ICTV Virus Taxonomy Profile: Plasmaviridae
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ICTV Virus Taxonomy Profile: *Plasmaviridae*

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**Abstract**

The family *Plasmaviridae* includes bacterial viruses with slightly pleomorphic, enveloped virions with a diameter of 50–125 nm. Virions contain infectious, circular, supercoiled dsDNA molecule(s) of approximately 12 kbp. Plasmaviruses infect *Acholeplasma* species, wall-less bacteria of the class Mollicutes, and are released by budding through the cell membrane without causing host cell lysis. Although the temperate bacteriophage *Acholeplasma* virus L2 of *Acholeplasma laidlawii* is currently the only classified plasmavirus, related prophages reside in the genomes of different *Acholeplasma* species, where they are integrated into tRNA genes. This is a summary of the International Committee on Taxonomy of Viruses (ICTV) Report on the taxonomy of the *Plasmaviridae*, which is available at www.ictv.global/report/plasmaviridae.

**Table 1. Characteristics of the family *Plasmaviridae***

<table>
<thead>
<tr>
<th>Typical member:</th>
<th>*Acholeplasma virus L2 (L13696), species <em>Acholeplasma virus L2</em>, genus <em>Plasmavirus</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Virion</td>
<td>Enveloped, pseudo-spherical and pleomorphic virions (diameter 50–125 nm)</td>
</tr>
<tr>
<td>Genome</td>
<td>Circular, supercoiled dsDNA (11 965bp)</td>
</tr>
<tr>
<td>Replication</td>
<td>DNA replication is bidirectional from two origins and is dependent on the host DNA replisome; virions are released by budding</td>
</tr>
<tr>
<td>Translation</td>
<td>Translational coupling or re-initiation may be involved in translation of the viral polycistronic mRNAs by the host translation machinery</td>
</tr>
<tr>
<td>Host range</td>
<td><em>Acholeplasma</em> species; non-lytic</td>
</tr>
<tr>
<td>Taxonomy</td>
<td>Single genus with a single species</td>
</tr>
</tbody>
</table>

**VIRION**

Virions are quasi-spherical, slightly pleomorphic, enveloped and about 80 nm (range 50–125 nm) in diameter (Table 1, Fig. 1). At least three distinct virion forms are produced during infection, which have the same protein composition, but vary with respect to the number of encapsidated genome copies (from one to three) [1]. Thin sections show virions with electron-dense cores, presumably containing condensed DNA [2]. Virion assembly is coupled to virion release from the infected cells [3]. The absence of a regular capsid structure suggests plasmavirus virions consist of a condensed nucleoprotein bounded by a proteinaceous lipid vesicle.

**GENOME**

The genome of *Acholeplasma* virus L2 (AVL2) consists of a circular, negatively supercoiled dsDNA molecule of 11 965 bp, with a G+C content of 32%. The genome is infectious when introduced into the cell interior. All 15 annotated ORFs are encoded on one strand and start with an ATG codon (Fig. 2). Each of the ORFs has an upstream Shine–Dalgarno sequence. Several genes are translated from overlapping reading frames. Translational coupling or re-initiation may be involved in translation of the viral polycistronic mRNAs [4].

**REPLICATION**

Virus entry is thought to occur by fusion of viral and host cell membranes, resulting in delivery of the nucleoprotein core into the cell [3]. The DNA genome replicates bidirectionally from two ori sites, each containing a DnaA box bounded by AT-rich 6-mer repeats [5]. Both ori sites are located within intergenic regions of the genome. Replication of the parental DNA is membrane-associated and depends on the host DNA replisome, including DNA polymerase III and DNA gyrase. Plasmaviruses are temperate and establish lysogeny by site-specifically integrating into the host chromosome with the aid of virus-encoded recombinase [6].
Virus production can be reactivated by mitomycin C treatment or UV irradiation. Progeny virions appear to be released by budding through the cell membrane without causing cell lysis [2, 7].

**TAXONOMY**

The single genus *Plasmavirus* includes the single species *Acholeplasma virus L2*. Related, unclassified, viruses have been reported but their genome sequences are not available. Apparently functional proviruses related to AVL2 are integrated in the genomes of several *Acholeplasma* species. Except for the integrase, plasmaviruses do not share homologous proteins with other known viruses.

**RESOURCES**


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**Conflicts of interest**

The authors declare that there are no conflicts of interest.

**References**

1. Poddar SK, Cadden SP, Das J, Maniloff J. Heterogeneous progeny viruses are produced by a budding enveloped phage. *Intervirology* 1985;23:208–221.

**Fig. 1.** Electron micrograph of *Acholeplasma* virus L2 virions negatively stained with uranyl acetate. Bar, 100 nm. Modified, with permission from the Microbiology Society, from Gourlay [8].

**Fig. 2.** Genome map of *Acholeplasma* virus L2. The base on the 3’-side of the single BstEII cleavage site is taken as the first base of the DNA sequence. The map also shows locations of the viral attachment site (attP) and the two DNA replication origin sites (ori1 and ori2). ORFs are shown in yellow, whereas intergenic regions are in turquoise. ORF13* has a translation start site 295 codons downstream from that of ORF13 and is in the same reading frame.