

When viruses attack: Chesapeake virus activity mirrors seasonal changes, plays critical ecosystem role

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Professor Eric Wommack and Danielle Winget have published research on viruses in the Chesapeake Bay.

The Chesapeake Bay houses a huge diversity of fish, birds, plants, and mammals. But to understand this vital habitat, University of Delaware scientists studied its tiniest inhabitants -- viruses -- and found that they play an extremely important role in the workings of the ecosystem.

The research, published in the June 24 [Proceedings of the National Academy of Sciences](#), looked at viral lysis, the process through which viruses invade and destroy [cells](#) (in this case, microbes such as [bacteria](#)). The 4.5-year study revealed that the occurrence of viral lysis on microbes follows [seasonal patterns](#). Particularly of interest, the

researchers found that it plays a disproportionately large role in the mortality of microbes in the wintertime.

“Every year you can go back and find approximately the same proportion of bacteria being killed by viruses, and it follows these really nice seasonal patterns,” said lead author Danielle Winget. “It shows viruses are a part of this ecosystem, and they’re actually alive and interacting and following the same patterns of other living things.”

Winget, a post-doctoral fellow at the University of British Columbia, conducted the research for her doctoral dissertation at UD. Collaborating on the project was her adviser, Professor Eric Wommack, and several other members of his lab: former graduate students Rebekah Helton, Kurt Williamson and Shellie Bench, and former post-doctoral fellow Shannon Williamson.

Results from the group’s research are expected to help shape future approaches to improving [Chesapeake Bay](#) health. The bay’s deep waters experience low oxygen values in the summer, a condition known as hypoxia that can lead to fish kills and other environmental problems. Hypoxia is caused by excess nutrients, often from human activities, flowing into the water and stimulating the growth of bacteria that use up all the oxygen.

That’s why understanding the viruses that attack the bacteria is important, Wommack explained.

“Microbes are really the unsung heroes in that they maintain the nutrient balance of the ecosystem,” he said. “Understanding the mechanisms behind how communities of [microbes](#) work is really critical ultimately to managing the bay.”

Wommack said that the new insights provided by the study were a result

of it being the longest such investigation on viruses in the Chesapeake. The science team collected samples during 18 cruises over the course of the more than four-year study period and analyzed more than 1,000 independent samples.

The resulting findings will benefit our understanding of the critical coastal ecosystem of the Chesapeake Bay.

“Human beings stand on the shore of the ocean and think the ocean is so vast, and they’re right,” Wommack said. “But most of the productivity that we care about in the ocean occurs in coastal areas and those are the areas that are undergoing the greatest amount of impact from human activity.”

Provided by University of Delaware

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