plant viruses produce lesions at the site of infection.

9) Characterization of Assay:

Assay characterization process comprise of set of five experiments, as illustrated in the schematic representation of the assay characterization guidance.

10) Viral components:

Viruses contain two basic components, namely protein capsid and nucleic acid core.

Viral components are analyzed by making use of the following techniques:

1. Radioactive labelling
2. Isolation of viral nucleic acids
3. Isolation of viral proteins
4. Hybridization
5. Electron microscopy.

11) Bacteriophage:

The viruses that infect bacteria and within the bacterial cells are called bacteriophages. They are believed to be bacteria eaters. So that they are known as bacteriophages. They are simply called phages.

12) Phage M13

M13 phage is a filamentous coliphage. It is composed of a helical capsid and single stranded DNA. It belongs to the family Inoviridae. The name M13 derived from city of Munich where it was first isolated by Hotschneider in 1965.

13) Phage Lambda (λ)

Lambda phage is a temperate phage that infects the coliform bacterium *E. coli* K12 strain. As it is temperate phage, it follows lysogenic life cycle most frequently than lytic life cycle. It has several applications in molecular biology and genetic engineering. It is circular double stranded DNA virus.

14) Mycoviruses :

viruses that particularly infect fungi are called mycophages or mycoviruses or virus of fungi. Mycophages are all polyhedral particles measuring 25-50 nm diameter. Their weight ranges from $6-13 \times 10^6$ daltons. It cause die back disease in mushrooms, *Agaricus bisporus*.

15) SS DNA Phage :

The SS DNA phages exist in two morphological groups. They are icosahedral

Phages and filamentous Phages. The icosahedral Phages have isometric polygonal capsid. Phages such as ϕ X174, ϕ R, α 3, β t-1, β SR. Filamentous Phages are rod shaped. It shows helical symmetry.

16) Viroids :

Naked circular RNA that infects plant cells and causes a characteristic disease in them; no virus capsid at all.

17) Prions :

Prions are an infectious crystallizing protein, which affects the brain. Prions are Proteinaceous infectious viral particle with out nucleic acids.

18) Herpes viruses :

DNA viruses that cause clusters of vesicles having no tendency to burst off, are called Herpes viruses. Herpes viruses are large viruses (100-200) nm diameter.

19) Rhabdo viruses :

Rhabdoviruses are bullet-shaped virus with single stranded RNA genome. They are included in the family Rhabdoviridae. They infect birds, animals, fishes, insects and plants

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20) Reoviridae :

Virus Particles are complex and made up of 1 or 2 or 3 shells with icosahedral symmetry (70 nm diameter). Genome consists of 10, 11, or 12 segments of linear dsRNA. Mostly infect plant and animals. There are three genera

* Fibrovirus * Oryzavirus * Phytoreovirus

21) Satellite virus :

Satellites are subviral agents that differ from viroids because they depend on the presence of helper virus for their propagation. Satellite viruses are particles that contain nucleic acid genome encoding a structural protein with satellite RNA

22) Tobacco mosaic virus (TMV) :

Tobacco mosaic virus (TMV) is an important plant virus that causes mosaic disease in tobacco. It is world wide in distribution. It is seen in all tobacco growing tracts of India. It was the first plant virus known to science, which was isolated by Dimitri Iwanowsky in 193

23) Cauliflower mosaic virus (CAMV) :

The CAMV causes mosaic disease in cauliflower. Mosaic virus is the prototype of

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caulimovirus group. This virus is widely distributed all over the world. CAMV is the first known virus of higher plants with DNA as its genetic material. It is also called Cabbage mosaic virus or cabbage virus-B.

24) Plant virus:

A group of viruses that infect plants are called plant viruses. They have been infecting almost all crop plants and wild plants and causing diseases in them. The common virus diseases of plants are leaf curl, mosaic diseases, bunchy tops, marble diseases.

25) Rice-tungro virus:

It is a common virus disease of rice. It is prevalent in Orissa, West Bengal, Bihar and Delhi, but not in other states of India. There are two viruses that are RTBV - Rice Tungro Bacilliform Virus and another one is (RTSV) Rice Tungro Spherical Virus. RTBV like viruses in the family of caulimoviridae.