**RNA virus**

From Wikipedia, the free encyclopedia

An **RNA virus** is a [virus](http://en.wikipedia.org/wiki/Virus) that has [RNA](http://en.wikipedia.org/wiki/RNA) (ribonucleic acid) as its [genetic material](http://en.wikipedia.org/wiki/Genetic_material).[[1]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-1) This [nucleic acid](http://en.wikipedia.org/wiki/Nucleic_acid) is usually single-stranded RNA (ssRNA), but may be double-stranded RNA (dsRNA).[[2]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Pattonrnav-2) Notable human diseases caused by RNA viruses include [SARS](http://en.wikipedia.org/wiki/SARS), [influenza](http://en.wikipedia.org/wiki/Influenza), [hepatitis C](http://en.wikipedia.org/wiki/Hepatitis_C), [West Nile fever](http://en.wikipedia.org/wiki/West_Nile_fever), [polio](http://en.wikipedia.org/wiki/Polio) and [measles](http://en.wikipedia.org/wiki/Measles).

The [ICTV](http://en.wikipedia.org/wiki/International_Committee_on_Taxonomy_of_Viruses) classifies RNA viruses as those that belong to *Group III*, *Group IV* or *Group V* of the [Baltimore classification](http://en.wikipedia.org/wiki/Virus_classification#Baltimore_classification) system of classifying viruses, and does not consider viruses with [DNA](http://en.wikipedia.org/wiki/DNA) intermediates in their life cycle as RNA viruses.[[3]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-titleListing_in_Taxonomic_Order.E2.80.94Index_to_ICTV_Species_Lists-3) Viruses with RNA as their genetic material but that include DNA intermediates in their replication cycle are called [retroviruses](http://en.wikipedia.org/wiki/Retrovirus), and comprise *Group VI* of the Baltimore classification. Notable human retroviruses include [HIV-1](http://en.wikipedia.org/wiki/HIV-1) and [HIV-2](http://en.wikipedia.org/wiki/HIV-2), the cause of the disease [AIDS](http://en.wikipedia.org/wiki/AIDS).

Another term for RNA viruses that explicitly excludes retroviruses is **ribovirus**.[[4]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-pmid10570172-4)

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**Characteristics**

**Single-stranded RNA viruses and RNA Sense**

RNA viruses can be further classified according to the sense or polarity of their RNA into [negative-sense](http://en.wikipedia.org/wiki/Sense_(molecular_biology)) and [positive-sense](http://en.wikipedia.org/wiki/Sense_(molecular_biology)), or ambisense RNA viruses. Positive-sense viral RNA is similar to [mRNA](http://en.wikipedia.org/wiki/MRNA) and thus can be immediately [translated](http://en.wikipedia.org/wiki/Translation_(genetics)) by the host cell. Negative-sense viral RNA is complementary to mRNA and thus must be converted to positive-sense RNA by an [RNA polymerase](http://en.wikipedia.org/wiki/RNA_polymerase) before translation. As such, purified RNA of a positive-sense virus can directly cause infection though it may be less infectious than the whole virus particle. Purified RNA of a negative-sense virus is not infectious by itself as it needs to be [transcribed](http://en.wikipedia.org/wiki/Transcription_(genetics)) into positive-sense RNA; each [virion](http://en.wikipedia.org/wiki/Virion) can be transcribed to several positive-sense RNAs. [Ambisense](http://en.wikipedia.org/wiki/Ambisense) RNA viruses resemble negative-sense RNA viruses, except they also translate genes from the positive strand.[[5]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-5)

**Double-stranded RNA viruses**

The [double-stranded (ds)RNA viruses](http://en.wikipedia.org/wiki/Double-stranded_RNA_viruses) represent a diverse group of viruses that vary widely in host range (humans, animals, plants, [fungi](http://en.wikipedia.org/wiki/Fungi), and [bacteria](http://en.wikipedia.org/wiki/Bacteria)), [genome](http://en.wikipedia.org/wiki/Genome) segment number (one to twelve), and [virion](http://en.wikipedia.org/wiki/Virion) organization (T-number, [capsid](http://en.wikipedia.org/wiki/Capsid) layers, or turrets). Members of this group include the [rotaviruses](http://en.wikipedia.org/wiki/Rotavirus), renowned globally as the most common cause of [gastroenteritis](http://en.wikipedia.org/wiki/Gastroenteritis) in young children, [picobirnaviruses](http://en.wikipedia.org/wiki/Picobirnavirus), renowned worldwide as the most commonly occurring virus in fecal samples of both humans and animals with or without signs of diarrhea. [Picobirnaviruses](http://en.wikipedia.org/wiki/Picobirnavirus), have also been recently reported in respiratory tract samples of pigs and [bluetongue virus](http://en.wikipedia.org/wiki/Bluetongue_virus),[[6]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-sobrino7-6)[[7]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-roy2-7) an economically important pathogen of cattle and sheep. In recent years, remarkable progress has been made in determining, at atomic and subnanometeric levels, the structures of a number of key viral proteins and of the virion capsids of several dsRNA viruses, highlighting the significant parallels in the structure and replicative processes of many of these viruses.[[2]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Pattonrnav-2)

**Mutation rates**

RNA viruses generally have very high [mutation](http://en.wikipedia.org/wiki/Mutation) rates compared to [DNA viruses](http://en.wikipedia.org/wiki/DNA_virus), because viral RNA polymerases lack the proof-reading ability of [DNA polymerases](http://en.wikipedia.org/wiki/DNA_polymerase).[[8]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Klein-8)[[9]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-9) This is one reason why it is difficult to make effective [vaccines](http://en.wikipedia.org/wiki/Vaccines) to prevent diseases caused by RNA viruses.[[10]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-pmid3318675-10) Retroviruses also have a high mutation rate even though their DNA intermediate integrates into the host genome (and is thus subject to host DNA proofreading once integrated), because errors during reverse transcription are embedded into both strands of DNA before integration.[[11]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-pmid20846038-11) Some genes of RNA virus are important to the viral replication cycles and mutations are not tolerated. For example, the region of the[hepatitis C virus](http://en.wikipedia.org/wiki/Hepatitis_C_virus) genome that encodes the core protein is [highly conserved](http://en.wikipedia.org/wiki/Conserved_sequence),[[12]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-pmid8058787-12) because it contains an RNA structure involved in an [internal ribosome entry site](http://en.wikipedia.org/wiki/Internal_ribosome_entry_site).[[13]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-pmid15448367-13)

**Replication**

Animal RNA viruses are [classified](http://www.ncbi.nlm.nih.gov/ICTVdb/Ictv/fr-fst-g.htm) into three distinct groups depending on their genome and mode of replication (and the numerical groups based on the older [Baltimore classification](http://en.wikipedia.org/wiki/Virus_classification#Baltimore_classification)):

* [Double-stranded RNA viruses](http://en.wikipedia.org/wiki/Double-stranded_RNA_viruses) (Group III) contain from one to a dozen different RNA molecules, each of which coding for one or more viral proteins.
* [Positive-sense ssRNA viruses](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#Group_IV_-_positive-sense_ssRNA_viruses) (Group IV) have their genome directly utilized as if it were mRNA, with host [ribosomes](http://en.wikipedia.org/wiki/Ribosomes) translating it into a single protein that is modified by host and viral proteins to form the various proteins needed for replication. One of these includes [RNA-dependent RNA polymerase](http://en.wikipedia.org/wiki/RNA-dependent_RNA_polymerase) (RNA replicase), which copies the viral RNA to form a double-stranded replicative form. In turn this directs the formation of new virions.
* [Negative-sense ssRNA viruses](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#Group_V_-_negative-sense_ssRNA_viruses) (Group V) must have their genome copied by an [RNA-dependent RNA polymerase](http://en.wikipedia.org/wiki/RNA-dependent_RNA_polymerase) to form positive-sense RNA. This means that the virus must bring along with it the RNA replicase enzyme. The positive-sense RNA molecule then acts as viral mRNA, which is translated into proteins by the host[ribosomes](http://en.wikipedia.org/wiki/Ribosomes). The resultant protein goes on to direct the synthesis of new virions, such as [capsid](http://en.wikipedia.org/wiki/Capsid) proteins and RNA replicase, which is used to produce new negative-sense RNA molecules.

[Retroviruses](http://en.wikipedia.org/wiki/Retrovirus) (Group VI) have a single-stranded RNA genome but, in general, are not considered RNA viruses because they use DNA intermediates to replicate. [Reverse transcriptase](http://en.wikipedia.org/wiki/Reverse_transcriptase), a viral enzyme that comes from the virus itself after it is uncoated, converts the viral RNA into a complementary strand of DNA, which is copied to produce a double-stranded molecule of viral DNA. After this DNA is integrated into the host genome using the viral enzyme [integrase](http://en.wikipedia.org/wiki/Integrase), expression of the encoded genes may lead to the formation of new virions.

**Classification**

Classification of the RNA viruses has proven to be a difficult problem. This is in part due to the high mutation rates these genomes undergo. Classification is based principally on the type of genome (double-stranded, negative- or positive-single-strand) and gene number and organisation. Currently there are 5 orders and 47 families of RNA viruses recognised. There are also many unassigned species and genera.

Related to but distinct from the RNA viruses are the [viroids](http://en.wikipedia.org/wiki/Viroid) and the [RNA satellite viruses](http://en.wikipedia.org/wiki/Satellite_(biology)). These are not currently classified as RNA viruses and are described on their own pages.

**Positive strand RNA viruses**

This is the single largest group of RNA viruses with 30 families. Attempts have been made to group these families in higher orders. These proposals were based on an analysis of the RNA polymerases and are still under consideration. To date, the suggestions proposed have not been broadly accepted because of doubts over the suitability of a single gene to determine the taxonomy of the clade.

The proposed classification of positive-strand RNA viruses is based on the RNA-dependent RNA polymerase. Three groups have been recognised:[[14]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Koonin-14)

I. Bymoviruses, comoviruses, nepoviruses, nodaviruses, picornaviruses, potyviruses, sobemoviruses and a subset of luteoviruses (beet western yellows virus and potato leafroll virus)—the picorna like group (Picornavirata).

II. Carmoviruses, dianthoviruses, flaviviruses, pestiviruses, tombusviruses, single-stranded RNA bacteriophages, hepatitis C virus and a subset of luteoviruses (barley yellow dwarf virus)—the flavi like group (Flavivirata).

III. Alphaviruses, carlaviruses, furoviruses, hordeiviruses, potexviruses, rubiviruses, tobraviruses, tricornaviruses, tymoviruses, apple chlorotic leaf spot virus, beet yellows virus and hepatitis E virus—the alpha like group (Rubivirata).

A division of the alpha-like (Sindbis-like) supergroup on the basis of a novel domain located near the N termini of the proteins involved in viral replication has been proposed.[[15]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Rozanov1992-15) The two groups proposed are: the 'altovirus' group (alphaviruses, furoviruses, hepatitis E virus, hordeiviruses, tobamoviruses, tobraviruses, tricornaviruses and probably rubiviruses); and the 'typovirus' group (apple chlorotic leaf spot virus, carlaviruses, potexviruses and tymoviruses).

The alpha like supergroup can be further divided into three [clades](http://en.wikipedia.org/wiki/Clades): the rubi-like, tobamo-like, and tymo-like viruses.[[16]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Koonin1993-16)

Additional work has identified five groups of positive-stranded RNA viruses containing four, three, three, three, and one order(s), respectively.[[17]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Ward1993-17) These fourteen orders contain 31 virus families (including 17 families of plant viruses) and 48 genera (including 30 genera of plant viruses). This analysis suggests that alphaviruses and flaviviruses can be separated into two families—the Togaviridae and Flaviridae, respectively—but suggests that other taxonomic assignments, such as the pestiviruses, hepatitis C virus, rubiviruses, hepatitis E virus, and arteriviruses, may be incorrect. The coronaviruses and toroviruses appear to be distinct families in distinct orders and not distinct genera of the same family as currently classified. The luteoviruses appear to be two families rather than one, and apple chlorotic leaf spot virus appears not to be a closterovirus but a new genus of the Potexviridae.

**Evolution**

The evolution of the picornaviruses based on an analysis of their RNA polymerases and [helicases](http://en.wikipedia.org/wiki/Helicase) appears to date to the divergence of the [eukaryotes](http://en.wikipedia.org/wiki/Eukaryote).[[18]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Koonin2008-18) Their putative ancestors include the bacterial group II [retroelements](http://en.wikipedia.org/wiki/Retroelement), the family of HtrA [proteases](http://en.wikipedia.org/wiki/Protease) and DNA [bacteriophages](http://en.wikipedia.org/wiki/Bacteriophage).

**Double-stranded RNA viruses**

This analysis also suggests that the dsRNA viruses are not closely related to each other but instead belong to four additional classes—Birnaviridae, Cystoviridae, Partitiviridae, and Reoviridae — and one additional order (Totiviridae) of one of the classes of positive ssRNA viruses in the same subphylum as the positive-strand RNA viruses.

One study has suggested a that there are two large clades: One includes the Caliciviridae, Flaviviridae, and Picornaviridae families and a second that includes the Alphatetraviridae, Birnaviridae and Cystoviridae, Nodaviridae, and Permutotretraviridae families.[[19]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Gibrat2013-19)

**Group III—dsRNA viruses**

There are nine families and a number of unassigned genera and species recognised in this group.[[8]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Klein-8)

* Family [Birnaviridae](http://en.wikipedia.org/wiki/Birnaviridae)
* Family [Chrysoviridae](http://en.wikipedia.org/wiki/Chrysoviridae)
* Family [Cystoviridae](http://en.wikipedia.org/wiki/Cystoviridae)
* Family [Endornaviridae](http://en.wikipedia.org/wiki/Endornaviridae)
* Family [Hypoviridae](http://en.wikipedia.org/wiki/Hypoviridae)
* Family [Megabirnaviridae](http://en.wikipedia.org/w/index.php?title=Megabirnaviridae&action=edit&redlink=1)
* Family [Partitiviridae](http://en.wikipedia.org/wiki/Partitiviridae)
* Family [Picobirnaviridae](http://en.wikipedia.org/wiki/Picobirnaviridae)
* Family [Reoviridae](http://en.wikipedia.org/wiki/Reoviridae)—includes [Rotavirus](http://en.wikipedia.org/wiki/Rotavirus)
* Family [Totiviridae](http://en.wikipedia.org/wiki/Totiviridae)
* Unassigned species
  + [*Botrytis porri RNA virus 1*](http://en.wikipedia.org/w/index.php?title=Botrytis_porri_RNA_virus_1&action=edit&redlink=1)
  + [*Circulifer tenellus virus 1*](http://en.wikipedia.org/w/index.php?title=Circulifer_tenellus_virus_1&action=edit&redlink=1)
  + [*Cucurbit yellows associated virus*](http://en.wikipedia.org/w/index.php?title=Cucurbit_yellows_associated_virus&action=edit&redlink=1)
  + [*Sclerotinia sclerotiorum debilitation-associated virus*](http://en.wikipedia.org/w/index.php?title=Sclerotinia_sclerotiorum_debilitation-associated_virus&action=edit&redlink=1)
  + [*Spissistilus festinus virus 1*](http://en.wikipedia.org/w/index.php?title=Spissistilus_festinus_virus_1&action=edit&redlink=1)

**Group IV—positive-sense ssRNA viruses**

There are three orders and 33 families recognised in this group. In addition, there are a number of unclassified species and genera.

* Order [Nidovirales](http://en.wikipedia.org/wiki/Nidovirales)
  + Family [Arteriviridae](http://en.wikipedia.org/wiki/Arterivirus)
  + Family [Coronaviridae](http://en.wikipedia.org/wiki/Coronaviridae)—includes [Coronavirus](http://en.wikipedia.org/wiki/Coronavirus), [SARS](http://en.wikipedia.org/wiki/Severe_Acute_Respiratory_Syndrome)
  + Family [Mesoniviridae](http://en.wikipedia.org/wiki/Mesoniviridae)
  + Family [Roniviridae](http://en.wikipedia.org/wiki/Roniviridae)
* Order [Picornavirales](http://en.wikipedia.org/wiki/Picornavirales)
  + Family [Dicistroviridae](http://en.wikipedia.org/wiki/Dicistroviridae)
  + Family [Iflaviridae](http://en.wikipedia.org/wiki/Iflaviridae)
  + Family [Marnaviridae](http://en.wikipedia.org/wiki/Marnaviridae)
  + Family [Picornaviridae](http://en.wikipedia.org/wiki/Picornaviridae)—includes [Poliovirus](http://en.wikipedia.org/wiki/Poliovirus), the [common cold](http://en.wikipedia.org/wiki/Rhinovirus) virus, [Hepatitis A](http://en.wikipedia.org/wiki/Hepatitis_A) virus
  + Family [Secoviridae](http://en.wikipedia.org/wiki/Secoviridae) includes subfamily [Comovirinae](http://en.wikipedia.org/wiki/Comoviridae)
  + Genus [Bacillariornavirus](http://en.wikipedia.org/w/index.php?title=Bacillariornavirus&action=edit&redlink=1)
  + Genus [Labyrnavirus](http://en.wikipedia.org/w/index.php?title=Labyrnavirus&action=edit&redlink=1)
* Order [Tymovirales](http://en.wikipedia.org/wiki/Tymovirales)
  + Family [Alphaflexiviridae](http://en.wikipedia.org/wiki/Alphaflexiviridae)
  + Family [Betaflexiviridae](http://en.wikipedia.org/wiki/Betaflexiviridae)
  + Family [Gammaflexiviridae](http://en.wikipedia.org/wiki/Gammaflexiviridae)
  + Family [Tymoviridae](http://en.wikipedia.org/wiki/Tymoviridae)
* Unassigned
  + Family [Alphatetraviridae](http://en.wikipedia.org/wiki/Tetraviridae)
  + Family [Alvernaviridae](http://en.wikipedia.org/w/index.php?title=Alvernaviridae&action=edit&redlink=1)
  + Family [Astroviridae](http://en.wikipedia.org/wiki/Astroviridae)
  + Family [Barnaviridae](http://en.wikipedia.org/wiki/Barnavirus)
  + Family [Bromoviridae](http://en.wikipedia.org/wiki/Bromoviridae)
  + Family [Caliciviridae](http://en.wikipedia.org/wiki/Caliciviridae)—includes [Norwalk virus](http://en.wikipedia.org/wiki/Norwalk_virus)
  + Family [Carmotetraviridae](http://en.wikipedia.org/w/index.php?title=Carmotetraviridae&action=edit&redlink=1)
  + Family [Closteroviridae](http://en.wikipedia.org/wiki/Closteroviridae)
  + Family [Flaviviridae](http://en.wikipedia.org/wiki/Flaviviridae)—includes [Yellow fever](http://en.wikipedia.org/wiki/Yellow_fever) virus, [West Nile virus](http://en.wikipedia.org/wiki/West_Nile_virus), [Hepatitis C virus](http://en.wikipedia.org/wiki/Hepatitis_C_virus), [Dengue fever](http://en.wikipedia.org/wiki/Dengue_fever) virus
  + Family [Leviviridae](http://en.wikipedia.org/wiki/Leviviridae)
  + Family [Luteoviridae](http://en.wikipedia.org/wiki/Luteoviridae)—includes [Barley yellow dwarf virus](http://en.wikipedia.org/wiki/Barley_yellow_dwarf_virus)
  + Family [Narnaviridae](http://en.wikipedia.org/wiki/Narnaviridae)
  + Family [Nodaviridae](http://en.wikipedia.org/wiki/Nodaviridae)
  + Family [Permutotetraviridae](http://en.wikipedia.org/w/index.php?title=Permutotetraviridae&action=edit&redlink=1)
  + Family [Potyviridae](http://en.wikipedia.org/wiki/Potyviridae)
  + Family [Togaviridae](http://en.wikipedia.org/wiki/Togaviridae)—includes [Rubella](http://en.wikipedia.org/wiki/Rubella) virus, [Ross River virus](http://en.wikipedia.org/wiki/Ross_River_virus), [Sindbis virus](http://en.wikipedia.org/wiki/Sindbis_virus), [Chikungunya virus](http://en.wikipedia.org/wiki/Chikungunya_virus)
  + Family [Tombusviridae](http://en.wikipedia.org/wiki/Tombusviridae)
  + Family [Virgaviridae](http://en.wikipedia.org/wiki/Virgaviridae)[[20]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Adams2009-20)
  + Unassigned genera
    - Genus [*Benyvirus*](http://en.wikipedia.org/wiki/Benyvirus)
    - Genus [*Blunervirus*](http://en.wikipedia.org/w/index.php?title=Blunervirus&action=edit&redlink=1)
    - Genus [*Cilevirus*](http://en.wikipedia.org/wiki/Cilevirus)
    - Genus [*Hepevirus*](http://en.wikipedia.org/wiki/Hepevirus)—includes [Hepatitis E](http://en.wikipedia.org/wiki/Hepatitis_E) virus
    - Genus [*Higrevirus*](http://en.wikipedia.org/w/index.php?title=Higrevirus&action=edit&redlink=1)
    - Genus [*Idaeovirus*](http://en.wikipedia.org/wiki/Idaeovirus)
    - Genus [*Negevirus*](http://en.wikipedia.org/w/index.php?title=Negevirus&action=edit&redlink=1)
    - Genus [*Ourmiavirus*](http://en.wikipedia.org/wiki/Ourmiavirus)
    - Genus [*Polemovirus*](http://en.wikipedia.org/w/index.php?title=Polemovirus&action=edit&redlink=1)
    - Genus [*Sobemovirus*](http://en.wikipedia.org/wiki/Sobemovirus)
    - Genus [*Umbravirus*](http://en.wikipedia.org/wiki/Umbravirus)
  + Unassigned species
    - [Acyrthosiphon pisum virus](http://en.wikipedia.org/w/index.php?title=Acyrthosiphon_pisum_virus&action=edit&redlink=1)
    - [Blueberry necrotic ring blotch virus](http://en.wikipedia.org/w/index.php?title=Blueberry_necrotic_ring_blotch_virus&action=edit&redlink=1)
    - [Botrytis virus F](http://en.wikipedia.org/w/index.php?title=Botrytis_virus_F&action=edit&redlink=1)
    - [Canine picodicistrovirus](http://en.wikipedia.org/w/index.php?title=Canine_picodicistrovirus&action=edit&redlink=1)
    - [Chronic bee paralysis associated satellite virus](http://en.wikipedia.org/w/index.php?title=Chronic_bee_paralysis_associated_satellite_virus&action=edit&redlink=1)
    - [Extra small virus](http://en.wikipedia.org/w/index.php?title=Extra_small_virus&action=edit&redlink=1)
    - [Heterocapsa circularisquama RNA virus](http://en.wikipedia.org/w/index.php?title=Heterocapsa_circularisquama_RNA_virus&action=edit&redlink=1)
    - [Kelp fly virus](http://en.wikipedia.org/w/index.php?title=Kelp_fly_virus&action=edit&redlink=1)
    - [Le Blanc virus](http://en.wikipedia.org/w/index.php?title=Le_Blanc_virus&action=edit&redlink=1)
    - [Plasmopara halstedii virus](http://en.wikipedia.org/w/index.php?title=Plasmopara_halstedii_virus&action=edit&redlink=1)
    - [Orsay virus](http://en.wikipedia.org/w/index.php?title=Orsay_virus&action=edit&redlink=1)
    - [Santeuil virus](http://en.wikipedia.org/w/index.php?title=Santeuil_virus&action=edit&redlink=1)
    - [Solenopsis invicta virus 2](http://en.wikipedia.org/w/index.php?title=Solenopsis_invicta_virus_2&action=edit&redlink=1)
    - [Solenopsis invicta virus 3](http://en.wikipedia.org/w/index.php?title=Solenopsis_invicta_virus_3&action=edit&redlink=1)

**Group V—negative-sense ssRNA viruses**

There are two orders and eight families recognised in this group. There are also a number of unassigned species and genera.

* Order [*Mononegavirales*](http://en.wikipedia.org/wiki/Mononegavirales)
  + Family [Bornaviridae](http://en.wikipedia.org/wiki/Borna_disease)—[Borna disease virus](http://en.wikipedia.org/wiki/Borna_disease_virus)
  + Family [Filoviridae](http://en.wikipedia.org/wiki/Filoviridae)—includes [Ebola](http://en.wikipedia.org/wiki/Ebola) virus, [Marburg virus](http://en.wikipedia.org/wiki/Marburg_virus)
  + Family [Paramyxoviridae](http://en.wikipedia.org/wiki/Paramyxoviridae)—includes [Measles](http://en.wikipedia.org/wiki/Measles) virus, [Mumps virus](http://en.wikipedia.org/wiki/Mumps_virus), [Nipah virus](http://en.wikipedia.org/wiki/Nipah_virus), [Hendra virus](http://en.wikipedia.org/wiki/Hendra_virus)
  + Family [Rhabdoviridae](http://en.wikipedia.org/wiki/Rhabdoviridae)—includes [Rabies](http://en.wikipedia.org/wiki/Rabies) virus
* Unassigned families:
  + Family [Arenaviridae](http://en.wikipedia.org/wiki/Arenaviridae)—includes [Lassa virus](http://en.wikipedia.org/wiki/Lassa_virus)
  + Family [Bunyaviridae](http://en.wikipedia.org/wiki/Bunyaviridae)—includes [Hantavirus](http://en.wikipedia.org/wiki/Hantavirus), [Crimean-Congo hemorrhagic fever](http://en.wikipedia.org/wiki/Crimean-Congo_hemorrhagic_fever)
  + Family [Ophioviridae](http://en.wikipedia.org/wiki/Ophioviridae)
  + Family [Orthomyxoviridae](http://en.wikipedia.org/wiki/Orthomyxoviridae)—includes [Influenza](http://en.wikipedia.org/wiki/Influenza) viruses
* Unassigned genera:
  + Genus [*Deltavirus*](http://en.wikipedia.org/wiki/Deltavirus)—includes [Hepatitis D](http://en.wikipedia.org/wiki/Hepatitis_D) virus
  + Genus [*Dichorhavirus*](http://en.wikipedia.org/wiki/Dichorhavirus)
  + Genus [*Emaravirus*](http://en.wikipedia.org/wiki/Emaravirus)
  + Genus [*Nyavirus*](http://en.wikipedia.org/wiki/Nyavirus)[[21]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Mihindukulasuriya2009-21)—includes Nyamanini and Midway viruses
  + Genus [*Tenuivirus*](http://en.wikipedia.org/wiki/Tenuivirus)
  + Genus [*Varicosavirus*](http://en.wikipedia.org/wiki/Varicosavirus)
* Unassigned species:
  + [Taastrup virus](http://en.wikipedia.org/w/index.php?title=Taastrup_virus&action=edit&redlink=1)

Source:[[8]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Klein-8)

**Notes**

The majority of fungal viruses are double-stranded RNA viruses. A small number of positive-strand RNA viruses have been described. One report has suggested the possibility of a negative stranded virus.[[22]](http://en.wikipedia.org/w/index.php?title=RNA_virus&printable=yes#cite_note-Kondo2012-22)

**See also**

* [Virus classification](http://en.wikipedia.org/wiki/Virus_classification)
* [Viral replication](http://en.wikipedia.org/wiki/Virus#Replication_cycle)
* [Positive/negative-sense](http://en.wikipedia.org/wiki/Sense_(molecular_biology))
* [Animal viruses](http://en.wikipedia.org/wiki/Animal_virology)
* [Double-stranded RNA viruses](http://en.wikipedia.org/wiki/Double-stranded_RNA_viruses)
* [Retrovirus](http://en.wikipedia.org/wiki/Retrovirus)
* [DNA viruses](http://en.wikipedia.org/wiki/DNA_viruses)
* [Norovirus cis-acting replication element](http://en.wikipedia.org/wiki/Norovirus_cis-acting_replication_element)

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**External links**

* [RNA Viruses](http://www.nlm.nih.gov/cgi/mesh/2011/MB_cgi?mode=&term=RNA+Viruses) at the US National Library of Medicine [Medical Subject Headings](http://en.wikipedia.org/wiki/Medical_Subject_Headings) (MeSH)
* [Animal viruses](http://www.horizonpress.com/gateway/animal-viruses.html)

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