

THE UNIVERSITY OF MISSISSIPPI

FIELD STATION

"Nature's Laboratory at Ole Miss"

FALL 2008
NEWSLETTER

The Journey – A Milestone...

In the first issue of our new series of newsletters, published Fall 2007 (<http://www.baysprings.olemiss.edu>), I indicated that changes were occurring at the Field Station and we're pleased to report in this issue on a significant development that will contribute to our long-term goal of molding the Field Station into the leading research and teaching field station in the Mid-South.

In addition to being director of the Field Station, I am also executive director of UM's National Institute for Undersea Science and Technology, making NIUST another Field Station partner. NIUST was established in 2002 through a partnership between UM, the University of Southern Mississippi and NOAA's Undersea Research Program.

NIUST consists of three divisions, the Ocean Biotechnology Center and Repository, the Seabed Technology Research Center and the Undersea Vehicle Technology Center. OBCR seeks to discover and develop new products



Pictured above: Karen Kobanowich, acting NURP director with Director Highsmith at Development lab / shop grand opening

from the sea such as pharmaceuticals and to develop new technologies such as biosensors. OBCR benefits from a strong collaboration with UM's National Center for Natural Products Research, which is also a Field Station partner.

The Seabed Technology Research Center develops new sensors and methodologies for seafloor survey and observatory systems. The UVTC develops new technologies associated with undersea vehicles.

We just completed construction of a shop/development lab at the Field Station for the undersea vehicle program. I hope you enjoy reading about the grand opening in this issue. We hope to develop ties to the UM School of Engineering and UM's National Center for Physical Acoustics to develop interesting new technologies for the vehicles. The establishment of this facility will undoubtedly increase and diversify the activities at the Field Station. This is a real milestone in our journey to reach the full potential of the UM Field Station.

Ray Highsmith

STAFF

Dr. Ray Highsmith
Executive Director
ray@olemiss.edu

Mark Baker
Resident Director
jbaker@olemiss.edu

Dr. Ikhlas Khan
Research Professor & Coordinator for Natural Products
Research at the Center for Water & Wetland Resources
ikhlan@olemiss.edu

Dr. James Anderson
Research Scientist, Center for Water &
Wetland Resources
jandersn@olemiss.edu

Dr. Rita Moraes
Research Assistant Professor, Center for
Water & Wetland Resources
rmoraes@olemiss.edu

Dr. Robbie Kroger
Postdoctoral Research Associate
kroger@olemiss.edu

Michelle Edwards
Assistant to the Executive Director
Marketing & Business Development,
edwardsm@olemiss.edu

Graham Green
Network Administrator
ggreen@olemiss.edu

Sarah Lovett -
Manager of Project Resources
smholter@olemiss.edu

David Mathis
Water Systems Coordinator

Joko Sumiyanto
Research Assistant
joko@olemiss.edu

Linda Williams
Senior Staff Assistant
lechols@olemiss.edu

**All photos by Michelle Edwards unless
otherwise noted*

Raph Powe Research Award

The UM Field Station annually awards grants-in-aid of \$500 each to graduate students working on projects in which the majority of the research is conducted at the Field Station.

These research grants honor the numerous contributions of Dr. Ralph Powe, who was the first chair of the UM Field Station Advisory Board. There are two 2008 recipients of the Powe Award. Rani Menon, a second year Ph.D. graduate student of Dr. Marjorie Holland's in the UM biology department, is investigating phosphorus retention in vegetated agricultural drainage ditches of the Mid-South. This research ties in with the on going study by the Water and Ecology Research group at the USDA-ARS National Sedimentation Laboratory on vegetated drainage ditches as best management practices for mitigation of agricultural runoff. Her two-part experiment began in the Field Station greenhouse during summer 2007 and moved into a two-year field study in summer 2008.

Clinton Helms, second year master's graduate student of Dr. Marjorie Holland's, is studying how competition affects the nitrogen assimilation capacity of the common wetland plant *Juncus effusus*. Previous research has shown *Juncus effusus* to be very effective at mitigating nitrogen loads from agricultural and urban runoff, however, this is the first study to examine how competition will affect the plant's ability to assimilate nitrogen from the water column. Congratulations to the the 2008 grant recipients !

POWE AWARD DEADLINE FOR 2009 :
February 13, 2009

Our Mission:

*To foster ecosystem stewardship by
providing a natural laboratory for
research, education and service.*

Donor Information: Friends of the Field Station Account,
UM Foundation, PO Box 249 University, MS 38677

Research Spotlight: The Ant Whisperer

Of all the stops on the Field Station tour, the fire ant lab is the most popular. Almost everyone is fascinated by the research that research scientist Dr. James Anderson and doctoral candidate Jake Marquess are conducting at the UM Field Station's ant lab. So, what's the deal with the fire ants? (Cute and cuddly, they are not). This is scientific research that hits home.

Anyone who has grown up or lived in the South has a fire ant story, so the connection is instant and personal. Who in Mississippi has not done the "fire ant dance" ?

Because chemicals have not had the desired effect on the imported fire ants, the researchers at the UM Field Station are going another route. On any given day you can walk by the ant lab and see a note taped to the closed doors reading "Quiet Please ! Recording in Progress." It is a seemingly odd request posted on the door of a fire ant lab. However, Jake Marquess is behind those doors recording and listening to imported fire ants stridulate with very sensitive acoustic equipment.

Stridulation is a common form of communication in the insect world. One of the most familiar examples of stridulation is the cricket's chirp. Crickets rub together two specialized structures located on their legs and that makes the chirping noise they use to communicate with other crickets. The fire ants' stridulatory structures are a scraper and ridge-like structure on two segments of the abdomen that rub together to create sound. "The sound," Marquess says, "may be an important component in fire ant communication."

The imported fire ants are bad news. This invasive species has wreaked havoc on rural farms and suburban lawns alike across the Southeastern states and is now spreading into the Western U.S. Fire ants are incredibly hard to deal with. The USDA spends \$5 billion annually trying to control the infestation in the Southeastern and Southwestern U.S., and it is estimated that they cause \$750 million annually in damage to crops and livestock. Since hitching a ride from South America to the Alabama coast on a shipment of bananas in the 1920s, they have not slowed down.

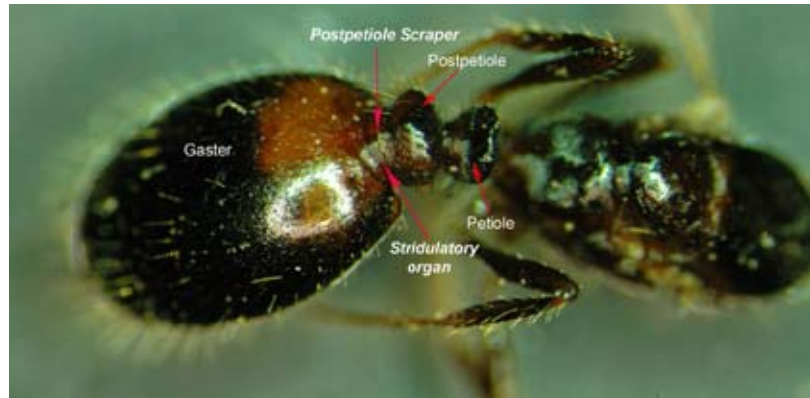
Marquess works under the supervision of Dr. James Anderson, research scientist at the Center for Water & Wetland Resources and Dr. Richard Buchholz in the UM biology department. Dr. Anderson, who studied fire ants and Mediterranean fruit flies during his postdoctoral work at the Center for Medical and Veterinary Entomology, a USDA Agricultural Research Service facility at the



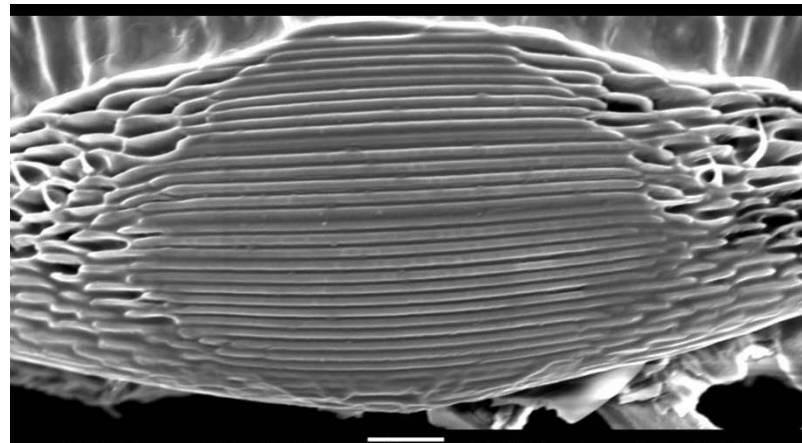
Jake Marquess at work in Fire Ant Lab facility

University of Florida, became interested in the work of Robert Hickling, a former UM National Center for Physical Acoustics researcher. Hickling's premise that fire ants use stridulatory organs to produce acoustic signals intrigued him enough to "provoke further investigation."

"What we hope to do," Jake says "is to learn how they use stridulation to communicate and then turn that knowledge against them. If we can disrupt communication between the workers and the queens or make nest mates turn on each other, we may have an environmentally friendly way of controlling these pests."



Fire ant structures produce sounds



Stridulatory Organ enlarged 1500X

FULL SPEED

UM Field Station's Newest Building to House the National Institute for U



A yellow, torpedo-shaped submarine and a box-like submersible with cameras and a robotic arm were displayed October 8, as the University of Mississippi held the grand opening of its Undersea Vehicle Technology Center facility.

Housed at UM's Field Station northeast of Oxford, the new 2,600-square-foot, three-bay undersea vehicle technology shop and development laboratory is part of the National Institute for Undersea Science and Technology partnership. Established in 2002 for ocean exploration, research and advanced technology development, NIUST is a collaboration among UM, the University of Southern Mississippi and NOAA's Undersea Research Program.

"This new facility allows us to consolidate our efforts for vehicle design," said NIUST Executive Director Ray Highsmith at the ribbon-cutting ceremony. "We now have the capability for all our engineers and operators to work side-by-side at a single location, which helps to create better ideas in a more efficient manner."

Two of those vehicles, the *Eagle Ray* autonomous under-

sea vehicle and the box-like submersible Station Service Device, were on display for the nearly 100 people on hand at the ceremony. The *Eagle Ray* is designed to perform high-resolution sea floor mapping, as well as serve as a cargo unit to test and develop new underwater sensors and devices.

"The *Eagle Ray* is capable of multiple missions," said USM's Vernon Asper, director of the Undersea Vehicle Technology Center.

At 17 feet in length and 27 inches in diameter, the *Eagle Ray* weighs one ton on land, but in water, it is slightly bouyant so it will float if there is a power failure during operations. Its high-tech multi-beam sonar system enables the vessel to perform high-resolution seafloor mapping.

"It's completely autonomous," Asper explained. "We program it through its inertial navigation system, which is the same as a ring laser gyro found on cruise missiles, and off it goes. It travels back and forth, much like a lawn mower in the yard, to map the seafloor."

DAHEAD!

Undersea Science & Technology's Underwater Vehicle Laboratory/Shop



photo by Arne Diercks



photo by Hanu Singh

The multi-million dollar *Eagle Ray*, designed to submerge to depths of more than 2,000 meters, also features several safety devices, including a global positioning system sensor, strobe light, radio, satellite transmission sensor, satellite telephone and an acoustic transponder to aid in recovery in case the vehicle is lost at sea.

Asper said naming the yellow submarine *Eagle Ray* was part of a group effort. (An eagle ray is a white-spotted black ray that gracefully swims along the bottom of the ocean).

The SSD, designed to be tethered to a ship and operated by remote control while at sea, is complete with four thrusters, a fiber optic communication system, an acoustic altimeter, cameras, lights and a robotic five-axis manipulator arm. It was designed to service NIUST's Seabed Technology Research Center's seafloor observatory, which is 100 miles due south of Biloxi at 900 meters beneath the Gulf of Mexico in what's known as Mississippi Canyon Block 118.

The seafloor observatory is designed to monitor the stability of methane hydrate deposits, which are being studied as potential fossil fuel alternatives.

Former STRC director Robert Woolsey, who passed away in July, would have been proud of the grand opening, according to family members.

"Bob (Woolsey) would have had just one word," said his widow, Maxine Woolsey. "Outstanding."

"This was a vision of his for years, so he'd be thrilled to see his dream become a reality," she said. "He would be inspired to see his colleagues here today, and I know he is in the hearts of all of them." (written by Tobie Baker)

WWW.NIUST.ORG

Pictured Above:

Top: Eagle Ray AUV

Lower, starting from left: Ribbon cutting (from left)

Alice Clark, Karen Konhanowich, Ray Highsmith,

Gene Smith, Carol Lutken, Marc Slattery, Vernon Asper

New Building

Computers in new lab facility

SSD in bay

Eagle Ray AUV in bay

Photographic AUV, being purchased



FROGS

of the University of Mississippi Field Station

“Only in recent years have biologists appreciated the tremendous influence that frogs and other amphibians have on woodland and aquatic ecosystems and on populations of other species of vertebrates, as well as invertebrates. Frog populations are extremely sensitive to environmental changes.”

– Dr. Ed Keiser

The UM Field Station is pleased to announce the latest addition to our field guide series, “Frogs of the University of Mississippi Field Station,” written by Dr. Ed Keiser. This is the third book Dr. Keiser has authored for the Field Station. His previous volumes cover salamanders and turtles.

The 60-page booklet is filled with useful information concerning the life cycle and habits of the native frog population of the Field Station. A checklist of the 16 species, an identification key and species accounts with color photos are included. Dr. Keiser describes in detail each native species and includes such particulars as easy identification markers, individual calls and how to distinguish between similar species.

Although Dr Keiser is retired

from the UM biology department following a 30-year career, he remains involved and still teaches part time. When he is not teaching, he does contract field studies for the Mississippi Department of Wildlife, Fisheries and Parks and for the U.S. Fish and Wildlife Service. Dr. Keiser’s generous contributions to the UM Field Station’s field guide series is deeply appreciated. He is not only an expert on amphibians and reptiles, but also an excellent field naturalist with many years experience at the Field Station, dating back to its establishment in the mid-1980s. We are honored to have his presence at the Field Station and his expertise in the form of these valuable guides.

pictured above: Juvenile Barking Tree Frog

To purchase a copy of Frogs of the UM Field Station, contact the Field Station 662-915-5479, \$7.50 per copy

UM Field Station Publications



Neighbors

Davis Tool and Die has been a friend and neighbor to the UM Field Station since the very early days when the university bought the property in the 1980s. Dale Davis and his brother, Durward, both UM alums, run the family tool and die shop that is just down the road.

Dale and his wife also own a 300-acre block of timber that directly adjoins the Field Station on the east side.

**Turtles of the University
of Mississippi Field Station**



**Salamanders of the University of Mississippi
Field Station**



**Frogs of the University of Mississippi Field
Station**

**A Field Guide to the Butterflies Common to
the University of Mississippi Field
Station**

**A Guide to Representative Plants at the Uni-
versity of Mississippi Field Station**

**Medicinal and Edible Plants of the Univer-
sity of Mississippi Field Station**

Guide to the Eagle Scout Nature Trail

**Guide to the Eagle Scout Nature Trail: Kin-
dergarten to Fourth-grade Curriculum**

Guide to the Young Scholars Nature Trail

For more information on publications, check us out
online : www.baysprings.olemiss.edu/publications/



Started in 1968 by Ervin Davis and his friend, Glenn Klepzig, it was Davis and Klepzig Tool and Die for years until Dale and Durward took it over and renamed it Davis Tool and Die. They have a diverse client base and make everything from oven door parts for Viking ranges to hip and knee replacements for pharmaceutical companies.



Dale Davis

Dale and his five siblings grew up beside the Field Station property and have fond memories of hunting and fishing on the land when it was Minnows Inc. He also pitched in during the early days when the first field station director, Dr. Luther Knight, was just beginning to get the property in shape after years of neglect. "We've done a lot of work over the years, helping clear willows from the ponds and build levees. Occasionally they would drown a tractor and he would bring it to me to resuscitate it," said Dale, laughing. "I'll never forget that time he (Dr. Knight) called us over to help, and all you could see of the tractor was the exhaust pipe sticking out of the pond. Dale said, "The next day, someone put up a sign beside the pond that read Submarine Races Held Here." Resident director Mark Baker laughed and replied, "we haven't needed him to fish us out of any of the ponds lately. But it's nice to know he's here !"



Ronnie Leggitt



Adam Smith



Melvin Smith

davistool@nepower.coop



Aerial photo of the 740-acre UM Field Station

photo by Robert Jordan