



# ICTV Virus Taxonomy Profile: *Arenaviridae* 2023

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## Abstract

*Arenaviridae* is a family for ambisense RNA viruses with genomes of about 10.5 kb that infect mammals, snakes, and fish. The arenavirid genome consists of two or three single-stranded RNA segments and encodes a nucleoprotein (NP), a glycoprotein (GP) and a large (L) protein containing RNA-directed RNA polymerase (RdRP) domains; some arenavirids encode a zinc-binding protein (Z). This is a summary of the International Committee on Taxonomy of Viruses (ICTV) report on the family *Arenaviridae*, which is available at [www.ictv.global/report/arenaviridae](http://www.ictv.global/report/arenaviridae).

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

Example	lymphocytic choriomeningitis virus (S: AY847350; L: AY847351), species <i>Mammarenavirus choriomeningitidis</i> , genus <i>Mammarenavirus</i>
Genome	Two or three single-stranded, usually ambisense, RNA molecules (segments): small (S), medium (M), and large (L)
Replication	Ribonucleoprotein complexes containing anti-genomic RNA serve as templates for synthesis of genomic RNA
Translation	From capped and non-polyadenylated mRNAs. The 5' cap structure is obtained via cap-snatching from cellular mRNAs
Host range	Fish (antennaviruses), mammals (mammarenaviruses), reptiles (hartmanviruses and reptarenaviruses), and potentially also ticks
Taxonomy	Realm <i>Riboviria</i> , kingdom <i>Orthornavirae</i> , phylum <i>Negarnaviricota</i> , class <i>Ellioviricetes</i> , order <i>Bunyavirales</i> ; >4 genera and >59 species

## VIRION

Arenavirids produce virions that are spherical or pleomorphic in shape and 40–200 nm in diameter, with dense lipid envelopes (Table 1 and Fig. 1). The virion surface layer is covered with club-shaped projections that have distinctive stalk and head regions. These projections consist of trimeric spike structures of two virus-encoded membrane glycoprotein (GP) subunits (GP1 and GP2) and, in the case of some arenavirids, a stable signal peptide (SSP). Isolated ribonucleoprotein

(RNP) complexes are organized into ‘beads-on-a-string’-like structures [1, 2].

## GENOME

Arenavirid genomes consist of two or three single-stranded, typically ambisense, RNA segments (small [S], medium [M], and large [L]). Some of these RNAs encode two proteins in non-overlapping open reading frames of opposite polarities that are separated by

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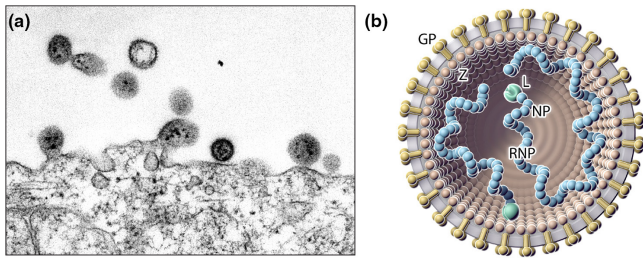
**Abbreviations:** GP, glycoprotein; GPC, glycoprotein precursor; IGRs, intergenic regions; L, large; M, medium; NP, nucleoprotein; RNP, ribonucleoprotein; S, small; SSP, stable signal peptide; Z, zinc-binding protein.

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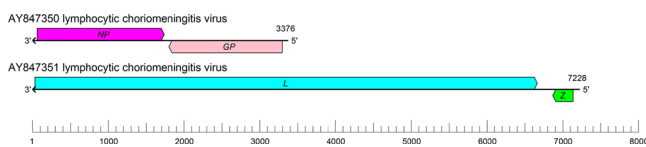


**Fig. 1.** (a) Electron micrograph of lymphocytic choriomeningitis virus budding from an infected cell. (b) Illustration of a particle in (a) showing the spherical and enveloped particle (grey) that is spiked with glycoproteins (GP, gold) around a layer of zinc-binding proteins (Z, brown). The small (S) and large (L) ribonucleoprotein (RNP) complexes inside the particle consist of nucleoprotein (NP; blue) and large (L; green) protein.

non-coding intergenic regions (IGRs) (Fig. 2). The S RNA encodes a nucleoprotein (NP) in the virus genome-complementary strand and, in many cases, a virus glycoprotein precursor (GPC) in the virus genome-sense strand. The L RNA segment encodes a large (L) protein in the virus genome-complementary strand and, in some cases, a zinc-binding protein (Z) in the virus genome-sense sequence [1–3].

## REPLICATION

Arenavirions attach to cell-surface receptors or attachment factors and enter via the endosomal route. Some viruses engage intracellular receptors in endosomes. pH-dependent fusion with late endosomes releases the virion RNP complex into the cytoplasm. The virus RNP directs both RNA genome replication and gene



**Fig. 2.** Mammarenavirus genome. The ends of both segments are complementary at their termini, likely promoting the formation of panhandle RNP complexes within the virion. GP, glycoprotein gene; L, large protein gene; NP, nucleoprotein gene; Z, zinc-binding protein gene.

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transcription. During replication, L protein reads through the IGR transcription-termination signal and generates uncapped antigenomic and genomic RNAs. Transcription of mRNAs encoding GPC and Z occurs only after the first round of virus replication, during which S and L antigenomes are produced. Arenavirid mRNAs lack 3'-terminal poly(A) tracts but have several non-templated 5' bases, consistent with the use of a cap-snatching mechanism to initiate transcription. Virion budding occurs from the cellular plasma membrane, thereby providing the virion envelope [1, 2].

## TAXONOMY

Current taxonomy: [ictv.global/taxonomy](http://ictv.global/taxonomy). The family *Arenaviridae* is included in the negarnaviricot order *Bunyavirales*. Arenavirids are most closely related to myxovirids, nairovirids, phenuivirids and wupedevirids. Arenavirids differ from most other bunyavirals by having segmented genomes with ambisense organization. The family includes several genera and >59 species. Some arenavirids can cause severe diseases in humans (e.g. Lassa fever) [4]. Other arenavirids cause disease in captive snakes [3, 5].

## RESOURCES

Full ICTV Report on the family *Arenaviridae*: [www.ictv.global/report/arenaviridae](http://www.ictv.global/report/arenaviridae).

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## Conflicts of interest

The authors declare that there are no conflicts of interest.

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