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Class: Deg.-I (Hons.)
Paper: II, Group-'A'
Topic: Nature, Properties & Structure of Virus(contd.)
Lecture no.-24
Date: 26/4/2021

Nature, Properties and Structure of Viruses (continued):

Classification of Viruses:

Viruses may be classified according to the type of the host, genetic material and number of strands.

On the basis of type of host, viruses are:

1. Animal Viruses:

They live inside animal cells including man. On entering the cell, these disturb the metabolism of the host cell and cause various diseases. The common animal viruses are small pox virus, influenza virus, mumps virus, polio virus and herpes virus. In many animal viruses an extra envelope surrounds their protein coat. The membrane consists of proteins, lipids and carbohydrates and is derived from the host plasma membrane.

Animal viruses may enter cells by attaching to the surface. Some are then engulfed by the cell through pinocytosis or phagocytosis. In such cases, uncoating of the viral nucleic acid might occur within the cell. Inside the host cell they may multiply and form numerous new viral particles. Usually, animal viruses release from the host cells by the rapturing and subsequent death of the host cells.

2. Plant Viruses:

They are parasites of plant cells. Their genetic material is RNA which remains enclosed in the protein coat. The most important plant viruses are tobacco mosaic virus (TMV), tobacco rattle virus (TRV), potato virus (PV), southern bean mosaic virus (SBMV), beet yellow virus (BYV) and turnip yellow virus (TYV).

3. Bacterial virus:

They are parasitic on bacteria and so also called bacteriophages. There are many varieties of bacteriophages. Their size and shape varies from species to species. Some phages are spherical, some comma-shaped whereas majority of them have tadpole-like appearance.

On the basis of nucleic acids, viruses are:

1. DNA viruses:

These viruses possess DNA as the genetic material. On replication this DNA produces new DNA. DNA transmits information for protein synthesis through RNA. (DNA → RNA → PROTEIN).

2. RNA viruses:

These viruses possess RNA as the genetic material. The RNA replicates directly to produce new RNA. Information for protein synthesis passes from RNA to protein without involment of DNA. (RNA → RNA → PROTEIN).

3. DNA – RNA viruses:

In a group of RNA tumour viruses called leukoviruses or rousviruses the genetic material is alternately DNA and RNA. In addition to the normal mode of transfer found in DNA viruses (DNA → RNA → PROTEIN) the rousviruses also transfer information from RNA to DNA (RNA-DNA-RNA -PROTEIN).

With respect to number of strands, four types of nucleic acids have been found in viruses:

1. Double stranded DNA:

Double stranded DNA has been reported in pox viruses, the bacteriophages T 2, T 4, T 6, T 3, T 7 and lamda, herpes viruses, adeno viruses, polyoma virus SV-40 and papilloma viruses.

2. Single stranded DNA:

Single stranded DNA is found in the bacteriophages ph i X 174 and M-13 and is cyclic.

3. Double stranded RNA:

Double stranded RNA has been found within viral capsid in the reoviruses of animals and in the wound tumour virus and rice dwarf viruses of plants.

4. Single stranded RNA:

Single stranded RNA is found in most of RNA viruses e.g. Tobacco mosaic virus, influenza virus, poliomylitis bacteriophage MS – 2, F – 2, Coliphage R 17 and the avian leukemia virus.