

FLC NORTHEAST REGION NEWSLETTER – SPRING 2010

Note from the Northeast Regional Coordinator – Lewis Meixler

Welcome to the spring 2010 issue of the Northeast Region newsletter. In addition to updating what's going on in our laboratories, we are also spotlighting our 2010 FLC award winners: the U.S. Army Armament Research, Development and Engineering Center; U.S. Army Natick Soldier Research, Development and Engineering Center; and Dr. Theresa Baus of the Naval Undersea Warfare Center, Division Newport. Because nominations are submitted from all six regions, the national FLC awards program is extremely competitive, so our winners should be especially proud of their achievements.

I want to say thanks to those who attended our recent meeting in West Point. It was a great two days of networking and exchanging ideas that will strengthen our laboratories' technology transfer efforts. Be sure to check out the proceedings on our site (http://www.flcnortheast.org/march2010_meeting.html) if you missed any presentation or couldn't make the meeting.

It won't be much longer before we are heading to Albuquerque for the 2010 national meeting. I expect to see a large Northeast Region presence as the turnout of our members has been increasing in recent years. As always, thank you for your continued support of our region and its laboratories.

Northeast Region Honored with 2010 National FLC Awards

The winners of the 2010 FLC awards were recently announced, with three of the awards going to Northeast Region laboratories. The FLC awards program honors outstanding technology transfer achievements of member laboratories from its six regions. The awards will be presented on April 29 at a ceremony during the national meeting in Albuquerque, New Mexico.

This year's winners from the Northeast Region include:

Award for Excellence in Technology Transfer

*U.S. Army Armament Research, Development and Engineering Center (ARDEC)
"Coyote™ Unattended Ground Sensor Network"*

The team of Dr. Myron Hohil, Mark Mellini, Sean Schumer, and Kent Colling developed the Coyote™ Unattended Ground Sensor (UGS) Network, a state-of-the-art joint sensor and communications system that is easy to deploy, resistant to security attacks, reliably scales from small focused targets to nationwide networks and, most importantly, is cost-effective.

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ARDEC entered into a partnership with Innovative Wireless Technologies (IWT) to transfer the technology through patent licensing agreements. The Coyote™ has been supplied to the Department of Homeland Security, the Army, and the Canadian government, which used it during the Vancouver Olympic Games.

*U.S. Army Natick Soldier Research, Development and Engineering Center
D-FENS (Disinfectant Sprayer for Foods and Environmentally-Friendly Sanitation)*

To protect warfighters from food-borne illness in global deployments, researchers Dr. Christopher Doona and Florence Feeherry developed “D-FENS” (Disinfectant-sprayer for Foods and ENvironmentally-friendly Sanitation) as an innovative chlorine dioxide (ClO₂) “green” technology that promotes the safety of human health and the environment. D-FENS was invented using a unique chemical combination and an innovative mixing method for producing ClO₂ as an easily dispensable solution in convenient, small, batch-sized delivery systems.

In May 2009, the D-FENS technology transferred under a Patent License Agreement with ClorDiSys Solutions, Inc. This qualified licensee is further refining the technology and its delivery system for the benefit of the consumer, providing an environmentally friendly noncorrosive product with superior surface disinfectant properties and no unpleasant odor.

FLC Service Award – Harold Metcalf Award

*Dr. Theresa Baus
Naval Undersea Warfare Center, Division Newport*

Dr. Baus, the current FLC Vice-Chair, was selected as the recipient of this award for her longstanding service to the FLC and her outstanding accomplishments as Northeast Regional Coordinator (2007-2009).

During her service as Northeast Regional Coordinator, Dr. Baus instituted and nurtured several unique projects that carried out the FLC's goals in her region. She increased the number of FLC regional meetings to give laboratories an additional chance to participate in events that provided up-to-date training and education, the latest information on changes and advancements in technology transfer procedures, and access to new opportunities. Other regional projects undertaken by Dr. Baus included developing a “road show” with patent attorneys to provide education about patents, licenses, and disclosures; and participating in a number of conferences to increase awareness about the laboratories in her region and the available opportunities for partnerships in technology transfer.

The Northeast Region congratulates these winners on their exceptional achievements.

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Northeast Regional Spring Meeting Recap

The Northeast Region recently held its spring 2010 meeting in West Point, New York. Attended by representatives from member laboratories and industries in the region, the two-day meeting provided an opportunity to get an update on laboratory happenings, as well as information on how to maximize technology transfer.

Meeting highlights included:

- An overview of the U.S. Military Academy's Academic Research Program, which uses a number of its centers and departments to move technologies developed by students and faculty into the marketplace.
- A presentation from the National Association of Seed and Venture Funds illustrating the role of innovation capital in advancing technology transfer.
- A panel discussion featuring two licensees providing first-hand accounts of how technology transfer with federal laboratories has benefitted them.

Additional information on the meeting, including a photo gallery, is available at http://www.flcnortheast.org/march2010_meeting.html.

Scientists Get Funding to Design Anti-Botulism Drugs

Scientists at Brookhaven National Laboratory (BNL), in collaboration with researchers at Stony Brook University's Institute of Chemical Biology and Drug Discovery (ICB&DD), were selected to receive up to \$1.4 million in applied research funds from the Department of Defense's Defense Threat Reduction Agency (DTRA) to develop drugs that block the paralytic and deadly effects of botulinum neurotoxins.

"There are currently no reliable treatments for botulinum toxin exposure," said Brookhaven biologist Subramanyam Swaminathan, who leads the collaborative effort. "It is important to develop a drug that combats the neurotoxic effects to mitigate fears associated with this deadly poison, including the fear of its potential use in bioterrorism attacks."

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Botulinum toxins are poisonous proteins produced by *Clostridium botulinum* bacteria. The toxins destroy essential components of nerve cells that control muscle movement, which prevents muscle functioning and leads to paralysis and death. Most commonly known for causing botulism poisoning from canned foods and for their use in cosmetic surgeries, botulinum toxins are the most potent neurotoxins known to humans and are considered extremely dangerous due to their potential use as a large-scale bioterrorism agent.

Fueling the need for developing new drugs is the fact that the current treatment for exposure to botulinum toxin is only effective if it is administered before the toxin infiltrates target cells—a critical time period that may pass before a diagnosis is even made.

The DTRA-funded project focuses on four main drug development goals, including:

- Deciphering the structure of enzyme-inhibitor complexes
- Screening large databases for candidate molecules and peptides that block the active sites of multiple botulinum toxin strains
- Synthesis of novel compounds and the modification of molecules for broad spectrum use
- Applying medicinal chemistry to optimize the design of these compounds.

Because there are seven different strains, or serotypes, of botulinum toxin—four of which affect humans—one important aspect of the project is developing a single drug that blocks the toxic effects of multiple strains.

“When inflicted by the neurotoxin, you don’t know which serotype you were infected with,” Swaminathan said. “Finding one common drug is useful because otherwise the specific serotype would need to be identified before treatment.”

Swaminathan has studied the botulinum neurotoxin proteins for over two decades, and he previously deciphered the structure of several strains of botulism toxin using x-ray crystallography data collected at Brookhaven’s National Synchrotron Light Source (NSLS). The multidisciplinary research project combines his enzyme-inhibitor structure work with the expertise and resources of Iwao Ojima and Peter Tonge of Stony Brook University’s Department of Chemistry and Robert Rizzo from the Department of Applied Mathematics and Statistics. The drug development effort is the first consortium award between Brookhaven and ICB&DD.

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GFDL Study Suggests Doubling of Category 4 and 5 Hurricanes This Century

A team of scientists from NOAA's Geophysical Fluid Dynamics Laboratory (GFDL) used a unique downscaling approach to model hurricane activity through the end of the 21st century, and their results produce nearly a doubling of the frequency of category 4 and 5 storms.

Most climate models are incapable of reproducing the strongest hurricanes (category 3 or higher), so GFDL scientists used a unique three-step approach. They began by creating an average climate change projection based on 18 global climate models, and then fed this projection into a regional model with much higher resolution to simulate entire hurricane seasons. Finally, they used GFDL's operational hurricane prediction model to resimulate each storm generated by the regional model—but at a still higher resolution—so that the very intense (category 4 and 5) hurricanes could be simulated.

These results are based on projections of a substantial warming of the tropical Atlantic hurricane regions over the 21st century due to an increase in greenhouse gases. The projections used a standard future emission scenario from the Intergovernmental Panel on Climate Change (IPCC).

In these experiments, the models showed a decrease in the total number of hurricanes by the end of this century, yet still produced nearly a doubling of category 4 and 5 hurricanes. The largest increase in intense hurricanes was seen in the western Atlantic region (between 20°N and 40°N).

Category 4 and 5 hurricanes making landfall account for approximately 48% of all hurricane damage in the U.S., despite accounting for only 6% of the total number of hurricanes that make landfall. The authors estimate about a 30% increase in potential damage from the combined effect of fewer hurricanes overall and more very intense hurricanes.

The authors conclude that the increase in intense hurricanes may not be evident until late in the 21st century, because of year-to-year variations in storm activity and multi-decadal fluctuations that are known to exist in the Atlantic. Persistent change can only be detected using many decades of recorded observations to look for trends that emerge over the long-term.

This study was published in the January 22 issue of *Science*. The authors are Morris Bender, Thomas Knutson, Robert Tuleya, Joseph Sirutis (GFDL), Gabriel Vecchi, Stephen Garner and Isaac Held.

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Hudson Canyon Gives Up Secrets

Scientists studying Hudson Canyon off the coast of New Jersey, one of the largest underwater canyons in the world, have found evidence of deepwater corals and crater-like depressions that may be methane gas blowouts, not seen before on the northeastern U.S. continental margin. Extensive burrowing by golden tilefish, a commercially valuable fish typically found in submarine canyons, was also observed.

Using an autonomous underwater vehicle (AUV) named *Eagle Ray*, researchers from the National Oceanic and Atmospheric Administration's (NOAA) Fisheries Service, Rutgers University, and the National Institute for Undersea Science and Technology (NIUST) have produced high-resolution sonar maps of the canyon bottom. The maps provide details that other equipment such as sonar mounted on a ship's hull cannot detect, and will be used to direct visual searches for the various bottom features during subsequent work in the area next summer.

The maps reveal crater-like depressions several hundred feet across and tens of feet deep, as well as hard-topped "pockmarks" resembling deepwater coral habitats found elsewhere. The maps also showed steep slopes like those that support sponges and soft corals in New England canyons, and revealed expanses of hummocky terrain created by long-term tilefish burrowing.

"Hudson Canyon is a very large seafloor feature that has not been well documented. Being able to produce high-resolution seafloor maps while we were at sea revealed these new features and enabled us to adapt our sampling efforts during the cruise," said Vince Guida, an ecologist at the J.J. Howard Laboratory of NOAA's Northeast Fisheries Science Center (NEFSC) in Sandy Hook, N.J, and co-chief scientist of the 2009 cruise. "For example, we collected water samples near the craters to test for continuing methane release that could support the production of chemosynthetic bacteria in the canyons."

Mary Scranton, a marine scientist at Stony Brook University in New York, is analyzing the water samples. Chemosynthetic bacteria use chemicals from the earth's interior, rather than sunlight or photosynthesis, to survive and to support other forms of marine life on the ocean floor. The bacteria are often associated with methane seeps or areas where the seafloor is geologically active.

The crater-like depressions on the ocean floor occur when gas hydrates (methane gas frozen in ice crystals below the surface) dissolve and release the methane gas, thereby collapsing the sediments to form craters. Similar features have been found in the Gulf of Mexico and in other areas on the continental shelf, but would be a new discovery off the northeast U.S.

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“We found evidence of large structural corals down deep in the Hudson Canyon at depths between 350 and 400 meters (1,100 to 1,300 feet), where there is very little sunlight,” Guida said. “Similar types of structures have been found off North Carolina, along the southern U.S. coast, and in Canadian waters farther north, but not off the Northeast coast. We think these corals may be *Lophelia*, a cold-water species that forms large reef structures. Another possibility is that they may be masses of specialized clams, mussels or tube worms fed by chemosynthetic bacteria supported by methane release. Their true nature will remain uncertain until they can be seen visually at close range.”

Marine life in the Hudson Canyon is very diverse. Invertebrates include red crabs, lobsters and squid, while typical fish species encompass blackbelly rosefish, flounder, hakes, monkfish and black sea bass. Some species live only in shallower depths on the shelf, while others live deep in the canyon, which starts about 100 miles southeast of New York City on the continental shelf and runs some 300 miles into very deep water. Comparable in size to the Grand Canyon, Hudson Canyon is the largest known ocean canyon on the U.S. East Coast and one of the largest underwater canyons in the world.

Guida, who has been conducting research in the canyon area since 2001, and geologist Peter Rona of Rutgers University’s Institute of Marine and Coastal Sciences, served as co-chief scientists on the summer 2009 cruise. Together with colleagues from NIUST, a joint venture of NOAA, the University of Mississippi and the University of Southern Mississippi, they have explored the canyon every year since 2007 aboard NOAA ships and mapped progressively deeper sections. Another cruise is planned during the summer of 2010 aboard the NOAA ship *Henry B. Bigelow*.

“We plan to use the NIUST AUV *MolaMola* to take high quality still images of the features we found this year with multibeam sonar, and will also use the *Eagle Ray* to continue making detailed bottom maps,” Guida said. “We have no idea how extensive the methane seep deposits are, or how large the structural feature we think is a deepwater coral reef is. There may also be soft corals and other marine life in the area that we haven’t yet seen.”