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:	***2009.010a,bB***	(to be completed by ICTV officers)

Short title: Create new species named Bacillus phage G to be unassigned in the family Myoviridae
(e.g. 6 new species in the genus *Zetavirus*)

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

Author(s) with e-mail address(es) of the proposer:

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Has this proposal has been seen and agreed by the relevant study group(s)? Please select answer in the box on the right	**N/A**

ICTV-EC or Study Group comments and response of the proposer:

EC40. Move to -04

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

MODULE 2: **NEW SPECIES**

Part (a) to create and name one or more new species.
If more than one, they should be a group of related species belonging to the same genus (see Part b)

Code	***2009.010aB***	(assigned by ICTV officers)

To create 1 new species with the name(s):

Bacillus phage G

Part (b) assigning new species to higher taxa
All new species must be assigned to a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family.

Code	***2009.010aB***	(assigned by ICTV officers)

To assign the species listed in section 2(a) as follows:

Genus:	**unassigned**
Subfamily:	**unassigned**
Family:	***Myoviridae***
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.

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.
- Provide Genbank accession numbers (not RefSeq accessions) for genomic sequences
- Further material in support of this proposal may be presented in the Appendix, Module 9

Phage G ('giant') of *Bacillus megaterium* is unique among bacteriophages. It is the largest phage known (head diameter 150 nm, tail length 455 nm) and has a genome which is equivalent in size (497,531 bp, 684 genes) to the smallest bacterial genomes. Another unique feature is a single spiral fiber around the tail.

MODULE 9: **APPENDIX**: supporting material

additional material in support of this proposal

References:

Ageno M, Donelli G, Guglielmi F. 1973. Structure and physico-chemical properties of bacteriophage G. II. The shape and symmetry of the capsid. Micron 4:376-403

Donelli G, Guglielmi F, Paoletti L. 1972. Structure and physico-chemical properties of bacteriophage G. I. Arrangement of protein subunits and contraction of tail sheath. J Mol Biol 71:113-125

Pedulla ML, Lewis JA, Hendrickson HL, Ford ME, Houtz JM, Peebles CL, Lawrence JG, Hatfull GF, Hendrix RW. 2003. Bacteriophage G: analysis of a bacterium-sized phage genome. Presentation No. M-039, 103rd General ASM Meeting, May 18-22, Washington, DC. Prepublication sequence on (http://pbi.bio.pitt.edu).

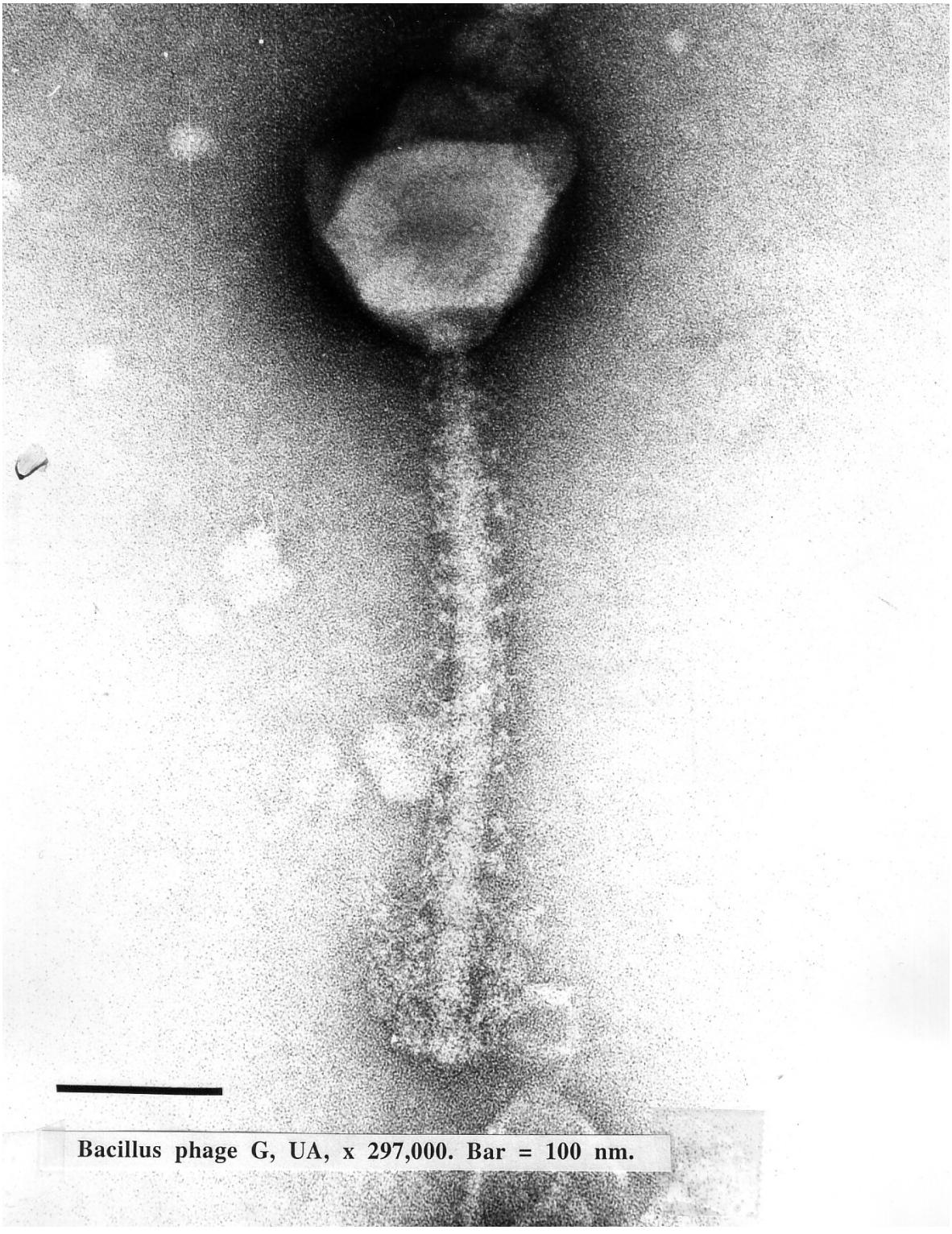
Serwer P, Estrada A, Harris RA. 1995. Video light microscopy of 670-kb DNA in a hanging drop: shape of the envelope of DNA. Biophys J 69:2649-2660

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.

Phage G ('giant') of *Bacillus megaterium* is truly unique; no similar phage has been found in 50 years of phage research. The virus particle is extremely large and contains by far the largest phage genome known; indeed, the genome is equivalent in size to the smallest bacterial genomes. Another unique feature is a single spiral fiber around the tail. According to the literature (Ageno, Donelli), G has a head diameter of 160 nm and a tail length of 455 nm. I have little confidence in these early data. I measured the phage again after catalase calibration and found 150 nm for the head and 410 nm for tail length.

Although the sequence of phage G DNA has not yet been published, the main features of G are known and should be vastly sufficient for classification.



Bacillus phage G, UA, x 297,000. Bar = 100 nm.

Distinguishing Features

Bacteriophage G is the largest bacterial virus known. Capsid and tail length are exceptional. The DNA size is larger than that of any other tailed phage. The tail is surrounded by a spiral fiber.

Virion Properties

Morphology

Capsid are icosahedral and ~150 nm in diameter. Tails measure ~410 x 20 nm in the extended state, are surrounded over their complete length by a single spiral fiber, and carry a bundle of indistinct, curled terminal fibers. Baseplates are not observed.

Physicochemical and Chemical Properties

Not known.

Nucleic Acid

The genome is 497,531 bp in size and circular, suggesting circular permutation. It contains 684 genes corresponding to 667 protein-coding ORFs and 17 tRNA genes. Isolated DNA forms a flexible filament with 17 double helical segments. The G+C content is 30%.

Proteins	No data available.
Lipids	None known.
Carbohydrates	None known.

Genome Organization and Replication

The genome shows evidence of duplications, namely a 10 kbp region with 28 similar genes for related proteins and several ORFs for polymerase III subunits. G seems to replicate via a theta mode.

Antigenic Properties Not known.

Biological Properties

The known host range of phage G is limited to *Bacillus megaterium.* Phage G requires Co2+ for optimal propagation.

List of Species Demarcation Criteria Not applicable.

Additional References

Ageno M, Donelli G. 1968. Research in progress on the octahedral shape of a temperate phage of Bacillus megatherium. In: Electron Microscopy 1968, Proc 4th Eur Reg Conf, Rome 1968, Vol. II, 155-156, ed. S Bocciarelli. Tipografia Poliglotta Vaticana, Rome

Donelli G. 1968. Isolamento di un batteriofago di eccezionali dimensioni attivo su *B. megatherium.* Atti Accad Naz Lincei Rend Cl Sci Fis Mat Natur Ser VII 44:95-97

Donelli G, Dore E, Frontali C. 1973. Physico-chemical properties of phage G components. In: Proc 9th Internat Congr Biochem, 460, Stockholm, Sweden, July 1-7, 1973

Donelli G, Dore E, Frontali C. 1974. Quantitative estimate of the contour length of phage G DNA. In: Proc 8th Internat Congr Electron Microsc, Vol. II, 22-23

Donelli G, Dore E, Frontali C, Grandolfo ME. 1975.
Structure and physico-chemical properties of bacteriophage G. III. A homogeneous DNA of molecular weight 5×10^8. J Mol Biol 94:555-565

Donelli G, Guglielmi F, Paoletti L. 1972. The structural arrangement of protein subunits in bacteriophage G. In: Proc 1st Eur Biophys Congr, 547-551, Baden, Austria, Sept. 14-17, 1971, eds. E Broda, A Locker, H Springer-Lederer. Verlag der Wiener Medizinischen Akademie, Vienna

Fangman WL. 1987. Separation of very large DNA molecules by gel electrophoresis. Nucleic

Acids Res 5:653-665

Hutson MS, Holzwarth G, Duke T, Viovy J-L. 1995. Two-dimensional motion of DNA bands during 120^o pulsed-field gel electrophoresis. I. Effect of molecular weight. Biopolymers 35:297-306

Sun M, Serwer P. 1997. The conformation of DNA packaged in bacteriophage G. Biophys J 72:958-963