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Control of Rickettsial Infections in White Seabass

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Background

In 1998, an unrecognized disease spread through the Leon Raymond Hubbard, Jr., Marine Fish Hatchery in northern San Diego County. This forced hatchery operators to destroy some 10,000 to 20,000 juvenile white seabass in order to halt the outbreak at the facility and to prevent disease from spreading into the wild.

The hatchery, operated by the Hubbs-SeaWorld Research Institute, raises white seabass (*Atractoscion nobilis*) for release in the wild. The California Department of Fish Game supports the $1-million-a-year stock-enhancement program through the sale of sport fishing permits.

White seabass are a popular sport fish whose numbers were severely reduced by intense fishing.

Fish hatchery operated by Hubbs-SeaWorld Research Institute.

Project and Findings

Sea Grant funded disease specialist Ron Hedrick of the School of Veterinary Medicine at University of California, Davis to answer fundamental questions about the emerging disease, its causative agent, and potential sources.

His work was conducted in close collaboration with hatchery scientists and showed that the pathogen infecting seabass was a rickettsial-like bacteria, *Piscirickettsia salmonis*, previously believed to infect only salmon, hence its Latin name. The disease can be spread through contaminated water, especially when animals are in close proximity to each other.

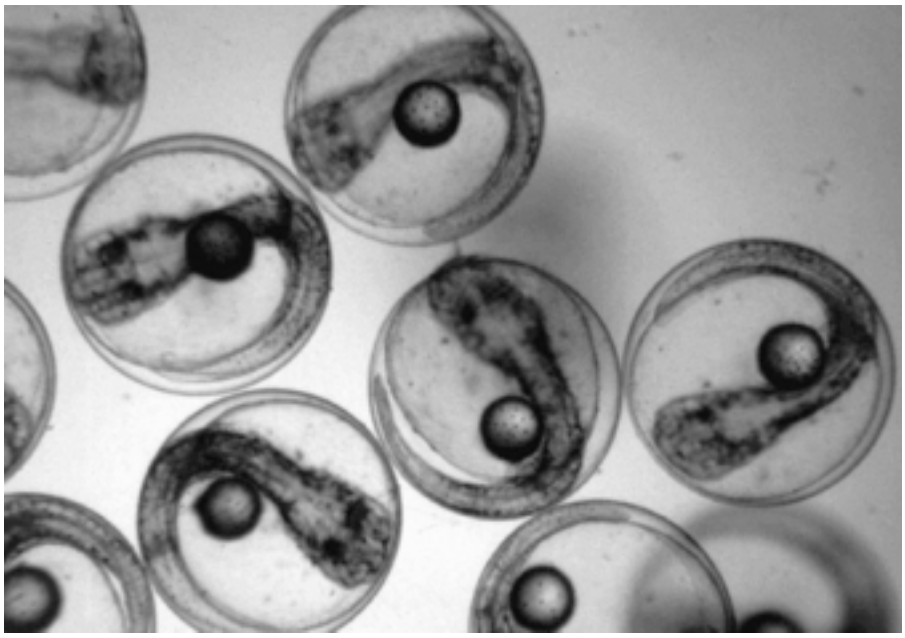
Disease has been a huge issue at salmon farms in Chile and British Columbia. In Chile, *P. salmonis* has infected as much as 90 percent of animals and hence destroyed their commercial value.

Juvenile white seabass are tested for *Piscirickettsia salmonis* before being released. Photos ©Hubbs-SeaWorld Research Institute

Based on his Sea Grant work, Hedrick and others now believe that *P. salmonis* is broadly distributed in marine fishes around the world. That is, many species of fish besides salmon and white seabass may carry and spread disease. If this is true, it would explain the prevalence of the disease in Chile, where there are no native salmon species.

During the course of his grant, Hedrick also developed molecular tools for diagnosing the disease. He was able to develop one PCR assay for detecting key isolates of the bacterium and another for detecting antibodies to the bacterium. Using these, he was able to show that wild seabass (not just hatchery fish) had previously been exposed to the bacterium, further supporting the idea that *P. salmonis* is common to many marine fishes.

In other experiments, Kristen Arkush of the Bodega Marine Laboratory, and a co-investigator on



Late-stage white seabass eggs ready to hatch in 6 to 12 hours. Photo ©Hubbs-SeaWorld Research Institute

the project, showed that seabass could transmit the disease to Chinook salmon—an important discovery given the number of endangered salmon species along the West Coast.

Applications

The molecular tools developed in this project are easily transferable to commercial operations and can be modified to address new diseases, their prevalence and means of early detection in fish.

Hedrick is currently looking at whether methods for controlling disease at salmon farms can be transferred to the seabass hatchery. In particular, he is investigating the efficacy of antibiotic treatments, and a vaccine is currently under development.

Collaborating Organizations
California Department of Fish and Game
Hubbs-SeaWorld Research Institute
Washington Department of Fisheries

Publications

Chen, M.F., S. Yun, G.D. Marty, T.S. McDowell, M.L. House, J.A. Apperson, T.A. Guenther, K.D. Arkush, and R.P. Hedrick. 2000. A *Piscirickettsia salmonis*-like bacterium associated with mortality of white seabass *Atractoscion nobilis*. *Dis. Aquat. Org.* 43(2):117–126.

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