This form should be used for all taxonomic proposals. Please complete all those modules that are applicable (and then delete the unwanted sections). For guidance, see the notes written in blue and the separate document "Help with completing a taxonomic proposal"

Please try to keep related proposals within a single document; you can copy the modules to create more than one genus within a new family, for example.

MODULE 1: **TITLE, AUTHORS, etc**

Code assigned:	***2015.054a-dB***	(to be completed by ICTV officers)

Short title: Create one (1) new genus, *Septima3virus*, including five (5) new species within the family *Siphoviridae*
(e.g. 6 new species in the genus *Zetavirus*)

Modules attached (modules 1 and 10 are required)	**1** ☒	**2** ☒	**3** ☒	**4** ☐	**5** ☐
	6 ☐	**7** ☐	**8** ☐	**9** ☐	**10** ☒

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List the ICTV study group(s) that have seen this proposal:

A list of study groups and contacts is provided at http://www.ictvonline.org/subcommittees.asp . If in doubt, contact the appropriate subcommittee chair (fungal, invertebrate, plant, prokaryote or vertebrate viruses)	

ICTV Study Group comments (if any) and response of the proposer:

Please note that we have chosen to refer to this new genus as *Septima3virus* rather than *Septima3likevirus* since the Bacterial and Archaeal Virus Subcommittee of ICTV has voted overwhelmingly in favour of eliminating "*like*" and "*Phi*" from phage genus names.

Date first submitted to ICTV: June 2015
Date of this revision (if different to above):

ICTV-EC comments and response of the proposer:

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for **one** isolate of each new species proposed.

Code	***2015.054aB***	(assigned by ICTV officers)

To create 5 new species within:

Genus:	***Septima3virus* (new)**
Subfamily:	
Family:	***Siphoviridae***
Order:	***Caudovirales***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

Name of new species:	**Representative isolate: (only 1 per species please)**	**GenBank sequence accession number(s)**
Pseudomonas virus 73	Pseudomonas phage 73	NC_007806 ***
Pseudomonas virus Kakheti25	Pseudomonas phage vB_Pae-Kakheti25	JQ307387
Pseudomonas virus Ab26	Pseudomonas phage vB_PaeS_SCH_Ab26	HG962376
Burkholderia virus KL1	Burkholderia phage vB_BceS_KL1	JF939047

*** Only this version is annotated and correctly named

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

We have chosen 95% DNA sequence identity as the criterion for demarcation of species in this new genus. Each of the proposed species differs from the others with more than 5% at the DNA level as confirmed with the BLASTN algorithm.

MODULE 3: **NEW GENUS**

creating a new genus

Ideally, a genus should be placed within a higher taxon.

Code	***2015.054bB***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	
Family:	***Siphoviridae***
Order:	***Caudovirales***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no family is specified, enter "**unassigned**" in the family box

naming a new genus

Code	***2015.054cB***	(assigned by ICTV officers)

To name the new genus: *Septima3virus*

Assigning the type species and other species to a new genus

Code	***2015.054dB***	(assigned by ICTV officers)

To designate the following as the type species of the new genus

Pseudomonas virus 73

Every genus must have a type species. This should be a well characterized species although not necessarily the first to be discovered

The new genus will also contain any other new species created and assigned to it (Module 2) and any that are being moved from elsewhere (Module 7b). **Please enter here the TOTAL number of species (including the type species) that the genus will contain:**

5

Reasons to justify the creation of a new genus:

Additional material in support of this proposal may be presented in the Appendix, Module 9

Three of these lytic viruses are specific for *Pseudomonas aeruginosa* (4,5) with one, 73, being a typing phage for this bacterium, while vB_BceS_KL1 is specific for *Burkholderia cenocepacia* (6). The receptor is for phages 73 (7) and vB_PaeS_SCH_Ab26 (C. Pourcel, unpublished data) are type IV pili.

The morphology of 73 and KL1 have been studied: According to Ackermann et al. (8) phage 73 has "relatively rigid tails with about 35 striations and club-shaped subterminal projections, and is morphologically identical to phages SD1 and D3112." Lynch et al. (6) state that "The KL1 virion has a non-contractile tail approximately 160 nm in length and a capsid approximately 55 nm in diameter." In the case of phage Ab26, the head diameter is approximately 58 nm and the tail is 152 nm long (C. Pourcel, unpublished data). The head diameter of phage 73 is 50 nm.

A phylogenetic analysis (3) of the large subunit terminase and major capsid protein (Fig. 3) together with whole genome BLASTN analysis reveal that these phages are related and distinct from other siphoviruses

The average genome characteristics of the members of this genus are: genome size, 42.9 kb;

mol%G+C, 53.8; encoding: 54 proteins and 0 tRNAs.

Origin of the new genus name:

Pseudomonas phage 73

Reasons to justify the choice of type species:

The first fully sequenced member of this genus (4)

Species demarcation criteria in the new genus:

If there will be more than one species in the new genus, list the criteria being used for species demarcation and explain how the proposed members meet these criteria.

We have chosen 95% DNA sequence identity as the criterion for demarcation of species in this new genus. Each of the proposed species differs from the others with more than 5% at the DNA level as confirmed with the BLASTN algorithm.

MODULE 10: **APPENDIX**: supporting material

additional material in support of this proposal

References:

1. Darling AE, Mau B, Perna NT. progressiveMauve: multiple genome alignment with gene gain, loss and rearrangement. PLoS One. 2010; 5(6):e11147.
2. Turner D, Reynolds D, Seto D, Mahadevan P. CoreGenes3.5: a webserver for the determination of core genes from sets of viral and small bacterial genomes. BMC Res Notes.
3. Dereeper A, Guignon V, Blanc G, Audic S, Buffet S, Chevenet F, Dufayard JF, Guindon S, Lefort V, Lescot M, Claverie JM, Gascuel O. Phylogeny.fr: robust phylogenetic analysis for the non-specialist. Nucleic Acids Res. 2008; 36(Web Server issue):W465-9.
4. Kwan T, Liu J, Dubow M, Gros P, Pelletier J. Comparative genomic analysis of 18 *Pseudomonas aeruginosa* bacteriophages. J Bacteriol. 2006;188(3):1184-7. [73 mislabelled PA73]
5. Karumidze N, Thomas JA, Kvatadze N, Goderdzishvili M, Hakala KW, Weintraub ST, Alavidze Z, Hardies SC. Characterization of lytic *Pseudomonas aeruginosa* bacteriophages via biological properties and genomic sequences. Appl Microbiol Biotechnol. 2012;94(6):1609-17. [vB_Pae-Kaheti25]
6. Lynch KH, Stothard P, Dennis JJ. Comparative analysis of two phenotypically-similar but genomically-distinct *Burkholderia cenocepacia*-specific bacteriophages. BMC Genomics. 2012;13:223. [vB_BceS_KL1)]
7. Kropinski AM, Chan L, Jarrell K, Milazzo FH. The nature of *Pseudomonas aeruginosa* strain PAO bacteriophage receptors. Can J Microbiol. 1977;23(6):653-8.
8. Ackermann HW, Cartier C, Slopek S, Vieu JF. Morphology of *Pseudomonas aeruginosa* typing phages of the Lindberg set. Ann Inst Pasteur Virol. 1988;139(4):389-404.

Annex:

Include as much information as necessary to support the proposal, including diagrams comparing the old and new taxonomic orders. The use of Figures and Tables is strongly recommended but direct pasting of content from publications will require permission from the copyright holder together with appropriate acknowledgement as this proposal will be placed on a public web site. For phylogenetic analysis, try to provide a tree where branch length is related to genetic distance.

Fig. 1. Electron micrograph of negatively stained vB_PaeS_SCH_Ab26EM (left panel, C. Pourcel) together with (right panel) phage 73 stained with uranyl acetate (H.-W. Ackermann). Magnification bar = 100 nm.

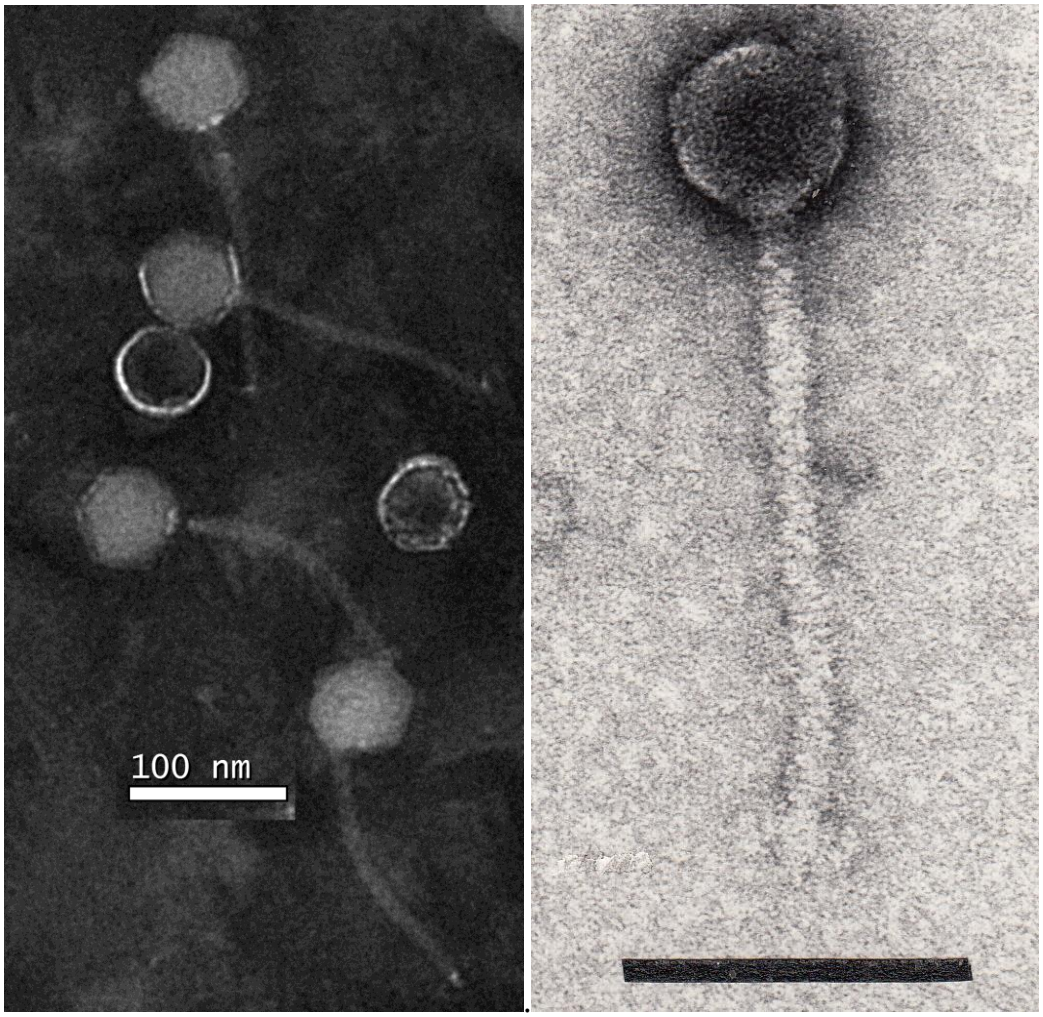

Table 1. Properties of the three phages belonging to the genus *Septima3virus*

Phage	GenBank Accession No.	Genome size (kb)	Genome (mol% G+C)	No. CDS	No. tRNAs	DNA (% sequence identity) *	% Homolog-ous proteins **
73	NC_007806 ***	43.00	53.6	52	0	100	100
vB_BceS_KL1	JF939047	42.83	54.6	55	0	55	80.8
vB_Pae-Kakheti25	JQ307387	42.84	53.8	58	0	91	90.4
vB_PaeS_SCH_Ab26	HG962376	43.06	53.4	52	0	91	84.6

* Determined using BLASTN; ** Determined using CoreGenes (2); *** the GenBank accession number for this phage (DQ163913) is not annotated.

Fig. 2. progressiveMauve alignment (1) of the annotated genomes of members of the *Septima3virus* genus – top to bottom: KL1, Kakheti25, Ab26 and 73. Colored blocks indicate the regions of 1 to 1 best alignment with rearrangement breakpoints in a different random color. The degree of sequence similarity between regions is given by a similarity plot within the colored blocks with the height of the plot proportional to the average nucleotide identity (Aaron Darling, personal communication).

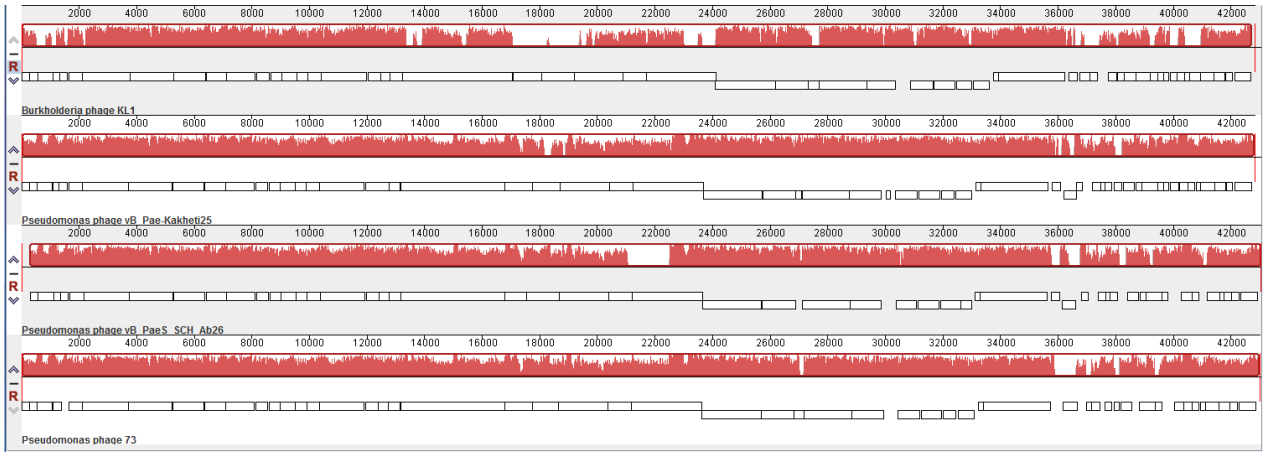

Fig. 3. Phylogenetic analysis of (A) the terminase, large subunit proteins add (B) the major capsid protein of *Septima3virus* and variety of other phages constructed using "one click" at phylogeny.fr (3). "The "One Click mode" targets users that do not wish to deal with program and parameter selection. By default, the pipeline is already set up to run and connect programs recognized for their accuracy and speed (MUSCLE for multiple alignment and PhyML for phylogeny) to reconstruct a robust phylogenetic tree from a set of sequences." It also includes the use of Gblocks to eliminate poorly aligned positions and divergent regions. "The usual bootstrapping procedure is replaced by a new confidence index that is much faster to compute. See: Anisimova M., Gascuel O. Approximate likelihood ratio test for branches: A fast, accurate and powerful alternative (Syst Biol. 2006;55(4):539-52.) for details."

A. Terminase, large subunit

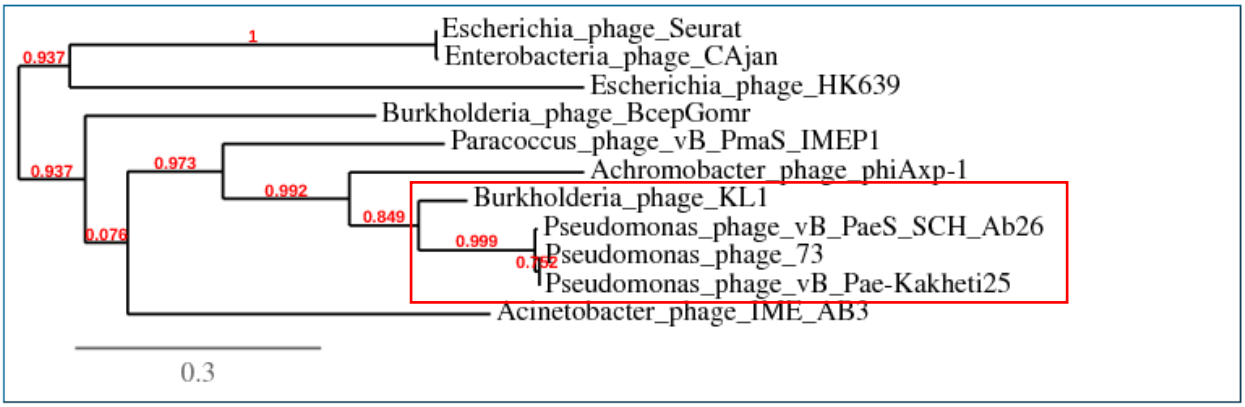

Figure 1: *Phylogenetic tree (the branch length is proportional to the number of substitutions per site).*

B. Major capsid protein

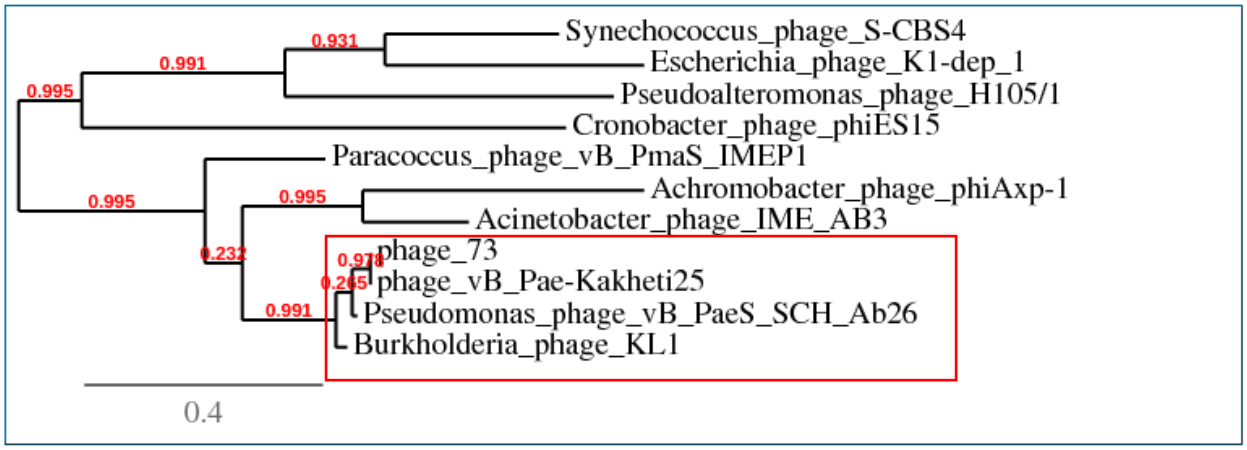

Figure 1: *Phylogenetic tree (the branch length is proportional to the number of substitutions per site).*