Virulent bacteria affecting oysters found to be a case of mistaken identity

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Oyster larvae such as these from a hatchery near Netarts Bay, Ore., have been threatened by a bacterial disease. Credit: Lynn Ketchum, courtesy of Oregon State University

The bacteria that helped cause the near-ruin of two large oyster hatcheries in the Pacific Northwest have been mistakenly identified for years, researchers say in a recent report.

In addition, the study shows that the bacteria now believed to have

participated in that problem are even more widespread and deadly than the previous suspect.

Although the hatchery industry has largely recovered, primarily by better control of ocean water acidity that was also part of the problem, the bacterial pathogens remain a significant concern for wild oysters along the coast, researchers said.

For many years, it had been believed that the primary bacteria causing oyster larval death in the Pacific Northwest was *Vibrio tubiashii*. Now, scientists say that most, or possibly all of the bacterial problem was caused by a different pathogen, *Vibrio coralliilyticus*, a close cousin that's now known to be even more virulent to Pacific oysters.

The findings were published in *Applied and Environmental Microbiology*, by researchers from the College of Veterinary Medicine at Oregon State University, the U.S. Department of Agriculture, and Rutgers University. The research was supported by the USDA.

"These bacteria are very similar, they're close cousins," said Claudia Häse, an OSU associate professor and expert in microbial pathogenesis. "*V. coralliilyticus* was believed to primarily infect warm water corals and contributes to coral bleaching around the world. It shares some gene sequences with *V. tubiashii*, but when we finally were able to compare the entire genomes, it became apparent that most of what we're dealing with in the Pacific Northwest is *V. coralliilyticus*."

Scientists now say that *V. coralliilyticus* is not only far more widespread than previously believed, but that it can infect a variety of fish, shellfish and oysters, including rainbow trout and larval brine shrimp. And it appears to be the primary offender in bacterial attacks on Pacific Northwest oyster larvae.

OSU experts have developed a rapid diagnostic assay for this bacteria that is nearing commercialization, and it may help assess problems both in oyster and coral health, Häse said.

"Although we've largely addressed the problems the hatcheries face, these bacteria continue to pose threats to wild oysters," Häse said. "And corals are still declining in many places, the Great Barrier Reef in Australia is dying at an alarming rate. Better diagnostics might help in all of these situations."

In what's now understood to be a problem with multiple causes, these pathogenic bacteria were involved in major crashes of oyster hatcheries, causing shortages in seed oysters for commercial producers. Dramatic losses were suffered in a Netarts Bay, Oregon, hatchery in 2005, and Washington hatcheries were also hard hit. Bacterial infection, water acidity, oxygen depletion and rising seawater temperatures are all believed to have been part of the problem.

By better monitoring and control of water acidity, which was one serious concern, hatcheries have been able to regain most of their productive capabilities. Wild oysters, however, continue to face the multiple pressures from rising acidity, pathogenic bacteria and other forces that have led to serious hatchery mortality.

Those problems have not been made any easier by the lack of funding for identification and studies of the bacteria that researchers now know to be causing infection.

In laboratory tests, strains of *V. tubiashii* did not show significant pathogenicity to Pacific oysters. *V. coralliilyticus*, by contrast, is highly infectious to both Pacific and Eastern oyster larvae, and perhaps other shellfish species.

"The Vibrio genus and many bacteria associated with it are a huge problem in fish and shellfish aquaculture, and we should be studying them more aggressively," Häse said. "*V. coralliilyticus*, in particular, has a very powerful toxin delivery system, and vibrios are some of the smartest of all bacteria. They can smell, sense things and swim toward a host."

It's believed that increasing environmental stresses may make oysters and other marine life more vulnerable to these types of bacterial infection, researchers say.

Provided by Oregon State University

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