Template for Taxonomic Proposal to the ICTV Executive Committee
To create a new Unassigned Genus

Code† 2007.086B To create a new genus*

Code† 2007.087B To name the new genus* ***Bicaudavirus***

Code† 2007.088B To create as type species in the new genus the species named*
Acidianus two-tailed virus

Code† 2007.089B To designate the following as species of the new genus*:
Acidianus two-tailed virus

Code† To designate the following as tentative species in the new genus*:

† Assigned by ICTV officers
* repeat these lines and the corresponding arguments for each genus created in the family

Author(s) with email address(es) of the Taxonomic Proposal

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Old Taxonomic Order

Order
Family
Genus
Type Species
Species in the Genus
Tentative Species in the Genus
Unassigned Species in the family

New Taxonomic Order

Order
Family
Genus ***Bicaudavirus***
Type Species ***Acidianus two-tailed virus***
Species in the Genus ***Acidianus two-tailed virus***

Tentative Species in the Genus **none**
Unassigned Species in the family **none**

ICTV-EC comments and response of the SG

Accepted. Move to 02. Need to modify Taxoprop before next consideration with additional proposal to create and name ***Acidianus two-tailed virus*** as new species in the genus.

Argumentation to choose the type species in the genus

Only virus described

Species demarcation criteria in the genus

Not appropriate

List of Species in the created genus

Acidianus two-tailed virus (ATV)

List of Tentative Species in the created genus

none

Argumentation to create a new genus:

We propose classifying the *Acidianus two-tailed virus* (ATV) as a first representative of a new genus because of the unique morphology of the virion, its exceptional property to develop two tails outside and independently of the host cell, and specific genomic properties.

Virions of the *Acidianus two-tailed virus* are released from host cells as lemon-shaped particles and thereafter develop long tails, one at each of two pointed ends, which terminate in anchor-like structures. This major morphological development takes place specifically at temperatures above 75°C, close to that of the natural habitat, and it does not require the presence of the host cells, an exogeneous energy source and any co-factors. Although in the viral world several examples of natural extracellular morphogenesis are known, these are triggered on a host-cell surface concurrently with the virus budding or adsorption. To our knowledge, ATV is the first example of a virus with a host-independent as well as extracellular functional activity.

The *Acidianus two-tailed virus* is the only known virus of hyperthermophilic acidophilic host causing lysis of the host cell. It is capable of two alternative developmental cycles: after infection, either ATV replication occurs and leads to lysis, or the infected cell is converted into a lysogene (in lysogens viral DNA is found integrated into the host chromosome) in which virus production can be induced by stress factors, e.g. UV-irradiation, decrease of temperature.

Among putative genes there are very few homologues to genes of characterized viruses. All of them are homologous to viruses of the hyperthermophilic archaeal hosts (genus Acidianus or the closely related genus Sulfololobus). These few similarities are compatible with horizontal gene transfer, rather than with common ancestry of the viruses.

Origin of the proposed genus name

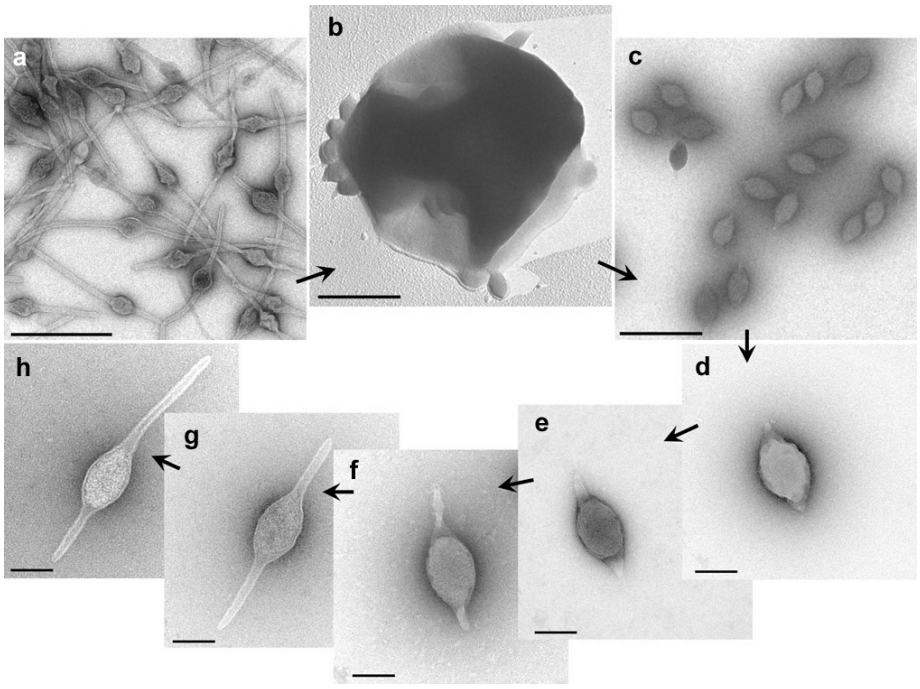
From the Latin *cauda*, for tail

References

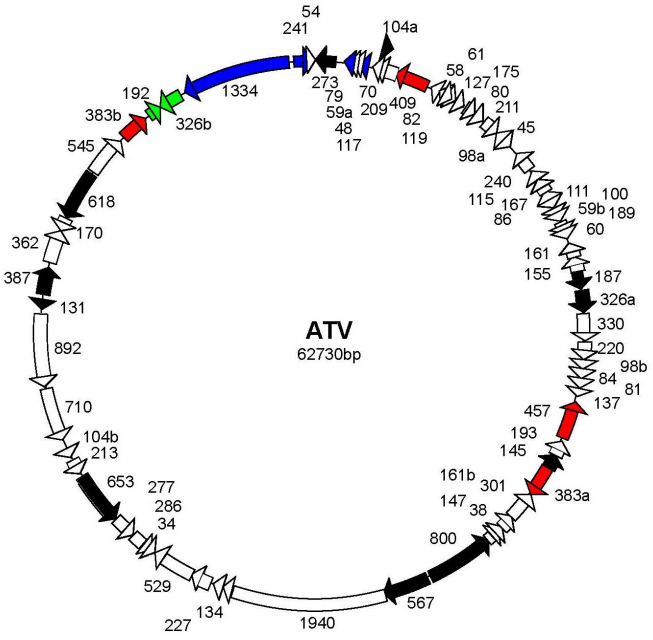
. Häring, M., G. Vestergaard, R. Rachel, L. Chen, R. A. Garrett, and D. Prangishvili (2005). Independent virus development outside a host. *Nature* vol. 436, pp. 1101-1102.

Prangishvili, D., G. Vestergaard, M. Häring, R. Aramayo, T. Basta, R. Rachel, and R.A. Garrett (2006) Structural and genomic properties of the hyperthermophilic archaeal virus ATV with an extracellular stage of the reproductive cycle. *J. Mol. Biol.* 359, 1203-1216.

Annexes:



Electron micrographs of "*Acidianus convivator*" and different forms of ATV. **a**, Virions in an enriched environmental sample. **b**, Extrusion of virions from an ATV-infected cell of "*A. convivator*". **c**, Virions in a growing culture of ATV-infected "*A. convivator*", 2 days p.i.. **d**, As for **c**, but purified by CsCl density gradient. **e**-**h**, As for **d**, but incubated at 75°C for 2, 5, 6, and 7 days, respectively. All preparations were negatively stained with 3% uranyl acetate, except for **b**, which was platinium shadowed. Bars: **a** to **c** 0.5 µm; **d** to **h** 0.1 µm.



A gene map of the circular ATV genome. ORFs are represented by arrows and labelled according to the number of amino acids in the predicted proteins. Genes for putative AAA ATPases, transposases, integrase and highly coiled-coil proteins are indicated. Colour coded ORFs correspond to: black, virion proteins; blue - homologous ORFs present in other crenarchaeal hyperthermophilic viruses, green - homologous ORFs occurring in conjugative plasmids of *Sulfolobus*; red - transposases.