

Recent revisions of the rules of virus classification and nomenclature

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The classification and nomenclature of viruses is the responsibility of the International Committee for the Taxonomy of Viruses (ICTV). This body comprises National Members, appointed by the member virological societies of the International Union of Microbiological Societies (IUMS), Life Members, appointed by vote at Plenary Sessions, and members of the ICTV Executive Committee. ICTV is controlled by Statutes approved by the Virology Division of IUMS and its decisions are guided by a set of Rules. These were modified at the recent Xth International Congress of Virology in Jerusalem by the Plenary Session of ICTV. The version in force until August 1996 was as in Murphy et al. [4] and was developed from the previous Rules (Francki et al. [1]) as described by Mayo and Murphy [3]. The new version of the Rules has been designated as a Code, in line with how the nomenclature of other biological organisms is controlled (Greuter et al. [2]). The Code is printed below with comments in parentheses to indicate how the new Rules are related to those in the previous version. A major change is the provision of a section of explanatory notes to assist users of the Rules. The Notes, and to some extent the Rules, are subject to refinement in the face of unexpected difficulties in their application. The author, or any other member of the Executive Committee of ICTV, would welcome comment from the virological community to assist with this refinement process.

The international code of virus classification and nomenclature

The activities of the International Committee for the Taxonomy of Viruses (ICTV) are governed by Statutes agreed with the Virology Division of the International Union of Microbiological Societies. The Statutes state that the objectives of the ICTV are (1) to develop an internationally agreed taxonomy for viruses, (2) to develop internationally agreed names for virus taxa, including species and subviral agents, (3) to communicate taxonomic decisions to the international community of virologists, and (4) to maintain an index of virus names. The Statutes also state that classification and nomenclature will be subject to rules. These rules are set out in this Code.

General rules

1. Virus classification and nomenclature shall be international and shall be universally applied to all viruses.

2. The universal virus classification system shall employ the hierarchical levels of Order, Family, Subfamily, Genus, and Species (see Note 1).
3. The ICTV is not responsible for classification and nomenclature of virus taxa below the rank of species. The classification and naming of serotypes, genotypes, strains, variants and isolates of virus species is the responsibility of acknowledged international specialist groups (see Note 2).
4. Artificially created viruses and laboratory hybrid viruses will not be given taxonomic consideration. Their classification will be the responsibility of acknowledged international specialist groups (see Note 3).
5. Taxa will be established only when representative member viruses are sufficiently well characterized and described in the published literature so as to allow them to be identified unambiguously and the taxon to be distinguished from other similar taxa.
6. When it is uncertain how to classify a species into a genus but its classification in a family is clear, it will be classified as an unassigned species of that family (see Note 4). (New Rule)
7. Names will only be accepted if they are linked to taxa at the hierarchical levels described in Rule 2 and which have been approved by the ICTV (see Note 5). (New Rule)

Rules pertaining to naming taxa

8. Names proposed for taxa are “valid names” if they conform to the Rules set out in the Code and they pertain to established taxa. Valid names are “accepted names” if they are recorded as approved international names in the 6th ICTV Report or become “accepted names” by an ICTV vote of approval for a taxonomic proposal (see Note 6). (New Rule)
9. Existing names of taxa and viruses shall be retained whenever feasible (see Note 7). (Old Rule 6)
10. The rule of priority in naming taxa and viruses shall not be observed. (Old Rule 7)
11. No person’s name shall be used when devising names for new taxa (see Note 8). (Old Rule 8)
12. Names for taxa shall be easy to use and easy to remember. Euphonious names are preferred. (Old Rule 9)
13. Subscripts, superscripts, hyphens, oblique bars and Greek letters may not be used in devising new names (see Note 9). (Old Rule 10)
14. New names shall not duplicate approved names. New names shall be chosen such that they are not closely similar to names that are in use currently or have been in use in the recent past. (Old Rule 11)
15. Sigla may be accepted as names of taxa, provided that they are meaningful to virologists in the field, normally as represented by Study Groups (see Note 10). (Old Rule 12)
16. In the event of more than one candidate name being proposed, the relevant Subcommittee will make a recommendation to the Executive Committee of the ICTV, which will then decide among the candidates (see Note 11). (New Rule based on old Rule 14)
17. If no suitable name is proposed for a taxon, the taxon may be approved and the name will be left undecided until the adoption of an acceptable international name when one is proposed to and accepted by ICTV (see Note 12). (New Rule)

18. Names shall be selected such that they, or parts of them, do not convey a meaning for the taxon which would either (1) seem to exclude viruses which lack the character described by the name but which are members of the taxon being named, or (2) seem to exclude viruses which are as yet undescribed but which might belong to the taxon being named, or (3) appear to include within the taxon viruses which are members of different taxa. (Based on old Rule 13)
19. New names shall be chosen with due regard to national and/or local sensitivities. When names are universally used by virologists in published work, these or derivatives shall be the preferred basis for creating names, irrespective of national origin. (Old Rule 14)
20. Proposals for new names, name changes, establishment of taxa and taxonomic placement of taxa shall be submitted to the Executive Committee of the ICTV in the form of taxonomic proposals. All relevant ICTV subcommittees and study groups will be consulted prior to a decision being taken (see Note 13). (Based on old Rule 15)

Rules pertaining to species

21. A virus species is defined as a polythetic class of viruses that constitutes a replicating lineage and occupies a particular ecological niche. (Old Rule 16)
22. When an ICTV Subcommittee is uncertain about the taxonomic status of a new species or about the assignment of the new species to an established genus, the new species will be listed as a tentative species in the appropriate genus or family. Names of tentative species, as of taxa generally (Rule 14), shall not duplicate approved names and shall be chosen such that they are not closely similar to names that are in use currently, names that have been in use in the recent past, or names of definitive species (see Note 14). (New Rule)
23. A species name shall consist of as few words as practicable but shall not consist only of a host name and the word "virus" (see Note 15). (Based on old Rule 17)
24. A species name, usually together with a strain designation, must provide an appropriately unambiguous identification without mention of the genus or family to which it belongs. (Old Rule 18)
25. Numbers, letters, or combinations thereof may be used as species epithets where such numbers and letters are already widely used. However, newly designated serial numbers, letters or combinations thereof are not acceptable alone as species epithets. If a number or letter series is in existence it may be continued. (Old Rule 19)

Rules pertaining to genera

26. A genus is a group of species sharing certain common characters. (Old Rule 21)
27. A genus name shall be a single word ending in "... *virus*". (Old Rule 22)
28. Approval of a new genus must be accompanied by the approval of a type species. (Old Rule 23)

Rules pertaining to subfamilies

29. A subfamily is a group of genera sharing certain common characters. The taxon shall be used only when it is needed to solve a complex hierarchical problem. (Old Rule 24)
30. A subfamily name shall be a single word ending in "... *virinae*". (Old Rule 25)

Rules pertaining to families

31. A family is a group of genera (whether or not these are organized into subfamilies) sharing certain common characters. (Old Rule 26)
32. A family name shall be a single word ending in "... *viridae*". (Old Rule 27)

Rules pertaining to orders

33. An order is a group of families sharing certain common characters. (Old Rule 29)
34. An order name shall be a single word ending in "... *virales*". (Old Rule 30)

Rules for orthography

35. In formal taxonomic usage, the names of virus orders, families, subfamilies, and genera are printed in italics and the first letters of the names are capitalized. (New Rule)
36. Species names are not italicized. (New Rule)
37. Species names are not capitalized, except in some instances when they have been derived from a place name or a host family or genus name. (New Rule)
38. In formal usage, the name of the taxon shall precede the term for the taxonomic unit (see Note 16). (New Rule)

Notes

1. It is not obligatory to use all levels of the taxonomic hierarchy. Families will not necessarily be classified into orders; when no appropriate order exists the family will be the highest level taxon used. Also, not all families are divided into subfamilies because this taxon is to be used only when it is needed to solve a complex hierarchical problem (Rule 29).

Some genera may be unassigned, that is not assigned to a family because it is not clear how the new genus is related to existing genera, generally because of insufficient information.

2. Particular virus isolates may be regarded as strains, variants or other subspecific entities which, together with other entities, constitute a species. Classification of such isolates is not the responsibility of the ICTV but is the responsibility of international specialty groups. When a particular isolate does constitute a separate species, its classification and nomenclature then becomes the responsibility of the ICTV. It is the responsibility of ICTV Study Groups to decide when an isolate constitutes a species.

Deciding the names of serotypes, genotypes, strains, variants or isolates of virus species is not the responsibility of the ICTV. However, it is recommended that new names should not be the same as, or closely similar to, names already in use (Rule 14 for taxa). When a particular virus isolate is designated to represent a species, the decision as to which name will be adopted for the species for formal taxonomic purposes will be the responsibility of the ICTV, initially of a particular Study Group working on behalf of the ICTV. The Study Group will be expected to consult widely so as to ensure the acceptability of names, subject to the Rules in the Code. The policy of the ICTV is to reflect the majority view of the appropriate virological constituency when adopting names.

3. Naturally occurring isolates which have genomes formed from parts of the genomes of different strains of a virus, either by recombination between the genome nucleic acids or by reassortment of separate genome parts, will be classified either as species or subspecific entities in the same way that other isolates are classified. Neither artificial variants made by recombination or reassortment, nor mutant viruses are subject to the Rules in the Code.
4. A species can be classified as an unassigned member of a family when no genus has been devised. For example, Bimbo virus is a rhabdovirus of vertebrates but is not a member of any of the currently recognised genera in the family *Rhabdoviridae*. Likewise, sweet potato mild mottle virus resembles viruses in the family *Potyviridae* but is not classified in any of the genera in that family. These viruses are each classified as an unassigned member of their respective families.
5. Taxa above the rank of species must be approved before a name is assigned to them. Proposals for the creation of taxa shall be accompanied by proposals for names. A decision to create a taxon can thus be followed immediately by a decision about the name for the taxon. Species will be approved together with their names as a single taxonomic act.
6. A valid name is one that has been published, one that is associated with descriptive material, and one that is acceptable in that it conforms to the Rules in the Code. Accepted names will be kept in an "Index" by the ICTV.
7. A stable nomenclature is one of the principal aims of taxonomy and therefore changes to names that have been accepted will only be considered in exceptional circumstances, and then only because of serious conflict with the Rules.
8. New taxon names shall not be made by adopting a person's name, by adding a formal ending to a person's name or by using part of a person's name to create a stem for a name.
9. The Rule is intended to make text unambiguous and easy to manipulate and its application should often make names more pronounceable, in agreement with Rule 12. Existing names of some species violate this Rule (e.g. *Nudaurelia capensis* ω virus; coliphage λ), but international names of genera and families do not.
10. Sigla are names comprising letters and/or letter combinations taken from words in a compound term. The name of the genus *Comovirus* has the sigla stem "Co-" from *cowpea* and "-mo-" from *mosaic*; the name of the genus *Papovavirus* has the sigla stem "Pa-" from *papilloma virus*, "-po-" from *polyoma virus* and "-va-" from *vacuolating agent*.
11. When there is more than one candidate name for the same taxon, the decision as to which will be accepted shall be made on the basis of the Code and, if necessary, thereafter on the basis of likely acceptability to the majority of virologists.
12. When genera have not been named this is indicated by quotation marks. For example, hepatitis C virus is a species in an as yet un-named genus in the family *Flaviviridae*. Until the genus is named, it is designated as "hepatitis C-like viruses". This designation is regarded as temporary as it is an inconvenience to most virologists.
13. For example, taxonomic proposals concerned with the family *Partitiviridae* would be considered by the Fungal Virus Subcommittee and one of its Study Groups but because some genera in the family contain viruses of plants, proposals affecting the family would also be considered by the Plant Virus Subcommittee.

14. Species classified as tentative are candidates for taxonomic decision by the appropriate Study Groups to resolve their tentative status.
15. The styles used when virus names are devised differ according to the traditions of the particular fields of virology. For example, plant virus names are usually constructed as host + symptom + "virus" (e.g. tobacco necrosis virus) whereas, in contrast, viruses in the family *Bunyaviridae* are usually named after the location at which the virus was found + "virus" (e.g. Bunyamwera virus).
16. For example, the correct formal descriptions of various taxa are ... the family *Herpesviridae* ... the genus *Morbillivirus*, ... the genus *Rhinovirus*, ... the species tobacco necrosis virus, and so on.

References

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