Template for Taxonomic Proposal to the ICTV Executive Committee
To create a new Genus in an existing Family

Code[†]	2005.139B	To create a new genus in the family*	***Myoviridae***
Code[†]	2005.140B	To name the new genus*	**"I3-like viruses"**
Code[†]	2005.141B	To create as type species in the new genus the species named*	***"Mycobacterium phage I3"***
Code[†]	2005.142B	To designate the following as species of the new genus*:	*Mycobacterium phage I3*
Code[†]		To designate the following as tentative species in the new genus*:	**None**

[†] 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

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

ICTV-EC comments and response of the SG

Accepted. Move to 02. Before reconsideration need to amend proposal to create and name I3 as a species in the newly created genus.

Done.
Hans-W. Ackermann

Argumentation to choose the type species in the genus

The type species is the only species in the genus.

Species demarcation criteria in the genus

Not applicable

List of Species in the created genus

Mycobacterium phage I3

List of Tentative Species in the created genus

None

Argumentation to create a new genus:

Mycobacterium phages I3 and its relative Bxz1 are the only *Mycobacterium* phages with contractile tails. This is a great rarity among phages of the high-GC branch of eubacteria (mycobacteria and actinomycetes) because there are only 3 *Myoviridae* among over 500 phages of these bacteria. I3 was found to contain 15% lipids, which is highly unusual in tailed phages. The lipids were said to form a bilayer between capsid and DNA (unconfirmed).

Origin of the proposed genus name

Name of type virus

References

Ackermann H-W, DuBow MS. 1987. Viruses of Prokaryotes. Vol. II. Natural Groups of Bacteriophages. CRC Press, Boca Raton, FL, p. 61

Kozloff LM, Raj CVS, Rao RN, Chapman VA, DeLong SS. 1972. Structure of a transducing mycobacteriophage. J Virol 9:390-393

Pedulla ML, Ford ME, Houtz JM, Karthikeyan T, Wadsworth C, Lewis JA, Jacobs-Sera D, Falbo J, Gross J, Pannunzio JR, Brucker W, Kumar V, Kandasamy J, Keenan L, Bardarov S, Kriakov J, Lawrence JG, Jacobs WR, Hendrix RW, Hatfull GF. 2003. Origins of highly mosaic mycobacteriophage genomes. Cell 113:171-182

Annexes:

I3

Background

The present ***Myoviridae*** family of tailed phages has 6 genera named after their type species: T4, P1, P2, Mu, (enterics), SPO1 *(Bacillus),* ϕH1 *(Halobacterium).* These phages comprise no more than a small part of myoviruses and differ in every respect from phage I3 and its only kn own relative.

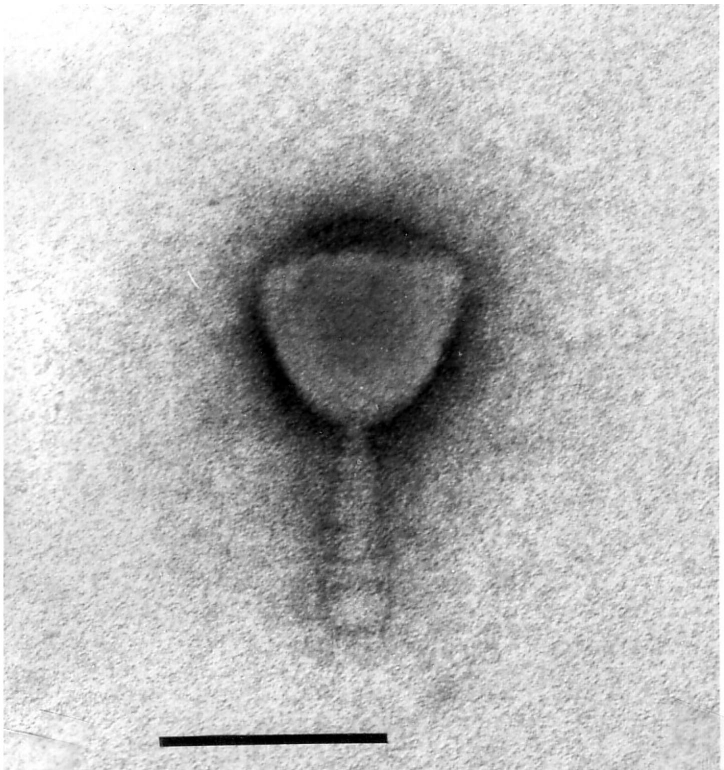
Mycobacterium smegmatis phage I3 was isolated before 1970. It has a contractile tail, which is a great rarity among phages of the high G+C branch of eubacteria (mycobacteria and actinomycetes). There are only 3 *Myoviridae* among over 500 phages observed in these bacteria (Ackermann, 2001). The phage was found to contain 15% lipids, which is highly unusual in tailed phages. The lipids were said to form a bilayer between capsid and DNA, but I did not see the bilayer when I examined the phage. I3 was given species rank.

A similar *M. smegmatis* phage, named Bxz1, was recently found in soil. Dimensions were not given, but the phage is clearly identical to I3. Its genome was fully sequenced, is larger than that of any mycobacteriophage known, and has very few relationships to those of other mycobacteriophages. Most of its genes show no database matches at all (Pedulla et al., 2003). I3-like phages are profoundly different from other mycobacteriophages; indeed, they do not resemble any other phage of Gram-positive and Gram-negative bacteria.

I examined and measured I3 after catalase calibration. The head is an icosahedron and not an octahedron (as suggested by Kozloff and coll. (1972). The phage was described as having a head of 80 nm and a tail length of 80 nm.

Proposals

1. To establish a new *Myovirus* genus for *Mycobacterium* phage I3 and related viruses.
2. To name this genus "I3-like viruses."
3. To designate species I3 as the type species of this genus.
4. To designate phage I3 as the type virus of this species.



Mycobacterium phage I3, UA, 297,000.
Bar = 100 nm.

GENUS "I3-LIKE VIRUSES"

Type Species *Mycobacterium phage I3*

Distinguishing Features

Tails are contractile, which is an exquisite rarity among phages of the high-G+C branch of Gram-positive bacteria.

Virion Properties

Morphology

Phage heads are icosahedra of 85 nm in diameter, show conspicuous capsomers, and have a membrane-like layer between capsid and DNA. Tails are relatively short, measure 86 x 17 nm, and carry a conspicuous baseplate.

Physicochemical and Physical Properties

Virions contain 42% of DNA, 43% of protein, and 13% of lipids. Virions are inactivated by butanol, chloroform, and methanol.

Nucleic Acid

Genomes are large and contain 65% G+C. The Bxz1 genome consists of 156,102 bp. Most genes have no database matches.

Proteins 43% of particle.
Lipids 15% of particle.
Carbohydrates None known.

Genomic Organization and Replication

As determined in Bxz1, genomes include about 225 ORFs and 26 tRNAs and have a mosaic structure.

Antigenic Properties No group antigens are reported.

Biological Properties **Phages are temperate and general transductants.**

List of Species Demarcation Criteria Not applicable.

List of Species in the Genus

SPECIES IN THE GENUS

Mycobacterium phage I3

Mycobacterium phage Bxz1	[]	(Bxz1)
Mycobacterium phage I3		(I3)

Similarity with Other Taxa Not known.

References

Ackermann H-W, DuBow MS. 1987. Viruses of Prokaryotes. Vol. II. Natural Groups of Bacteriophages. CRC Press, Boca Raton, FL, p. 61

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SUPPORTIUNG MATERIAL

Additional References

Ackermann H-W. 2001. Frequency of morphological phage descriptions in the year 2000. Arch Virol 146:843-857

Ackermann H-W, Berthiaume L, Jones LA. 1985. New actinophage species. Intervirology 23:121-130

Gope ML, Gopinathan KP. 1982. Presence of lipids in mycobacteriophage I3. J Gen Virol 59:131-138

Gopinathan KP, Saroja D, Gadagkar RR, Ramakrishnan R. 1978. Control of lysogeny in mycobacteria. In: Genetics of the Actinomycetales, 237-242, eds. E Freerksen, I Tárnok, JH Thumin, Proc Internat Coll Forschungsinstitut Borstel, Sept. 29-Oct. 1, 1976. Gustav Fischer, Stuttgart, Germany

Lee S, Kriakov J, Vilcheze C, Day ZY, Hatfull CG, Jacobs WR. 2004. BxZ1, a new generalized transducing phage for mycobacteria. FEMS Microbiol Lett 241:271-276

Reddy AB, Gopinathan KP. 1986. Presence of random single-stranded gaps in mycobacteriophage I3 DNA. Gene 44:227-234

Sundar Raj CV, Ramakrishnan T. 1970. Transduction in *Mycobacterium smegmatis.* Nature 228:280-281