This form should be used for all taxonomic proposals. Please complete all those modules that are applicable.

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.

Part 1: **TITLE, AUTHORS, etc**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Code assigned:** | ***2017.007B*** | | | | (to be completed by ICTV officers) |
| **Short title:** To create one (1) new subfamily *Dclasvirinae*, including two (2) new genera in the family *Siphoviridae*. | | | | | |
| **Modules attached**  (Modules 1, 4 and either 2 or 3 are required. | | **1**  **2  3  4** | | | |
| **Author(s):** | | | | | |
| Héctor Ricardo Morbidoni— Universidad Nacional de Rosario (Argentina)  Andrew M. Kropinski—University of Guelph (Canada)  Jens H. Kuhn – National Institute of Allergy and Infectious Diseases (USA)  Evelien M. Adriaenssens—University of Liverpool (UK) | | | | | |
| **Corresponding author with e-mail address:** | | | | | |
| Andrew M. Kropinski Phage.Canada@gmail.com | | | | | |
| **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 (there are six virus subcommittees: animal DNA and retroviruses, animal ssRNA-, animal ssRNA+, fungal and protist, plant, bacterial and archaeal) | | | **ICTV Bacterial and Archaeal Viruses Subcommittee** | | |
| **ICTV Study Group comments (if any) and response of the proposer:** | | | | | |
|  | | | | | |
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| Date first submitted to ICTV: | | | | June 8, 2017 | |
| Date of this revision (if different to above): | | | |  | |

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| **ICTV-EC comments and response of the proposer:** |
|  |

**Part 2**: **PROPOSED TAXONOMY**

|  |
| --- |
| Present the proposed new taxonomy on accompanying spreadsheet |
| **Name of accompanying spreadsheet: 2017.007B.N.v1.Dclasvirinae** |

**Part 4:** **APPENDIX**: supporting material

| additional material in support of this proposal |
| --- |
| **Annex:**  Please explain the reasons for the taxonomic changes you are proposing and provide evidence to support them. The following information should be provided, where relevant:   * **Species demarcation criteria**: Explain how new species differ from others in the genus and demonstrate that these differences meet the criteria previously established for demarcating between species. If no criteriahave previously been established, and if there will now be more than one species in the genus, please state the demarcation criteria you are proposing. * Higher taxa:   + There is no formal requirement to state demarcation criteria when proposing new genera or other higher taxa. However, a similar concept should apply in pursuit of a rational and consistent virus taxonomy.   + Please indicate the **origin of names** assigned to new taxa at genus level and above.   + For each new genus a **type species** must be designated to represent it. Please explain your choice. * Supporting evidence: The use of Figures and Tables is strongly recommended (note that copying from publications will require permission from the copyright holder). For phylogenetic analysis, try to provide a tree where branch length is related to genetic distance. |
| **References:** | | |
| **A. General -**  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. 2013; 6:140. doi: 10.1186/1756-0500-6-140.  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. Agren J, Sundström A, Håfström T, Segerman B. Gegenees: fragmented alignment of multiple genomes for determining phylogenomic distances and genetic signatures unique for specified target groups. PLoS One. 2012;7(6):e39107.  **B. This TaxoProp Specifically**  5. Hatfull GF, Pedulla ML, Jacobs-Sera D, Cichon PM, Foley A, Ford ME, Gonda RM, Houtz JM, Hryckowian AJ, Kelchner VA, Namburi S, Pajcini KV, Popovich MG, Schleicher DT, Simanek BZ, Smith AL, Zdanowicz GM, Kumar V, Peebles CL, Jacobs WR Jr, Lawrence JG, Hendrix RW. Exploring the mycobacteriophage metaproteome: phage genomics as an educational platform. PLoS Genet. 2006;2(6):e92. [Plot]  6. Pope WH, Bowman CA, Russell DA, Jacobs-Sera D, Asai DJ, Cresawn SG, Jacobs WR, Hendrix RW, Lawrence JG, Hatfull GF; Science Education Alliance Phage Hunters Advancing Genomics and Evolutionary Science.; Phage Hunters Integrating Research and Education.; Mycobacterial Genetics Course.. Whole genome comparison of a large collection of mycobacteriophages reveals a continuum of phage genetic diversity. Elife. 2015;4:e06416. [Hawkeye] | | |

**Species demarcation:** We have chosen 95% DNA sequence identity as the criterion for demarcation of species in this new genus. The members of each of the proposed species differ from those of other species by more than 5% at the DNA level as confirmed with the BLASTN algorithm.

**Genus demarcation:**.

*Plotvirus*: The type species *Mycobacterium virus PLot* was chosen because it represents the first sequenced member of this genus. The name of the new genus was based on that of its first sequenced member, which was isolated in 2003 in Pittsburgh, PA, USA, by enrichment on *Mycobacterium smegmatis* mc²155. A number of related phages have been isolated (Table). The Mycobacterium phage PLot circularly permuted genome is 64.8 kb in length (65.5 mol% G+C) and encodes 89 proteins and 0 tRNAs. The Actinobacteriophage Database Cluster recognizes this phage as a member of the D1 subcluster. This virus shares 50% DNA sequence identity with Mycobacterium phage Hawkeye.

*Hawkeyevirus*: The type species *Mycobacterium virus Hawkeye* was chosen because it represents the first sequenced member of this genus. The name of the new genus was based on that of its first sequenced member, which was isolated in 2012 in Pittsburgh, PA, USA, by enrichment on *Mycobacterium smegmatis* mc²155. Only a single member of this genus exists with the following characteristics: circularly permuted 67.4 kb long (57.0 mol% G+C) genome, encoding 104 proteins and 0 tRNAs. The Actinobacteriophage Database Cluster recognizes this phage as a member of the D2 subcluster.

**Subfamily demarcation:** These phages all belong to The Actinobacteriophage Database Cluster D but can be clearly distinguished by DNA sequence identity, number of encoded proteins tRNAs, and phylogeny. They possess circularly permuted genomes.

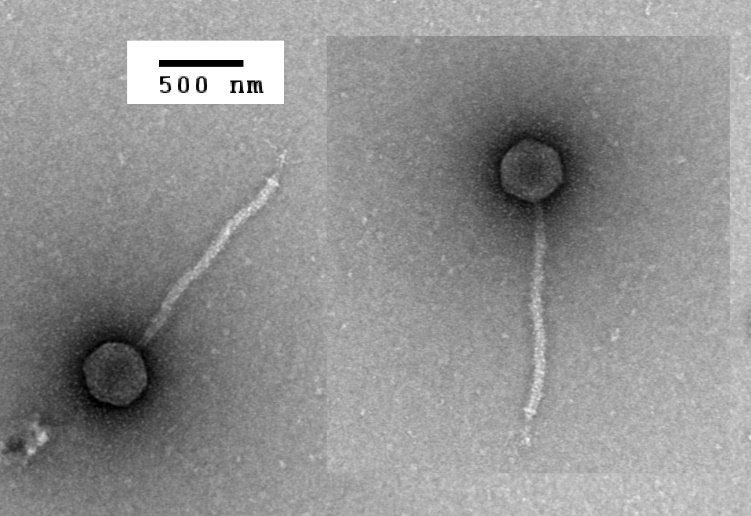
The name of this subfamily is a Sigil of “**D Cl**uster”

**Table 1**. Properties of the phages belonging to the genus *Dclasvirinae*.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Mycobacterium phage | RefSeq No. | GenBank accession No. | Genome length (kb) | %G+C | # proteins | # tRNA | % DNA  sequence  identity\* |
| **A. *Plotvirus* (new)** |  |  |  |  |  |  |  |
| PLot | NC\_008200 | DQ398051 | 64.79 | 59.7 | 89 | 0 | 100 |
| Butterscotch \*\*\* |  | FJ168660 |  |  |  |  | 98 |
| Troll4 \*\*\* |  | FJ168662 |  |  |  |  | 97 |
| PBI1 \*\*\* |  | DQ398047 |  |  |  |  | 97 |
| Adjutor \*\*\* |  | EU676000 |  |  |  |  | 97 |
| SirHarley \*\*\* |  | JF937107 |  |  |  |  | 96 |
| Gumball \*\*\* |  | FJ168661 |  |  |  |  | 96 |
| Nova \*\*\* |  | JN699014 |  |  |  |  | 95 |
|  |  |  |  |  |  |  |  |
| **B. *Hawkeyevirus* (new)** |  |  |  |  |  |  |  |
| Hawkeye | NC\_024209 | KJ194582 | 67.38 | 57.0 | 104 | 0 | 100 |

\* Determined using BLASTN; \*\*\* should be considered strains of the species *Mycobacterium virus Plot* within this genus

**Fig. 1.** Electron micrograph of negatively stained Mycobacterium phage PLot - Limited permission was granted by The Actinobacteriophages Database, funded by the Howard Hughes Medical Institute, to use this electron micrograph for this taxonomy proposal; it cannot be reused without permission of The Actinobacteriophages Database.



**Fig. 2.** Phylogenetic analysis of (A) large subunit terminase proteins, and (B) major capsid proteins Mycobacterium phage PLot-related viruses and variety of other phage proteins 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".

1. **TerL protein  
     
   **
2. **Major capsid protein**

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