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VIROLOGY DIVISION NEWS

A proposal to change existing virus species names to non-Latinized binomials

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Abstract A proposal has been posted on the ICTV website (2011.001aG.N.v1.binomial_sp_names) to replace virus species names by non-Latinized binomial names consisting of the current italicized species name with the terminal word "virus" replaced by the italicized and non-capitalized genus name to which the species belongs. If implemented, the current italicized species name *Measles virus,* for instance, would become *Measles morbillivirus* while the current virus name measles virus and its abbreviation MeV would remain unchanged. The rationale for the proposed change is presented.

Introduction

The current species names approved by the ICTV are written in italics and capitalized but are otherwise the same as the English vernacular names of viruses written in Roman. This has resulted in considerable confusion among virologists who must differentiate in their writing, only on the basis of typography, between a species (a taxonomic construct created by taxonomists) and a virus (a molecular genetic parasite usually causing a disease) [1–4].

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It is important not to confuse a virus species (which is a taxonomic construct or concept which does not have a sequence and cannot be isolated, transmitted to a host or otherwise manipulated) with a virus (a physical entity) that can be isolated and manipulated experimentally and always exists in the form of many mutants, variants and strains possessing different genome sequences. For the same reason, other taxonomic constructs such as a family or a genus also cannot be transmitted to a host or be sequenced. It is incorrect to write, as is often done, that the species *Measles virus* (italics) or *Cucumber mosaic virus* (italics) has been isolated, transmitted to a host or sequenced.

In biology, many animals, plants and microorganisms do not have vernacular names in English or other languages. As a result scientists will write that *Escherichia coli* (the italicized species name) has been infected by a bacterial virus, falsely implying that a taxonomic entity could be infected. In virology this undesirable practice can be avoided since all viruses have vernacular names and these names (in Roman) can therefore be used if one wants to refer to the infectious agent rather than to the species into which it has been placed. Unfortunately at present many virologists do not use available correct typography and write that a virus species (italicized typography) can be transmitted or sequenced [5].

Rationale for introducing non-Latinized binomial species names

Binomial Latin names have been proposed for virus species [6, 7] although virologists have traditionally been opposed to the introduction of Latin names [8–10]. This would require the creation of new Latin names for more than 2,000 virus species and reaching agreement on such names is unlikely to be easy [11]. In contrast, introducing non-Latinized binomial species names would be simple since they are obtained by combining existing English virus names with accepted genus names without involving the creation of new names.

Very few virus species are not yet assigned to a genus and are therefore excluded from the proposed system [12]. Only in a small number of cases will it be necessary to change existing genus names, mostly because these names do not follow the ICTV rule that genus names must end in "virus" [13–15]. For instance the species *Enterobacteria phage T1* is currently placed in a genus called "T1-like viruses" in the family *Siphoviridae* and a proper genus name would have to be introduced to make the binomial system applicable. However, the need to create proper genus names in such cases is already recognized by the ICTV. In the case of bacterial viruses, the word "phage" could be deleted from the species name altogether. For instance, the virus enterobacteria phage M13 which is a member of the genus *Inovirus* could be placed into a species with the name *Enterobacteria M13 inovirus*.

Since the species name, which is written in italics with a capital initial, would be obtained by replacing the terminal word "virus" in the virus name with the genus name to which the species belongs, it would be appropriate to have species names such as *Human papilloma 32 alphapapillomavirus* and *Influenza A alphainfluenzavirus.* If the species name contains "-virus" as a suffix as in *Rotavirus A*, the suffix can be removed to avoid repeating "virus" twice in the binomial species name which then becomes *Rota A rotavirus*. Such word repetition is also frequent in the species names of organisms, for instance *Rattus rattus* (roof rat), *Ciconia ciconia* (white stork) and *Gorilla gorilla gorilla* (Western Lowland Gorilla).

The current proposal does not aim to provide a solution for these cases which should be addressed by the relevant ICTV Study Groups, once the principle of binomial species names has been accepted. However, these few problems are not a valid reason for rejecting the proposal.

Adopting the proposed binomial species names implies that a name change would have to occur when species are moved from one genus to another. However, by drawing attention to a new taxonomic placement this is probably a clarifying advantage rather than an alleged disadvantage [12]. Such changes are common in animal, plant and bacterial taxonomy.

Since all species names of animals, plants and microorganisms are binomials that always include a genus designation, virus species binomials will be easily recognizable as species names. The vernacular virus names in different languages (measles virus; virus de la rougeole; Masernvirus, etc.) will be recognized as virus names rather

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than species names and this will make it easier to distinguish between the two.

A major advantage of the proposed system is that inclusion of the genus affiliation in the species name indicates relationships with other viruses and provides additional information about the properties of members of the species. The advantage of a binomial name exists also when the genus affiliation appears at the end of the binomial species name instead of at the beginning. For instance, it would be immediately obvious that hepatitis A, B and C viruses are very different infectious agents belonging to different genera if the corresponding species names were *Hepatitis A hepatovirus, Hepatitis B orthohepadnavirus and Hepatitis C hepacivirus*. Since all such binomial names for virus species end with the suffix -virus present in the genus name, they also clearly indicate that the names refer to viral entities. This is an advantage compared to the Latin names used in biology which do not indicate to the uninitiated whether the organism referred to is an animal, a plant or a microorganism.

The proposed binomial system is not a new idea. The system was used to index the viruses in the 2nd, 3rd and 4th ICTV reports published in 1976, 1979 and 1982, respectively [16–18], because the benefits of referring to entries like bluetongue orbivirus and West Nile flavivirus must have been obvious already at the time. In the 5th ICTV report published in 1991 [19] the binomials were retained only for the indexing of plant viruses. In the 6th ICTV report [20], the binomials were dropped altogether because certain animal virologists, for no declared reason, were opposed to their use. Binomial names for referring to viruses rather than to species have always been popular with plant virologists and they have been used in many books [21–24]. Some animal virologists also find it helpful to use binomials to refer to viruses such as Bunyamvera orthobunyavirus [25]. When coining new virus names, the ICTV plant virus Study Groups have always been careful to avoid redundancies between virus names and genus names and, as a result, the proposed binomial species names would lead to very few problems with plant viruses [11, 14, 15].

When the proposal was first made in 1998, most members of the ICTV Executive Board who actually were not plant virologists, were opposed to the introduction of non-Latinized binomial species names [10]. By 2004, half the ICTV Executive Board no longer objected to the system, but when asked about their opinion on binomial names, only a minority of the 80 Study Groups responded [26]. Although in the past, the ICTV often has ratified decisions by accepting that a no answer vote was a vote in favor, this practice was not followed in this case. Surveys conducted in 2002 among laboratory virologists showed that more than 80% of those who responded were in favor of the binomial system [10, 12, 15, 27].

Table 1 Examples of non-Latinized binomial species names for vertebrate viruses

Virus name	Binomial species name
California encephalitis virus	*California encephalitis orthobunyavirus*
hepatitis A virus	*Hepatitis A hepatovirus*
hepatitis B virus	*Hepatitis B orthohepadnavirus*
hepatitis C virus	*Hepatitis C hepacivirus*
hepatitis E virus	*Hepatitis E hepevirus*
lassa virus	*Lassa arenavirus*
louping ill virus	*Louping ill flavivirus*
measles virus	*Measles morbillivirus*
mumps virus	*Mumps rubulavirus*
rabies virus	*Rabies lyssavirus*
rubella virus	*Rubella rubivirus*
sendai virus	*Sendai respirovirus*
Sindbis virus	*Sindbis alphavirus*
Sin Nombre virus	*Sin Nombre hantavirus*
West Nile virus	*West Nile flavivirus*

Table 2 Examples of possible virus non-Latinized binomial species names

Species name	Unchanged virus name
The dsDNA viruses	
Family: ***Tectiviridae***	
–genus *Tectivirus*	
Enterobacteria PRD1 tectivirus	enterobacteria phage PRD1
Family: ***Corticoviridae***	
–genus *Corticovirus*	
Pseudoalteromonas PM2 corticovirus	pseudoalteromonas phage PM2
Family: ***Plasmaviridae***	
–genus *Plasmavirus*	
Acholeplasma L2 plasmavirus	acholeplasma phage L2
Family: ***Lipothrixviridae***	
–genus *Alphalipothrixvirus*	
Thermoproteus tenax1 alphalipothrixvirus	thermoproteus tenax virus 1
Family: ***Rudiviridae***	
–genus *Rudivirus*	
Sulfolobus islandicus rod-shaped 2 rudivirus	sulfolobus islandicus rod-shaped virus 2
Family: ***Fuselloviridae***	
–genus *Fusellovirus*	
Sulfolobus spindle-shaped 1 fusellovirus	sulfolobus spindle-shaped virus 1
Family: ***Poxviridae***	
–genus *Orthopoxvirus*	
Vaccinia orthopoxvirus	vaccinia virus

Table 2 continued

Species name	Unchanged virus name
Ectromelia orthopoxvirus	ectromelia virus
Variola orthopoxvirus	variola virus
–genus *Parapoxvirus*	
Orf parapoxvirus	orf virus
–genus *Avipoxvirus*	
Fowlpox avipoxvirus	fowlpox virus
Turkeypox avipoxvirus	turkeypox virus
–genus *Capripoxvirus*	
Sheeppox capripoxvirus	sheeppox virus
Lumpy skin disease capripoxvirus	lumpy skin disease virus
–genus *Leporipoxvirus*	
Myxoma leporipoxvirus	myxoma virus
Rabbit fibroma leporipoxvirus	rabbit fibroma virus
–genus *Suipoxvirus*	
Swinepox suipoxvirus	swinepox virus
–genus *Molluscipoxvirus*	
Molluscum contagiosum molluscipoxvirus	molluscum contagiosum virus
–genus *Yatapoxvirus*	
Yaba monkey tumor yatapoxvirus	Yaba monkey tumor virus
–genus *Alphaentomopoxvirus*	
Melolontha melolontha alphaentomopoxvirus	melolontha melolontha entomopoxvirus
–genus *Betaentomopoxvirus*	
Amsacta moorei betaentomopoxvirus	amsacta moorei entomopoxvirus
–genus *Gammaentomopoxvirus*	
Chironomus luridus gammaentomopoxvirus	chironomus luridus entomopoxvirus
Family: ***Asfarviridae***	
–genus *Asfivirus*	
African swine fever asfivirus	African swine fever virus
Family: ***Iridoviridae***	
–genus *Iridovirus*	
Invertebrate iridescent 6 iridovirus	invertebrate iridescent virus 6
–genus *Chloriridovirus*	
Invertebrate iridescent 3 chloriridovirus	invertebrate iridescent virus 3
–genus *Ranavirus*	
Frog 3 ranavirus	frog virus 3
–genus *Lymphocystivirus*	
Lymphocystis disease 1 lymphocystivirus	lymphocystis disease virus 1
Family: ***Phycodnaviridae***	
–genus *Chlorovirus*	
Paramecium bursaria Chlorella 1 chlorovirus	paramecium bursaria chlorella virus 1
–genus *Prasinovirus*	
Micromonas pusilla SP prasinovirus	micromonas pusilla virus SP
–genus *Phaeovirus*	
Ectocarpus siliculosus 1 phaeovirus	ectocarpus siliculosus virus 1
Family: ***Baculoviridae***	
–genus *Granulovirus*	
Cydia pomonella granulovirus	cydia pomonella granulovirus
Family: ***Herpesviridae***	
–genus *Simplexvirus*	
Human herpes 1 simplexvirus	human herpesvirus 1
–genus *Varicellovirus*	
Human herpes 3 varicellovirus	human herpesvirus 3
–genus *Cytomegalovirus*	
Human herpes 5 cytomegalovirus	human herpesvirus 5
–genus *Muromegalovirus*	
Murid herpes 1 muromegalovirus	murid herpesvirus 1
–genus *Roseolovirus*	
Human herpes 6 roseoloviru	human herpesvirus 6
–genus *Lymphocryptovirus*	
Human herpes 4 lymphocryptovirus	human herpesvirus 4
–genus *Rhadinovirus*	
Saimiriine herpes 2 rhadinovirus	saimiriine herpesvirus 2
–genus *Ictalurivirus*	
Ictalurid herpes 1 ictalurivirus	ictalurid herpesvirus 1
Family: ***Adenoviridae***	
–genus *Mastadenovirus*	
Human adeno C mastadenovirus	human adenovirus C
–genus *Aviadenovirus*	
Fowl adeno A aviadenovirus	fowl adenovirus A
–genus *Rhizidiovirus*	
Rhizidiomyces rhizidiovirus	rhizidiomyces virus
Family: ***Polyomaviridae***	
–genus *Polyomavirus*	
Simian 40 polyomavirus	simian virus 40
Family: ***Papillomaviridae***	
–genus *Alphapapillomavirus*	
Human papilloma 32 alphapapillomavirus	human papillomavirus 32
–genus *Betapapillomavirus*	
Human papilloma 5 betapapillomavirus	human papillomavirus 5
–genus *Gammapapillomavirus*	
Human papilloma 4 gammapapillomavirus	human papillomavirus 4
Family: ***Polydnaviridae***	
–genus *Bracovirus*	

Table 2 continued

Species name	Unchanged virus name
Cotesia melanoscela bracovirus	cotesia melanoscela bracovirus
–genus *Icnovirus*	
Campoletis sonorensis ichnovirus	campoletis sonorensis ichnovirus
Family: ***Ascoviridae***	
–genus *Ascovirus*	
Spodoptera frugiperda asco 1a ascovirus	spodoptera frugiperda ascovirus 1a
The ssDNA viruses	
Family: **Inoviridae**	
–genus Inovirus	
Enterobacteria M13 inovirus	enterobacteria phage M13
Enterobacteria X-2 inovirus	enterobacteria phage X-2
Enterobacteria C-2 inovirus	enterobacteria phage C-2
Enterobacteria SF inovirus	enterobacteria phage SF
Vibrio CTX inovirus	vibrio phage CTX
Vibrio VSK inovirus	vibrio phage VSK
Pseudomonas Pf1 inovirus	pseudomonas phage Pf1
Xanthomonas Cf16 inovirus	xanthomonas phage Cf16
Xanthomonas Xf inovirus	xanthomonas phage Xf
–genus Plectrovirus	
Acholeplasma L51 plectrovirus	acholeplasma phage L51
Spiroplasma 1-KC3 plectrovirus	spiroplasma phage 1-KC3
–genus Microvirus	
Enterobacteria phiX 174 microvirus	enterobacteria phage phiX 174
–genus spiromicrovirus	
Spiroplasma 4 spiromicrovirus	spiroplasma phage 4
–genus Bdellomicrovirus	
Bdellovibrio MAC 1 bdellomicrovirus	bdellovibrio phage MAC 1
–genus Chlamydiamicrovirus	
Chlamydia 1 chlamydiamicrovirus	chlamydia phage 1
Family: ***Geminiviridae***	
–genus *Mastervirus*	
Maize streak mastrevirus	maize streak virus
Sugarcane streak mastrevirus	sugarcane streak virus
Tobacco yellow dwarf mastrevirus	tobacco yellow dwarf virus
–genus Curtovirus	
Beet curly top curtovirus	beet curly top virus
–genus *Topocuvirus*	
Tomato pseudo-curly top topocuvirus	tomato pseudo-curly top virus
–genus *Begomovirus*	
Bean golden mosaic begomovirus	bean golden mosaic virus
Cowpea golden mosaic begomovirus	cowpea golden mosaic virus
Mungbean yellow mosaic begomovirus	mungbean yellow mosaic virus
Squash leaf curl begomovirus	squash leaf curl virus
Tomato leaf curl begomovirus	tomato leaf curl virus
Tomato mottle begomovirus	tomato mottle virus
Family: ***Circoviridae***	
–genus *Circovirus*	
Beak and feather disease circovirus	beak and feather disease virus
Porcine 1 circovirus	porcine circovirus 1
–genus *Gyrovirus*	
Chicken anemia gyrovirus	chicken anemia virus
Family: ***Nanoviridae***	
–genus *Babuvirus*	
Banana bunchy top babuvirus	banana bunchy top virus
–genus *Nanovirus*	
Subterranean clover stunt nanovirus	subterranean clover stunt virus
Family: ***Parvoviridae***	
–genus *Parvovirus*	
Mice minute parvovirus	minute virus of mice
Feline panleukopenia parvovirus	feline panleukopenia virus
–genus *Erythrovirus*	
Human parvo B19 erythrovirus	human parvovirus B19
–genus *Dependovirus*	
Adeno-associated 2 dependovirus	adeno-associated virus 2
Avian adeno-associated dependovirus	avian adeno-associated virus
–genus *Densovirus*	
Junonia coenia densovirus	junonia coenia densovirus
–genus *Iteravirus*	
Bombyx mori iteravirus	bombyx mori densovirus
–genus *Brevidensovirus*	
Aedes aegypti brevidensovirus	aedes aegypti densovirus
–genus *Amdovirus*	
Aleutian mink disease amdovirus	Aleutian mink disease virus
–genus *Bocavirus*	
Bovine parvo bocavirus	bovine parvovirus
–genus *Pefudensovirus*	
Periplaneta fuliginosa pefudensovirus	periplaneta fuliginosa densovirus
Family: ***Anelloviridae***	
–genus *Alphatorquevirus*	
Torque teno 1 alphatorquevirus	torque teno virus 1
Retrotranscribing DNA and RNA viruses	
Family: ***Hepadnaviridae***	

Table 2 continued

Species name	Unchanged virus name
–genus *Orthohepadnavirus*	
Hepatitis B orthohepadnavirus	hepatitis B virus
–genus *Avihepadnavirus*	
Duck hepatitis B avihepadnavirus	duck hepatitis B virus
Family: ***Caulimoviridae***	
–genus *Caulimovirus*	
Cauliflower mosaic caulimovirus	cauliflower mosaic virus
Mirabilis mosaic caulimovirus	mirabilis mosaic virus
–genus *Petuvirus*	
Petunia vein clearing petuvirus	petunia vein clearing virus
–genus *Soymovirus*	
Soybean chlorotic mottle soymovirus	soybean chlorotic mottle virus
–genus *Cavemovirus*	
Cassava vein mosaic cavemovirus	cassava vein mosaic virus
–genus *Badnavirus*	
Banana streak badnavirus	banana streak virus
Commelina yellow mottle badnavirus	commelina yellow mottle virus
–genus *Tungrovirus*	
Rice tungro bacilliform tungrovirus	rice tungro bacilliform virus
Family: ***Pseudoviridae***	
–genus *Pseudovirus*	
Saccharomyces cerevisiae Ty1 pseudovirus	saccharomyces cerevisiae virus Ty1
–genus *Hemivirus*	
Drosophila melanogaster copia hemivirus	drosophila melanogaster copia virus
Family: ***Metaviridae***	
–genus *Metavirus*	
Saccharomyces cerevisiae Ty3 metavirus	saccharomyces cerevisiae virus Ty3
–genus *Errantivirus*	
Drosophila melanogaster gypsy errantivirus	drosophila melanogaster gypsy virus
Family: ***Retroviridae***	
–genus *Alpharetrovirus*	
Avian leukosis alpharetrovirus	avian leukosis virus
–genus *Betaretrovirus*	
Mouse mammary tumor betaretrovirus	mouse mammary tumor virus
–genus *Gammaretrovirus*	
Murine leukemia gammaretrovirus	murine leukemia virus
–genus *Deltaretrovirus*	
Bovine leukemia deltaretrovirus	bovine leukemia virus
–genus *Epsilonretrovirus*	
Walleye dermal sarcoma epsilonretrovirus	walleye dermal sarcoma virus
–genus *Lentivirus*	
Human immunodeficiency 1 lentivirus	human immunodeficiency virus 1
Human immunodeficiency 2 lentivirus	human immunodeficiency virus 2
Simian immunodeficiency lentivirus	simian immunodeficiency virus
–genus *Spumaretrovirus*	
Simian foamy spumaretrovirus	simian foamy virus
The dsRNA viruses	
Family: ***Cystoviridae***	
–genus *Cystovirus*	
Pseudomonas phi6 cystovirus	pseudomonas phage phi6
Family: ***Reoviridae***	
–genus *Orbivirus*	
African horse sickness orbivirus	African horse sickness virus
Bluetongue orbivirus	bluetongue virus 1
–genus *Rotavirus*	
Rota A rotavirus	rotavirus.A
Simian SA 11 rotavirus	simian rotavirus SA 11
–genus *Coltivirus*	
Colorado tick fever coltivirus	Colorado tick fever virus
–genus *Aquareovirus*	
Aquareo A aquariovirus	aquareovirus A
–genus *Cypovirus*	
Cypo 1, Cypovirus	Cypovirus 1
–genus *Fijivirus*	
Fiji disease fijivirus	Fiji disease virus
Garlic dwarf fijivirus	garlic dwarf virus
–genus *Phytoreovirus*	
Wound tumor phytoreovirus	wound tumor virus
–genus *Oryzavirus*	
Rice ragged stunt oryzavirus	rice ragged stunt virus
Family: ***Birnaviridae***	
–genus *Aquabirnavirus*	
Infectious pancreatic necrosis aquabirnavirus	infectious pancreatic necrosis virus
–genus *Avibirnavirus*	
Infectious bursal disease avibirnavirus	infectious bursal disease virus
–genus *Entomobirnavirus*	
Drosophila X entomobirnavirus	drosophila X virus
Family: ***Totiviridae***	
–genus *Totivirus*	
Saccharomyces cerevisiae L-A totivirus	saccharomyces cerevisiae virus L-A
–genus *Giardiavirus*	
Giardia lamblia giardiavirus	giardia lamblia virus

Table 2 continued

Species name	Unchanged virus name
–genus *Leishmaniavirus*	
Leishmania RNA 1–1 leishmaniavirus	leishmania RNA virus 1–1
Family: ***Hypoviridae***	
–genus *Hypovirus*	
Cryphonectria hypo 1 hypovirus	cryphonectria hypovirus 1
Family: ***Chrysoviridae***	
–genus *Chrysovirus*	
Penicillium chrysogenum chrysovirus	penicillium chrysogenum virus
Family: ***Partitiviridae***	
–genus *Partitivirus*	
Atkinsonella hypoxylon partitivirus	atkinsonella hypoxylon virus
–genus *Alphacryptovirus*	
White clover cryptic 1 alphacryptovirus	white clover cryptic virus 1
–genus *Betacryptovirus*	
White clover cryptic 2 betacryptovirus	white clover cryptic virus 2
The negative sense ssRNA viruses	
Family: ***Bornaviridae***	
–genus *Bornavirus*	
Borna disease bornavirus	borna disease virus
Family: ***Filoviridae***	
–genus *Marburgvirus*	
Marburg marburgvirus	Marburg virus
–genus *Ebolavirus*	
Reston ebolavirus	Reston virus
Family: ***Paramyxoviridae***	
–genus *Respirovirus*	
Human parainfluenza 1 respirovirus	human parainfluenza virus 1
Sendai respirovirus	Sendai virus
–genus *Rubulavirus*	
Mumps rubulavirus	mumps virus
Simian 5 rubulavirus	simian virus 5
–genus *Avulavirus*	
Newcastle disease avulavirus	Newcastle disease virus
–genus *Morbillivirus*	
Measles morbillivirus	measles virus
Rinderpest morbillivirus	Rinderpest virus
–genus *Henipavirus*	
Hendra henipavirus	Hendra virus
–genus *Pneumovirus*	
Human respiratory syncytial pneumovirus	human respiratory syncytial virus

Table 2 continued

Species name	Unchanged virus name
Family: ***Rhabdoviridae***	
–genus *Vesiculovirus*	
Vesicular stomatitis Indiana vesiculovirus	vesicular stomatitis Indiana virus
–genus *Lyssavirus*	
Rabies lyssavirus	rabies virus
–genus *Ephemerovirus*	
Bovine ephemeral fever ephemerovirus	bovine ephemeral fever virus
–genus *Cytorhabdovirus*	
Lettuce necrotic yellows cytorhabdovirus	lettuce necrotic yellows virus
–genus *Nucleorhabdovirus*	
Potato yellow dwarf nucleorhabdovirus	potato yellow dwarf virus
Family: ***Orthomyxoviridae***	
–genus *Alphainfluenzavirus*	
Influenza A alphainfluenzavirus	influenza virus A
–genus *Betainfluenzavirus*	
Influenza B betainfluenzavirus	influenza virus B
–genus *Gammainfluenzavirus*	
Influenza C gammainfluenzavirus	influenza virus C
–genus *Thogotovirus*	
Thogoto thogotovirus	Thogoto virus
–genus *Isavirus*	
Infectious salmon anemia isavirus	infectious salmon anemia virus
Family: ***Bunyaviridae***	
–genus *Orthobunyavirus*	
Bunyamwera orthobunyavirus	Bunyamwera virus
–genus *Hantavirus*	
Hantaan hantavirus	Hantaan virus
Sin Nombre hantavirus	Sin Nombre virus
–genus *Nairovirus*	
Dugbe nairovirus	Dugbe virus
–genus *Phlebovirus*	
Rift Valley fever phlebovirus	Rift Valley fever virus
–genus *Tospovirus*	
Tomato spotted wilt tospovirus	tomato spotted wilt virus
Family: ***Arenaviridae***	
–genus *Arenavirus*	
Lymphocytic choriomeningitis arenavirus	lymphocytic choriomeningitis virus
Unassigned Family	
–genus *Tenuivirus*	
Rice stripe tenuivirus	rice stripe virus
Unassigned genus	
–genus *Varicosavirus*	

Table 2 continued

Species name	Unchanged virus name
Lettuce big-vein associated varicosavirus	lettuce big-vein associated virus
The positive sense ssRNA viruses	
Family: ***Leviviridae***	
–genus *Levivirus*	
Enterobacteria BZ13 levivirus	enterobacteria phage BZ13
Family: ***Narnaviridae***	
–genus *Narnavirus*	
Saccharomyces 20S RNA narnavirus	saccharomyces 20S RNA narnavirus
–genus *Mitovirus*	
Cryphonectria 1 mitovirus	cryphonectria mitovirus 1
Family: ***Picornaviridae***	
–genus *Enterovirus*	
Human polio 1 enterovirus	human poliovirus 1
–genus *Cardiovirus*	
Encephalomyocarditis cardiovirus	encephalomyocarditis virus
–genus *Aphthovirus*	
Foot-and-mouth disease aphthovirus	foot-and-mouth disease virus
–genus *Hepatovirus*	
Hepatitis A hepatovirus	hepatitis virus A
–genus *Parechovirus*	
Human parecho parechovirus	human parechovirus 1
–genus *Erbovirus*	
Equine rhinitis B erbovirus	equine rhinitis B virus
–genus *Kobuvirus*	
Aichi kobuvirus	Aichi virus
–genus *Teschovirus*	
Porcine tescho teschovirus	porcine teschovirus 1
Family: ***Dicistroviridae***	
–genus *Cripavirus*	
Cricket paralysis cripavirus	cricket paralysis virus
Family: ***Sequiviridae***	
–genus *Sequivirus*	
Parsnip yellow fleck sequivirus	parsnip yellow fleck virus
Family: ***Comoviridae***	
–genus *Comovirus*	
Cowpea mosaic comovirus	cowpea mosaic virus
Squash mosaic comovirus	squash mosaic virus
–genus *Fabavirus*	
Broad bean wilt 1 fabavirus	broad bean wilt virus 1
–genus *Nepovirus*	
Arabis mosaic nepovirus	arabis mosaic virus
Grapevine fanleaf nepovirus	grapevine fanleaf virus
Tobacco ringspot nepovirus	tobacco ringspot virus
Tomato black ring nepovirus	tomato black ring virus

Table 2 continued

Species name	Unchanged virus name
Family: ***Potyviridae***	
–genus *Potyvirus*	
Potato Y potyvirus	potato virus Y
Bean common mosaic potyvirus	bean common mosaic virus
Henbane mosaic potyvirus	henbane mosaic virus
Johnsongrass mosaic potyvirus	johnsongrass mosaic virus
Lettuce mosaic potyvirus	lettuce mosaic virus
Papaya ringspot potyvirus	papaya ringspot virus
Plum pox potyvirus	plum pox virus
Sugarcane mosaic potyvirus	sugarcane mosaic virus
Tobacco etch potyvirus	tobacco etch virus
Watermelon mosaic potyvirus	watermelon mosaic virus
–genus *Ipomovirus*	
Sweet potato mild mottle ipomovirus	sweet potato mild mottle virus
–genus *Macluravirus*	
Maclura mosaic macluravirus	maclura mosaic virus
–genus *Rymovirus*	
Ryegrass mosaic rymovirus	ryegrass mosaic virus
–genus *Tritimovirus*	
Wheat streak mosaic tritimovirus	wheat streak mosaic virus
–genus *Bymovirus*	
Barley yellow mosaic bymovirus	barley yellow mosaic virus
Family: ***Caliciviridae***	
–genus *Lagovirus*	
Rabbit hemorrhagic disease lagovirus	rabbit hemorrhagic disease virus
–genus *Norovirus*	
Norwalk norovirus	Norwalk virus
–genus *Sapovirus*	
Sapporo sapovirus	Sapporo virus
–genus *Vesivirus*	
Swine vesicular exanthema vesivirus	swine vesicular exanthema virus
Family: ***Astroviridae***	
–genus *Mamastrovirus*	
Human astro mamastrovirus	human astrovirus 1
Family: ***Nodaviridae***	
–genus *Alphanodavirus*	
Flock House alphanodavirus	Flock House virus
Family: ***Tetraviridae***	
–genus *Betatetravirus*	
Trichoplusia ni betatetravirus	trichoplusia ni virus
–genus *Omegatetravirus*	
Helicoverpa armigera stunt omegatetravirus	helicoverpa armigera stunt virus

Table 2 continued

Species name	Unchanged virus name
Family: ***Luteoviridae***	
–genus *Luteovirus*	
Barley yellow dwarf MAV luteovirus	barley yellow dwarf MAV virus
–genus *Polerovirus*	
Potato leafroll polerovirus	potato leafroll virus
–genus *Enamovirus*	
Pea enation mosaic 1 enamovirus	pea enation mosaic virus 1
Family: ***Tombusviridae***	
–genus *Carmovirus*	
Carnation mottle carmovirus	carnation mottle virus
–genus *Dianthovirus*	
Carnation ringspot dianthovirus	carnation ringspot virus
–genus *Machlomovirus*	
Maize chlorotic mottle machlomovirus	maize chlorotic mottle virus
–genus *Necrovirus*	
Tobacco necrosis A necrovirus	tobacco necrosis virus A
–genus *Panicovirus*	
Panicum mosaic panicovirus	panicum mosaic virus
–genus *Tombusvirus*	
Cymbidium ringspot tombusvirus	cymbidium ringspot virus
Tomato bushy stunt tombusvirus	tomato bushy stunt virus
Family: ***Coronaviridae***	
–genus *Bafinivirus*	
White Bream bafinivirus	white bream virus
–genus *Torovirus*	
Equine toro torovirus	equine torovirus
Family: ***Arteriviridae***	
–genus *Arterivirus*	
Equine arteritis arterivirus	equine arteritis virus
Family: ***Flaviviridae***	
–genus *Flavivirus*	
Louping ill flavivirus	louping ill virus
Dengue flavivirus	dengue virus 1
St. Louis encephalitis flavivirus	St. Louis encephalitis virus
West Nile flavivirus	West Nile virus
Yellow fever flavivirus	yellow fever virus
–genus *Pestivirus*	
Bovine viral diarrhea 1 pestivirus	bovine viral diarrhea virus 1
–genus *Hepacivirus*	
Hepatitis C hepacivirus	hepatitis virus C
Family: ***Togavirivae***	
–genus *Alphavirus*	
Chikungunya alphavirus	chikungunya virus
Semliki Forest alphavirus	Semliki Forest virus
Sindbis alphavirus	Sindbis virus
Western equine encephalitis alphavirus	western equine encephalitis virus
–genus *Rubivirus*	
Rubella rubivirus	rubella virus
Family: ***Bromoviridae***	
–genus *Alfamovirus*	
Alfalfa mosaic alfamovirus	Alfalfa mosaic virus
–genus *Bromovirus*	
Brome mosaic bromovirus	brome mosaic virus
Cowpea chlorotic mottle bromovirus	cowpea chlorotic mottle virus
–genus *Cucumovirus*	
Cucumber mosaic cucumovirus	cucumber mosaic virus
Peanut stunt cucumovirus	peanut stunt virus
–genus *Ilarvirus*	
Apple mosaic ilarvirus	apple mosaic virus
Hydrangea mosaic ilarvirus	hydrangea mosaic virus
Prune dwarf ilarvirus	prune dwarf virus
Tobacco streak ilarvirus	tobacco streak virus
–genus *Oleavirus*	
Olive latent 2 oleavirus	olive latent virus 2
Family: ***Closteroviridae***	
–genus *Ampelovirus*	
Grapevine leafroll-associated 3 ampelovirus	grapevine leafroll-associated virus 3
–genus *Closterovirus*	
Citrus tristeza closterovirus	citrus tristeza virus
–genus *Crinivirus*	
Lettuce chlorosis crinivirus	lettuce chlorosis virus
Family: ***Tymoviridae***	
–genus *Tymovirus*	
Okra mosaic tymovirus	okra mosaic virus
Turnip yellow mosaic tymovirus	turnip yellow mosaic virus
Wild cucumber mosaic tymovirus	wild cucumber mosaic virus
–genus *Maculavirus*	
Grapevine fleck maculavirus	grapevine fleck virus
–genus *Marafivirus*	
Maize rayado fino marafivirus	maize rayado fino virus
Family: ***Alphaflexiviridae***	
–genus *Potexvirus*	
Cymbidium mosaic potexvirus	cymbidium mosaic virus
Hydrangea ringspot potexvirus	hydrangea ringspot virus
Papaya mosaic potexvirus	papaya mosaic virus
Potato X potexvirus	potato virus X
White clover mosaic potexvirus	white clover mosaic virus

Table 2 continued

Species name	Unchanged virus name
–genus *Allexivirus*	
Shallot X allexivirus	shallot virus X
Family: ***Betaflexiviridae***	
–genus *Foveavirus*	
Apple stem pitting foveavirus	apple stem pitting virus
–genus *Carlavirus*	
Carnation latent carlavirus	carnation latent virus
Hop mosaic carlavirus	hop mosaic virus
Pea streak carlavirus	pea streak virus
Potato S carlavirus	potato virus S
–genus *Capillovirus*	
Apple stem grooving capillovirus	apple stem grooving virus
–genus *Vitivirus*	
Grapevine A vitivirus	grapevine virus A
–genus *Trichovirus*	
Apple chlorotic leaf spot trichovirus	apple chlorotic leaf spot virus
Family: ***Virgaviridae***	
–genus *Tobamovirus*	
Odontoglossum ringspot tobamovirus	odontoglossum ringspot virus
Ribgrass mosaic tobamovirus	ribgrass mosaic virus
Tobacco mosaic tobamovirus	tobacco mosaic virus
Tomato mosaic tobamovirus	tomato mosaic virus
Cucumber green mottle mosaic tobamovirus	cucumber green mottle mosaic virus
–genus *Tobravirus*	
Tobacco rattle tobravirus	tobacco rattle virus
–genus *Hordeivirus*	
Barley stripe mosaic hordeivirus	barley stripe mosaic virus
–genus *Furovirus*	
Soil-borne wheat mosaic furovirus	soil-borne wheat mosaic virus
–genus *Pomovirus*	
Potato mop-top pomovirus	potato mop-top virus
–genus *Pecluvirus*	
Peanut clump pecluvirus	peanut clump virus
Unassigned Family	
–genus *Benyvirus*	
Beet necrotic yellow vein benyvirus	beet necrotic yellow vein virus
–genus *Ourmiavirus*	
Ourmia melon ourmiavirus	ourmia melon virus
–genus *Idaeovirus*	
Raspberry bushy dwarf idaeovirus	raspberry bushy dwarf virus

Species names in biology are never abbreviated in the form of acronyms. Since virus species names are used sparingly, they also do not deserve abbreviations. Abbreviations are useful for virus names but these are not affected by the present proposal. Although the ICTV is not responsible for devising appropriate abbreviations, it has published several lists of recommended virus name abbreviations [28–31]. Although one list [31] refers to abbreviations of virus species, these recommendations do all pertain to abbreviations of virus names.

Some non-Latinized binomial species names for vertebrate viruses are shown in Table 1. Many examples of possible binomial species names together with the unchanged current virus names are provided as a guideline in Table 2. In this list, the species names are grouped by family and genus. All family, genus and species names are written in italics. Unchanged virus names are written in Roman without capitals except for proper names. This list compiled by Claude Fauquet does not include all the species, genera and families presently recognized by the ICTV since the list only serves to illustrate that the binomial system is widely applicable. Although in many cases such as the ssRNA plant viruses these species names will not be controversial, in a limited number of cases the relevant ICTV Study Groups will have to decide which binomial species names should be adopted.

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