

# Virus Structures

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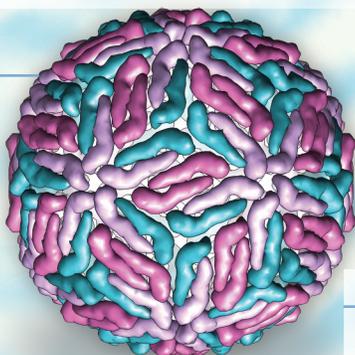
Viruses attack cells and force them to make many new viruses, often killing the cell in the process. Some viruses are very simple, such as the protein capsids that surround a short strand of RNA or DNA. More complex viruses inject the cell with a viral genome capable of encoding proteins to fight the cell's defenses.

## Virus Sizes

Most viruses are much smaller than cells—the ones shown here are all drawn at approximately 900,000x magnification, ranging from less than 30 nanometers to over 500 nanometers in diameter (1 nanometer = 1 billionth of a meter).

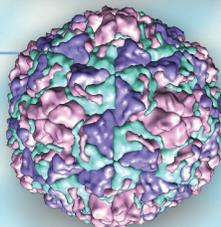
### Dengue fever virus

Dengue fever virus usually causes flu-like symptoms, but the infection can be deadly in some cases.  
PDB ID: 1k4r



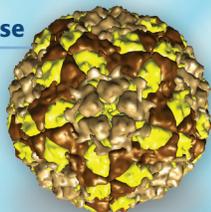
### Rhinovirus

Rhinovirus is one of the causes of the common cold.  
PDB ID: 1rhv



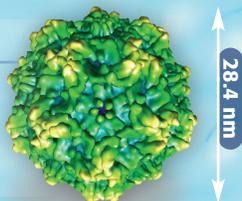
### Foot and mouth disease

Foot and mouth disease is a serious problem that causes high fever and blisters in livestock.  
PDB ID: 1bbt



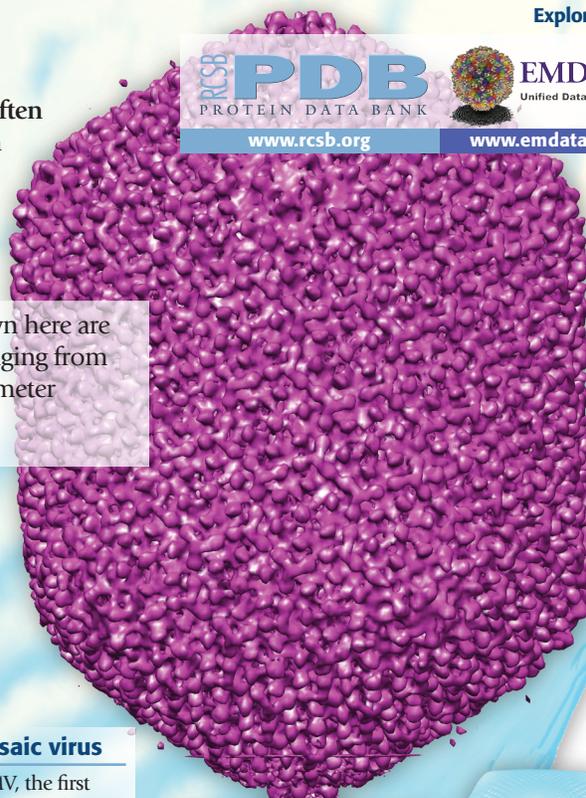
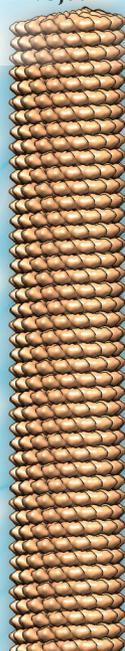
### Feline distemper

Vaccination can prevent this life-threatening infection in cats.  
PDB ID: 1c8e



### Tobacco mosaic virus

Research on TMV, the first virus to be discovered, began late in the 19<sup>th</sup> century. It is so stable that it can survive for years in cigars and cigarettes made from infected leaves.  
PDB ID: 3j06



### Mimivirus

The blue background figure is the mimivirus, one of the largest viruses. Mimivirus may be linked to some forms of pneumonia.  
EMD-5039

### Bacteriophage T4

This complex virus injects its DNA genome into bacteria through the long tube at the bottom.  
EMD-1414  
EMD-1126

## Virus Shapes

### Polyhedral viruses ▲

These viruses are composed of polyhedral protein shells. They are also called icosahedral viruses because of their symmetry.

### Helical viruses ▲

In these viruses, the nucleic acid genome is wound inside a cylindrical protein capsid with helical symmetry.

### Complex viruses ▲

These viruses are composed of many different proteins that work together to protect the genome, attach to cells, and inject the nucleic acid inside.

### Enveloped viruses (not shown)

Viruses such as influenza and HIV are surrounded by a membrane that includes glycoproteins that seek out cells to infect.