

SCIENCE LAB

By William Booth

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Marine viruses, virtually unknown until a year ago, may play a central role in the health and productivity of the world's oceans, according to new research that threatens to overturn traditional ideas about the forces that control life in the sea. The studies indicate that viruses infect phytoplankton, the microscopic plants and algae that are the most important organisms in the ocean and the foundation of the marine food web.

"Until now, nobody has really considered disease organisms as important in marine environments," says Curtis Suttle of the University of Texas Marine Science Institute in Port Aransas, Tex., who headed a team of researchers whose findings were published in the Oct. 4 issue of the scientific journal *Nature*. "But viruses might be in control."

As the full role of ocean viruses emerge, marine biologists say it may one day be possible for humans to seed the seas with certain strains of naturally occurring viruses to control the phytoplankton blooms, called red or brown tides, that litter beaches, kill fish and are toxic to mussels, clams and oysters.

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Sort of Like a Flu Bug?

Marine viruses may play an important role in the health of the world's oceans

"This may be a new biological means for controlling the primary productivity of the ocean," says Randall Alberte, a professor at the University of Chicago and a scientific officer at the Office of Naval Research, which finances some of the viral studies. Alberte called the new ideas about the importance of marine viruses "revolutionary."

Alberte says viruses could be used to encourage certain species of phytoplankton while suppressing others, thereby allowing humans to, in essence, farm the seas. This could be particularly important if nations decided to control global warming by encouraging the growth of phytoplankton that absorb carbon dioxide from the atmosphere.

Viruses exist in a realm somewhere be-

tween the living and the inanimate. They do not eat, breathe, move or reproduce on their own, but when they enter a cell, they commandeer the genetic machinery and start reproducing. After the invading virus has made a few hundred copies of itself, the cell dies and its membrane bursts, releasing virus particles.

Scientists have shown that naturally occurring marine viruses attack specific phytoplankton hosts. The marine biologists speculate that viral infection may be the crucial factor in determining the mix of plant species and their relative abundance in the ocean. Any change in species mix or abundance of phytoplankton has a direct effect on all ocean life, from shrimp to fish to dolphins to fishermen. The viruses probably have been a force in evolution for eons.

Suttle and his colleagues have found that viral pathogens infect the most common and most important "primary producers" in the ocean, such as diatoms, or microscopic algae, and blue-green algae. Other researchers have shown that seaweed and bacteria also are infected.

Suttle reported in the *Nature* article that concentrates made with marine viruses were capable of dramatically reducing phytoplankton populations in the laboratory, in some cases by as much as 78 percent. Some protein molecules also could have damaged the phytoplankton, he says, but he speculates that additional experiments would probably show that, overall, viruses and not contaminants were responsible for the killing.

Previously, most marine researchers assumed that phytoplankton were limited mostly by the absence of sunlight or essential nutrients such as phosphate, iron or nitrogen.

But a growing number of marine biologists suspect that viruses control the competition among plankton. Elizabeth Cosper of Marine Sciences Research Center at the State University of New York in Stony Brook says that the sudden appearance and disappearance of brown or red tides may be regulated by viruses.