LETTER TO EDITOR

Virovore: A Breakthrough in Virology

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Dear Editor,

The recent discovery of the virovorous nature of a species of *Halteria*, a genus of planktonic ciliates that are seen in freshwater environment, has grasped the attention of both microbiologists and environmentalists. *Halteria* ciliates are Virovore, organism that can survive on a virus only diet, as reported by John DeLong and his team in the United States.[1] John DeLong is a microbiologist at the University of Nebraska-Lincoln and discovered this virovore while doing research on microbes and viruses that can consume other viruses and whether this intake can help in physiological growth. *Halteria* have been shown to feed on many infectious *Chloroviruses*, a double stranded DNA virus, and derive their nutrition from them as *Chloroviruses* are rich in desirable substances including nucleic acid, phosphorous, and nitrogen. Both *Halteria* and *Chloroviruses* live in an aquatic freshwater habitat and this remarkable achievement opens up a whole new realm of exploration into the role of viruses in the food cycle on a microscopic level.[1]

The members of the genus *Halteria* are planktonic ciliate organisms with dome-shaped cells, that live in freshwater environments in trophic or cystic forms. They are motile having characteristic jumping motility. They reproduce asexually via binary fission. *Halteria*, being heterotrophic, are unable to make their own food. They are known to have a *bacteriovore* nature and feed on bacteria, playing an important role in the environment.[2] Their *Chlorovirus* prey occurs in an icosahedral shape and uniquely codes for proteins that are among the smallest-sized proteins currently known. They are infectious and classically proliferate by infecting and replicating in symbiotic chlorella-like and unicellular algae. They are capable of forming plaques and occur ubiquitously across the globe in the areas of inland freshwaters.[3]

This new virovore is a unique find as it shows that certain organisms can thrive on viruses as a primary source of nutrition, and it raises many questions about the role of viruses and virovores in the food web and ecosystem dynamics. This is expected to have a significant impact on the field of microbiology, and it may lead to a deeper understanding of the complex interactions between viruses and other organisms in the natural world. In the past viral genes have been reported in the genome of protists which gave rise to doubts about viral ingestion by them.[4] This breakthrough has revealed that these organisms can not only consume viruses but can sustain themselves solely by viruses. This is an exclusive feeding behavior of *Halteria* that leads to the consumption of large amounts of *Chlorovirus* and growth in the size of these virovores. In their experiments, the scientists observed that the *Halteria* species in the sample multiplied and increased in number while the number of viruses decreased when compared to the sample.[5] There was a 15-fold increase in the *Halteria* number and it was concluded that they feed on 10 000-1 000 000 viruses on a daily basis, making the impact they have on a scale more than expected.[6]

With this new development in research, it is conclusively demonstrated that "virovory," obtaining nutrients from consuming a virus, is sufficient for the growth of an organism at a physiological and population level.[1,2] This latest advancement in knowledge also impacts the understanding of "global carbon cycling." By comprising a system of 4 carbon reservoirs, the oceans, atmosphere, fossil fuels, land[7] and the dynamics of carbon transfer among them. The consumption of these viruses by protists plays a vital role in the food chain, as it enables the carbon from the viruses to be passed on to the next level of the food chain, allowing for its continued movement upwards. This is a vital aspect of maintaining the balance and health of the ecosystem. This highlights the importance of viruses in freshwater systems and their global impact at the higher level of climate change reinforcing their role in the functioning of the ecosystem.[8]

This finding opens up a new area of exploration into the role of viruses in the food web and ecosystem dynamics. It also paves the way for the discovery of similar organisms that feed exclusively on viruses, further expanding our understanding of the complex interactions between viruses and other organisms in the natural world. The discovery of *Halteria*, the only known protist virovore to date, will have implications for freshwater ecosystem management and will open doors to provide newer strategies for controlling the population of certain harmful viruses that infect algae and newer strategies for changes in climate systems around the globe at large.[6]

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