**CLASSIFICATION AND NOMENCLATURE OF VIRUSES**

What is the purpose of classification?

1-To make structural arrangement for easy comprehension

2-To be able to communicate with each other

3- To enable prediction of properties of new viruses

4-Possible evolutionary relationships

From the 1930s to 1960s, various classification systems were proposed for plant (and other) viruses. This led to much confusion, and at the International Congress for Microbiology, held in Moscow in 1966, the first meeting of the International Committee for the Nomenclature of Viruses was held. An organization was set up for developing an internationally accepted taxonomy and nomenclature for all viruses. Rules for the nomenclature of viruses were laid down.

**Naming Viruses (Species)**

When a family or genus is approved by the International Committee on theTaxonomy of Viruses (ICTV), a type species is designated. Some virologists favour using the English vernacular name as the official species name. Using part of a widely known vernacular name as the official species name may frequently be a very suitable solution, but it could not always apply (e.g., with newly discovered viruses). Other virologists favour serial numbering for viruses (species)(tobaco virus 1). The experience of other groups of microbiologists is that, although numbering or lettering systems are easy to set up in the first instance, they lead to chaos as time passes and changes must be made in taxonomic groupings.

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In 1966, Gibbs et al., and in 1968, Gibbs and Harrison, introduced a system of cryptograms in addition to vernacular name with a view to give concise information about the properties of the virus. Cryptogram gives quick summary of the virus properties. e.g (R/1: 2/5: E/E :S/O)

Keys to Term

1.I Term: Type of n/a / stranded ness

1.R: RNA1= ss 2.D: DNA2= ds.

II Term: mol. wt. of n/a in millions/% of n/a in infective particle.

III term: Out line of the particle shape/ outline of nucleocapsid:

S: Spherical (isometric)

E: Elongated (rod)/ E= ends parallel

B: Bacilliform

IV term: type of host infected / type of victor

F:fungi , B: Bacterium , S: seed plant

Ap: Aphidade 0: vector less fu : fungi

**Plant virus taxonomy**, like the taxonomy of viruses in general, is a system for classifying and naming plant viruses based on certain criteria. The rules and guidelines for plant virus taxonomy are set by the International Committee on Taxonomy of Viruses (ICTV).

 The ICTV provides a hierarchical classification system for viruses, including plant viruses. Here are some key rules and principles of plant virus taxonomy:

1. Hierarchical Classification: Plant viruses are classified hierarchically based on a series of taxonomic ranks, including realm, kingdom, phylum, class, order, family, genus, and species. These ranks are used to group viruses with similar characteristics.
2. Realm and Kingdom: Viruses do not belong to any traditional biological kingdoms or realms since they are not considered living organisms. Instead, they are classified under a realm called "Riboviria."
3. Kingdom: Viruses do not belong to traditional biological kingdoms, so this rank is not used for plant viruses.
4. Phylum: Viruses are not classified into phyla in the same way that cellular organisms.
5. Class: Plant viruses are not classified into classes.
6. Order: The order is the first rank used in the classification of plant viruses. It is a level below the realm and above the family. Orders group together families of viruses with similar characteristics
7. Family Names: The family name for a plant virus typically ends in "-viridae." For example, the family name for many plant viruses is "Potyviridae."
8. Genus Names: The genus name of a plant virus typically ends in "-virus." For example, the genus name of the Potato virus Y is "Potyvirus."
9. Species Names: The species name is often descriptive and may include the name of the host plant, the disease it causes, or other relevant characteristics. For example, "Potato virus Y" is the species name for a virus affecting potatoes.

 10-Subspecies and Strains: Within a species, viruses can be further divided into

 subspecies or strains based on genetic differences and other criteria. These subdivisions

 help differentiate closely related viruses.

 11-Nomenclature: Virus names are typically italicized, with the genus name capitalized

 and the species name in lowercase. For example, "Potato virus Y." Strain names are

 often written in single quotes, like 'N:O' for a specific strain of *Potato virus Y*.

**Use of Virus Names**

The last word of a species is virus, and the suffix (ending) for a genus name is -virus. For a subfamily, it is -virinae; for a family, it is -viridae; and for an order, it is -virales. In formal taxonomic usage, the virus order, family, subfamily, genus, and species names are printed in italics (or underlined), with the first letter being capitalized; other words in species names are not capitalized unless they are proper nouns or parts of proper nouns. Also, in formal use, the name of the taxon should precede the name being used—for example, the family Caulimoviridae, the genus Mastrevirus, and the species Potato virus Y.

**Acronyms or Abbreviations**

Abbreviations of virus names have been used for many years to make the literature more easy to read and more succinct to present. The abbreviation is usually in the form of an acronym using the initial letters of each word in the virus name. As the designation of the acronym was by the author of the paper, it was leading to much overlap and confusion. For instance, AMV was used to designate Alfalfa mosaic virus and Arabis mosaic virus and could also justifiably be used for a number of viruses such as Abutilon mosaic virus, Alternantha mosaic virus, Aneilema mosaic virus, or Anthoxanthum mosaic virus. Therefore, in 1991, the Plant Virus Section of the ICTV initiated a rationalization of plant virus acronyms . The designation of the abbreviations is based on the following principles:

● Abbreviations should be as simple as possible.

● An abbreviation must not duplicate any other previously coined and still in current usage.

● The word “virus” in a name is abbreviated as “V”.

● The word “viroid” in a name is abbreviated as “Vd”.

**CRITERIA USED FOR CLASSIFYING VIRUSES**

1. **Structure of the virus particle**

The importance of virus structure in the classification of viruses with isometric viruses, particle morphology, as revealed by electron microscopy, has not proved as generally useful as with the rod-shaped viruses. This is mainly because many isometric particles lie in the same size range (about 25-30 nm in diameter). And are of similar appearance unless preparations and photographs of high quality are obtained.



**B. Physicochemical properties of virus particles**

Physicochemical properties and stability of the virus particle have sometimes played a part in classification.

**C. Properties of viral nucleic acids**

The organization and strategy of viral genomes, is now of prime importance for the placing of viruses into families, and genera, or for the establishment of a new family or genus.

**D. Viral proteins**

The properties of viral proteins, and in particular the amino acid sequences, are of great importance in virus classification at all levels .Coat protein amino acid sequence homologies have been used to distinguish between distinct pot viruses and strains of these viruses.

**E. Serological relationships**

Serological methods for determining relationships and their limitations these methods have been the most important single criterion for placing viruses in related groups. Members of some groups may be all serologically related.

**F. Activities in the plant**

 The use of biological properties such as host range and symptoms in particular host plant as major criteria led to considerable confusion in the identification and classification viruses.

**G. Methods of transmission**

Most viruses have only one type of vector, and usually all the viruses within a group have the same type of vector.