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Commentary

Role of Viruses in Aquatic Environment during the Evolution of Life

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DESCRIPTION

A virus is an infectious submicroscopic creature that only reproduces inside of live cells. All living things, including plants, animals, and microbes like bacteria and archaea, are susceptible to virus infection. The tobacco mosaic virus, more than 9,000 virus species out of the millions of different types of viruses in the environment has been documented in detail. Viruses are the most common sort of living organism and can be found in practically all ecosystems on Earth. Virology is the study of viruses and it is a branch of microbiology.

A host cell that has been infected is frequently compelled to quickly make thousands of copies of the original virus. When outside of an infected cell or while in the process of infecting a cell, viruses exist as independent particles or virions, which are made up of I the genetic material, or long molecules of DNA or RNA that encode the structure of the proteins by which the virus acts; a protein coat, the capsid, which surrounds and protects the genetic material; and in some cases, an external envelope of lipids. These viral particles come in a variety of configurations, from straight forward helical and icosahedral forms to more intricate ones. The majority of virus species have virions that are one hundredth the size of most bacteria and are too small to be seen with an optical microscope.

It is uncertain where viruses first appeared in the evolutionary history of life. Some viruses may have descended from bacteria, while others may have originated from plasmids, which are DNA fragments that can migrate between cells. In the process of evolution, viruses play a key role in horizontal gene transfer, which boosts genetic variety similarly to sexual reproduction. Some biologists believe that viruses are living forms because they carry genetic material, reproduce, and change through natural selection, despite the fact that they lack essential traits, including cell structure, that are typically thought to be crucial requirements for defining life. The term "organisms at the edge of life" and "replicators" have been used to characterize viruses since they share some but not all of these characteristics.

Role in aquatic ecosystems

The most prevalent biological species in aquatic environments are viruses. In one teaspoon of seawater, there are around ten million of them. The majority of these viruses are bacteriophages that attack heterotrophic bacteria and cyanophages that attack cyanobacteria, and they are crucial for controlling ecosystems in both freshwater and saltwater. Bacteriophages are key mortality agents of phytoplankton, the foundation of the food chain in aquatic environments, and are non-lethal to plants and animals. They are crucial to the management of marine and freshwater ecosystems. One of the most significant methods of recycling carbon and nutrient cycling in marine environments, they infect and kill bacteria in aquatic microbial communities. The viral shunt is a process in which the organic compounds released from the dying bacterial cells promote the creation of new bacterial and algal cells.

It has been demonstrated that bacterial lysis by viruses specifically improves nitrogen cycling and stimulates phyton development. Additionally, the biological pump, which is responsible for sequestering carbon in the deep ocean, may be impacted by viral activity.

In the sea, microorganisms make up more than 90% of the biomass. According to estimates, viruses kill about 20% of this biomass every day, and there are 10 to 15 times as many viruses as bacteria and archaea in the oceans. Additionally, viruses play a significant role in the devastation of phytoplankton, especially hazardous algal blooms. Further offshore and deeper into the ocean, where there are fewer host organisms; there are fewer viruses to be found.

Scientists reported in January 2018 that a global atmospheric stream of viruses, circulating above the weather system but below the altitude of typical airline travel, disperses viruses around the planet on a daily basis, depositing 800 million viruses, primarily of marine origin, onto every square meter of the planet's surface. Marine animals are susceptible to viral infections much like any other organism. The phocine distemper virus killed thousands of harbour seals in Europe in 1988 and 2002.The populations of marine mammals are also home to numerous additional viruses, such as caliciviruses, herpesviruses, adenoviruses, and parvoviruses.

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