**Metagenomics sequencing and analyses**

For Oxford Nanopore library preparation and sequencing, the method has been described in Prabhu et al 2024 (see supplementary text).

**Proposed names**

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| --- | --- | --- | --- | --- | --- | --- |
| **Proposed name** | **Taxonomic rank** | **Indian / English name** | **Gender** | **Pronunciation** | **Latin suffix** | **Meaning** |
| Apasiiviridae | Family | Apas = Apasia | Feminine | Ap-as | Apas | ancient water goddess in Indian mythology |
| Agniivirus | Genus | Agni = Agnia = the stem of the word is agni- | Masculine | Ag-nee | Agni | After the Hindu God Agni, as the fire of life on earth was born out of Apas, from ancient Indian mythology |
| Agniivirus brisbanense | Species | Agni, Brisbane | Masculine | Ag-nee, Br-s-ba-ne | Agni, Brisbane |  |
| Savitriivirus | Genus | Savitr = Savitria = the stem of the word savitri | Masculine | Sa-vi-tra | Savitr (letter "a" is half pronunciated, almost silent) | After the Hindu God Savitr, and is the fire of the sun and the child of the waters from ancient Indian mythology |
| Savitriivirus brisbanense | Species | Savitr, Brisbane | Masculine | Sa-vi-tra, Br-s-ba-ne | Savitr, Brisbane |  |
| Krittikaiviridae | Family | Krittika = Krittikaea => Krittika | Feminine | k-r-ih-t-ih-k-ah | Krittika | named after Krittika, a legendary princess and foster mother of Velan, who was bathing in an Indian river (Ganga) according to ancient Indian mythology |
| Velaniivirus | Genus | Velania = velani | Masculine | Ve-lan | Velan | named after Velan, the child of Krittika, born and flowed in the waters, according to ancient Indian mythology |
| Velaniivirus brisbanense | Species | Velan, Brisbane | Masculine | ve-lan, Br-s-ba-ne | Velan, Brisbane |  |
| Adrikaivirales | Order | Adrika = adrikaea | Feminine | Ah-d-r-ih-k-ah | Adrika | named after the Adrika belonging to cursed apsara (celestial nymph), who took form of a fish in ancient Indian mythology |
| Satyavatiiviridae | Family | Satyavati = Satyavatia | Feminine | s-uh-t-y-uh-v-uh-t-ee | Satyavati | named after Satyavati, the child of Adrika, who later became an ancient Indian Queen in ancient Indian mythology |
| Vyasaivirus | Genus | Vyasa = Vyasaea | Masculine | v-y-uh-s-aa | Vyasa |  |
| Vyasaivirus brisbanense | Species | Vyasa, Brisbane | Masculine | v-y-uh-s-aa, Br-s-ba-ne | Vyasa, Brisbane | named after Vyasa, the child of Satyavati, a revered sage who compiled the Vedas in ancient Indian mythology |

**Viral host assignments**

Our host assignments were based on predictions by iPHoP, a recently published software that contains a suite of prediction methods, i.e. BLASTn, CRISPR, WIsH, PHP, RaFaH (REF). iPHoP calculates a composite score based on top three host-based (BLASTn, CRISPR, WIsH, PHP) scores that is considered alongside a phage-based (RaFaH) score. Table S8 provides the iPHoP output for our data set, and the main predictions method is indeed BLAST, whereas other predicted scores like iPhoP-RF are less common.

In particular, Agnivirus (group A), and Vyasaivirus (novel Poseidoniales viruses) had blast scores >= 91% and added prediction from iPHoP-RF (Table S8, Fig 7). Savitriivirus (group A) and Velanivirus (group E) were predicted by blast alone and had predicted scores of >= 95 and >= 91 respectively. iPHoP reports confidence scores ranging from 75-100, but the authors suggest that only confidence scores ≥90 are reliable for host genus prediction. Furthermore, iPHoP considers only blast hits with ≥ 80% identity and ≥ 500bp. Hits covering ≥ 50% of the length of a "host" contig are ignored as these are often derived from contigs that are nearly or entirely viral, and could represent contaminants in genomes or MAGs and are thus not reliable for host prediction.

MAGs can contain erroneous contigs (contamination) and these could create erroneous virus host assignments. In our data set, the estimated contamination of all *Poseidoniales* MAGs identified as possible hosts was low, with an average of 2.40%, suggesting that erroneous virus host assignments are not common. However, to explore this matter further we have now evaluated all MAG contigs that were used to establish virus host assignments for Poseidoniales, to see if they are bona fide parts of the MAGs, or could be a possible contamination.

The hosts of *Vyasavirus* (novel order) and also of *Agnivirus* (groupA) were predicted based on BLASTn and iPHoP-RF (see above). Host assignments based on iPHoP-RF restrict further refinement, since this machine learning approach does not provide any matching host contigs, but only the host genome and a prediction score. We therefore investigated the BLASTn based results, i.e. the host contigs identified by BLASTn. The Agnivirus host BLASTtn results were based on two contigs from the same MAG (Table S17). Both were relatively short (1,9 and 2,3kb), had no meaningful BLASTn hits (max 3% coverage, hypothetical proteins), besides self-hits and hits to Agnivirus. The Vyasavirus (novel *Poseidoniales* viruses) host BLASTn results were based on one 12kb contig, that also had no meaningful BLASTn hits (max 26% coverage, hypothetical proteins), except for self-hits. An additional BLASTx analysis confirmed these result and revealed only self hits, i.e. 100% identity of hypothetical proteins that were all linked to the genome “NZGQ01000106.1” which has the taxonomic assignment  “Archaea; Methanobacteriati; Methanobacteriota” at NCBI. However, further analysis revealed that this genome bin (GCA\_002689565.1) is misclassified at NCBI and that the same bin is assigned to the order Poseidoniales at GTDB (https://gtdb.ecogenomic.org/genome?gid=GCA\_002689565.1), and is actually the host genome identified in our analysis.   
These results demonstrate that the contig identified by BLASTn-based host assignments of Vyasavirus is very likely not a contamination, since we found no BLASTn/BLASTx hits to other archaeal or bacterial taxa. The origin of this 12kb contig, e.g. if it is a remnant of a viral infection and/or a unique part of this Poseidoniales lineage that does not occur in other Poseidoniales taxa, cannot be established at this point.