

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

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| **Code assigned:** | **2020.063B** |  |
| **Short title:** Rename the genus *Alphaglobulovirus* and create two new species (*Globuloviridae*) | | |
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**Author(s) and email address(es)**

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**List the ICTV Study Group(s) that have seen this proposal**

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| Bacterial and Archaeal Viruses Subcommittee |

**ICTV study group comments and response of proposer**

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**Authority to use the name of a living person**

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| **Taxon name** | **Person from whom the name is derived** | **Permission attached (Y/N)** |
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**Submission dates**

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| Date first submitted to SC Chair | July 2020 |
| Date of this revision (if different to above) |  |

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

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**Part 3:** **TAXONOMIC PROPOSAL**

**Name of accompanying Excel module**

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| 2020.063B.R.Globuloviridae.xlsx |

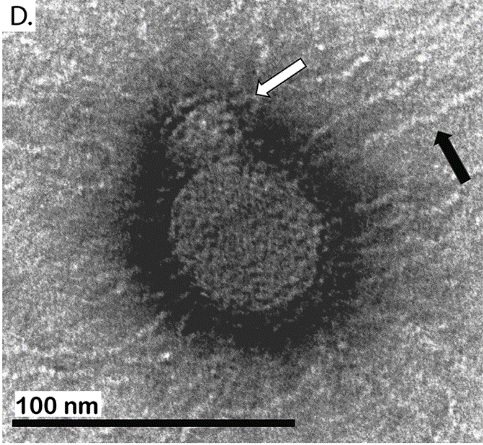
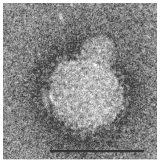
**Abstract**

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| Here we propose to create two new species, *Alphaglobulovirus PSV2* and *Alphaglobulovirus TSPV1*, in the genus *Alphaglobulovirus* of the family *Globuloviridae*, for classification of Pyrobaculum spherical virus 2 and Thermoproteus spherical piliferous virus 1. We also propose to rename the genus and the two existing species. |

**Text of proposal**

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| |  | | --- | | The family *Globuloviridae* comprises enveloped viruses with linear, double-stranded DNA genomes of about 21–28 kbp. The virions are spherical with a diameter of 70–100 nm. Globuloviruses infect hyperthermophilic archaea belonging to the genera *Pyrobaculum* and *Thermoproteus*, which thrive in extreme geothermal environments. Currently, the family includes two species, *Pyrobaculum spherical virus* and *Thermoproteus tenax spherical virus 1* [1]. Recently, two additional members of the family have been isolated and characterized [2,3].  The first of the two new viruses, Pyrobaculum spherical virus 2 (PSV2), produces spherical virions of around 90 ± 20 nm of diameter, with a variable number of bulging protrusions on their surface (Fig. 1A) [2]. PSV2 infects *Pyrobaculum arsenaticum* 2GA. The linear dsDNA genome of PSV2 is 18,212 bp in length and has a GC content of 45%. The coding region of the PSV2 genome is flanked by perfect 55 bp-long terminal inverted repeats (TIR), confirming the linear topology and (near) completeness of the genome. It contains 32 predicted open reading frames (ORFs), all located on the same strand. Homologs of PSV2 proteins were identified exclusively in members of the *Globuloviridae* (Fig. 2). Nineteen PSV2 ORFs, including those encoding the three major structural proteins (VP1-VP3), have closest homologs in PSV with amino acid sequence identities  ranging between 28% and 65%; 13 of these ORFs are also shared with Thermoproteus tenax spherical virus 1 (TTSV1; E < 1e−05). The remaining 13 PSV2 ORFs yielded no significant matches to sequences in public databases.  Virions of Thermoproteus spherical piliferous virus 1 (TSPV1) are 83 nm in diameter and, similar to PSV2, contain bulging protrusions on the surface [3]. However, unlike other globuloviruses, TSPV1 virions are decorated with multiple long fibers, which can be several hundreds of nanometers long (Fig. 1B). The function of these fibers remain unknown. TSPV1 is chronically produced by a *Thermoproteus* sp. strain CP80, originally isolated from Cinder Pool (NHSP103) in Yellowstone National Park [3]. TSPV1 genome is 18,655-bp linear dsDNA molecule with 102 bp-long ITRs and a GC% content of 56%. The TSPV1 genome codes for 31 putative gene. Eighteen of the 31 TSPV1 gene products (GP) are conserved in other members of the *Globuloviridae* (BLASTp E values < 1e-5). Fifteen of the 31 GPs are exclusively found in *Globuloviridae* members and are not found in other viral or cellular genomes.  Species demarcation criteria have not been previously proposed, due to scarcity of available representatives. We propose to use a 95% global genome identity as a species demarcation criterion, to be consistent with the thresholds used for other prokaryotic viruses. At the nucleotide sequence level, PSV2 and TSPV1 genomes display no appreciable similarity to each other or to other two globuloviruses, indicating considerable sequence diversity within the *Globuloviridae* family. We propose the following changes in the *Globuloviridae* family:   1. Renaming the genus *Globulovirus* to *Alphaglobulovirus*, to avoid confusion due to the same stem in the family and genus names. 2. Renaming the existing species to binomial format with freeform epithet, to match other proposed species. Hence, *Pyrobaculum spherical virus* and *Thermoproteus tenax spherical virus 1* would be renamed to *Alphaglobulovirus PSV* and *Alphaglobulovirus TTSV1*, respectively. 3. Classify PSV2 and TSPV1 into the species *Alphaglobulovirus PSV2* and *Alphaglobulovirus TSPV1*, respectively.   We note that the four species of globuloviruses are likely to be sufficiently divergent to justify their classification into four separate genera. However, until more genome sequences become available, we chose to classify them within the same genus. | |

**Supporting evidence**



A

B

**Figure 1.** Negatively stainedelectron micrograph of the Pyrobaculum spherical virus 2 (A) and Thermoproteus spherical piliferous virus 1 (B). White arrows point to the bulging protrusions, whereas black arrow in B points to the filaments decorating the virion. Scale bars: 100 nm. The micrographs in A and B are reproduced from [2] and [3], respectively.

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**Figure 2.** Genome maps of globuloviruses. The genomes were compared using tblasn mode in EasyFig [4].

**References**

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