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FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

Virus

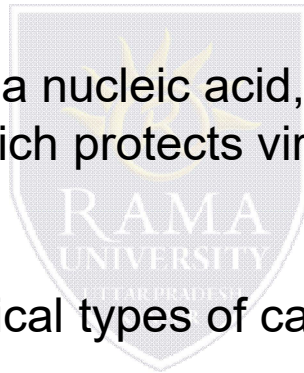
- ❖ Viruses are small obligate intracellular parasites, which by definition contain either a RNA or DNA genome surrounded by a protective, virus-coded protein coat. Viruses are 10 to 100 times smaller than most bacteria with an appropriate size range of 20 to 300 nm.
 - ❖ Viruses may be viewed as mobile genetic elements, most probably of cellular origin and characterized by a long co-evolution of virus and host. For propagation viruses depend on specialized host cells supplying the complex metabolic and biosynthetic machinery of eukaryotic or prokaryotic cells.
 - ❖ A complete virus particle is called a virion. The main function of the virion is to deliver its DNA or RNA genome into the host cell so that the genome can be expressed (transcribed and translated) by the host cell.
 - ❖ The viral genome, often with associated basic proteins, is packaged inside a symmetric protein capsid. The nucleic acid-associated protein, called nucleoprotein, together with the genome, forms the nucleocapsid. In enveloped viruses, the nucleocapsid is surrounded by a lipid bilayer derived from the modified host cell membrane and studded with an outer layer of virus envelope glycoproteins.
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General Structural Properties

All virions (10 to 300 or 400 nm in size), even if they possess other constituents, are constructed around a **nucleocapsid** core (indeed, some viruses consist only of a nucleocapsid).

The nucleocapsid is composed of a nucleic acid, either DNA or RNA, held within a protein coat called the **capsid**, which protects viral genetic material and aids in its transfer between host cells.

There are four general morphological types of capsids and virion structure.



1. Some capsids are **icosahedral** in shape. An icosahedron is a regular polyhedron with 20 equilateral triangular faces and 12 vertices (figure 16.10*h,j-l*). These capsids appear spherical when viewed at low power in the electron microscope.
2. Other capsids are **helical** and shaped like hollow protein cylinders, which may be either rigid or flexible (figure 16.10*m*).
3. Many viruses have an **envelope**, an outer membranous layer surrounding the nucleocapsid. Enveloped viruses have a roughly spherical but somewhat variable shape even though their nucleocapsid can be either icosahedral or helical (figure 16.10*b,c,i*).
4. **Complex viruses** have capsid symmetry that is neither purely icosahedral nor helical (figure 16.10 *a,d,f,g*). They may possess tails and other structures (e.g., many bacteriophages) or have complex, multilayered walls surrounding the nucleic acid (e.g., poxviruses such as vaccinia).

Size and shape of various viruses

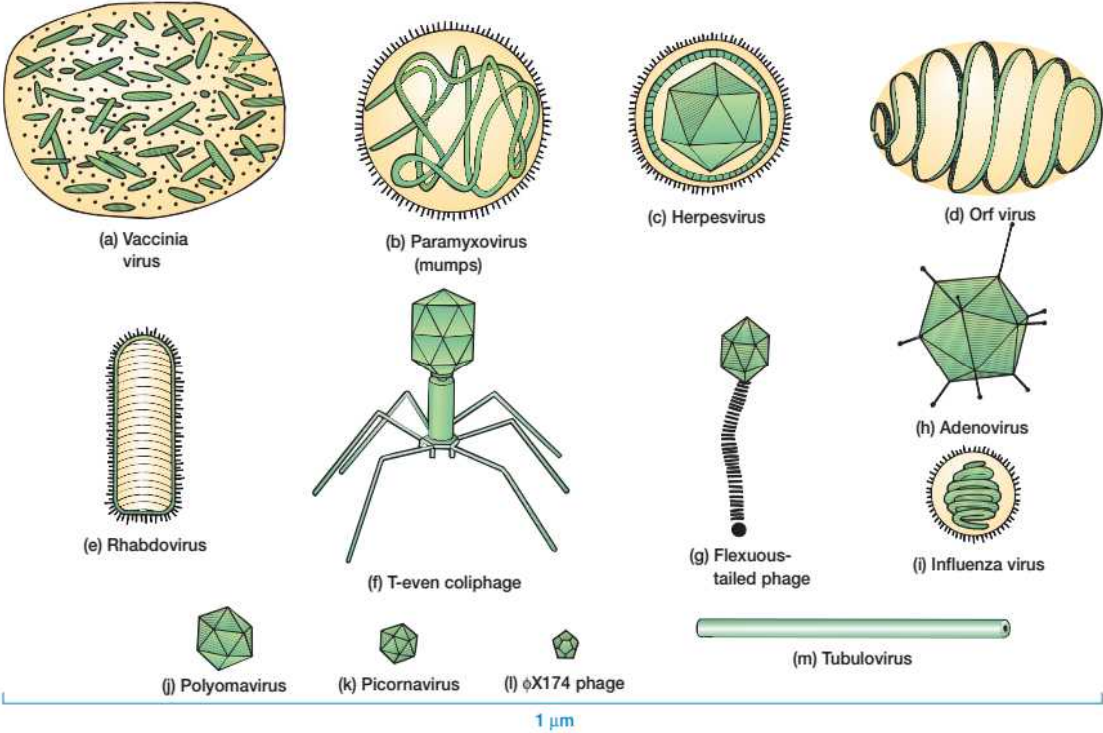


Figure: The Size and Morphology of Selected Viruses