ICTV Virus Taxonomy Profile: Partitiviridae

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Abstract

The Partitiviridae is a family of small, isometric, non-enveloped viruses with bisegmented double-stranded (ds) RNA genomes of 3–4.8 kbp. The two genome segments are individually encapsidated. The family has five genera, with characteristic hosts for members of each genus: either plants or fungi for genera Alphapartitivirus and Betapartitivirus, fungi for genus Gammapartitivirus, plants for genus Deltapartitivirus and protozoa for genus Cryspovirus. Partitiviruses are transmitted intracellularly via seeds (plants), oocysts (protozoa) or hyphal anastomosis, cell division and sporogenesis (fungi); there are no known natural vectors. This is a summary of the International Committee on Taxonomy of Viruses (ICTV) Report on the taxonomy of the Partitiviridae, which is available at www.ictv.global/report/partitiviridae.

Table 1. Characteristics of the family Partitiviridae

| Typical member: Atkinsonella hypoxylon virus, 2H (RNA1, L39125; RNA2, L39126), species Atkinsonella hypoxylon virus, genus Betapartitivirus | Genome | 3–4.8 kbp of linear bisegmented dsRNA |
| Virion | Isometric, non-enveloped, 25–43 nm in diameter; dsRNA1 and dsRNA2 are separately encapsidated |
| Replication | Cytoplasmic. Genomic RNA acts as a template for mRNA synthesis within the virus particle; transcription occurs by a semiconservative mechanism |
| Translation | From monocistronic positive-sense transcripts of both genomic dsRNAs |
| Host range | Plants, fungi and protozoa |
| Taxonomy | Five genera, including >40 species, and 15 species unassigned to a genus |

VIRION

Virus particles are isometric, non-enveloped, and 25–43 nm in diameter (Table 1, Fig. 1a, b). Each capsid is composed of 120 copies of a single protein arranged as 60 dimers with T=1 icosahedral symmetry [1]. Dimeric surface protrusions are frequently observed on viral capsids. One or two molecules of RNA-dependent RNA polymerase (RdRP) are packaged inside each particle [2].

REPLICATION

Each dsRNA is monocistronic. The RdRP is believed to function as both a transcriptase and a replicase and catalyzes in vitro end-to-end transcription of each dsRNA to produce mRNA by a semi-conservative mechanism. Virions accumulate in the cytoplasm.

GENOME

Members of all five genera possess two essential genome segments, dsRNA1 and dsRNA2, each containing one large ORF on the positive-strand RNA molecule (Fig. 2). The smaller of the two dsRNA genome segments usually encodes the coat protein (CP) and the larger usually encodes the virion-associated RNA polymerase. The linear dsRNA segments are separately encapsidated. Additional dsRNA segments (satellite or defective) may also be present.

TAXONOMY

Alphapartitivirus

Members of the genus Alphapartitivirus infect either plants, or ascomycetous or basidiomycetous fungi. The two
essential dsRNA genome segments are individually about 1.9–2.0 kbp (dsRNA1) and 1.7–1.9 kbp (dsRNA2), typically containing a poly(A) tract near the plus-strand 3′-terminus. There is a single major CP with predicted Mr of 51–57 kDa. Plant alphapartitiviruses cause persistent infections, whereas some fungal alphapartitiviruses cause host effects, such as hypovirulence or a reduced growth rate [3, 4].

**Betapartitivirus**

Members of the genus *Betapartitivirus* infect either plants, or ascomycetous or basidiomycetous fungi. The two essential dsRNA genome segments are about 2.2–2.4 kbp (dsRNA1) and 2.1–2.4 kbp (dsRNA2), typically containing a poly(A) tract near the plus-strand 3′-terminus. There is a single major CP with predicted Mr of 71–77 kDa. Plant betapartitiviruses cause persistent infections [5, 6]. Some fungal betapartitiviruses cause reduced host virulence and changes in colony morphology [7].

**Gammapartitivirus**

All known members of the genus *Gammapartitivirus* infect ascomycetous fungi. The two essential dsRNA segments are about 1.6–1.8 kbp (dsRNA1) and 1.4–1.6 kbp (dsRNA2). There is a single major CP with predicted Mr of 44–47 kDa. Most gammapartitiviruses seem to induce latent infections. *Aspergillus fumigatus* partitivirus 1, a related, unclassified virus, has been associated with host effects.

**Deltapartitivirus**

All known members of the genus *Deltapartitivirus* induce persistent infections in plants [8]. They are transmitted by ovule and pollen to the seed embryo. The two essential dsRNA segments are individually 1.6–1.7 kbp (dsRNA1) and 1.4–1.6 kbp (dsRNA2). There is a single major CP with predicted Mr of 38–49 kDa.

**Cryspovirus**

Members of the genus *Cryspovirus* infect apicomplexan protozoa of the genus *Cryptosporidium* [9]. The viral genome comprises two dsRNA segments, which are individually 1.5 and 1.8 kbp. There is a single major CP with predicted Mr of 37 kDa. Virions are disseminated within *Cryptosporidium* oocysts. Infections of the *Cryptosporidium* host cells appear to be latent.

**RESOURCES**


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**Conflicts of interest**

The authors declare that there are no conflicts of interest.

**References**