

**HARBOR BRANCH**

FLORIDA ATLANTIC UNIVERSITY

**e-bulletin**

August, 2007

Ocean Science for a Better World

## Keys to Cures: Exploring Deep-Florida for New Medicines

Departing on June 3rd and funded by the State of Florida's Ocean Initiative, scientists from the Biomedical Marine Research Group at Harbor Branch led by Senior Scientist Amy Wright continued their exploration of deep water habitats off Florida. The team's two goals were to collect unusual organisms that may produce the next cancer therapy, antibiotic or treatment for Alzheimer's disease, and to document the deep-water habitats off South Florida. On June 3rd most of the scientific party transited by car to Key West to meet the *R/V SEWARD JOHNSON*. Chief Scientist John Reed, Research Associate Tara Pitts and Graduate student Priscilla Winder were already on board the vessel as they had participated in a NOAA funded trip just prior to this expedition.



Overnight, the ship transited to the deep-water habitats at the edge of the Continental Shelf off the Dry Tortugas to two areas called the Tortugas and Agazzi Valleys. These valleys are situated in very deep water southwest of the Florida peninsula and took the *JOHNSON-SEA-LINK II* submersible to its maximum depth of 3,000 ft. Prior to these dives there had been only one reported dive in this area, conducted by the *ALVIN* submersible, and so there was quite a bit of debate as to whether the group would find hard bottom (good for the target organisms, sponges and sea fans) or soft sediment bottom (less productive for their work). The explorers found soft sediment bottom, so they decided to explore different sites farther north.

**The *JOHNSON-SEA-LINK II* submersible was used to explore deep-water habitats during the expedition.**

Over the next few days, the group explored a series of previously unexplored sinkholes. First mapped by G.F. Jordan in the late 1950's, the BMR group was the first to take a submersible down into these sinkholes to look at their geology and fauna. Amazingly, the first sinkhole contained an abundance of fish: thousands of small (12 inch) silver fish

covered the bottom. Fish expert Grant Gilmore upon viewing the footage suggested that this is a never before observed spawning aggregation of these fish. Typically, they only occur in numbers of twelve or fewer; it had been unheard of to see thousands at a time. The sinkhole also had many other fish: Antheids, small Dory-like fish, huge sharks and even a swordfish. FAU graduate student Rex “Chip” Baumberger, who is studying to be a fish biologist, was the observer for this dive. In the next sinkhole they found unusual sponges and sea fans. A third sinkhole had similar organisms. John Reed is writing a journal article describing the geology and fauna of these newly explored habitats. The next site was a deep water feature discovered by colleagues at the University of Miami, Rosenstiel School of Marine and Atmospheric Science during a NOAA funded deep-water mapping expedition. Located right at the edge of the US Exclusive Economic Zone, this deep-water lithoherm (a high-relief rocky, deep water reef), in 2,300 feet of sea water, was rich with both sponges and sea fans. At this site we were excited to collect more specimens of the sponge which produces one of our hottest lead compounds- Leiodermatolide. Some of the specimens had Leiodermatolide and others had new compounds. This is one of the most exciting finds of the expedition and the group is already in the process of looking at these new chemicals as possible cancer treatments.



**This unusual lithistid sponge was discovered on a deep-water lithoherm off Islamorada.**



**This sponge is called *Leiodermatium* and is the source of a potent new antitumor agent. Similar specimens were collected and look like they may contain additional interesting new compounds.**

Over 200 samples were collected during the expedition and it is clear that deep-water habitats off Florida remain an exciting area for the discovery of novel medicines. Collecting the materials is just the beginning. Back in the labs at HBOI, the group is in the process of testing the samples for their ability to combat disease. They are also working on isolating new microbes from the samples with the hope of finding new antibiotics. It will take years to complete the work begun during the expedition, but hopefully in the end, these explorations will lead to new medicines and to improved management and conservation of Florida's marine resources. While at sea, the group posted daily dispatches to the @Sea web site ( [www.at-sea.org](http://www.at-sea.org) ) about their work and life onboard the ship. Many of the scientists participating in the trip were newcomers to deep-sea exploration and their descriptions of their experience at sea and diving in the Johnson-Sea-Link submersible provide a diverse set of perspectives to the exploration experience.

“It was a productive and fun expedition. We observed previously undocumented fish spawning aggregations; sites with abundant snowy grouper; numerous sites with exceptional sponge and gorgonian

diversity and collected specimens that we have not seen before. All of this keeps me optimistic that deep-Florida is a healthy and productive area for continued exploration. I hope that we will have funding to come back again next year and continue this work.” --Amy Wright, Senior Scientist BMR



**Front Row L-R: Vincent Burke, Chip Baumberger, Shirley Pomponi, Esther Guzman, Jill Roberts, Tara Pitts, Malcolm de Sieyes. Second Row L-R: Hilaire Kemami Wangun, Jennifer Choate, Latasha Amisial, Amy Wright, Kathleen Janda, John Reed. Back Row L-R Kate Douglas, Priscilla Winder**

## Saving the Manatees One Lock at a Time

The Manatee Protection System team from Harbor Branch Engineering has spent the summer installing a Manatee Acoustic Detection System (ADS) at the Ortona Lock. This Lock is on the Caloosahatchee River, 10 miles east of LaBelle and is part of the Okeechobee Waterway System Operated by the U.S. Army Corps of Engineers.

Harbor Branch along with prime contractor Underwater Engineering Services, Inc. of Port Saint Lucie have been selected as the contractors to install the MPS system on six navigation locks around Lake Okeechobee. The MPS system, designed by HBOI engineers is a unique array of acoustic transmitters and receivers that provides non-contact detection of manatees as they pass through the gates of the lock. When the manatees block the acoustic beams, the gates stop and remain open long enough to allow the manatees to pass unharmed.

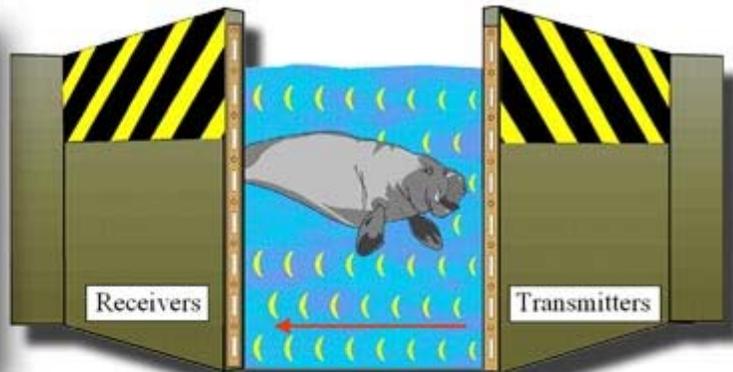
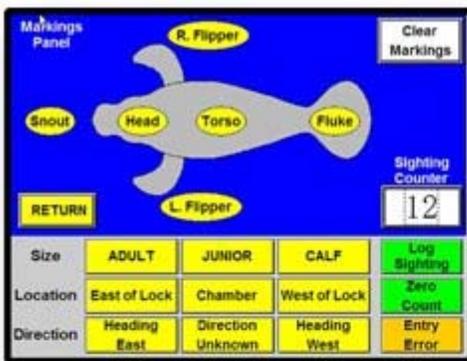
The Ortona Lock Manatee Protection System is expected to be fully functional in late September. In 2008, HBOI is scheduled to install the system on the Moore Haven lock at Clewiston and on the Port Mayaca lock where the St. Lucie River meets lake Okeechobee.

“We installed the prototype acoustic detection system at the St. Lucie lock in 1998,” says Larry Taylor, Project Manager for manatee protection systems. “We followed with the Canaveral Lock in 2000. Our experiences with the first two locks have led us to redesign much of the system, including the underwater sensor cartridges. We are excited to be installing the new system that is simpler to operate and yet will meet the government-mandated 10-year service life. I am very proud of the hard work put in by the entire MPS team.”

In the 25 years prior to 2000, more than 150 manatee deaths were attributed to flood gates and boat locks. The Harbor Branch Engineering team has been instrumental in using their technological expertise to design, fabricate and install these innovative manatee protection devices.

On the manatee sighting screen lock operators can easily record information on a touch screen panel.

This represents how the MPS acoustic sensors work to detect manatees. Sensors are activated by blocking the path between transmitter and receiver. The gate will automatically stop and allow the manatee to pass unharmed.



Brian Carlan pulling power wires for the MPS system.



Jack Yager installing manatee sensors in the de-watered lock.



## Marine Oceanographic Academy (MOA) to Launch at Harbor Branch in August

Dennis Hanisak, Senior Scientist and Marine Science Education Program Manager, is working with the Marine Science Education staff (Brandy Ninesling and Jill Sunderland) on final preparations for a new program coming to Harbor Branch. Beginning Aug 20, Harbor Branch and the St. Lucie County School District will implement a new high school program: the Marine Oceanographic Academy (MOA). The program this year will be limited to ninth graders, but over the next three years, an additional grade will be added each year until MOA is a full four-year high school.



**Reminder: There will be close to 100 high school students on campus every day. Please OBSERVE THE CAMPUS-WIDE SPEED LIMIT of 15 mph.**

MOA students will get a customized integrated curriculum for enrichment in the fields of marine and environmental studies. This curriculum will blend all the Florida and St. Lucie County curricular requirements with the best that our Harbor Branch research and education community has to offer.

*"It is our hope that this unique program, right on our campus, will ultimately be a model for partnering a major marine research institution with a public school system for improving the scientific literacy of high school students and their teachers".* --Dennis Hanisak, Marine Science Education Program Manager.

Some facts about the MOA/Harbor Branch partnership include:

- MOA is a satellite academy of Fort Pierce Westwood High School, but students were selected from applicants throughout the St. Lucie county. Enrollment for the first year of MOA was capped at 100; the current enrollment is 95.
- MOA is being located in the Marine Education Annex, adjacent to the Johnson Education Center. Some facility upgrades, paid for by the School Board, began in July.
- MOA students will take five courses here each day, including two science courses (Integrated Science and Marine Science).
- Students will all arrive by bus from a transportation hub (as the students are coming

from various areas of the county). We expect three buses to arrive by 7:00am and depart by 12:30pm. Each day after the MOA classes, students will take a sixth elective course and participate in various extracurricular activities at Westwood.

- While on campus, the students will be limited to the Marine Education Annexes, the designated picnic table areas outside, and once a week to the cafeteria.

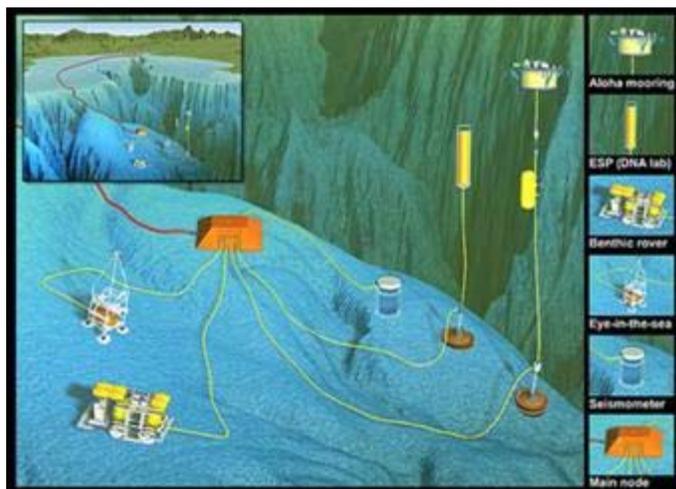
**Only one class (about 20 students and their teacher) per day will be eating in the HBOI cafeteria. Their lunch break will be over by 11:30am, well before the usual HBOI lunch hour.**

The foundation for the MOA partnership is the Lincoln Park Academy Harborside program, which Harbor Branch has hosted for more than a decade. Marine Education staff (Brandy Ninesling and Dennis Hanisak) have been working with MOA staff to develop the first year of programs. During the year, they will interface with other HBOI staff involved with specific educational activities (e.g., lectures, labs, field trips).

A successful open house for MOA students and staff was held at the Johnson Education Center and Marine Education Annexes on August 10th.

## Eye In The Sea on MARS - A Real-Time Window Into the Deep Sea

The MARS Eye-In-The-Sea (MEITS) project is funded by The National Science Foundation, and is a joint venture between the **O**cean **R**esearch and **C**onservation **A**ssociation (ORCA), Harbor Branch (HBOI), and the **M**onterey **B**ay **A**quarium **R**esearch **I**nstitute (MBARI). Project management and science are headed by Dr. Edith Widder at ORCA, while engineering and instrumentation development is conducted at HBOI, led by Lee Frey. A third group at MBARI, led by Duane Edgington, is working on image processing and data analysis software.



**The Monterey Accelerated Research System (MARS), is a cabled seafloor network which will allow instruments, such as MEITS to be connected continuously to shore from 3000ft. deep in the Monterey Canyon.**

Using this system, and the newly developed MEITS instrument, scientists will be able to perform experiments and observations in real-time, and have an extended presence on the bottom. Unlike the 4 to 8 hour dives that a submersible or ROV is capable of, MEITS will be on-site for 6 months to a year between recoveries.

The concept for the new MEITS system was based on another instrument built at Harbor Branch, called the Eye-In-The-Sea. It was designed to be used as an exploratory platform for observing life in the deep sea unobtrusively. Currently, most of the tools that we use to in the deep sea require large, bright lights, loud thrusters and other tools that disturb and scare away deep sea animals. The problem is that we don't even know what we may be scaring away! MEITS uses quiet technology: a special ultra-sensitive camera, and unobtrusive far-red lighting that deep-sea animals can't see. With the previous instrument, which was only able to stay on the bottom for a few days at a time because it ran on batteries, we filmed animals and behavior that had never been seen before. So, needless to say, the promise of being on-site for 6 months and getting data in real-time is very exciting!

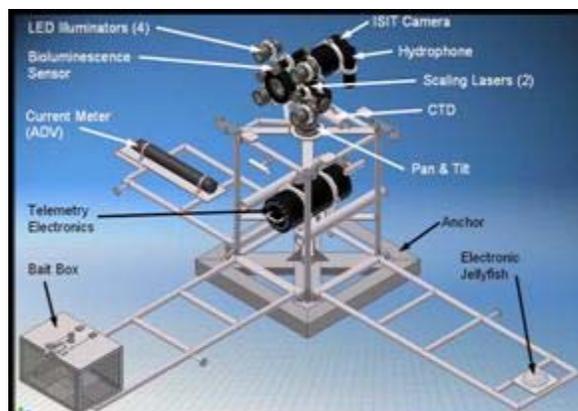
The new system contains a suite of peripherals, such as a bioluminescence sensor, CTD (a standard oceanographic instrument suite that measures water conductivity, temperature and depth), current meter, scaling lasers, and an "electronic jellyfish" that emulates bioluminescent lightshows. These sensors, along with video and audio recordings, will give us much more data than before, and help scientists to better answer questions about the behavior of these mysterious creatures.

Connection to shore via the MARS network will enable other interesting possibilities. Eventually, we can connect MEITS to the internet, offering teachers and other scientists the ability to interact and conduct experiments in the deep sea from, say, the middle of Kansas. Imagine, exposing a kid in a land-locked area to the ocean from the internet, or having a teacher connect in near real-time to an experiment being conducted in the deep sea. In addition to the scientific uses, the educational and outreach potential for such technology is enormous.

Development and construction of MEITS is complete, and its first in-water tests in the HBOI large test tank were successful. It's scheduled for testing in MBARI's tank in October, and ocean deployment at the end of the year. With any luck, we should be collecting more video and data than we can handle by early 2008!



**Lee Frey oversees as the Eye-In-The-Sea is lowered into the tank for it's first in-water test.**



**The anatomy of the Eye-In-The-Sea system.**

"The Eye-In-The-Sea on MARS is going to give us the ability to look at the deep sea in new ways, and bring those experiences to the public as well as the scientific community. I've been very fortunate to work with such a talented team on such an exciting project." – Lee Frey, Engineering Project Manager for MEITS.



**The Eye-In-The-Sea Team (left to right)**

**Lee Frey**  
**Chris Tietze**  
**Erika Raymond (ORCA)**  
**Mike Young**  
**Mark Whitlock**  
**George LaBarca**  
**Edie Widder (ORCA)**  
**Tony Cimaglia (ORCA)**  
**Ladd Borne**  
**Kathy Russ**  
**Jack Yager**

**Preview of next month's Harbor Branch e-bulletin:**

Join Dr. Tammy Frank, Harbor Branch Associate Scientist for a remarkable research expedition in the deep waters between Apia, Samoa and Auckland, New Zealand to study the physiology of deep water animals. Tammy's unique mid-water trawl, used to collect specimens, was fabricated by Harbor Branch's own engineering group. See unusual animal species, such as the cookie cutter shark. It's all coming up in the next e-Bulletin!



**Squid species gathered by Dr. Tammy Frank and her associates that are so unusual they could not be immediately identified.**

**SAVE THE DATE**

Harbor Branch hosts artist of the sea, Wyland for a daytime school painting event at our own Ocean Discovery Center (ODC) on October 30<sup>th</sup>. There will be a morning event with school kids helping Wyland paint a wall of the ODC. The day will be capped off with an evening cocktail reception and art auction fundraiser at the Johnson Education Center where the premier of Wyland's new film, narrated by the late Lloyd Bridges, will be shown and Wyland himself will paint and auction his work. More information will be announced as we get closer to the event so save the date now! Tickets: \$75.00, \$100.00 for reserved seating. For ticket information phone 772-465-2400 ext 500 or email: [oceandiscovery@hboi.edu](mailto:oceandiscovery@hboi.edu)



## Support Ocean Science for a Better World

If you would like to support the projects you've read about or others at Harbor Branch please contact Janice McDuffie at 772-465-2400 ext. 448.



Next Issue: September 24, 2007 To submit information or request printed copies of this e-bulletin, email Nancy Hatch at [nhatch@hboi.edu](mailto:nhatch@hboi.edu)

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