



GRICE LOGBOOK

A NEWSLETTER OF THE GRICE MARINE LABORATORY AND THE GRADUATE PROGRAM IN MARINE BIOLOGY
COLLEGE OF CHARLESTON

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Please forward announcements, photos & suggestions to marine@cofc.edu.

[Louis E. Burnett](#), Director, GML
[David W. Owens](#), Director, GPMB

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SECRETS OF THE SOUTHERN OCEAN

This past winter (the austral summer), [Jack DiTullio](#), of the Dept. of Biology, and his research assistant [Sarah Riseman](#) (M.S. in Marine Biology, 1999, Univ. of Charleston, SC) participated in a six-week oceanographic cruise in the Southern Ocean aboard the Australian Ice-breaker *RV/IB Aurora Australis*. They departed from Hobart, Tasmania, in late October and traveled south to the Antarctic continent. There were over 70 international scientists onboard with varied research interests in physical, biological, and chemical oceanography.



Above: A highlight of the trip was an afternoon where everyone was allowed to disembark and have a few hours of R&R on the sea-ice.

Below: One of many icebergs seen near Antarctica



Dr. DiTullio collaborated with scientists from the University of Delaware and the Bermuda Biological Station for Research to examine the influence of iron on phytoplankton community structure and biogenic sulfur production in the Southern Ocean. The influence of this micronutrient on community structure has broad ramifications affecting both the global carbon and sulfur cycles.

The University of Delaware team set up a chemostat incubation system to conduct shipboard iron-addition experiments. Unlike other incubation methods, the chemostat design allows for the continuous addition of iron at low concentrations throughout the incubation. This design more realistically simulates iron input in natural regimes such as upwelling systems. The College of

DEEP-SEA CORALS

To the surprise of many people, corals are not restricted to shallow-water tropical environments. Deep-sea corals are common on steep-sided, hard substrates, for example, seamount slopes and canyon walls. Most deep-water corals belong to the subclass Octocorallia (sea whips, sea fans, sea pens etc.), although some hard coral species can be found greater than 6000 meters deep. Scott France, of the Department of Biology is working in collaboration with Les Watling, University of Maine, to study the genetic structure of deep-sea corals on the east coast of the U.S. This project is funded by the National Undersea Research Program (NURP) and NOAA's Ocean Explorer program. In September Dr. France participated in an R/V Atlantis-DSV ALVIN cruise to the submarine canyons and seamounts south of Georges Bank. The cruise was hampered by the effects of Hurricane Erin; high seas caused the cancellation of 3 of the 5 submersible dives. Dr. France had the opportunity to dive into Oceanographer Canyon where he sampled corals at depths of 700 to 1300 meters. Additional images and details about the cruise can be obtained at the [Deep East website](#). A second cruise is scheduled for this summer using the R/V Connecticut and ROV Kraken to observe and sample deep-sea corals in the canyons and ledges at 200 meters depth in the Gulf of Maine. You can learn more about the research interests of Scott France at his [website](#).



Above: A photo was taken through the porthole of DSV Alvin at 814 meters depth in Oceanographer Canyon. The orange corals on the left are *Paramuricea grandis*; each has a single large reddish-pink brittle star living on its branches. In the right foreground is the bright yellow *Synathus mirabilis*, a colonial anemone which is overgrowing an old octocoral skeleton.

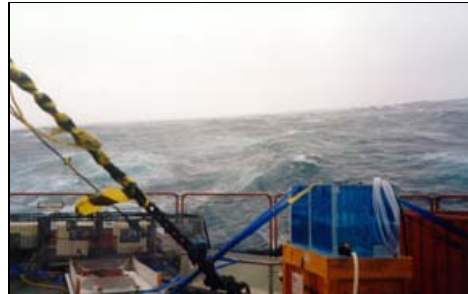
Below: Dr. Scott France on board the R/V Atlantis.

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Charleston group measured the production of biogenic sulfur, phytoplankton physiological status, and algal pigments over the course of these experiments. The pigment data will be used to determine which classes of algae were present initially, and how the community changed in response to iron-addition. This cruise was the first time shipboard chemostats were used to study the effects of iron in the Southern Ocean and the results of this research will be a valuable contribution to understanding the influence of iron in this region.



Natural sunlight is used in these experiments so the incubator must be outside. Here is a view of the chemostat (the large blue box) secured on the fantail in fairly rough seas.

The work posed several challenges. First, conducting trace-metal work requires an elaborate laboratory set-up and water collection system, and a meticulously clean lab etiquette to avoid contamination. The concentration of iron in these waters is so low that even the smallest speck of dust has enough iron to contaminate the experiments. Keeping the chemostat running in the sub-zero temperatures proved extremely challenging and required around the clock care. And finally, because the laboratory was on the upper deck of the ship, it experienced the greatest movement when the ship rolled in rough seas. Anything not tied-down took on a life of its own, sliding across the floor or launching off the bench! Luckily the Southern Ocean, notorious for the largest waves in the world, was calm for most of the voyage.

The rewards for working long hours under challenging conditions were more than just the successful completion of the experiments. The sights included soaring albatross, night skies filled with the shimmering aurora australis, towering icebergs, and curious Adelie and Emperor penguins. The ship also had its perks. The cuisine was unparalleled among research vessels and, unlike American ships, the *Aurora* has a bar to retire to after a long shift of work. The Husky Bar, so named because the last huskies removed from Antarctica were carried away aboard this ship, was a common gathering place.

Despite the difficulties of working in the Southern Ocean and the intricacies of doing trace-metal-clean work, the cruise was a success. The College of Charleston researchers returned to the Grice



RECENT GPMB DEGREES

Melissa Alm, Photosynthetic Efficiency as a Diagnostic Indicator of Phytoplankton Physiology in the Eastern Equatorial Pacific Ocean and the Peruvian Upwelling System (Advisor Jack DiTullio)

Christopher Gawle, Tidal Creek Responses to Watershed Development: A comparison of Summer 1994 and Winter 2000 Data (Advisor Fred Holland)

Jill Jennings, Distribution, diversity, and habitats of fishes on the continental shelf and upper slope of the South Atlantic Bight, USA (Advisor George Sedberry)

Sarah Kingston, Genetic survey of *Delphinus delphis*, *D. capensis* and other delphinid taxa using amplified fragment length polymorphism markers (Advisor Patty Rosel)

Jennifer Lawton, Direct and Indirect Effects of the Herbicide Atrazine on the Clam *Mercenaria mercenaria* (Advisor Geoff Scott)

Jennifer Maucher, Flavodoxin as a Diagnostic Indicator of Iron Stress in Oceanic Phytoplankton (Advisor Jack DiTullio)

Xavier Mayali, Investigating the interactions between algicidal bacteria and the toxic dinoflagellate *Gymnodinium breve* using molecular techniques (Advisor Greg Doucette)

Jennifer Moore, Age, Growth, and Reproductive Biology of the Gray Triggerfish, *Balistes capricus*, from the Atlantic coast of the Southeastern United States during 1992-1997 (Advisor George Sedberry)

Alice Palmer, Daily, Tidal and Seasonal Movements of Shortnose Sturgeon, *Acipenser brevirostrum*, in the Lower Cooper River (Advisor Mark Collins)

Michelle Zatzoff, Population Genetic Analysis of *Mycteroperca bonaci* and *Epinephelus morio*, (Teleostei Serranidae) in the Western Atlantic, Gulf of Mexico, and Caribbean Using Microsatellite DNA Markers (Advisor Bob Chapman)

SHRIMP AQUACULTURE

Karen Burnett and **Lou Burnett**, Dept. of Biology, have recently begun working with Iowa-based **Diamond V Mills, Inc.**, a major producer of animal feed additives, to evaluate the immune-enhancing properties of the Diamond V XP™ yeast

Marine Laboratory with a large amount of data and samples that they are now in the process of analyzing.

STUDENT COLLOQUIUM

The Graduate Program in Marine Biology (GPMB) successfully staged its Fifth Annual Graduate Student Research Colloquium on February 22 – 23, 2002, at the Marine Resources Research Institute, South Carolina Department of Natural Resources at Fort Johnson. The Colloquium aims to provide graduate students with experience in making scientific presentations and to promote interactions among students and faculty conducting research in marine biology at the College of Charleston.

Twenty graduate students from the GPMB and the Environmental Studies Program took advantage of the opportunity to give oral presentations on their thesis research. Second-year GPMB student **Bob Grant** earned the best student oral presentation award. Bob is working on habitat preferences in the juvenile black sea bass, *Centropristis striata*. A close runner-up in the award competition, **Melissa Recks**, spoke about her plans to determine feeding strategies of bottlenose dolphins using fatty acid analysis. **Dr. Larry Crowder**, the Stephen Toth Professor of Marine Biology at Duke University, gave the keynote lectures at the Colloquium. Dr. Crowder's talks illustrated ways in which scientific research can be used to influence public policy on management issues related to natural resources and endangered species. More than 125 students, faculty and visitors attended one or more sessions of the Colloquium, which also included a social, a poster session, and an oyster roast. A complete program and pictures of both formal and informal moments from the Colloquium are available at www.cofc.edu/~marine.



Dr. Larry Crowder of Duke University was the keynote speaker.

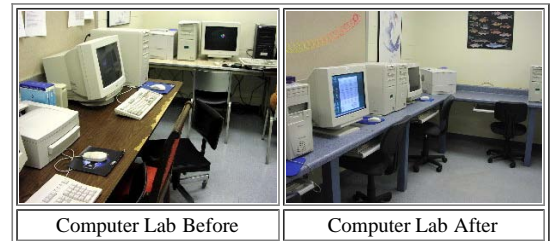
TAXONOMIC CENTER

The Southeastern Regional Taxonomic Center (SERTC) has been established at the Marine Resources Research Institute of the South Carolina Department of Natural Resources and the Grice Marine Laboratory. Funding for the project has been provided by the National Marine Fisheries Service. The center will provide a regional focus for developing taxonomic expertise and skills, along with the infrastructure to support taxonomic endeavors in this geographic area. One of the

culture. The goal of these studies is to evaluate whether XP, when added to the normal diet of the Pacific white shrimp, *Litopenaeus vannamei*, will increase the shrimp's resistance to infectious disease. Worldwide, *L. vannamei* is one of the major shrimp species used in aquaculture. The techniques that the Burnett laboratory will use to evaluate disease resistance were originally developed with support from the United States Department of Agriculture, and represent one way in which support for basic research can ultimately benefit the economic and business sector, while providing funding for graduate student stipends.

CLASSROOM UPGRADES

This year the Grice Marine Laboratory made good progress in modernizing its classrooms and computer lab. The two classrooms are now considered "smart" and have internet linkages and projectors permanently mounted. The student computer lab received a giant facelift in December when the furniture was replaced with sleek looking benches and new chairs. The project is expected to be completed late this spring with the arrival of 8 new computers. These projects were funded from a variety of sources including Academic Computing, the Graduate Program in Marine Biology, the Department of Biology, and the Grice Marine Laboratory.



ALUMNI NOTES

Graduate alumni who are currently pursuing Ph.D. degrees:

- Julian Burgos - University of Washington
- Kimberly del Carmen - University of Hawaii
- Todd Haney - UCLA
- Michelle Hardee - University of South Carolina
- Mike Janech - Medical Univ. of South Carolina
- Xavier Mayali - Scripps Institution of Oceanography
- Wendy Moore - University of Arizona
- Paul Pennington - University of South Carolina
- Eric Trembl - Duke University
- Tim Zimmerman - Univ. of California, Berkeley

Kevin Davis, MS, Marine Biology, 1985. Kevin worked for SCDNR for several years as an Oceanographer. Then tiring of the seasickness bug he realized satellites can facilitate a lot of oceanography. Starting in a garage with some engineering friends he built his first earth station on a shoestring. That was a few years back. Currently Kevin heads SMARTech of Moncks Corner, South Carolina, a small company which builds earth

initial objectives is to develop a database for existing and future collections of fish and invertebrate specimens from various habitats of the region. A second objective is to compile a reference library of taxonomic publications relevant to the fauna of the region. Undergraduate and graduate students with interests in systematic study of marine organisms are encouraged to contact SERTC. Contacts:

Fish collections - Tony Harold, 843-406-4027, harolda@cofc.edu

Invertebrate collections - Elizabeth Wenner, 843-762-5050, wennere@mrd.dnr.state.sc.us, David Knott, 843-762-5006, knottd@mrd.dnr.state.sc.us



Student Rob Javonillo works in the collection room at GML

RECENT SCHOLARLY

CONTRIBUTIONS (see [GML Web Site](#) for a complete list) Please contact Dr. William D. Anderson, Jr. (andersonwd@cofc.edu) for a GML contribution number for manuscripts that have been accepted for publication. Some recent contributions follow:

#185. Pennington, P. L. and G. I. Scott. 2001. Toxicity of atrazine to the estuarine phytoplankter *Pavlova* sp. (Prymnesiophyceae): Increased sensitivity after long-term, low-level population exposure. *Environmental Toxicology and Chemistry*, Vol. 20, No. 10, pp. 2237-2242.

#186. Karnaky, K. J., Jr., L. R. Forte, J. Bridges, E. Brown, S. Decker, A. Pelletier, S. Forrest, and J. N. Forrest. In press. Evidence for a guanylin/guanylate cyclase signaling system in the intestine, but not in rectal glands of the dogfish shark (*Squalus acanthias*). *Bulletin of the Mt. Desert Island Biological Laboratory*.

#187. Karnaky, K. J., Jr., M. Sedmeroval, D. Petzel, J. Bridges, S. W. Boatwright, and D. S. Miller. In press. MRP2-like transport in the Malpighian tubule of the cricket, *Acheta domesticus*. *Bulletin of the Mt. Desert Island Biological Laboratory*.

#188. Murphy, S. H., T. Murphy, and D. W. Owens. In press. Ecology of benthic immature loggerhead turtles (*Caretta caretta*) on foraging grounds and inter-nesting habitat use by adult females - Atlantic. In A. Bolten and B. Witherington (editors), *Biology and conservation of Loggerhead Sea Turtles*. Smithsonian Institution Press, Washington, D. C.

#189. Finkenbine, S. S., T. W. Gettys, and K. G. Burnett. 2002. Beta-adrenergic receptors on leukocytes of the Channel Catfish, *Ictalurus*

stations for downloading data from some of the thousands of satellites now orbiting the earth. Business is brisk for their SMART stations which retail for \$50,000 to \$750,000 each. Some of their main customers are NOAA, NASA and other government agencies.

Whit McMillan, MS, Marine Biology, 1993. Whit is Conservation Education Manager at the South Carolina Aquarium where he has worked for nearly three years. Whit joined the staff of nearly 90 employees a year before the aquarium even opened. His position has three primary duties. The first is the scientific responsibility for accuracy in the graphics, displays and signage. The second is developing and facilitating partnerships with other organizations such as SCDNR, The Coastal Conservation League and the South Atlantic Fisheries Management Council with whom they recently hosted the Marine Protected Areas Forum at the Aquarium's elegant meeting center. Finally, Whit is also responsible for the education programs on the floor of the aquarium where he works with staff and volunteers to provide a quality education experience for visitors.

We plan to feature more alumni news in future issues. Please keep us informed of your activities by emailing us at marine@cofc.edu.

FACULTY NOTES

Visiting faculty member, **Dr. Carol Pride**, will be leaving Grice early this summer to begin a faculty appointment in the Marine Science Program at Savannah State University. She will be helping to launch a new joint masters degree program this fall at SSU in conjunction with the Skidaway Institute of Oceanography. Carol has plans to expand her studies of the stable isotopic composition of plankton-produced shell and organic matter from the Gulf of California and the Southern Ocean to the South Atlantic Bight and estuarine environments.

Data collected in three semesters of oceanography class field trips (BIOL 342 and BIOL 610) to the Charleston Harbor will be presented in the School of Science and Math annual student poster session by the recent Biology Department graduate, Rachel McEvers. All data were collected using the the departmental CTD with the assistance of Mark Geesey. The CTD has been an invaluable resource in the training of our oceanography students in the interpretation of the physical and biological properties of our estuary.

Dr. Craig Plante recently received a \$223,330 grant from the National Science Foundation Ecology Division for the project, "Non-equilibrium determinants of microbial community structure in marine sediments: Role of deposit feeding." This three-year project will focus on the importance of biotic disturbance, recolonization and succession in structuring microbial communities. Field experiments will be conducted in a variety of intertidal habitats in both South Carolina and in Maine. Quantitative and qualitative examination of bacterial assemblages will rely heavily on epifluorescence microscopy and molecular techniques, respectively. The latter work will benefit greatly from GML's new Core Facility for

punctatus. Comparative Biochemistry and Physiology, Part C 131, pp. 27-37.

#190. Collette, B. B. and W. D. Anderson, Jr. In press. Frederick H. Berry, 1927-2001. (Obituary.) Copeia.

#191. Wilde, S. B. and C. J. Plante. In press. Spatial heterogeneity of bacterial assemblages in marine sediments: The influence of deposit feeding Balanoglossus aurantiacus. Estuarine, Coastal, and Shelf Science, 56.

#192. Miller, D. S., R. Masereeuw, and K. J. Karnaky, Jr. In press. Regulation of MRP2-mediated transport in shark rectal salt gland tubules. American Journal of Physiology.

#193. Plante, C. J. and S. B. Wilde. 2001. Bacterial recolonization of deposit-feeder egesta: In situ regrowth or immigration? Limnology and Oceanography, Vol. 46, No. 5, pp. 1171-1181.

#194. Anderson, W. D., Jr. In press. John Edwards Holbrook's Senckenberg plates and the fishes they portray. Archives of Natural History.

#195. Harold, A. S. In press. Review of SPECIES CONCEPTS AND PHYLOGENETIC THEORY: A DEBATE, by Quentin D. Wheeler and Rudolf Meier. Copeia.

#196. Burnett, L., N. Terwilliger, A. Carroll, D. Jorgensen, D. Scholnick. 2002. Respiratory and acid-base physiology of the purple sea urchin, Strongylocentrotus purpuratus, during air exposure: Presence and function of a facultative lung. The Biological Bulletin (in press).

#197. Karnaky, K. J., Jr., E. Milner, J. N. Forrest, Jr., and L. R. Forte. In press. Guanylin/guanylate cyclase signaling in the intestine of dogfish shark (Squalus acanthias) and American eel (Anguilla rostrata). Bulletin of the Mt. Desert Island Biological Laboratory.

#198. Brzezinski, M. A., C. J. Pride, D. M. Sigman, J. L. Sarimento, K. Matsumoto, N. Gruber, G. Rau, and K. Coale. In press. A switch from Si(OH)_4 to NO_3 -depletion in the glacial Southern Ocean. Geophysical Research Letters.

GRICE COFFEE MUGS & T-SHIRTS

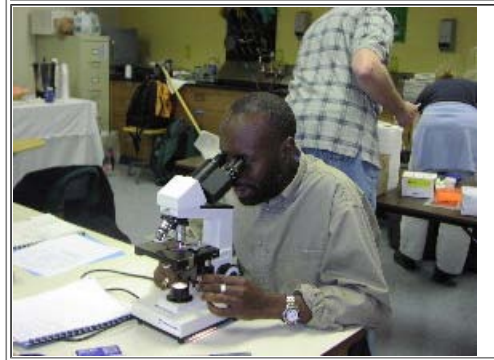
The graduate students in marine biology are selling t-shirts and coffee mugs to raise money to support student travel to meetings and other activities. Shirts, long sleeve \$13, short sleeve \$11, in variety of colors and sizes. Coffee mugs, \$6 each or \$5 for 3 or more. Get more information by emailing gricembgsa@hotmail.com or call (843) 406-4000.



Molecular Biology.



Fisheries Workshop at Grice. A "hands-on" fish pathology workshop (photos above and below) was held at the Grice Marine Laboratory in conjunction with the Eastern Fish Health Workshop, which was held in Charleston on March 22. Dr. Jill Arnold from the Baltimore Aquarium taught the workshop with assistance from Drs. Al Segars and Ted Smith of SCDNR. More than 25 scientists participated in the session.



ANNOUNCEMENT

- Sometime during the summer the Grice phone numbers will change. Calls to the old numbers will be forwarded temporarily. Please check the Grice web page for the new numbers



Powder magazine adjacent to the Grice Marine Laboratory.