

**Report from the 36th and 37th Meetings
of the Executive Committee of the International
Committee on Taxonomy of Viruses**

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It has become the regular practice of the International Committee on Taxonomy of Viruses (ICTV) Executive Committee (EC) secretaries to report a summary of the substantive business transacted at meetings of the EC as notes such as this one in Virology Division News (VDN). Because of exceptional circumstances, this did not happen after the 36th meeting of the EC held in Kingston in July 2004 (EC36). This report contains a summary of both EC36 and the 37th EC meeting (EC37), which was held at the International Congress of Virology (ICV; part of the joint meeting organized by the International Union of Microbiological Societies) in San Francisco in July 2005.

1. Taxonomic Proposals from EC36 and EC37

A. Taxonomic proposals yet to be voted on by ICTV

(i) *From the Vertebrate Virus Subcommittee (SC)*

(a) Classify Duck circovirus (DuCV) as an additional member of the genus *Circovirus* (proposal number 2004.007V.02)

(ii) *From the Plant Virus SC*

(a) Create a new genus named *Anulavirus* in the family *Bromoviridae* and having *Pelargonium zonate spot virus* as the type species (proposal numbers 2004.008-011P.02)

B. New proposals approved for public examination via the ICTV website

(http://www.danforthcenter.org/iltab/ictvnet/asp/_MainPage.asp)

(i) *From the Vertebrate Virus SC*

(a) New taxonomy for the herpesviruses

A thorough revision of the herpesvirus taxonomy was proposed (proposal numbers 2005.020 to 2005.072V.01). If approved, this will create a new order (Herpesvirales) containing the families –

1. *Herpesviridae*, comprising all mammalian, avian and reptilian herpesviruses, subdivided into the three subfamilies *Alphaherpesvirinae*, *Betaherpesvirinae* and *Gammaherpesvirinae*,
2. *Alloherpesviridae*, which contains fish and amphibian viruses, as one genus and 13 unassigned species, and
3. *Malacoherpesviridae*, which contains the single invertebrate herpesvirus species known.

Proposals were also made to add new species and genera to the existing subfamilies.

(b) Viruses resembling picornaviruses

It is proposed to group the families *Picornaviridae*, *Dicistroviridae*, *Marnaviridae*, *Sequiviridae* and *Comoviridae*, along with the unassigned genera *Iflavirus*, *Sadwavirus* and *Cheravirus*, into a new order (Picornavirales) (proposal numbers 2005.200-202V.01).

Some rearrangements are proposed for the genera *Enterovirus* and *Rhinovirus* of the family *Picornaviridae* (proposal numbers 2005.261-267V.01).

(c) ds RNA viruses

The families *Reoviridae*, *Totiviridae*, *Cystoviridae* and *Birnaviridae* are proposed to be classified in a new order (provisionally named Reovirales) (proposal numbers 2005.236-238V.01).

A new family is proposed to contain birnaviruses with an RNA-dependent RNA polymerase typical of picornaviruses (proposal numbers 2005.216-222V.01).

Two new genera will be added to the family *Reoviridae*: *Cardoreovirus* with the new species *Eriocheir sinensis reovirus* as the type species, and *Dinovernavirus* with the new species *Aedes pseudoscutellaris reovirus* as the type species (proposal numbers 2005.229V-232V.01 and 2005.242-245V.01).

A new genus is proposed in the family *Birnaviridae* (proposal numbers 2005.212-215V.01).

(d) New species

- in the genera *Atadenovirus* and *Mastadenovirus* of the family *Adenoviridae* (proposal numbers 2005.223-224V.01);
- in the genus *Coronavirus* of the family *Coronaviridae* (proposal number 2005.260V.01);
- in the genus *Hantavirus* of the family *Bunyaviridae* (proposal number 2005.119V.01).

(ii) From the Invertebrate Virus SC

(a) New species in the genera *Iflavirus* and *Cripavirus* (proposal numbers 2005.118-120I.01).

(iii) From the Prokaryote Virus SC

(a) New taxonomy for the *Caudovirales*

Proposals were made to classify viruses in the families *Myoviridae*, *Podoviridae* and *Siphoviridae* but the EC felt unable to accept these without further details from the SC. The proposals included the use of the taxon sub-genus which is not recognized as a virus taxon (proposal numbers 2005.123-181B.01).

(b) New genus named *Deltalipothrixvirus* with the new species *Acidianus filamentous virus 2* as type species in the family *Lipothrixviridae* (proposal numbers 2005.084-2005.087B.01).

(c) New species in the genus *Rudivirus* (proposal number 2005.073B.01).

(iv) From the Fungus Virus SC

(a) New family to contain the genus *Mimivirus*, named *Mimiviridae* (proposal numbers 2005.004-005F.01).

(b) New taxonomy for the reverse-transcribing viruses, retrotransposons and retrons. Formal proposals were discussed for the classification of all taxa containing viruses that replicate by using a reverse transcription step (pararetroviruses; families *Retroviridae*, *Hepadnaviridae*, *Caulimoviridae*, *Pseudoviridae* and *Metaviridae*) and also the classification of retrotransposons and retrons. The EC felt that the idea of grouping the reverse-transcribing elements has already been accepted by the ICTV as this has received broad support from those who work with such elements. However, the detail of the proposal involved the use of the taxon sub-order, which is not a recognized virus taxon. Workers in the field had not been supportive of creating an order to contain retrotransposons and retrons, largely because of there being no lateral transfer of these latter elements. Also it was noted that there was a question of whether or not ICTV should be concerned with these elements. The proposals were therefore referred back to the proposers for amendment (proposal numbers 2005.091-117F.01).

(v) *From the Plant Virus SC*

(a) New family

To contain the genus *Ophiovirus* (family Ophioviridae) (proposal numbers 2005.233-235P.01).

(b) New genera

- in the family *Flexiviridae*, named Citrivirus and with *Citrus leaf blotch virus* as type species (proposal numbers 2005.017-019P.01);
- in the family *Avsunviroidae*, named Elaviroid and with *Eggplant latent viroid* as type species (proposal numbers 2005.255-258P.01).

(c) New species

- in the genera *Curtovirus* and *Begomovirus* (family *Geminiviridae*) (proposal numbers 2005.001-002P.01);
- in the genus *Nepovirus* (family *Comoviridae*) (proposal number 2005.007P.01);
- in the genera *Necrovirus* and *Tombusvirus* (family *Tombusviridae*) (proposal numbers 2005.011-012P.01);
- in the genus *Polerovirus* (family *Luteoviridae*) (proposal numbers 2005.014-015P.01);
- in the genus *Marafivirus* (family *Tymoviridae*) (proposal number 2005.022P.01);
- in the genera *Trichovirus* and *Potexvirus* (family *Flexiviridae*) (proposal numbers 2005.008-009P.01).

2. Proposals for Statute and Code changes

At EC36 there were extensive discussions of proposals to revise the statutes under which ICTV operates and to revise the International Code for Virus Classification and Nomenclature (ICVCN). The proposals arose in part from papers published in VDN [1, 2].

In response to the proposal that ICTV should provide for each approved species a latinized binomial name to link its common name(s), the 'type' description and the classification, the EC felt that there was little support in the virology community for using latinized names. The use of binomial name forms is at present being considered by various Study Groups (SGs).

It was proposed that the ICVCN be modified so as to become congruent with the other Codes of Nomenclature. However, EC members could see no reason to link virus nomenclature to that of organisms such as animals, plants and microbes. Moreover, significant disadvantages were identified for virologists if the rules in ICVCN were to be changed to be like those contained in other Codes of Nomenclature. In particular, and in contrast to practice under other Codes of Nomenclature, the ICVCN states that there is no Rule of Priority in virology. This greatly simplifies the nomenclature of virus taxa.

The changes proposed further called for the publication of draft minutes of EC meetings. Members thought that this would be unhelpful (necessitating pre-draft minutes). The publication of VDN reports after EC meetings together with the public exposure of taxonomic proposals on the ICTV website were felt to meet the criterion of transparency.

The changes proposed further stipulated that ICTV should keep an official list of virus names that were used previously but are no longer in current taxonomy. The lack of such a list was felt to be a weakness of current procedures. The EC will work towards creating such lists but without creating a new rule to make it an obligation to include old virus names in the lists. The proposition that ICTV keep synonyms in all major languages was felt not to be feasible. It was also stated that taxon names cannot be translated and that any translation attempted becomes a vernacular name and thus not the responsibility of ICTV.

It was proposed that ICTV use the Internet more for communication. The EC already recognizes this as a desirable aim and this will be developed along with other changes to the web-based operation of ICTV. It was felt not to be useful to specify a deadline.

Furthermore, it was proposed that all taxonomic information relevant to the decisions of the ICTV be made available via the Internet in a database under the guidance of the Virus Database SC. The EC thought that the message board on ICTV net where comments on proposals are posted goes a long way towards achieving this. It was stated that a database is being developed so as to have accessible all currently approved virus taxa. This development should satisfy the spirit of the proposed amendment.

The proposal that ICTV be responsible for the classification and nomenclature of viruses at all taxonomic levels was felt to be likely to lead to an overwhelming task for the SGs of ICTV and therefore to be unworkable.

The proposal that taxonomic groupings indicated by virus names shall be based, if possible, on evolutionary analyses reflects current ICTV objectives. The proposition that ICTV should maintain a public record of the characteristics that distinguish each approved taxon from related ones or from those with which it might be confused, is one of the aims of the development of the ICTV database (ICTVdB).

The EC did not approve any of the proposals to change the Statutes or ICVCN. However, many of the points raised by the proposed changes are being addressed, either by current practice or by various developments that are currently in progress. Most notably, it is expected that the development of the ICTVdB will address many concerns.

It was decided that a Working Group be set up to review the Code in a comprehensive fashion taking into account the proposals on the table.

3. Rules concerning the appointment of National Members (EC37)

As a means of promoting contact between ICTV and its National Members and to ensure that lists of members are up-to-date, it was proposed that the Statutes be modified such that Societies would be obliged to either renew National Members or replace them. In effect, National Members would have a 3-year tenure that could be renewed indefinitely. This was accepted unanimously by the EC and the ICTV in Plenary Session. It was subsequently also approved by the Virology Division.

4. Report on progress with the ICTVdB (EC37)

It has been agreed with the EC that (1) in order to propose a species, at least one entry of an isolate description should be made; (2) data entry into the ICTVdB could be made at

the isolate level, the first taxonomic level being the species; (3) an isolate is the only real data entry; (4) the Virus Database SC will work with the National Center for Biotechnology Information (NCBI) to link virus genome descriptions with isolate data entered into the ICTVdB; and (5) a simple two-page data entry process will be developed and supplied to NCBI to facilitate the submission of isolate data into the ICTVdB and its linking with GenBank entries.

Discussions have taken place with the American Society for Microbiology about the long-term support of ICTVdB and funding of ICTV EC activities. Bulk data entry processes will be developed for entry from private databases and collections of isolates, resulting in the accessing of information on nearly 10,000 virus isolates, including the World Reference collection of foot-and-mouth disease viruses, major plant virus databases, and some very significant collections of arboviruses. There is agreement that the next Arbovirus Catalogue will be developed with the assistance of the ICTVdB provided there is sufficient arbovirus information and entry.

The ICTVdB has moved from the Australian National University to Columbia University.

The ICTVdB has the copyright (in the name of the ICTV) in order to protect the information for the ICTV and virologists.

5. The non-latinized binomial system (EC36)

An opinion poll conducted at the Paris ICV showed that about 80% of those who voted were in favour of adopting a non-latinized virus binomial (NLVB) system for constructing the names of virus species. In this system, each species name would end with the genus name rather than the word "virus". However it was recognized that if applied universally this system would result in some strange names, and it was acknowledged that some sections of the virology community (as represented by SG opinion) are firmly against NLVB.

The advantages of NLVB were summarized as follows:-

- It conveys a sense of the affiliation of the species.
- It would allow more flexibility in naming, as for example with Latin binomial names for higher organisms.
- It would make clear the distinction between species names and virus names.

The disadvantages were summarized as follows:-

- It would necessitate many name changes and thus conflict with the stability principle.
- It would create difficulties for the ICTVdB.
- Species in a family but unassigned to a genus could not have a genus name in the species name.
- It would necessitate formal name changes when species are moved from one genus to another or if an unassigned species were assigned to a genus.
- It would produce odd names because of curious genus names in use, in particular when these contain numerals.

The President stated that he had decided to listen to opinion rather than be an advocate for the system and suggested that any adoption be on a case-by-case basis. The Picornaviridae SG had suggested that the use of NLVB for new names be strongly encouraged but that existing names not be changed, but the EC felt that any changeover to NLVB should then apply to all species in a genus.

At the end of the discussion, a vote showed that EC opinion was evenly divided between those in favour of NLVB and those not in favour, and that of those in favour, half were strongly in favour and half were only moderately supportive.

6. Greek characters in taxon names (EC37)

The use of Greek characters in species and genus names can be a major complication because of difficulty in dealing with the characters electronically. There was a general feeling that this problem should be addressed and that it would be legitimate to convert the affected names to names consisting entirely of roman characters. The proposition was passed to the Chairs of the Prokaryote Virus SC and the Invertebrate Virus SC for them to consult the affected SC members and/or SGs.

7. Standardization of suffixes for vernacular group names (EC37)

A paper was presented outlining ideas for the use of standard suffixes on vernacular names to signify the taxonomic level of the viruses being described. The system is used widely at the moment for viruses in a particular taxon, usually genus, but no distinction is made between “potyvirus” as a member of the genus *Potyvirus* and “potyvirus” as a member of the family *Potyviridae*. A comprehensive scheme was presented that includes distinctive endings for all taxa including those containing viroids. The EC thought that it would be useful to promote the simplest scheme (‘-virad’ for members of an order, ‘-virid’ for members of a family, ‘-virin’ for members of a subfamily and ‘-virus’ for members of a genus) but that it would be better to omit endings for as yet unused taxa and for the viroid taxa, at least until it was clear that virologists welcomed the scheme. A paper will be prepared in the near future for publication in VDN to present the suggestions in detail.

8. Species demarcation criteria (EC36)

A proposal was discussed that there should be a fixed degree of sequence relatedness that would indicate that two viruses were either members of the same species, or belong to different species in the same genus, or belong to species in different genera. These values would then be applied to all classification decisions. There was little support for this idea as all EC members agreed that genera differed in the detail of species demarcation criteria. It was pointed out that fixing these lists of criteria was an important task for individual SGs.

9. Proposed abolition of the category of “tentative species” (EC37)

It was proposed that the category “tentative species” be eliminated from taxonomic usage because a virus can either be a member of a species or it cannot. The tentative assignment had been a source of confusion in the ICTV Reports and for NCBI. However, it was pointed out that at least for some virologists the idea of identifying a tentative species as a first step towards recognizing a species was well understood. Most EC members agreed with the proposal, and SC Chairs were asked to ask their SGs to take note and consider what to do with the tentative species in their lists.

10. Membership of the EC for 2005–2008

SC Chairs elected at or after EC36 were D. McGeoch (Vertebrate viruses), P. Christian (Invertebrate viruses), M. Adams (Plant viruses), J. van Etten (Fungus viruses), I. Molineux (Prokaryote viruses) and L. Blaine (Virus database). EC members elected by the ICTV membership at the Plenary Session of ICTV at the San Francisco ICV were L. A. Ball

(President), E. B. Carstens (Vice-President), A.-L. Haenni and D. Fargette (Secretaries), H. J. Vetten, A. M. Q. King, U. Desselberger, A. Gorbalenya, C. Suttle, J. Mackenzie, P. Krell and A. Davison (Elected members).

11. Plenary Session organization

At EC36, it has been agreed that considering proposals for taxonomic change was not well served by being part of the Plenary Session. The use of postal balloting has allowed members more time to consider proposals, and proposals are now available for inspection and for comment on the ICTV web site. Therefore it was decided that in normal circumstances all voting on taxonomic proposals will be done by postal/electronic balloting.

At EC36 it was decided that the current statutory definition of who is entitled to vote on taxonomic proposals was unsatisfactory as SG Chairs were not entitled to vote. It was agreed to propose changes to statutes such that all members of any SC become entitled to vote. This proposal was subsequently approved by the ICTV and then by Virology Division prior to the Plenary Session at the San Francisco ICV.

12. Proposal to link Virus Evolution and Virus Taxonomy (EC37)

A proposal from David Mindell that ICTV adopt a statement explicitly linking taxonomy and evolution was discussed. It was pointed out that a statement about the objectives of ICTV and how and when evolution can be linked with taxonomy is already in the Introduction to the 8th Report. In the light of the successful workshop held at the American Society for Virology meeting in Montreal in 2004, it was agreed that a symposium every 2 to 3 years reviewing virus evolution and the state of virus taxonomy would be valuable. EC members agreed to encourage people to organize satellite symposia that would promote interest in taxonomic matters.

References

1. Bos L (2003) Virus nomenclature; continuing topicality. *Arch Virol* 148: 1235–1245
2. Gibbs AJ (2003) Viral nomenclature, where next? *Arch Virol* 148: 1645–1654

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