

Template for Taxonomic Proposal to the ICTV Executive Committee

Creating Species in an existing genus

Code † To create the following 5 species in the genus:

Betalinothrixvirus

belonging to the family[°] : *Linothrixviridae*

Acidianus filamentous virus 3
Acidianus filamentous virus 6
Acidianus filamentous virus 7
Acidianus filamentous virus 8
Acidianus filamentous virus 9

† Assigned by ICTV officers

° leave blank if inappropriate or in the case of an unassigned genus

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

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Old Taxonomic Order

Order

Family *Lipothrixviridae*

Genus *Betalipothrixvirus*

Type Species *Sulfolobus islandicus filamentous virus*

Species in the Genus

Sulfolobus islandicus filamentous virus

Sulfolobus islandicus filamentous virus (SIFV)

Tentative Species in the Genus

Desulfurolobus ambivalens filamentous virus (DAFV)

Thermoproteus tenax virus 2 (TTV-2)

Thermoproteus tenax virus 3 (TTV-3)

New Taxonomic Order

Order

Family *Lipothrixviridae*

Genus *Betalipothrixvirus*

Type Species *Sulfolobus islandicus filamentous virus*

Species in the Genus

Sulfolobus islandicus filamentous virus

Sulfolobus islandicus filamentous virus (SIFV)

Acidianus filamentous virus 3

Acidianus filamentous virus 3 (AFV3)

Acidianus filamentous virus 6

Acidianus filamentous virus 6 (AFV6)

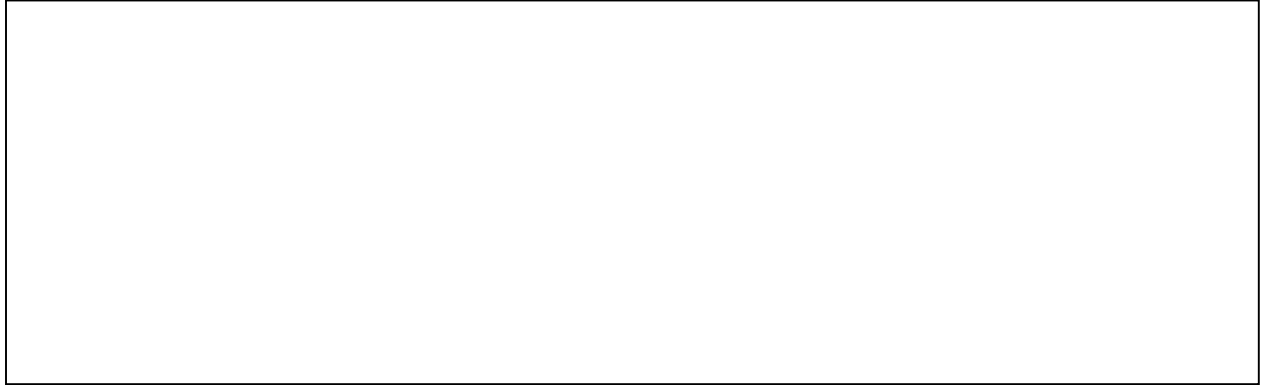
Acidianus filamentous virus 7

Acidianus filamentous virus 7 (AFV7)
Acidianus filamentous virus 8
Acidianus filamentous virus 6 (AFV8)
Acidianus filamentous virus 9
Acidianus filamentous virus 9 (AFV9)

Tentative Species in the Genus

Desulfurolobus ambivalens filamentous virus,
Thermoproteus tenax virus 2
Thermoproteus tenax virus 3

ICTV-EC comments and response of the SG



Species demarcation criteria in the genus

Acidianus filamentous virus 3 (AFV3), *Acidianus filamentous virus 6* (AFV6), *Acidianus filamentous virus 7* (AFV7), *Acidianus filamentous virus 8* (AFV8), and *Acidianus filamentous virus 9* (AFV9), differ by structures of their virion termini and nucleotide sequences of the genomes,

Argumentation to justify the designation of new species in the genus

Virions of *Acidianus filamentous virus 3* (AFV3), *Acidianus filamentous virus 6* (AFV6), *Acidianus filamentous virus 7* (AFV7), *Acidianus filamentous virus 8* (AFV8), and *Acidianus filamentous virus 9* (AFV9), differ from each other in terminal structures: the virion of AFV3 has three tail fibers attached at its termini, AFV6, and AFV7 have t-shaped terminal structures, AFV7 virion has complex terminal structures comprising two sets of short filaments, and AFV9 virion carries one long tail fiber at its termini (see annexes). Moreover, the nucleotide sequences of the genomes of the five virus species differ from each other (see annexes). All viruses replicate in the hyperthermophilic archaeon *Acidianus convivator*. In addition, AFV3 replicates in *Acidianus* sp. Aci25, and AFV9 replicates in “*Acidianus uzoniensis*”.

All the new species differ from the type species of the genus, *Acidianus islandicus filamentous virus*, SIFV, by their host range, terminal structures of the virion and nucleotide sequences of the genome.

List of created Species in the genus

Acidianus filamentous virus 3
Acidianus filamentous virus 6
Acidianus filamentous virus 7
Acidianus filamentous virus 8
Acidianus filamentous virus 9

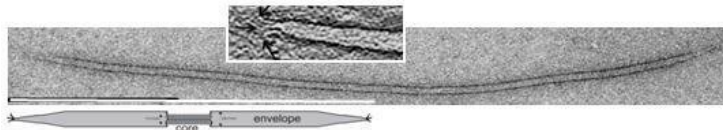
References

Vestergaard, G., Aramayo, R., Basta, T., Häring, M., Peng, X., Brügger, K., Chen, L., Rachel, R., Biosset, N., Garrett, R. A., and Prangishvili, D. (2008) Structure of the *Acidianus Filamentous Virus 3* and comparative genomics of related archaeal lipothrixviruses. *Journal of Virology*, 82:371-381.

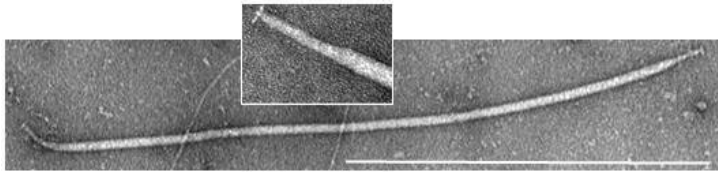
Bize, A., Peng, X., Prokofeva, M., MacLellan, K., Lucas, S., Forterre, P., Garrett, R.A., Bonch-Osmolovskaya, E.A., and Prangishvili, D. (2008) Viruses in acidic geothermal environments of the Kamchatka Peninsula. *Research in Microbiology*, 159:358-366.

Annexes:

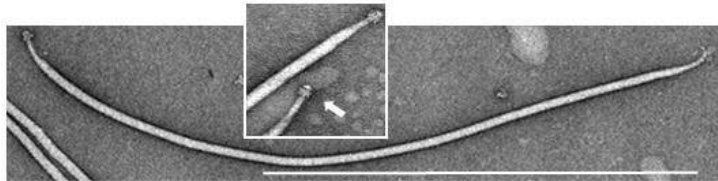
Genome sequences of the virus species are available at GenBank/EMBL with Accession Numbers: **AFV3** - [AM087120](#), **AFV6** - [AM087121](#), **AFV7** - [AM087122](#), **AFV8** - [AM087123](#), and **AFV 9** - EU545650



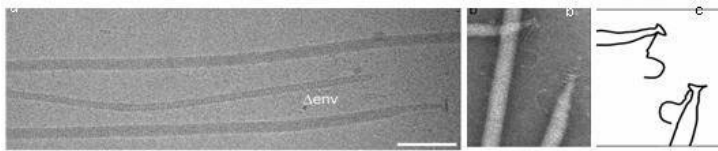
Electron micrograph of **AFV3** virion, and its trident-like terminal structure in an inset. Negative staining with 2% uranyl acetate. Bar, 1 μ m.



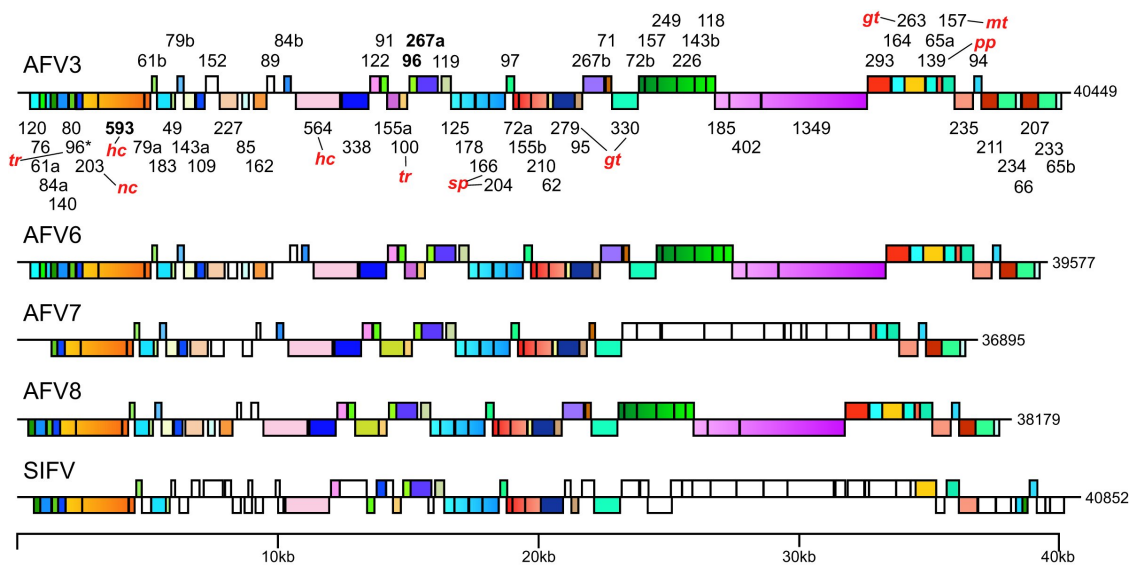
Electron micrograph of **AFV6** virion, and its terminal structure in an inset. Negative staining with 2% uranyl acetate. Bar, 1 μ m.



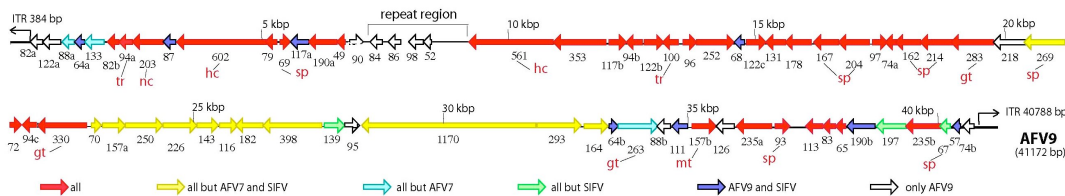
Electron micrograph of **AFV7** virion, and its terminal structures in an inset. Negative staining with 2% uranyl acetate. Bar, 1 μ m.



(a) Electron micrographs of portions of **AFV9** of virions. (b) The virion termini consisting of a t-bar and a single thin filament; (c) line diagram to aid the location of the single thin filaments attached to the virion termini in figure (b). (a) cryoelectron micrograph; (b) negative staining with 2% uranyl acetate. Bar, 100nm.



Genome maps aligned for **AFV3**, **AFV6**, **AFV7** and **AFV8** and of the betalipotrixvirus SIFV. Homologous genes are coded with identical colours and shading. Homologous operons carrying three or more genes are shown with graduated colour coding. White boxes indicate that no homologous genes were detected in the other genomes. The predicted AFV3 ORFs are labelled according to their amino acid lengths.



Genome map for **AFV9**. Putative genes with homologs in the betalipotrixviruses AFV3, AFV6, AFV7, AFV8, and/or SIFV are color-coded as indicated in the figure. The ORFs with putative functions are indicated with red letters: tr – transcription regulators, nc – nucleases, hc, helicase, sp – structural protein, g – glycosyl transferase, mt – methyl transferase.