



Description: A virus is defined as an infective agent that typically consists of genetic material in a protein coat, is too small to be seen by light microscopy, and is able to multiply only within the living cells of a host. What distinguishes viruses from other organisms is that they are incapable of reproducing on their own and must first infect a host before being able to reproduce. Once a virus has infected a cell, they release their own genetic material (either **DNA** or **RNA**) and use the cellular machinery of the host cell to produce more copies of themselves. Eventually, once the host is filled with new viruses, it bursts (called **lysis**) and the new viruses are released back into the water. Different types of viruses are often specific to a few host organisms (see below for examples), but all organisms in the marine microbial ecosystem can be infected by viruses. A virus particle is comprised of the genetic material (DNA or RNA) surrounded by a virus-produced protein shell.

Carbon Cycle: With the lysis of host cells, a lot of cellular debris (nutrients; Dissolved Organic Matter) is released into the water, which can then be used as food for other microbes. Viruses thus release nutrients from cellular form into the dissolved form where other organisms can access them.

Ecosystem Role: When not infecting an organism, viruses are inactive and have no motility. Thus, they must find a new host by random encounters with potential hosts. The more there are of a virus' potential host, the more likely it is for a virus to encounter a new potential host, which in turn produces more of those viruses. In this way, viruses act as regulator of diversity in the ecosystem, keeping any one organism from taking over the ecosystem.

Key Terms

Lysis: the disintegration of a cell by rupture of the cell wall or membrane.

DNA: deoxyribonucleic acid, a molecule that carries the genetic information in all living cells.

RNA: ribonucleic acid, a molecule present in all living cells that acts as a messenger carrying instructions from DNA for controlling the production of proteins, although in some viruses RNA rather than DNA carries the genetic information.

DNA virus: a virus in which the genetic information is stored in the form of DNA.

RNA virus: a virus in which the genetic information is stored in the form of RNA.

Cyanophage: a type of virus that infects cyanobacteria, which are bacteria that obtain their energy through photosynthesis (autotrophs).

Membraned virus: a type of virus (also called an enveloped virus) that has a lipid membrane surrounding the protein shell.

Multi-host virus: a type of virus that is capable of infecting several different types of hosts.

Host-specific virus: a type of virus that is only capable of infecting a specific host.

Abundant virus: types of viruses that are very common in the ocean; many of the hosts for these viruses remain unknown.

More Resources

Microbial Ecologies: The Role of Viruses in the Marine Environment:

<http://jrscience.wcp.muohio.edu/fieldcourses01/PapersMarineEcologyArticles/MicrobialEcologies.TheRol.html>

Differentiating RNA & DNA Viruses: <https://sciencing.com/differentiating-rna-dna-viruses-4853.html>

Most abundant viruses in Earth's oceans identified:

<https://www.sciencedaily.com/releases/2017/06/170629110248.htm>

Virus Infections and Hosts: <https://courses.lumenlearning.com/biology2xmaster/chapter/virus-infections-and-hosts/>

