

Scientists Patent Fish Disease Vaccine

Bacterial coldwater disease (CWD), caused by the bacterium *Flavobacterium psychrophilum*, is a lethal infection that causes significant losses of hatchery-reared salmonids worldwide. The disease is regarded as the No. 1 problem for Idaho's trout industry, resulting in \$9-10 million annual losses and up to a 30 percent reduction in yield.

University of Idaho fisheries scientist Ken Cain; Benjamin R. LaFrentz, research molecular biologist, US Department of Agriculture-Agricultural Research Service; and Scott LaPatra, director of research and farm services at Clear Springs Foods, Inc.; collaboratively developed a CWD vaccine that was recently patented by the University of Idaho.

"Cain's innovative, collaborative research promises millions in savings for Idaho's commercial trout industry – the third largest animal food industry in the state and the nation's largest producer," said Duane

Nellis, University of Idaho president.

"Solutions like this are in keeping with our mission as a 21st century land-grant institution with global impact."

CWD also is problematic at hatcheries rearing fish for sport or restoration, and although present in the wild, stress in the hatchery environment may induce disease outbreaks.

"Practical delivery of a vaccine in aquaculture is extremely important," said Cain.

"This is the first time we have been able to show that immersing fish into an experimental CWD vaccine will provide disease protection."

Cain explains that while most vaccines work using killed bacteria, CWD only responds to live bacteria. He and his colleagues developed a strain of the live *Flavobacterium psychrophilum* bacterium, which works as an injection or as an immersion vaccine.

This product currently is being tested in field trials at northwest hatcheries. If the field trials prove successful, the company Aquatic Life Sciences will have first option to license the patent from the university and commercialize the vaccine for sale to both public and private aquaculture operations.

Source: *TheFishSite News Desk*

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Simon Andreas Stäblein, from Humboldt University spends several months at Hagerman

Simon Andreas Stäblein is an undergraduate student from Humboldt University in Berlin, Germany. He spent several months at the Hagerman Fish Culture Experiment Station (HFCES) completing a senior thesis requiring independent research. This thesis is required to complete his degree program.

While at Humboldt, Simon worked with Dr. Jens Krause researching alternative protein sources for fish feeds to replace fish meal. As a result of this experience, he decided to investigate the potential to use dried meal produced from the freshwater shrimp *Gammarus pulex* which grows in freshwater lakes. *Gammarus pulex* is being harvested commercially in Russia and appears to have potential as a protein ingredient in feeds for trout.

Simon contacted ARI to see if he could conduct feeding trials using *Gammarus pulex* in feeds. ARI has an active program in fish nutrition with a focus on alternatives to fish meal in trout diets, and agreed to host Simon's research. After arriving in early September, he prepared experimental diets and conducted research. The feeding trial portion of his study ended on November 29 and was followed with a sensory evaluation of the trout to determine if addition of dried *Gammarus pulex* meal altered the taste, texture or odor of fillets.



Simon enjoying Idaho's sport fishing

Simon returned to Germany in mid-December with a draft of his senior thesis. Overall, dried *Gammarus pulex* meal was found to be an excellent feed ingredient to use in trout feeds. Fish grew more rapidly when dried *Gammarus pulex* meal was included in their feed up to 50% of dietary protein than in control feeds that were similar to commercial feeds, although complete substitution of all dietary protein with dried *Gammarus pulex* meal resulted in slightly reduced fish growth.

Simon was involved in different projects as research assistant at the Institute of Freshwater Ecology and

Inland Fisheries (IGB) at Humboldt University. Major operations during this phase included electrofishing, fish monitoring and the subsequent processing of the data, as well as assisting Ph.D. students. Thus, he has a strong background in fisheries. He is passionate about both aquaculture and sport fishing, which he enjoyed during his stay in Idaho. Based upon his positive experience, he is considering applying to the University of Idaho in 2011 to further his education as a graduate student.



Sensory evaluation of trout

FEATURED STUDENT



Amy Long is originally from Ft. Lauderdale, FL. As an undergraduate at the University of Pittsburgh, Amy became interested in microbial ecology and earned a B.S. in Microbiology. She then went on to University of South Florida in St. Petersburg for a master's degree in marine science focusing on marine bacteria and viruses. Amy's interest in fish health began while collaborating with the Florida Fish & Wildlife Conservation Commission Fish and Wildlife Research Institute (FWRI) on a project for her master's research. Upon completion of her master's degree in 2006, Amy was hired at FWRI as the microbiologist in the Fish & Wildlife Health section. Amy worked on a wide variety of projects while at FWRI including disease outbreaks at state aquaculture facilities, investigating fish kills, and sport fish health surveys. After two years with FWRI, Amy decided to return to school and came to University of Idaho for a Ph.D. in Fish Health with Dr. Ken Cain.

Amy's research project is focused on evaluating diagnostic assays for screening broodstock for *Flavobacterium psychrophilum*, the causative agent of Bacterial Coldwater Disease (BCWD). All salmonids are susceptible to this disease but rainbow trout

(*Oncorhynchus mykiss*), steelhead, and Coho salmon (*O. kisutch*) are particularly vulnerable. *F. psychrophilum* can be transmitted from fish to fish and research suggests that can also be passed from broodstock to progeny. The economic impact of this disease on aquaculture facilities, both regionally and worldwide, is substantial. There is no commercial vaccine available for *F. psychrophilum* and antibiotic treatment has limited success. As such, it has been suggested that control and/or prevention strategies to avoid disease outbreaks need to be developed. A culling program in which eggs from heavily infected adults are culled to reduce incidence of disease outbreaks in progeny is one possible method. A similar culling strategy has been used for reducing Bacterial Kidney Disease outbreaks in hatcheries in the Northwest.

Using diagnostic assays developed by a former student in Dr. Cain's lab to quantify bacterial levels in ovarian fluid and tissue samples, Amy is screening broodstock from hatcheries to determine if infection levels in broodstock can be used to predict disease outbreaks in progeny. Infection severity is assessed for broodstock and used to select progeny from five broodstock that have a range of infection levels. Progeny are sent to UI, sampled regularly for *F. psychrophilum*, and reared under a variety of conditions in an attempt to induce a BCWD outbreak. If an outbreak does occur and there are no other pathogens present, this will provide evidence that vertical transmission of *F. psychrophilum* has occurred and can be related to the severity of infection in the broodstock. Amy is also developing a quantitative real-time PCR for *F. psychrophilum*, and evaluating the prevalence of *F. psychrophilum* at regional hatcheries. She was the 2010 recipient of the Idaho Chapter AFS Idaho Graduate Student Scholarship, and recently presented her research at the 6th International Symposium of Aquatic Animal Health in Tampa, FL.

Aquaculture Research Institute

The ARI newsletter will be produced semi-annually and available online in Adobe Acrobat format through www.uidaho.edu/aquaculture. If you would like to be notified via email when the latest edition is available on our web page, please notify the editor at aqua@uidaho.edu.

We would be happy to include appropriate contributions from those of you working in the field! Feedback and suggestions on how to improve this newsletter would also be appreciated.

This issue of the newsletter highlights various projects being conducted on the Moscow campus, the Hagerman Fish Experiment Station and includes various extension activities.

The Aquaculture Research Institute Newsletter provides information about aquaculture-related activities at the University of Idaho. It is intended to complement rather than duplicate the Idaho Aquaculture Association Newsletter, although some articles may overlap. Articles in this newsletter may be reproduced without permission, provided they are properly cited. Please feel free to submit comments or material you would like us to consider for publication to:

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CALENDAR

**2011 American Fisheries Annual Meeting
Native Peoples Fisheries: Perspectives on Past,
Present, and Future**

March 2-4, 2011

Doubletree Hotel Boise-Riverside, Boise, Idaho

**2011 Aquaculture America
Aquaculture on Parade**

February 28-March 3, 2011

New Orleans, Marriott, New Orleans, La

**2011 American Fisheries Society
Fish Health Section, Western Meeting**

Nanaimo, British Columbia

June 14-16, 2011

**2011 American Fisheries Society Annual Meeting
Fisheries Management and Ecology: Leading the
Way in a Changing World**

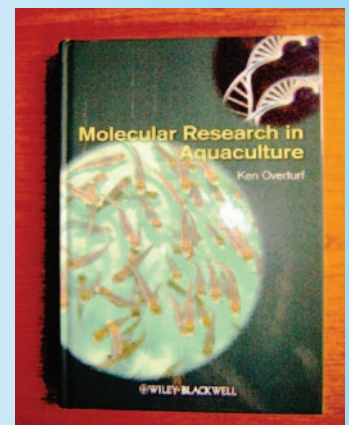
Seattle, Washington

September 4-8, 2011

MOLECULAR RESEARCH IN AQUACULTURE

by Dr. Overturf

Dr. Overturf completed a book in 2009 entitled "Molecular Research in Aquaculture." The aim of the book is to provide an understanding of modern molecular techniques used in aquaculture research so that readers can develop an understanding of the power and limitations of molecular biology.



The book begins by describing the convergence between aquaculture and molecular biology, then moves on to cover molecular tools used in research, such as quantitative PCR, microarrays, genomics and proteomics. The remaining chapters in the book deal with new ways in which the tools of molecular biology can be used in aquaculture research to better understand growth, metabolism, regulation of muscle growth, reproduction and the genomics of fish pathogens.

The text is a timely and welcome addition to scientific literature and joins other books published by ARI scientists in recent years.