

Aquaculture Research Institute

Drs. Cruz and Ricque spend a sabbatical year at the Hagerman laboratory



INSIDE

Experts in nutrition and feed in Hagerman..... 1

Hatching a plan..... 2

FEATURED STUDENT - Tyson Fehringer..... 2

Associate Professor from Greece spends sabbatical in Hagerman..... 3

Calendar..... 4

Dr. Elizabeth Cruz and Dr. Denis Ricque are professors of the Faculty of Biological Science at the Autonomous University of Nuevo Leon (UANL), in Monterrey, the industrial capital of northeast Mexico, located 200km south of the Texas border. They spent the 2011-2012 academic year on sabbatical leave at the Hagerman Fish Culture Experiment Station (HFCES) of ARI. Both are experts in shrimp nutrition and feeds. During their stay in Hagerman, they expanded their research to include evaluating the nutritional value of seaweed meal as a supplement to trout feeds.

Since 2000 one of their research topics has been evaluation of various seaweeds as additives in shrimp feeds. The best results have been obtained with the green macroalgae *Ulva clathrata*. This alga is produced by aquaculture on a pilot scale in Baja California, México,

and has been fed to shrimp fresh (co-cultured with white shrimp) or dried (as dietary supplement included at 3 to 5%). Co-culturing shrimp with *Ulva* results in increased growth and lower feed consumption, and improved final product quality (body pigmentation) and omega-3 fatty acid composition. Adding dried *Ulva* meal to shrimp feeds improves pellet quality, feed digestibility, and the immune response of shrimp.

Elizabeth, a native of Mexico City, received her Bachelor of Science degree in Biology with specialty in Hydrobiology from the Autonomous Metropolitan University, Mexico City in 1982. She then received a scholarship to study in France in the University of Bretagne Occidentale and IFREMER, the French Institute for Marine Research, in Brest, France, and Tahiti, French Polynesia. She received her PhD

Hatching a plan

Adapted from an article written by Matt Maw. Reprinted with permission from The Argonaut, October 2, 2012.

The University of Idaho's College of Natural Resources hosted Dr. Shawn Narum, lead conservation geneticist with the Columbia River Inter-Tribal Fish Commission (CRITFC), for a lecture on hatchery research and methodology. Narum became lead conservation geneticist for CRITFC in 2002 and received his Ph.D. from the University of Idaho in 2006. CRITFC's fish genetics program is located at ARI's Hageman Fish Culture Experiment Station. The genetics program was started several years earlier in a joint effort between ARI and CRITFC. ARI did all genetic analysis for CRITFC under contract. As the program expanded, CRITFC hired scientists, starting with Narum, to conduct population genetic research at the Hagerman Station. The program now employs 14 scientists and technicians who work closely with UI scientists on a range of research topics.



Picture taken by Tony Marcolina

Narum said his team uses molecular tools to determine the genetic origins of salmon, steelhead and other species using fin clips from fish (both juvenile and adults) sampled throughout the Columbia River basin and the west coast. The data they generate identi-

fies the fish as being of hatchery or wild origin and allows them to identify which hatchery or river system produced them. Data is also developed to investigate interactions between wild and hatchery fish in various watersheds and to explore the genetic bases for adaptation to the environment and other influences.

Narum said there are concerns that particular populations of fish may disappear from the Columbia River basin. Salmon, steelhead, sturgeon and Pacific lamprey populations in the Columbia River basin have decreased for many decades because of overharvesting, habitat destruction due to deforestation and the influences of mining, pollution and dams. He said recent studies show a subtler problem — hatchery fish can lower the viability of wild populations if they interbreed in the wild. Hatchery rearing practices can be modified to reduce the negative effects of hatchery fish on wild populations.

Narum said his team is researching ways to utilize hatchery supplementation in ways that have less impact on wild populations and still provide adult returns for Native American fisheries, sport fishermen and, most importantly, to boost wild populations.

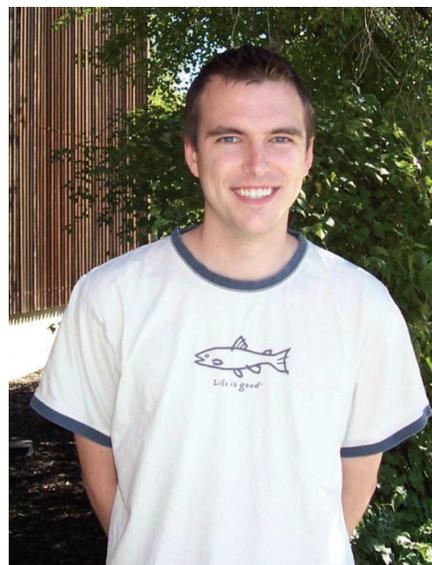
His team advocates the use of such positive rearing practices as using only local fish stock for supplementation hatcheries and incorporating natural-origin fish into hatchery broodstocks. Another method is rearing fish in hatcheries to produce outmigrating smolts over similar timeframes as wild fish, he said. For example, steelhead smolts are released after a year of hatchery rearing, whereas wild steelhead smolts migrate to the sea after two or more years of freshwater life.

“That’s the goal — to utilize hatchery supplementation programs that rear hatchery fish that are as similar as possible to their wild counterparts so that they don’t negatively impact wild populations,” Narum said.

His team also conducts research on the capacity of fish to adapt to various habitats, particularly those with varying or extreme temperatures during parts of the year. Inland fish in the region repopulated the area when glaciers

continued on page 4

Featured Student



Tyson Fehringer is originally from American Falls, Idaho. In 2010, he received his bachelor's degree in fishery resources with a minor in aquaculture from the University of Idaho. After working in Dr. Ken Cain's fish health laboratory, Tyson decided to pursue a master's degree in fish health with Cain serving as his advisor. His research has focused on the effects of dietary supplementation of immunostimulants and probiotics on immune response and disease resistance in rainbow trout.

Tyson's first project was to determine if byproducts from the Alaskan salmon fishery could be incorporated into trout diets and serve as immunostimulants. After finding there were no immunostimulatory effect from the byproducts, he began working with probiotics. A previous student had discovered two probiotics with potential benefits in the management of Bacterial Coldwater Disease (BCWD) outbreaks. BCWD is one of the leading causes of disease related mortality in salmonid aquaculture worldwide. Tyson's current research is focused on ways of improving the effects of the probiotic strains. He is currently evaluating methods for combining the two probiotics strains; using them in conjunction with vaccination strategies. This summer Tyson presented findings from his research at the Western Fish Disease Workshop in Boise, ID and received an award for best student presenter.

Tyson is graduating at the end of spring semester 2013, and hopes to get a job in the Pacific Northwest.

continued from page 1

in 1987; her research focused on the nutrition of penaeid shrimp, specifically the purification of a growth factor extracted from squid.

Denis Ricque was born in France in 1957 and received his professional education at the Veterinary School of Maisons-Alfort, near Paris. In 1983, while in postdoc at the National Fish Pathology Laboratory in Brest, he met Elizabeth; they were married in 1985.

Elizabeth and Denis moved to Mexico and began their academic careers in 1988 at the University in Monterrey, by creating the "Programa Maricultura", a research program focused on shrimp nutritional requirements, and the evaluation of ingredients and dietary additives for the two shrimp species cultured on the American Pacific coast, Pacific white-legged shrimp (*L. vannamei*) and blue shrimp (*L. stylirostris*).

This program has developed strong relationships with the national and international shrimp feed industry. They also founded the International Symposium on Aquatic Nutrition, where nutritionists from Latin and North America meet every two years for a conference that covers nutrition topics related to tropical crustacean and fish species. The proceedings are available on-line at (<http://www.uanl.mx/publicaciones/avances-en-nutricion-acuicola.html>).

Southern Idaho is a long distance from Mexico, but the transition from Mexico to Idaho was made easier by the presence of a vibrant Hispanic community in and around Twin Falls. They also developed a busy social life in Twin Falls due to their outgoing personalities and through the activities of their daughter, Daniela, who attended Twin Falls High School for her sophomore year.

Associate Professor from Greece spends sabbatical in Hagerman

Katerina Moutou, an Associate Professor at the University of Thessaly in Volos, Greece, is presently on a six-month sabbatical at the Hagerman Fish Culture Experiment Station. Dr. Moutou is an expert in cell biology with research projects in fish nutrition and digestion, fish muscle development and fish population genetics. She received her PhD degree from the University of Aberdeen, Scotland, and participates in several large EU-funded projects, most recently on fish larval biology.

While in Hagerman, Katerina is using her expertise to analyze gene expression in tissue samples from research projects being conducted at HFCES, and she is also taking the opportunity to sample fish in several studies for her own projects. Her present interest involves myokines, compounds that facilitate communication between skeletal muscle and adipose tissue, thereby regulating fatty acid metabolism (lipolysis or lipogenesis) and protein turnover. These are key topics related to the sustainability and economics of aquaculture. Two myokines of interest are leptin and adiponectin. How fat cells are regulated or, conversely, how they influence protein synthesis,

is an important topic in mammals, but whether or not fish metabolism is regulated in the same manner as in mammals is as yet unknown. Analysis of samples taken from existing studies at the Hagerman Station will help establish the mechanisms by which protein and fat metabolism is regulated in fish.

Hagerman, Idaho, is a big change from Greece, both in weather and culture. Katerina enjoys nature and the outdoors, and the environment in Idaho provides ample opportunities for outdoor activities. But, she notes that the night life in Twin Falls is quite different from that of Greece.



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 Culture 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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Aquaculture Research Institute

CALENDAR

Annual Meeting of the American Fisheries Society (AFS), Hosted by the Idaho Chapter Western Division

Fisheries: Learning from the past and looking towards the future.

April 15-18, 2013

Boise Centre, Boise, Idaho

For more information:

www.idahoafs.org/2013AnnualMeeting/

AFS Fish Health Annual Meeting Held in conjunction with Fish Disease Workshop

June 18-20, 2013

Fort Townsend, Washington

AFS Annual Meeting

Preparing for the Challenges Ahead

September 8-12, 2013

Little Rock, Arkansas

Annual Meeting of Asian-Pacific Aquaculture

Positioning for Profit.

December 10-13, 2013

Saigon Exhibition & Convention Centre

Ho Chi Minh City, Vietnam

continued from page 2

receded after the last Ice Age about 12,000 years ago. Over that time period, populations of fish have adapted to a range of habitats. Understanding the capacity of fish to adapt to changing habitats and water conditions will inform the team's conservation focus.

Though CRITFC's research is limited to fish in the Pacific Northwest, Narum said many wildlife populations around the world can benefit from genetic monitoring and better understanding of adaptation to local environments.

"Most species are expected to be affected by climate change. Basically, their options are to relocate (move), adapt to changing conditions, or die" Narum said. "The genetic approaches we are taking to address these issues can be applied to many other species with similar conservation concerns."