Michelle Miller

From: Marine Bio-Technologies Center of Innovation (MBCOI) <mmiller@mbcoi.net>
Sent: Monday, April 07, 2014 3:58 PM
To: mmiller@mbcoi.net
Subject: Fathom the Opportunities 2nd Edition - April 2013

MBCOI
Fathom the Opportunities

Website About Technologies Development Communications Contact

Save the Date

April 2014

Please click here for upcoming Events in April and May.

World Aquaculture Society Conference, June 7-11, 2014, Adelaide, South Australia

BIO 2014, June 23-26, 2014, San Diego, CA

International Meeting on Marine Research (IMMR 2014), July 10-11, 2014, Peniche, Portugal

BioMarine 2014, October 30-31, 2014, Cascais, Portugal

E-Lit Library Tool for Marine Natural Products

An area that has plagued discovery efforts in Marine Natural Products in the past was finding the same compound from many different sources.

Clearly the tools available today are far superior and allow for faster

Welcome to the 2nd Edition of ***Fathom the Opportunities*** in which we shine the innovation spotlight on the **Brick Builder**, and a introduce a market research project on **Aquaculture**. Read about the proposed **E-Lit Library** tool, and the launch of a wide bore **MRI** instrument dedicated to *in vivo* longitudinal, dynamic stress-response studies in intact living marine organisms. In this newsletter you will also find Save the Date **Events**, and a few **Fathom Facts**.

Innovation Spotlight

Photo: bioMASON

The Brick Builder

What do bricks have to do with marine biotechnology? The answer lies with coral.

After winning an international design award from Next Generation "The Big Fix" by Metropolis magazine to produce a brick that was 'grown' as opposed to being 'fired,' Ginger Krieg Dosier founded bioMASON and concentrated on novel research to develop new environmentally friendly construction materials. Production of traditional clay bricks discharges millions of tons of carbon dioxide and other greenhouse emissions annually - there is a

dereplication and hopefully a more rapid path to novel applications.

MBCOI plans to introduce a new tool to help speed the development of new applications for chemical entities.

These "e-lit libraries" are comprehensive cross-referenced databases of chemicals and biological properties with links to the biomedical literature, chemical data (Chem-Spider©), and patents. Previously, e-lit libraries have been created as custom databases for single users, but MBCOI is developing a series of libraries on topics of interest to our marine biotechnology stakeholders.

As an example of this tool and its functionality, we have created a library of natural products from **Sea Cucumbers**. This tool will be distributed towards the end of April.

Please contact us if you would like to be added to the **distribution list**. We will also be conducting a **survey** to gather feedback on the use- fulness, ease of use and future topics, to help us improve the design and ensure the tool is working properly.

Fathom Facts...

Because the architecture and chemistry of coral is so similar to human bone, coral has been used to replace bone grafts in helping human bone to heal quickly and cleanly.

Ref. "Little known facts about the ocean - MarineBio.org." MarineBio Conservation Society. Web. Friday, March 28, 2014. <http://marinebio.org/marinbio/facts/index.asp>.

Growing enough food to meet the needs of a population is one foundation of a strong national defense. A safe and stable food supply is paramount to our nation's existence. In this day and age, when the security of our food supply is more at risk than ever before, it is essential that we develop the capability within the US borders to meet the growing clear need for a more ecologically acceptable process, one that could revolutionize the building and construction industries.

The idea to grow bricks from the ocean arose from a study of coral structures: hard cementitious material created by nature in ambient sea temperatures with low energy and material inputs. And that's how bioMASON was born. The technology utilizes microbial-induced calcite precipitation in which calcium chloride and urea interact with bacteria cultures and sand microbes to bind grains - it takes about five days to grow a bioMASON 'brick.' bioMASON employs natural microorganisms and chemical processes to manufacture biological cement-based masonry building materials. The process is continually being refined and optimized for increased performance and reduced production costs.

Ginger Dosier formally trained as an architect, and has additional experience and training in material science and microbiologically-based materials. Before founding bioMASON, she was a teaching fellow of Architecture at North Carolina State University, and an assistant professor of Architecture at the American University in the UAE.

Listen to Ginger Dosier's **Ted X WWF** presentation here.

With thanks to bioMASON for allowing us to highlight this innovation.

MBCOI Featured Programs

Aquaculture in North Carolina - Planning for the Future

Aquaculture is the fastest growing sector of animal food production across the globe, outpacing combined growth rates of poultry and livestock by three times over the past 40 years. Global trends such as population growth, limited harvests of wild fisheries, and improvements in living standards mean that aquaculture will have to continue this growth over the coming decades. Additionally, aquaculture is a driver of economic growth that can work in tandem with wild-caught seafood to support local jobs and businesses. The development of aquaculture will provide opportunities to support industries including marine biotechnology, seafood processing,

demand for seafood and that it be meant in a way that does not threaten our environment."

Kevan Main, Ph.D. Marine & Freshwater Aquaculture Program Manager, Senior Scientist, Mote Laboratory, Florida.

As part of their second grade study of oceans last year, students at a school in Winston-Salem, North Carolina prepared drift bottles with messages inside. They were released into the Gulf Stream in April 2013 from Wrightsville Beach, NC. In February 2014, 10.5 months and 3,500 miles later, the teacher received an email from a journalist in Viana do Castelo, a town in the north of Portugal, letting the students know that their bottle had been found! The project was featured in the local press, on a local radio station, and on their website.

Join the mailing list

Forward to a friend

Stay Connected

View our profile on LinkedIn

distribution, and many more. Increased focus on sustainable food sources will push aquaculture to develop new innovations around use of resources, feed efficiency, energy consumption, and local production all while still supplying healthy, quality seafood products to the growing global population.

MBCOI seeks to create new dialogue and discussion between key researchers and producers and other stakeholders to align collective efforts and take advantage of the burgeoning aquaculture opportunities in NC and beyond. It is our belief that NC can establish itself as a global hub for aquaculture biotechnology in areas such as aquaculture related pathogen assays and vaccines; advanced water sanitation technologies; aquaculture feed; shellfish and finfish; genetic lines, hybrid vigor; and probiotics.

Please contact us if you would like to participate in this important undertaking. We welcome your contribution, insight, expertise, or funding assistance.

Introducing the Marine Magnetic Resonance Facility in Morehead City, NC

The North Carolina State University (NCSU) Center for Marine Sciences and Technology (CMAST) recently took delivery of "the only wide bore instrument in the world dedicated to *in vivo* longitudinal, dynamic stress-response studies in intact living marine organisms." (NCSU CMAST)

The Marine Magnetic Resonance equipment allows the study of larger organisms and microcosms, under carefully controlled and reproducible environmental conditions. The 4.7T, 40cm bore Oxford superconducting magnet is equipped with upgraded console and shims and enhanced radio frequency (RF) coil designs capable of using optimized data acquisition sequences to accomplish high resolution and fast data collection, making it possible to apply advanced MRI / Spectroscopy (MRS) methods to new areas of basic and applied marine biology research.

MRI using rapid imaging sequences can provide imaging of tissue motion noninvasively. MRS uses the same noninvasive methods to probe the biochemistry of tissue. Essentially, MRS can peer into the tissue and gather spectral data to dynamically follow metabolic processes in the functioning organism. No other analytical tool can provide these types of data on such a wide range of metabolic pathways. This enables study of

normal biochemical function in living organisms and the quantification of the effects of environmental stress on these systems at a biochemical level.

Other techniques used by MMRF investigators can monitor stress in biological systems which can be accomplished by observing dynamic changes of metabolism in intact, living systems that precede physiological changes. Dynamic 13C spectroscopy and spectroscopic imaging used in longitudinal studies can track antioxidant turnover in intact living organisms, for example, as a function of oxygenation and acidification.

The use of 13C-labeled nutrients and conventional 1H and 13C MR Spectroscopic Imaging (MRSI) techniques to achieve Whole-body Mass Balance Imaging (WhoMBI) allows scientists to follow dynamic alterations of highly nonpolar compounds, including lipids and petroleum hydrocarbons. MMRF techniques can also be used to visualize the mosaic of physiochemical microenvironments within organisms and to map the densities of the microbial communities against physiochemical parameters, such as internal pH based on ATP-ADP ratios using 31P MRI/MRS.

Using MR images that characterize relaxation properties, chemical structure, and mobility and cross-sectional views of intact parts of living organisms is a powerful tool and can be applied to obtain temporal and dynamic changes in different subjects. Examples for use in seafood are differentiation of adipose and muscle tissues, water and fat determination, salt content in cured products using NMR active sodium nuclei (23Na) and accumulation of hazardous materials, such as heavy metals. MR techniques can replace traditional techniques for monitoring the safety and quality of foods.

A major feature of the magnet is that it is possible to image live animals and actually obtain real biochemical data from them without having to sacrifice them. The instrument is available to marine scientists across the country and around the world. The scientists at CMAST will collaborate with other marine scientists to design experiments suitable for the equipment in the facility. This provides an opportunity to collaborate in a variety of research areas and provide answers to current research.

This wide bore horizontal magnet is the only one in the world dedicated to the study of marine organisms. There is a facility in Charleston and

another in Bremerhaven, Germany that have vertical narrow bore magnets dedicated to marine applications. These magnets are very useful for metabolomic studies and researchers at CMAST collaborate with these facilities when a combined approach can be helpful. More...

Source: NC State University, Center for Marine Sciences and Technology (CMAST)

Marine Bio-Technologies Center of Innovation | | mmiller@mbcoi.net |

Text | Optional Link