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VIRUSES

(L. VIRUS = Venom or poison)

Viruses was first discovered by Dimitri Iva nowsky in 1892 and the term virus was coined by beijerinck in 1898. Viruses shows both the living and non-living properties (characters) therefore viruses are not kept in 5 kingdom classfication.

Definition :- "Viruses may be defined as "acellular, microscopic, non filterable, crystallizable and pathogenic obligate parasites".

Or

" Viruses are crystallizable, non-cellular, non-living infections agents that are composed of biological molecules which can multiply inside the animal, plant or bacterial cells".

OR

"Viruses are defined as microscopic – acellular entities that are obligate parasites of a living cell made up of structural proteins & nucleic acids" (DNA or RNA).

Virology :- "The branch of biology, that deals with the study of virus called virology".

Occurrence :- The viruses are identified in host plants and animals. Ex:- Mosaic disease in tobacco, Beans, Katte disease in cardamom, bunchytop in Banana etc.,

Among animal disease, expecailly in man viruses causes several diseases like cold, AIDS, jaundice, Mumps(Ä«Ómœ«©« îæÄ«l),measles(ö«Fæ{« îæÄ«l), small pox (ÄãÓ}ø, §û«Ó¸Ó, ^Ä«ÓZ), rabies(©æÅÓ B«ÓÝ«ÓÐ), influenza(Íáú« Lx~«, zãùáÆF«Z Lx~«), etc.

PROPERTIES OF VIRUSES

The viruses are regarded as connecting link between the biotic (living) & abiotic (non-living) world. Therefore viruses are made up of both the living as well as non-living characters.

1) Living characters of viruses:-

1) The viruses are made up of proteins & nucleic acids (DNA or RNA) (i.e. Nucleoproteinceous in nature)
2) Viruses exhibit the ability to reproduce (multiply) within the host cell.
3) They can produce new varieties by mutation (It undergoes mutation).
4) All viruses are obligate intracellular parasites & do not found in the free living state.
5) They also cause the diseases like other organisms.
6) Viruses may possess either DNA or RNA but never both nucleric acids.

2) *Non-living characters of viruses :-*

1. They are non-cellular (acellular) i.e. not composed of cells.
2. Plasma membrane, G.C, mitochondria, ribosomes, Chloroplast, cell wall are absent. (They are on the border line between the living & non living)
3. They can be crystallized (we can preserved for long time like a chemicals in the lab).
4. Metabolism does not takes place in viurses.
5. They do not have any enzyme systems.
6. They do not show independent growth & multiplication.

CLASSIFICATION OF VIRUSES.

According to Holmes (1948) Viruses are classified into three groups.

1) Plant Viruses (phyto phaginae) or phytophages.
2) Animal Viruses (Zoophaginae) or Zoo phages.
3) Bacterial viruses (Bacteriophaginae) or Bacteriophages.

1) ***Phytophaginae*** :- Viruses which infect the plant cells (tissues) are called phytophaginae.
   Ex :- TMV, CMV. (cauliflower mosaic viruses)
   BMV (Beans mosaic viruses)
2) ***Zoophaginae*** :- Viruses which infect animal cells are called Zoophaginae.

3) ***Bacteriophaginae*** :- (Bacteriophage)
   Viruses which infect the bacteria are called bacteriophage.

STRUCTURE OF TMV (Tobacco mosaic virus)

1. TMV causes mosaic disease in the leaves of tobacco plant.
2. It destroys the chlorophyll pigment. (Patches on infected leaves).
3. TMV was discovered by D. Ivanowski in 1892. (It was first isolated in a crystalline form by stanley in 1935)
4. It is a rod-shaped structure measures about 300 nm (3000 A^0) in length & 15 to 70nm (170A^0) in diameter.
5. The proteinaceous coat of virus is called casid. It consists of a hollow cylindrial coat with a central cavity.
6. The capsid consists of 2130 protein subunits called capsomeres.
7. The capsomeres are helically (spirally) arranged an around the RNA strand. (molecule).
8. There are 130 turns in a complete virus capsid.
9. Each capsomere is made up of 158 aminoacids.
10. The RNA strand (viral genome) extends throughout the length of the particle (Acts as agenetic material)
11. TMV bears 94.5% protein & 5.5% RNA.
    (The TMV does not possess a lipo protein coat around its capsid. Hence the name non-enveloped virus).

LIFE CYCLE OF TMV

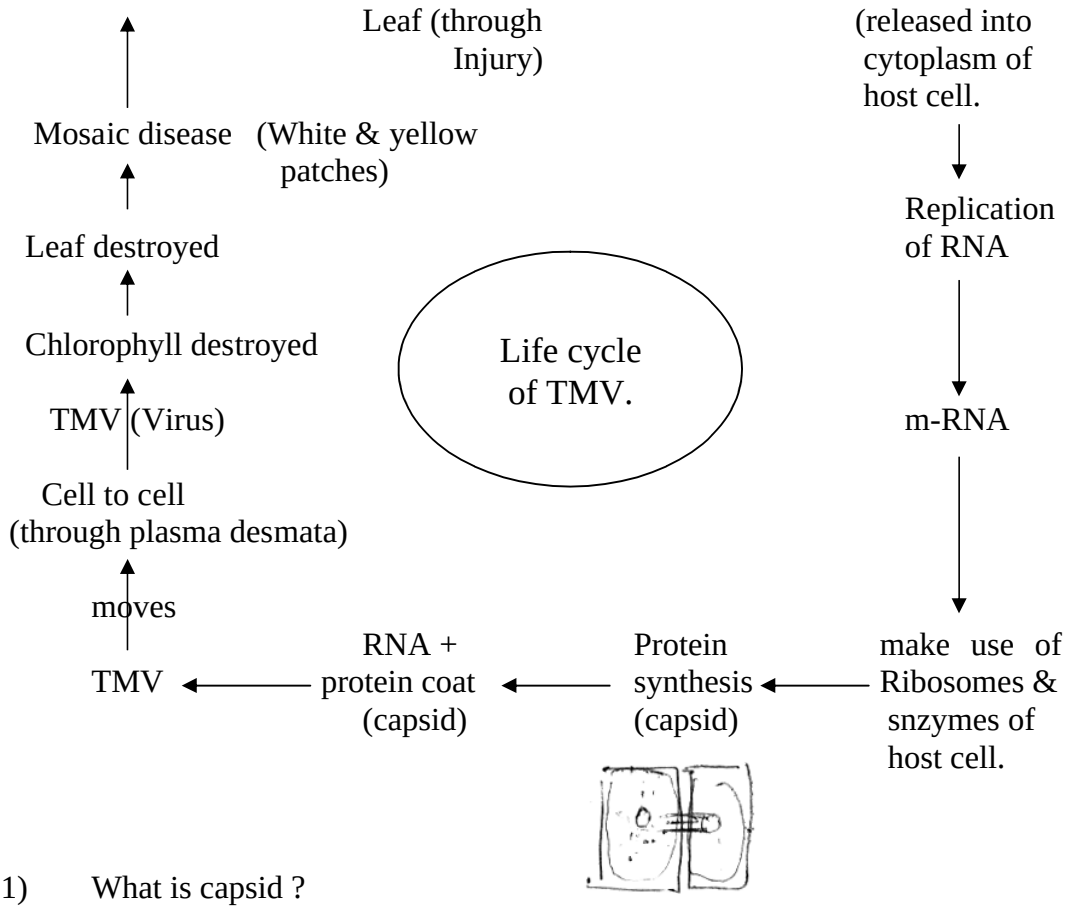
During infection the TMV enters the leaf cells of Tobacco plant (Nicotina tabacum) by any minute injury (or abrasion) on the leaf surface. The capsid (protein coat) is digested by the enzymes of host cell. As a result, the RNA strand is free & released into the cytoplasm of the host cell.

Now the viral RNA replicates (or copies) with in the host cell and newly produced RNA acts as a m-RNA (messenger RNA). Then they make use of the host's ribosomes & enzymes to synthesize proteins of the viral capsid. Immediately the capsid proteins associated themselves with RNA's to form new TMV Particles.

Later these viruses are moves from cell to cell in the leaf through plasmadesmata. When the viral activities are proceeds in the cell, the chlorophyll pigments in the leaft are destroyed.

As a result, the white & yellow patches appears on the surface of leaf. This is called mosaic disease. Ultimately the TMV are released due to lysis of the host cells.

TMV ⟶ Tobacco ⟶ Host cell ⟶ RNA



1) What is capsid ?

Ans :- Proteinaceous coat of Virus is called capsid.

2) What is capsomeres.

Ans :- Sub units (protein) of capsids are called capsomeres.

3) Expand TMV.

Ans :- Tobacco mosaic virus.

4) Who discovered the virus.

Ans :- D.Ivanowski in 1892.

5) Who coined the term virus.

Ans :- Beijerinck in 1898.

6) What is phytophage (Plant virus) ?

Ans : Virus which casues the disease in plants called phytophase.

Or

Viruses which infect the plant cells are called phytophage.

7) What is zoophage ?

Ans :- Viruses which infect the animal cells (tissues) called Zoophage.

8) What is bacteriophage ?

Ans :- Viruses which infect the bacteria are called bacteriophage

9) Write the living & non-living properties of viruses.

10) Explain the structure of TMV with a neat labelled diagram.

11) Draw a neat labelled diagram of TMV.