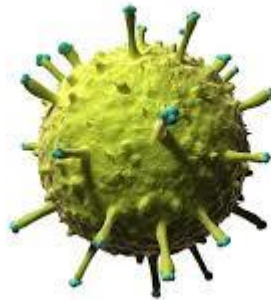


VIROLOGY-I



Viruses: Structure and Definition

Viruses

- A virus is a small parasite that cannot reproduce by itself.
- can direct the cell machinery to produce more viruses.
- have either RNA or DNA as their genetic material. The nucleic acid may be single- or double-stranded.

History of the Discovery of Viruses

- the word “**virus**” comes from a **Latin** word simply meaning “**slimy fluid**”
- **Adolf Eduard Mayer** from Germany, publishing in **1886** on work done in Holland from 1879, showed that the “**mosaic disease**” of **tobacco** – or “**mozaïkziekte**”, as he named it in his paper – could be transmitted to other plants by **rubbing a liquid extract**, filtered through paper, from an infected plant onto the leaves of a healthy plant.

The second virus discovered was what is now known as **Foot and mouth disease virus (FMDV)** of farm and other animals, in **1898** by the German scientists **Friedrich Loeffler and Paul Frosch**. Again, their “sterile” filtered liquid proved infectious in calves, providing the **first proof of viruses infecting animals**

In **1898** **G Sanarelli**, working in Uruguay, described the **smallpox virus** relative and tumour-causing **myxoma virus of rabbits** as a virus – but on the basis of **sterilisation by centrifugation** rather than by filtration.

A finding that was later to have great importance in veterinary virology was the discovery by **Maurice Nicolle** and **Adil Mustafa** (also known as Adil-Bey), in Turkey in 1902, that **rinderpest or cattle plague was caused by a virus**. This had been for several centuries the **worst animal disease** known worldwide in terms of mortality: for example, an epizootic or animal epidemic in Africa in the 1890s that had started in what is now Ethiopia in 1887 from cattle imported from Asia, had spread throughout the continent by 1897, and killed **80-90% of the cattle and a large proportion of susceptible wild animals in southern Africa**.

- Viroid → **Viroids** consist only of a short strand of circular RNA capable of self-replication. Unlike viruses, viroids do not have a protein coat to protect their genetic information.
- Virusoid → re subviral particles they are non-self-replicating ssRNAs. A virusoid genome does not code for any proteins, but instead serves only to replicate virusoid RNA
- Pirion → proteinaceous infectious particles. BSE, Scrapie.

WHAT IS A VIRUS??

1 cm³ of seawater contains 10⁶ -10⁹ virus particles Suttle, C.A. (2005) Nature 437:356

Non-cellular form of life Obligate intracellular parasites

The fundamental characteristic is their absolute dependence on a living host organism for their reproduction

Exist as inert particles (virions) outside the cell

Virions harbor viral genome protected by protein shell

Properties of Viruses

Viral Size: The viruses are smallest disease causing agent in living organisms, animal viruses range in size from 20- 350 nm.

Genom: DNA or RNA which maybe double stranded (ds) or single stranded (ss), and linear or circular.

Metabolism: Lack the enzymes necessary for protein and nuclic acid synthesis

Comparison of Viruses and Cellular Organisms

viruses

Simple organization
Either DNA or RNA
Can not replicate outside
the living cell
Mandatory intracellular
parasites

Cellular Organisms

Complex organization
Both DNA and RNA
Cell division
Some are obligatory
intracellular parasites