



ICTV Virus Taxonomy Profile: *Pospiviroidae*

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Abstract

Members of the family *Pospiviroidae* have single-stranded circular RNA genomes that adopt a rod-like or a quasi-rod-like conformation. These genomes contain a central conserved region that is involved in replication in the nucleus through an asymmetric RNA–RNA rolling-circle mechanism. Members of the family *Pospiviroidae* lack the hammerhead ribozymes that are typical of viroids classified in the family *Avsunviroidae*. The family *Pospiviroidae* includes the genera *Apscaviroid*, *Cocadviroid*, *Coleviroid*, *Hostuviroid* and *Pospiviroid*, with >25 species. This is a summary of the ICTV Report on the family *Pospiviroidae*, which is available at ictv.global/report/pospiviroidae.

Table 1. Characteristics of members of the family *Pospiviroidae*

Example:	potato spindle tuber viroid (V01465), species <i>Potato spindle tuber viroid</i> , genus <i>Pospiviroid</i>
Genome	Single-stranded circular RNA of 246–375 nt that adopts a rod-like or quasi-rod-like conformation of minimum free energy and contains typical conserved motifs
Replication	Mediated by nuclear DNA-dependent RNA polymerase II, with oligomeric RNAs of (+) polarity cleaved by a type III RNase and circularized by DNA ligase I
Translation	Absent
Host range	Plants (dicotyledons and some monocotyledons)
Taxonomy	Several genera including >25 species

GENOME

Members of the family *Pospiviroidae* have circular single-stranded RNA genomes of a few hundred nucleotides. They may assume rod-like or quasi-rod-like conformations containing a central conserved region (CCR) and a terminal conserved hairpin (TCH) or a terminal conserved region (TCR) (Table 1, Fig. 1) [1–3]. The G+C content is >50%. The genome of viroids does not encode any proteins.

REPLICATION

Replication is nuclear and mediated by DNA-dependent RNA polymerase II, which is redirected to use RNA templates through an asymmetric RNA–RNA rolling-circle mechanism. Circular RNA molecules of (+) polarity (by convention the most abundant strand *in vivo*) are repeatedly transcribed into oligomeric complementary (–) RNAs. Such intermediates serve as templates for generating oligomeric (+) RNAs that are cleaved by a

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Abbreviations: CCR, central conserved region; TCH, terminal conserved hairpin; TCR, terminal conserved region.

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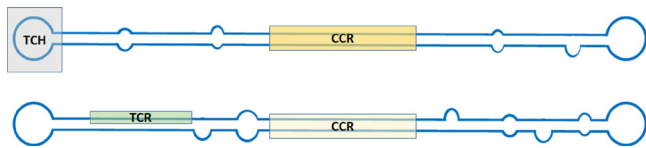


Fig. 1. Rod-like structure models for viroids. The positions of the central conserved region (CCR), the terminal conserved region (TCR) and the terminal conserved hairpin (TCH) are indicated by shading. The sequence-specific TCH and TCR elements have never been found together in the same viroid.

host enzyme of the RNase III class. The termini of the resulting linear monomers are ligated by the host DNA ligase 1 to generate the mature circular viroid RNA [4]. In contrast to members of the family *Avsunviroidae*, the (–) oligomeric RNAs of members of the family *Pospiviroidae* are not cleaved and do not generate the corresponding circular forms.

TAXONOMY

Current taxonomy: ictv.global/taxonomy. Demarcation of genera is based upon the type of CCR and the presence of a TCH or TCR (Fig. 1), as well as phylogenetic clustering in trees based upon whole-genome sequences (Fig. 2). Species demarcation criteria include there being <90% sequence identity and distinct biological properties with respect to other members of the genus [5]. Members of the genus *Pospiviroid*, such as potato spindle tuber viroid, share the same CCR and have a TCR. Most infect herbaceous hosts, mainly solanaceous species. Hostuviroids, such as hop stunt viroid, share the same CCR and have a TCH, except for members of the species *Dahlia latent viroid*, which have a TCR instead of the TCH. Hop stunt viroid has a wide natural host range, while dahlia latent viroid is restricted to *Dahlia* spp. Cocadviroids, such as coconut cadang-cadang viroid, share the same CCR and have a TCH. Some members infect monocotyledons, while others can only infect dicotyledons. Apscaviroids, such as apple scar skin viroid, share the same CCR and have a TCR. Apscaviroids mainly infect woody plants. Coleviroids, such as *Coleus blumei* viroid 1, share the same CCR and have a TCR or a TCH. The natural host range of coleviroids is restricted to species in the genus *Coleus*.

RESOURCES

Full ICTV Report on the family *Pospiviroidae*: ictv.global/report/pospiviroidae.

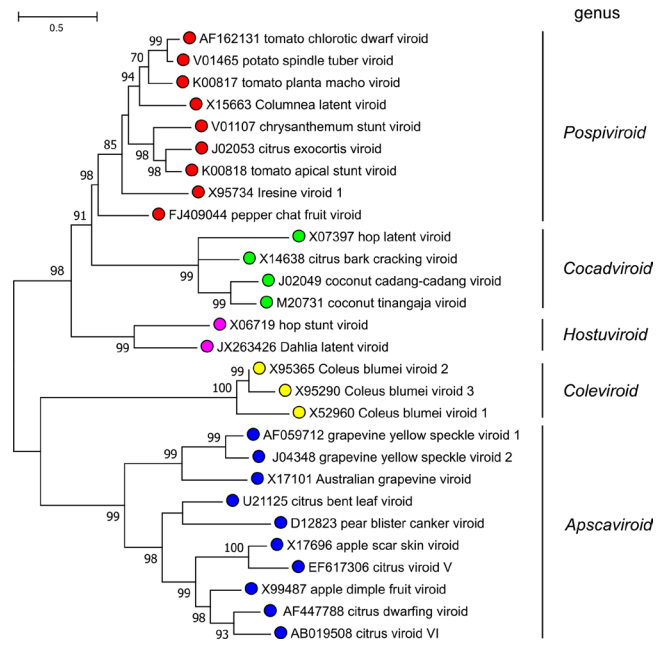


Fig. 2. Phylogenetic tree of viroid sequences. Maximum-likelihood analysis was conducted with MEGAX [6]. Nodes are labelled with bootstrap support (1000 replicates) where this was >70%.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

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