Viruses, Viroids,and Prions
General Characteristics
of Viruses

I. Depending on one's viewpoint, viruses may be regarded as exceptionally complex aggregations of nonliving chemicals or as exceptionally simple living microbes.

2. Viruses contain a single type of nucleic acid (DNA or RNA) and a protein coat, sometimes enclosed by an envelope composed of lipids, proteins, and carbohydrates.

3. Viruses are obligatory intracellular parasites. They multiply by using the host cell's synthesizing machinery to cause the synthesis of specialized elements that can transfer the viral nucleic acid to other cells.

Host Range

4. Host range refers to the spectrum of host cells in which a virus can multiply.

5. Most viruses infect only specific types of cells in one host species.

6. Host range is determined by the specific attachment site on the host cell's surface and the availability of host cellular factors.

Viral Size

7. Viral size is ascertained by electron microscopy.

8. Viruses range from 20 to IOOO nm in length.

Viral Structure

I. A virion is a complete, fully developed viral particle composed of nucleic acid surrounded by a coat.

Nucleic Acid

2. Viruses contain either DNA or RNA, never both, and the nucleic acid may be single- or double-stranded, linear or circular, or divided into several separate molecules.

3. The proportion of nucleic acid in relation to protein in viruses ranges from about 1 % to about 50%.

Capsid and Envelope

4. The protein coat surrounding the nucleic acid
   of a virus is called the capsid.
5. The capsid is composed of subunits, capsomeres,
   which can be a single type of protein
   or several types.
6. The capsid of some viruses is enclosed by an
   envelope consisting of lipids, proteins, and
   carbohydrates.
7. Some envelopes are covered with carbohydrate-protein complexes
called spikes.

General Morphology

8. Helical viruses (for example, Ebola virus) resemble long
   rods, and their capsids arc hollow cylinders surrounding the
   nucleic acid.
9. Polyhedral viruses (for example, adenovirus) are many-sided.
Usually the capsid is an icosahedron.

10. Enveloped viruses are covered by an envelope and are roughly
    spherical but highly pleomorphic. There are also enveloped helical
    viruses (for example, influenza virus) and enveloped polyhedral
    viruses (for example, *Simplexvirus).*
II. Complex viruses have complex structures. For example, many
bacteriophages

have a polyhedral capsid with a helical tail attached.

Taxonomy of Viruses

1. Classification of viruses is based on type of nucleic acid, stra tegy
   for replication, and morphology.
2. Virus family names end in *-viridae;* genus names end in *-virus.*
3. A viral species is a group of viruses sharing the same genetic
information and ecological niche.

Isolation, Cultivation, and
Identification of Viruses

1. Viruses must be grown in living cells.
2. The easiest viruses to grow are bacteriophages.

Growing Bacteriophages in the laboratory

3. The plaque method mixes bacteriophages with host bacteria and
    nutrient agar.
4. After several viral multiplication cycles, the bacteria in the area
   surrounding the original virus are destroyed; the area of lysis is
   called a plaque.

5. Each plaque originates with a single viral particle; the concentration of viruses is given as plaque-forming units.

Growing Animal Viruses in the Laboratory

6. Cultivation of some animal viruses requires whole animals.
7. Simian AIDS and feline AIDS provide models for studying human AIDS.
8. Some animal viruses can be cultivated in embryonated eggs.
9. Cell cultures are cells growing in culture media in the laboratory.
10. Primary cell lines and embryonic diploid cell lines grow for a short time in vitro.
11. Continuous cell lines can be maintained in vitro indefinitely.
12. Viral growth can cause cytopathic effects in the cell culture,

Viral Identification

13. Serological tests are used most often to identify viruses.

14. Viruses may be identified by RFLPs and PCR.

References':1- Microbiology an introduction TWELFTH EDITION. Gerard. Tortora.2016.

2- Microbiology an introduction TENTH EDITION. Gerard. Tortora.2010.