

World's largest, most complex marine virus is major player in ocean ecosystems: research

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UBC researchers have identified the world's largest marine virus--an unusually complex 'mimi-like virus' that infects an ecologically important and widespread planktonic predator.

Cafeteria roenbergensis [virus](#) has a genome larger than those found in some cellular organisms, and boasts genetic complexity that blurs the distinction between "non-living" and "living" entities.

"Viruses are classically thought of small, simple organisms in terms of the number of genes they carry," says UBC professor Curtis Suttle, an expert in marine microbiology and environmental virology and lead author of the study.

"Much of the [genetic machinery](#) we found in this virus you would only expect to find in living, cellular organisms, including many genes required to produce DNA, RNA, proteins and sugars."

The findings are reported in this week's issue of the [Proceedings of the National Academy of Sciences](#).

Viruses cannot replicate outside of living host cells and they depend on proteins provided by the cell, a boundary that is often used to delineate "non-living" from "living" organisms. Giant viruses challenge this definition, as they still need a cell to replicate, but encode in their own genome most of the proteins required for replication.

Discovered in Texas coastal waters in the early 1990s, Curtis and his team were able to determine that the pathogen's genome contains approximately 730,000 base pairs. That makes Cafeteria roenbergensis virus the largest known marine virus, and the second largest known virus, after the fresh water-borne *Acanthamoeba polyphaga* [mimivirus](#), which weighs in at 1.2 million base pairs.

Cafeteria roenbergensis virus also infects a major marine zooplankton which occupies a key position in marine food webs.

"Even though predation by these [marine plankton](#) grazers is a major pathway of carbon transfer and nutrient recycling in marine and freshwater systems, we know next to nothing about the role viruses play in this system," notes Curtis, cross appointed to the departments of Earth and Ocean Sciences, Botany, and Microbiology and Immunology.

"There's little doubt that this virus is just one representative from a major group of largely unknown but ecologically important marine giant viruses."

Provided by University of British Columbia

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