

Pathogenicity mechanism of virus

The Virology of Fish and shellfish

- **Virus-** it is a very small infectious particles that multiply only within the living cells of a host by utilising the machinery of the host cell for their own reproduction.
- Viruses are about 100 times smaller than bacteria and can only be observed by electron microscopy.
- **Virion-** A single infectious virus particle is called virion.
- Virions, single virus particles, are 18–300 nanometers in diameter.
- **Capsid:** The outer protein shell of a virus.
- A virion is an entire virus particle consisting of an outer protein shell called a *capsid* and an inner core of nucleic acid (either Ribonucleic or Deoxyribonucleic acid—RNA or DNA).

CONTD-

- Some viruses have an additional envelope that contains a lipid bilayer and proteins, usually glycoproteins.
- **Viral antigens**-Viruses may contain from 4-100 structural proteins, many of which will be recognized as immunogens.
- The antibody or T cell receptor does not react with the whole antigen but with distinct portions of the molecule called *antigenic determinants* or *epitopes*.

Virus classification

- ICTV classification
 - ICTV- International Committee on Taxonomy of Viruses.
 - Species names often take the form of (*Disease*) *virus*

Realm (-*viria*)

Subrealm (-*vira*)

Kingdom (-*viriae*)

Subkingdom (-*virites*)

Phylum (-*viricota*)

Subphylum (-*viricotina*)

Class (-*viricetes*)

Subclass (-*viricetidae*)

Order (-*virales*)

Suborder (-*virineae*)

Family (-*viridae*)

Subfamily (-*virinae*)

Genus (-*virus*)

Subgenus (-*virus*)

Species

Baltimore classification

➤ The Baltimore Classification of viruses is based on the method of viral mRNA synthesis.

I: **dsDNA viruses** (e.g. Adenoviruses, Herpesviruses, Poxviruses)

II: **ssDNA viruses** (+ strand or "sense") DNA (e.g. Parvoviruses)

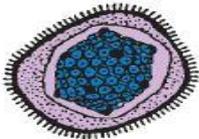
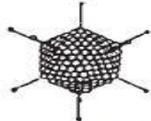
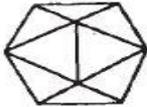
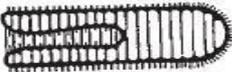
III: **dsRNA viruses** (e.g. Reoviruses)

IV: **(+)ssRNA viruses** (+ strand or sense) RNA
(e.g. Picornaviruses, Togaviruses)

V: **(-)ssRNA viruses** (- strand or antisense) RNA
(e.g. Orthomyxoviruses, Rhabdoviruses)

VI: **ssRNA-RT viruses** (+ strand or sense) (e.g. Retroviruses)

VII: **dsDNA-RT viruses** (e.g. Hepadnaviruses)

ENVELOPED	NON-ENVELOPED
<p data-bbox="556 72 653 97">ds DNA</p>  <p data-bbox="510 265 685 289"><i>Herpesviridae</i></p>	<p data-bbox="1205 68 1302 92">ds DNA</p>  <p data-bbox="1180 237 1344 261"><i>Adenoviridae</i></p>  <p data-bbox="1184 411 1323 435"><i>Iridoviridae</i></p>
<p data-bbox="459 458 755 482">Negative sense ss RNA</p>  <p data-bbox="494 658 697 682"><i>Paramyxoviridae</i></p>  <p data-bbox="479 843 697 868"><i>Orthomyxoviridae</i></p>  <p data-bbox="498 979 683 1003"><i>Rhabdoviridae</i></p>	<p data-bbox="1199 458 1296 482">ds RNA</p>  <p data-bbox="1199 611 1335 635"><i>Reoviridae</i></p>  <p data-bbox="1193 846 1348 871"><i>Birnaviridae</i></p>
<p data-bbox="452 1029 736 1053">Positive sense ss RNA</p>  <p data-bbox="517 1129 662 1153"><i>Togaviridae</i></p>	
<p data-bbox="471 1182 726 1206">Reverse transcribing</p>  <p data-bbox="517 1336 674 1360"><i>Retroviridae</i></p>	<p data-bbox="1132 1182 1416 1206">Positive sense ss RNA</p>  <p data-bbox="1166 1260 1350 1285"><i>Picornaviridae</i></p>  <p data-bbox="1180 1360 1336 1385"><i>Nodaviridae</i></p>

100 nm

Types of virion geometry

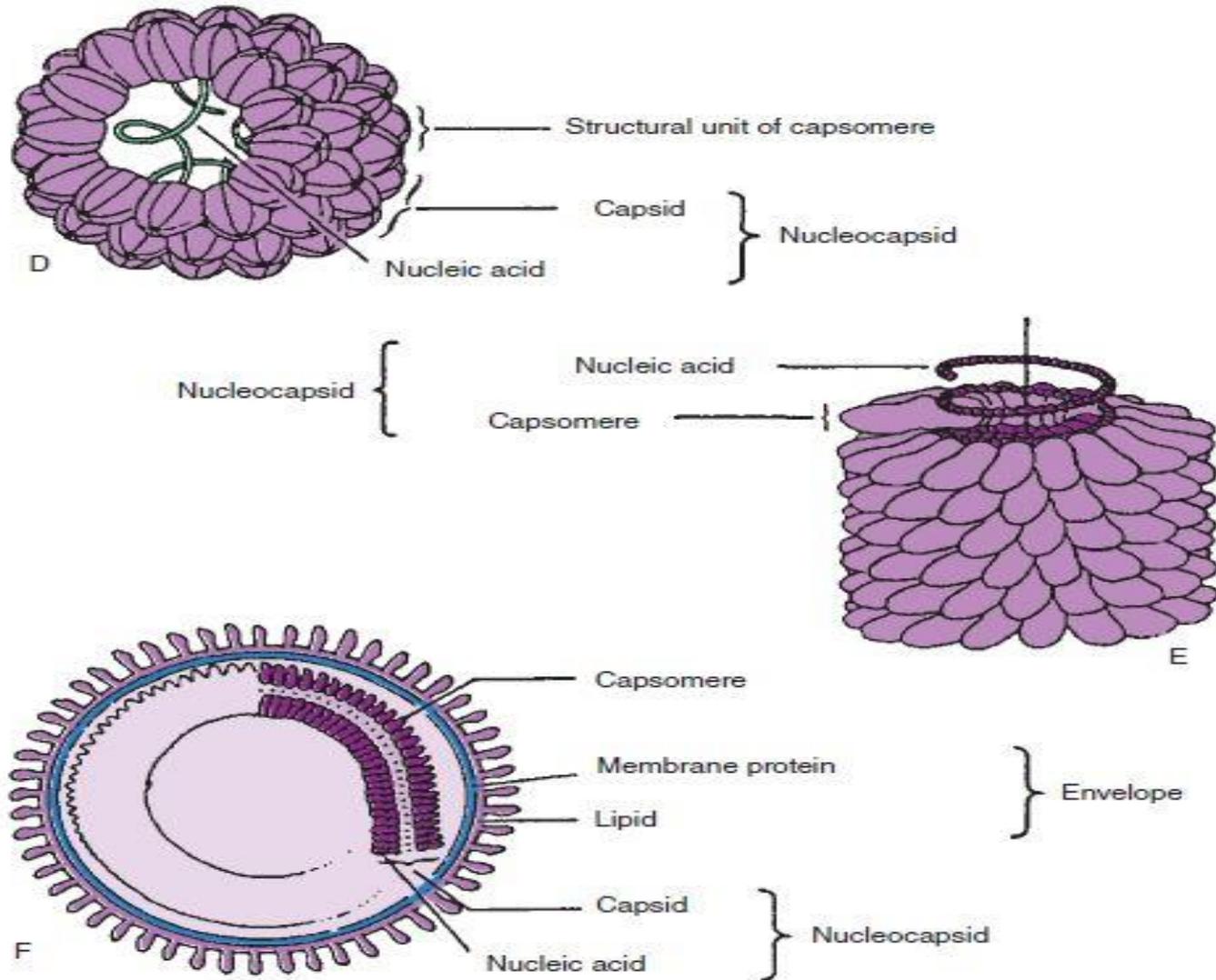


Fig. D: Subunits of a non-enveloped virion of icosahedral symmetry. E–F: substructure of a non-enveloped virion with tubular nucleocapsid and helical symmetry.

Virus Replication

Steps

ATTAE

- A-attachment
- T-transcription-mRNA
- T-translation-viral protein synthesis
- A-assemble of virus particles
- E-exit from host cell

OIE Listed Fish Viral Disease (2019)

1. Infection with **epizootic haematopoietic necrosis virus** (EHNV).
2. Infectious **salmon anaemia virus** (ISAV).
3. Infection with **infectious haematopoietic necrosis** (IHNV).
4. Infection with **koi herpesvirus** (KHV).
5. Infection with **red sea bream iridovirus** (RSBIV).
6. Infection with **salmonid alphavirus** (SAV).
7. Infection with **spring viraemia of carp virus** (SVCV)
8. Infection with **viral haemorrhagic septicaemia virus** (VHSV).

OIE Listed Shellfish Viral Disease (2019)

1. Infection with **infectious hypodermal and haematopoietic necrosis virus**(IHHNV).
2. Infection with **infectious myonecrosis virus** (IMV).
3. Infection with ***Macrobrachium rosenbergii* nodavirus** (MrNV) (white tail disease).
4. Infection with **Taura syndrome virus** (TSV).
5. Infection with **white spot syndrome virus** (WSSV).
6. Infection with **yellow head virus genotype 1**(YHV-1)

Fish Viral disease reported in India

1. Viral Encephalopathy and Retinopathy (VER) or Betanoda virus-2005.
2. Carp Edema Virus (CEV)- 2015.
3. Cyprinid Herpesvirus-2 (CyHV-2)-2016.
4. Koi Rana Virus (KIRV)-2016
5. Tilapia Lake Virus (TILV)-2018
6. Red Sea bream Iridovirus (RSIV)- 2019.

Shellfish Viral disease reported in India

1. Monodon baculovirus (MBV)-1993.
2. WSSV -1994
3. Infectious hypodermal and hematopoietic necrosis virus (IHHNV)-1998.
4. Hepatopancreatic parvovirus (HPV)-2002.
5. Laem-Singh virus (LSNV)-2007.