

Only italicised species names of viruses have a taxonomic meaning

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In a recent article in these columns, L. Bos [4] once again criticised the International Committee on Taxonomy of Viruses (ICTV) for having introduced in 1998 a number of changes to the *International Code of Virus Classification and Nomenclature* [10]. Bos actually misrepresents the changes that were introduced in the Code and fails to recognise that official virus species names became necessary once the species category had been accepted as the lowest but most fundamental taxonomic level in virus classification. Official or international species names adopted by the ICTV became the scientific names of virus species, they were written in italics like the names of genus and family taxa and they were of course not to be translated into other languages. Names like *Mus musculus* or *Picornaviridae* are obviously not translatable. Bos berates the ICTV for not becoming involved in deciding which common or vernacular virus names should be used in different languages. He claims that the ICTV disregards the existence and value of common virus names and further maintains that such common names are used in an abstract taxonomic sense. Such assertions cannot go unchallenged.

Common names of viruses refer to concrete viral objects that cause diseases and the ICTV has no mandate to provide dictionary-type guidelines on what the names of these infectious agents should be in different languages. Until 1995 [12] the ICTV reports listed the names of many viral entities, i.e. viruses, strains, isolates or serotypes, of which the taxonomic status was uncertain. What the alleged abstract “taxonomic sense” of such common virus names was supposed to be, Bos does not tell us. Only when it was accepted that the lowest taxonomic category that should be considered by the ICTV is the virus species, did it become necessary to decide which names should be allocated to this taxonomic category. Only at this stage did the corresponding new species names acquire a taxonomic sense.

Instead of coining new Latin names for the officially recognised virus species, the ICTV decided to confer the status of official species names to the English common names of viruses. The ICTV also introduced a typography using italics and a capital initial to indicate that these names corresponded to abstract taxonomic entities rather than to concrete viral agents. The use of English instead of Latin names for species is in line with the fact that English has replaced Latin as the language of communication used by scientists. The major

journals in Virology are written in English and all virologists are conversant with the English names of viruses. Using English names obviates the unenviable task of coining new Latin epithets for each virus species. Even proponents of Latinised binomial species names for viruses [1] accept that it is simpler, in texts written in various languages, to use acronyms and abbreviations taken from English virus names rather than to coin new abbreviations derived from the different virus names in each national language. The reason, of course, is that the English names are known to all virologists.

Since these names and the corresponding abbreviations have become well-established, it would seem reasonable to retain them [5, 6] rather than to coin new abbreviations corresponding to non-latinised virus binomials (NLVBs). Since the purpose of abbreviations is to replace names that are frequently used in a given text, it makes sense to abbreviate the common virus names rather than the official species names which will always be used sparingly in an article.

Bos [2–4] has repeatedly objected to the *in toto* italicisation of species names of viruses on the basis of an imaginary problem of his own making. He argued that certain common English plant names written in Roman, such as nasturtium (popular English for the species *Tropaeolum majus*) would not be distinguishable from the italicised species name, in this instance *Nasturtium officinale* (a different plant altogether), if the common plant name appearing in a virus species name were to be italicised. Since there are, in fact, no names of plant virus species that contain such common plant names, this is a spurious, non-existing problem. When the Latin name of a plant species appears in the virus species name (e.g. *Althea rosea enation virus*), it will be automatically italicised and one wonders why this is considered problematical. In an earlier rebuttal, the campaign of Bos against *in toto* italicisation has been likened to a quixotic attack against windmills [13].

When virus names are not official species names (such as the names of strains or tentative species), *in toto* italicisation is not used and it is debatable whether any existing Latin names appearing in such unofficial virus names should be italicised or not. Bos criticises the 7th ICTV Report [15] for not using italics in this case (for instance for the tentative species name Bacillus phage VM) although the use of italics is not specifically prohibited by ICTV rules. It could, of course, be argued [16] that it is inappropriate to link words that refer to concrete disease symptoms to the italicised taxonomic name of the host which refers to an abstraction. It is, of course, only the concrete members of the taxon that can become infected and not the species itself.

Bos also criticises the ICTV for having introduced in 1998 what he calls a revolutionary change in the naming of viruses. He claims that the changes made to the Virus Code [10] amounted to an authoritarian removal of the non-latinised binomial names, which according to him had become the accepted scientific names of viruses. Such unofficial binomial names had indeed become popular with plant virologists but they had never been actually endorsed as official names and the ICTV certainly did not suddenly decide to ban them in 1998. Non-latinised virus binomials (NLVBs) like tobacco mosaic tobamovirus and West Nile flavivirus had been used only in the indices of earlier ICTV Reports [7–9] but they no longer appeared in the 6th Report published in 1995 [12].

The issue of whether NLVBs should become the official species names of viruses has been debated within the ICTV for several years, as recounted elsewhere [13, 14, 16]. The usefulness of NLVBs is well-established and can be illustrated in the case of the hepatitis viruses since binomial names would indicate to non-specialists that Hepatitis A, B and C

viruses belong to different genera, i.e. *Hepatitis A hepatovirus*, *Hepatitis B orthohepadnavirus* and *Hepatitis C hepacivirus*.

If a binomial system using italics were introduced, *Measles morbillivirus* would be the taxonomic name (used once in the Materials and methods section of a publication written in English or other languages) while the common virus name: measles virus (or virus de la rougeole in French) would be used throughout the paper when referring to the actual infectious entity under study.

Using a binomial system for species names would have the advantage that a clear distinction would be made between the species name written in italics (*Measles morbillivirus*) which refers to a taxonomic category and the vernacular or common name (measles virus) written in Roman characters which refers to the infectious entity studied by virologists. At present, the distinction between the abstract species category (*Measles virus*) and the disease agent (measles virus) relies only on typography, which can lead to confusion.

At present, a total of 245 virus genera are recognised by the ICTV. For 222 of these genera, a binomial system of species names could easily be introduced by simply replacing the word *virus* at the end of the current official species name by the name of the genus which also ends in *-virus*. In the case of the remaining 23 genera (Table 1) some changes would have to be introduced to existing names to remove oddities like *Influenza A influenzavirus A* and other questionable names. It should be pointed out, however, that a certain repetition is also found in classical taxonomic names eg *Rattus rattus* (rat), *Bombina bombina* (toad) and *Ciconia ciconia* (stork). When existing genus names have been coined in accordance with the ICTV International Code, the binomial system would be readily applicable. As discussed above, the binomial names should be written in italics with a capital initial. On the other hand, and in spite of the opinion of some vocal advocates, it was not clear if binomial names would be welcomed by a majority of virologists [13, 14]. Since the ICTV strives to develop a universal system of nomenclature applicable to all viruses, it would be appropriate to introduce a universal binomial system for virus species only if a broad majority of virologists were in favour of such a change that would modify all current species names. To canvass the opinion of the virological community, an opinion poll was held at the recent 12th International Congress of Virology held in Paris in July 2002. The results [11] showed that a sizeable majority of the virologists who expressed their opinion on this issue were in favour of a binomial system.

A similar result was obtained in March 2002 when one of us (M.V.R.) gave a seminar on NLVBs at the Centers for Disease Control in Atlanta, Georgia. An opinion poll circulated after the seminar showed that of the 52 human and animal virologists who responded, 45 (86%) were in favour of adopting the NLVB system.

One of the tasks to be undertaken at present is for the relevant Study Groups of ICTV to look into the problems that NLVBs pose in a limited number of genera [14] and possibly to devise suitable names for the corresponding virus species. Most of the problems that exist with 23 genera are due to the fact that these genera either have no international genus names (e.g. SNDV-like viruses) or the names do not follow the ICTV rules (e.g. *Influenza virus A*). The NLVB system would become applicable to these cases once acceptable international genus names have been introduced. In the near future, the new ICTV Executive Committee, established in Paris in July 2002, will decide what steps should be taken regarding the possibility of implementing the NLVB system.

Table 1. List of Genera for which it will be impossible or difficult to apply the NLVB system

a) 16 genera without an international name:		
“c2-like viruses”	“L5-like viruses”	“Mu-like viruses”
“P1-like viruses”	“P22-like viruses”	“P2-like viruses”
“SP01-like viruses”	“T1-like viruses”	“T4-like viruses”
“T5-like viruses”	“T7-like viruses”	“φ29-like viruses”
“φ-H-like viruses”	“λ-like viruses”	“Ψ M1-like viruses”
“SNDV-like viruses”		
b) 7 genera with an imperfect international name, not following the ICTV rules:		
Influenzavirus A	Influenzavirus B	Influenzavirus C
Entomopoxvirus A	Entomopoxvirus B	Entomopoxvirus C
Entomopoxvirus D		

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