

Viruses

When is a life form not a life form? When it's a virus.

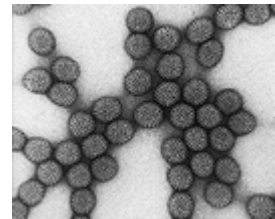
Viruses are strange things that straddle the fence between living and non-living. On the one hand, if they're floating around in the air or sitting on a doorknob, they're inert. They're about as alive as a rock. But if they come into contact with a suitable plant, animal or bacterial cell, they spring into action. They infect and take over the cell like pirates hijacking a ship.

What They Are

A virus is basically a tiny bundle of genetic material—either DNA or RNA—carried in a shell called the viral coat, or capsid, which is made up of bits of protein called capsomeres. Some viruses have an additional layer around this coat called an envelope. That's basically all there is to viruses.

What They Look Like

There are thousands of different viruses that come in a variety of shapes. Many are polyhedral <*polly-hee-druh*>, or multi-sided. If you've ever looked closely at a cut gem, like the diamond in an engagement ring, you've seen an example of a polyhedral shape. (Unlike the diamond in a ring, however, a virus does not taper to a point, but is shaped similarly all around.) Other viruses are shaped like spiky ovals or bricks with rounded corners.



Rotavirus
Courtesy CDC



Ebola virus
Courtesy CDC

Some are like skinny sticks while others look like bits of looped string. Some are more complex and shaped like little lunar landing pods.

Where They're Found

Viruses are found on or in just about every material and environment on Earth from soil to water to air. They're basically found anywhere there are cells to infect. Viruses have evolved to infect every form of life, from animal to plant and from fungi to bacteria.

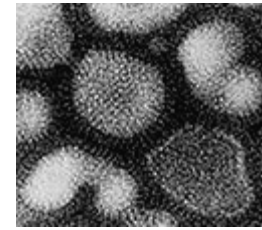
However, viruses tend to be somewhat picky about what type of cells they infect. Plant viruses are not equipped to infect animal cells, for example, though a certain plant virus could infect a number of related plants. Sometimes, a virus may infect one creature and do no harm, but cause havoc when it gets into a different but closely enough related creature. For example, the Hantavirus is carried by deer mice without much noticeable effect on the rodents. But if

Hantavirus gets into a person, it causes a dramatic and frequently deadly disease marked by excessive bleeding.

Single-Minded Mission

Viruses exist for one purpose only: to reproduce. To do that, they have to take over the reproductive machinery of suitable host cells.

Upon landing on an appropriate host cell, a virus gets its genetic material inside the cell either by tricking the host cell to pull it inside, like it would a nutrient molecule, or by fusing its viral coat with the host cell wall or membrane and releasing its genes inside. Some viruses inject their genes into the host cell, leaving their empty viral coats sitting outside.



Type A flu virus
Courtesy CDC

If a virus is a DNA virus, its genetic material then inserts itself into the host cell's DNA. If the virus is an RNA virus, it must first turn its RNA into DNA using the host cell's machinery before inserting into the host DNA. The viral genes are then copied many, many times, using the machinery the host cell would normally use to reproduce its own DNA. The virus uses the host cell's enzymes to build new viral capsids and other viral proteins. The new viral genes and proteins then come together and assemble into whole new viruses. The new viruses are either released from the host cell without destroying the cell or eventually build up to a large enough number that they burst the host cell like an overfilled water balloon.

Other Virus-Like Things

Viruses may be referred to often as the smallest infectious things. But there are some smaller contenders. Some of the agents of plant disease lack even a viral coat and are merely small strings of plain, or "naked," RNA. These particles are called **viroids**. They are believed to be a more primitive version of ordinary viruses. But maybe viroids aren't the smallest infectious agents all.

Prions

Do you recall hearing about Mad Cow Disease? This is an ailment that affects the animals' brains and is also called bovine spongiform encephalopathy <bovine sponge-ee-form en-sef-uh-la-puth-ee> because it makes the brain appear holey, like a sponge. There is a human form of this disease called Creutzfeldt-Jakob <kroits-feld ya-cob> disease. Some scientists now believe these brain illnesses are among a few diseases caused by an infectious agents called **prions** <pre-ons>. Prions are not even DNA or RNA, but simply proteins. They are thought to be misshapen or abnormal versions of proteins normally found in animals or people. Very little is known about prions. Scientists suggest that they spread when a prion comes into contact with the normal version of the protein and causes the normal protein to change shape and become a prion, too.

Make 10 questions about the previous article. They can be true/false, multiple choice, or matching. MAKE SURE THAT YOUR QUESTIONS HAVE ANSWERS.