



## ICTV Newsletter #19 (2022)

This newsletter is aimed at keeping all who are interested in the International Committee on Taxonomy of Viruses (ICTV) up to date on recent developments. It is available publicly on the ICTV website and is sent to all those who have joined the ICTV discussion site. To register on this site, navigate to <https://ictv.global/> and click the "Login" link in the upper-right corner. Once registered, sign in using the name and password that you provided. If you are already registered, **please make sure your contact information is up to date.** You can do this by clicking on "My account" and selecting the "Edit" tab. Comments and suggestions on the newsletter are welcome. This edition, which covers the period from September 2021, and previous editions are available [here](#).

### **Executive Committee (EC) activities**

#### EC54

The 54<sup>th</sup> annual EC meeting (EC54) was held virtually on Zoom between 11-13 July 2022 and was hosted by the President, Murilo Zerbini and the Business Secretary, Arcady Mushegian. This was the second regular meeting of the EC that had been elected in October 2020. The three-day meeting comprised of 6, 2<sup>1/2</sup>-hour sessions and was attended by nineteen EC members, as well as by Donald Smith, Managing Editor of the ICTV Report.

In addition to the review and approval of the Minutes of EC53 (2021) and the consideration of standard taxonomic proposals, the agenda included annual reports on the following ICTV resources:

- the ICTV finances (presented by Murilo Zerbini).
- the ICTV Report and Profiles (Stuart Siddell, Donald Smith).  
The President reported that, after 6 years of funding from the Wellcome Trust, the position of Donald Smith as Managing Editor of the ICTV Report is now supported as part of a two-year Memorandum of Understanding (MOU) with the Microbiology Society, UK. The "ICTV Virus Taxonomy Profiles" that summarise and act as a citation for each ICTV Report chapter will continue to be published in the Journal of General Virology, a journal of the Microbiology Society.
- the ICTV web site and taxonomic database (Elliot Lefkowitz).  
The data secretary reported that the development of the ICTV web site ([here](#)), which is supported by an NIH grant, "Virus Taxonomy: A Community Knowledgebase Supporting Virus Research" (U24AI162625), has been

advanced to a new cloud-based platform (Amazon Web Services) and a new content management system (Drupal). Further functionality is in development and is planned to include sequence-based taxon lookup, name-based taxon lookup, interactive visualization of taxonomy, and a database of demarcation criteria.

- the Virus Metadata Resource (Stuart Siddell).
- the Virology Division News (Sead Sabanadzovic).
- the ICTV Newsletters (Stuart Siddell).

The EC also discussed issues concerning ICTV policies and procedures, as well as extraordinary taxonomic proposals and nomenclature issues. An Executive Summary of the EC54 minutes will be published on the ICTV website but, of particular note, it was reported that:

1. In April 2022, the ICTV organized a workshop in Oxford, UK, to debate the concepts and approaches used to classify viruses. The workshop included a wide range of expert opinions that were summarized in four recommendations. First, taxonomic assignments should be congruent with virus evolutionary histories, i.e., taxa should be monophyletic. Second, phenotypic and ecologic properties of viruses may inform, but not override evolutionary relatedness in the placement of taxa. Third, alternative (i.e., not mandated by the ICTV) classifications considering phenotypic attributes may often better serve clinical and regulatory purposes. And fourth, an evolution-based framework enables viruses from metagenomic studies to be incorporated into the ICTV taxonomy but there are essential requirements for quality control of the sequence data used. These principles may be used to guide the future construction of a coherent and inclusive virus taxonomy. A more detailed rationale of the recommendations is explained in "Four principles to establish a universal virus taxonomy" by Simmonds et al. (2022) ([here](#)).

2. A standard two-part "binomial nomenclature" is now used for naming virus species. To clarify the distinction between "virus" and "virus species" and to provide guidelines for naming and writing them correctly, the ICTV EC has published a short article, "Differentiating between viruses and virus species by writing their names correctly" ([here](#)).

3. The Bioinformatics Expert Group has clarified the ICTV policy on the permissible forms of sequence data deposition for taxonomic proposals. Essentially:

- The ICTV requires that the complete genome sequence of an "exemplar virus" is available as an annotated sequence record in one of the International Nucleotide Sequence Database Collaboration (INSDC) member databases. Practically, this means that the annotated genome sequence should be submitted to GenBank (National Center for Biotechnology Information, NCBI), the European Nucleotide Archive (ENA), or the DNA Data Bank of Japan (DDBJ).
- Submission of the genome sequence of an exemplar virus should occur before a taxonomic proposal is submitted to the ICTV EC.
- ICTV approval and ratification of a taxonomic proposal are both contingent on the GenBank record having been made public.
- The ICTV may allow deposition in the form of RefSeq or third-party annotation (TPA) on a "case-by-case" basis. The detailed rationale of this policy will be published soon.

## Recent progress with taxonomic proposals

### Ratification of proposals

All proposals approved by the EC need to be ratified by the entire voting membership of the ICTV for final acceptance. The ICTV membership includes the Executive Committee, National Representatives, the members of the SCs (predominantly the SG chairs), and the Life Members.

At its virtual meeting (EC53, July 2021), the EC approved a total of 209 taxonomic proposals and a proposal to revise the International Code of Virus Classification and Nomenclature (ICVCN, the Code). These proposals were ratified by the ICTV membership in March 2022

An article reporting these taxonomic changes is available ([here](#)) (see summary in Table 1).

Table 1. Summary of taxonomic changes approved in March 2022

<b>Rank</b>	<b>Total MSL36<sup>a</sup></b>	<b>New</b>	<b>Moved</b>	<b>Abolished</b>	<b>Renamed</b>	<b>Merged</b>	<b>Total MSL37<sup>b</sup></b>
Realm	6	0	0	0	0	0	6
Subrealm	0	0	0	0	0	0	0
Kingdom	10	0	0	0	0	0	10
Subkingdom	0	0	0	0	0	0	0
Phylum	17	0	0	0	0	0	17
Subphylum	2	0	0	0	0	0	2
Class	39	0	0	0	0	0	39
Subclass	0	0	0	0	0	0	0
Order	59	7	0	1	0	0	65
Suborder	8	0	0	0	0	0	8
Family	189	48 <sup>c</sup>	11	4	1	0	233
Subfamily	136	37	32	2	0	3	168
Genus	2,224	390	571	8	5	0	2,606
Subgenus	70	14	0	0	0	0	84
Species	9,101	1,342	103	18	3,354	0	10,434

<sup>a</sup> Total number of taxa in the ICTV Master Species List (MSL) prior to 2022 ratification  
<sup>b</sup> Total number of taxa now recognized and reported in the ICTV MSL  
<sup>c</sup> Includes three families promoted from subfamily

The latest version of the official virus taxonomy can be downloaded as the ICTV Master Species List MSL37 ([here](#)).

Of note, the Study Groups have started to implement the new rule for uniform virus species naming that became effective in 2021 and mandates the binomial 'genus name-species epithet' format with or without Latinization. As a result of this ratification, the names of 6,481 virus species (more than 60 percent of all species names currently recognized by ICTV) now follow this format

Any virologist can make proposals to the ICTV via the appropriate SC chair, preferably in consultation with the relevant Study Group. New proposals that were submitted for discussion at EC54 can be examined [here](#).

## **ICTV publications**

### The ICTV web site

The ICTV web site provides access to the current taxonomy database in online and downloadable formats and maintains a complete [history](#) of virus taxa dating back to the first release in 1971. The following reference can be used to cite the taxonomic proposals that have been ratified in 2022:

Walker PJ, Siddell SG, Lefkowitz EJ, Mushegian AR, Adriaenssens EM, Alfenas-Zerbini P, Dempsey DM, Dutilh BE, García ML, Curtis Hendrickson R, Junglen S, Krupovic M, Kuhn JH, Lambert AJ, Łobocka M, Oksanen HM, Orton RJ, Robertson DL, Rubino L, Sabanadzovic S, Simmonds P, Smith DB, Suzuki N, Van Doorslaer K, Vandamme AM, Varsani A, Zerbini FM. Recent changes to virus taxonomy ratified by the International Committee on Taxonomy of Viruses (2022). Arch Virol. 2022 Aug 23. doi: 10.1007/s00705-022-05516-5. Epub ahead of print. PMID: 35999326.

### The ICTV Report and Profiles

The ICTV Report ([here](#)) is published online as a completely open-access, continuously updated publication. It strives to be a comprehensive description of all virus taxa and includes extensive information on virus structure, genome structure, biology and phylogenetics. In addition, summaries of the ICTV Report chapters are published in a special section of the Journal of General Virology, ICTV Virus Taxonomy Profiles ([here](#)). These profiles provide concise, summaries of individual chapters from the ICTV Report. Written by ICTV Study Groups, these summaries provide overviews of the classification, structure, and properties of individual virus taxa. The summaries are linked to the ICTV Report chapters and are indexed in PubMed. The Report now constitutes over 90 chapters with associated Profiles. Recently released chapters include the *Chaseviridae*, *Potyviridae*, *Polymycoviridae*, and *Reovirales*.

### Virus Metadata Resource (VMR)

The VMR is a [downloadable](#) spreadsheet that provides information on exemplar and additional viruses for each species. This information includes virus names, isolate designations and abbreviations, GenBank and RefSeq accession numbers, genome

composition and coverage, and the type of host. The current VMR provides details on exemplar viruses for 10,434 species and about 1,600 additional viruses.

### Virology Division News (VDN)

The [VDN](#) section of Archives of Virology remains an important open-access vehicle for freely communicating ICTV news to the virology community and beyond. Reports and articles that deal with the development of virus taxonomy should be sent to VDN, with a clear indication of whether the article presents changes officially recognized by the ICTV, the substance of taxonomic proposals currently being considered by the ICTV, or informal suggestions for discussion. Articles of taxonomic interest that have been published in VDN in 2022 include a new family of viruses that infect free-living amoebae (*Yaraviridae*), three new families of single-stranded DNA viruses (*Naryaviridae*, *Nenyaviridae*, and *Vilyaviridae*) in the phylum *Cressdnaviricota*, and five new genera (*Citlodavirus*, *Maldovirus*, *Mulcrilevirus*, *Opunvirus*, and *Topilevirus*) in the family *Geminiviridae*.

### **Life Member**

The Data Secretary proposed that Prof Andrew J. Davison, Former President of the ICTV should be nominated as a Life Member of the ICTV. Dr. Davison served as a member of the ICTV EC in a wide variety of roles for 15 years, from 2005 to 2020. The EC approved the proposal unanimously and a EC-wide vote will be arranged by the Business Secretary.

### **Meetings**

The next annual meeting of the EC (EC55) will be held in Jena, Germany in August 2023. The meeting format will be hybrid.

### **Funding**

The ICTV is very grateful to IUMS Virology Division, the American Society for Virology, the Australasian Virology Society, the Finnish Biochemical, Biophysical, and Microbiological Society (BioBio) Society, the Microbiology Society, the Société Française de Virologie, Wellcome, and the National Institute of Allergy and Infectious Diseases of the US National Institutes of Health (Award Number U24AI162625) for generous support. ICTV also very gratefully acknowledges the support it receives from all its Executive Committee members, Study Group members and National Representatives who volunteer a huge amount of their time and financial support to ensure that ICTV continues to function for the good of virology

### **Important links\***

[Main Website for ICTV](#)  
[ICTV virus taxonomy database](#)  
[The current MSL](#)

[The current VMR](#)  
[Templates for taxonomic proposals](#)  
[The ICTV Report](#)

\*Please note: the above links are stable but links to specific proposals will change upon ratification

### **Problems, comments and questions**

As always, comments and suggestions are welcome. To ensure efficient distribution of this and other information, we again ask you to keep your personal information up to date at the ICTV web site. In particular, **if you are a National Representative**, please make sure that all the appropriate information is on the [web site](#), and also send a note to Arcady Mushegian (mushegian2@gmail.com) to inform him of any changes.

**Editor:** Stuart Siddell