1 Ichthyoplankton Distribution Patterns Across the Continental Shelf off Charleston, SC

Ryan Yaden and Gorka Sancho, Department of Biology

To compare the seasonal and spatial distribution of ichthyoplankton across the continental shelf off the coast of Charleston a transect was made across the continental shelf. The collection plankton samples took place on a 5 day cruise November 19 and 2004. Seven samples were analyzed by removing ichthyoplankton from other zooplankton. Ichthyoplankton taxa Leptocephalus, Scombridae, Ophidiidae, Pleurinectiformes, and Syngnathidae were identified picked and counted. Larval fishes that could not be classified were put into the "unknown" category. Data were compared with similar collections from May 2004. The abundance of larval fish in November was greater than the abundance in May. The greater abundance in November 2004 could be related to the spawning seasons of fishes over the continental shelf and Gulf Stream.

2 Lifespan of philometrid larvae (Margolisianum bulbosum) and their infectivity in the copepod Oithona colcarva under different abiotic conditions

Lam C. Tsoi1, Vincent A. Conners2, and Isaure deBuron1
1Department of Biology, College of Charleston
2Department of Biology, University of South Carolina-Upstatet

Margolisianum bulbosum is a philometrid nematode whose large and viviparous females are found in the buccal and gill cavities of the Southern flounder, Paralichthys lethostigma. As part of a study of the biology of this worm we determined the optimal abiotic (salinity and temperature) conditions for larval survival and infectivity in the hypothesized copepod intermediate host. Experimental infections of copepods collected in the Charleston Harbor showed that the cyclopoid Oithona colcarva was the only species to become infected. Free living M. bulbosum larvae survived longer in mesohaline (5-18 ppt.) salinities and at lower temperatures (9-14 C). Infection of O. colcarva in 15 ppt saline with larvae 1, 6, 11, and 16 days old at various temperatures showed that 1 and 6 day old larvae were ingested by copepods at a higher rate at 20-30 C, resulting in an overall higher number of infected copepods at these temperatures. Moreover, the rate of
infection with older larvae at lower temperatures was significantly reduced. The behavior of the copepods and the motility of the nematode larvae appear to account for the observed variations in the rates of infection under the different salinity and temperature conditions utilized. Supported by the College of Charleston's 4th Century Initiative Program.

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A New Ray-Path Test Method for Surface Figure Determination of Spun-Cast Optical-Quality Epoxy-Composite Mirrors

T. R. Richardson¹, W. A. Scrivens², and K. L. Brodhacker²
¹Department of Physics and Astronomy, College of Charleston
²Department of Biochemistry, University of South Carolina, Columbia, SC

The manufacture of spun-cast concave mirrors from polymer mixtures has produced mirrors with 25 cm diameters requiring determination of the surface figure. A simple optical test using easily available equipment was sought to make these determinations. Because the longitudinal aberrations of the mirrors to be tested exceeded those of a perfect paraboloidal surface by as much as 40 times, conventional ray-path tests such as the Foucault and Hartman tests were unusable to test these mirrors. Interference methods were discarded because of the large deviations of the surface from near-perfect optics. A new ray path test conceptually similar to the Foucault test was used to analyze these mirrors and has discovered regions that are optically well formed to a fraction of the wavelength of visible light alongside of highly astigmatic regions. Results of these tests have been applied to manufacturing improved mirrors.

4

A Lowcountry Light Pollution Assessment Conducted by Public Volunteers

Dana Richards¹ and Terry R. Richardson²
¹Academic Magnet High School
²Department of Physics and Astronomy, College of Charleston

This project assessed light pollution in Charleston, Berkeley, and Dorchester counties, South Carolina. Volunteers counted stars in 2 constellations on clear nights during moonless periods reported numbers of stars, the location, date, time, their age, and gender. A limiting magnitude was obtained from each observation. A total of 132 limiting magnitude observations recorded on clear nights, compiled and plotted on maps of the tri-county area using Geographic Information Systems software. The effect of population density on limiting magnitude was statistically significant, F(2, 129) = 10.28, p < 0.0001. If more data had been received, a color-coded limiting-magnitude contour map could have been created, which would have revealed where the brightest skies in the Charleston area were. Future projects will need to be done to make more definitive conclusions about the amount of light pollution in the Charleston area.
A Photometric Study of Slowly Pulsating B Stars

Jennifer Andrews and Robert Dukes, Department of Physics and Astronomy

This poster presents the results of an extended photometric study of a sample of Slowly Pulsating B Stars (SPBs.) Observations were made using the College of Charleston Automatic Photometric Telescope located at Fairborn Observatory in Washington Camp, AZ. We observed using the technique of differential photometry in the Stroemgren uvby system. The aim of this research is to obtain a better understanding of SPB stars which were only fairly recently discovered. By analyzing light variations, the pulsational frequencies can be determined. Our study includes the known SPBs HD25558, HD138764, and HD222555, and the candidate star HD44112. For the known SPBs we have found additional or different frequencies than those determined by previous research, and have indeed classified the unknown as an SPB. In addition to frequency determination we have also found approximate effective temperatures and masses of these stars.

Interannual and Seasonal Hydrographic Variability across the Continental Shelf off Charleston, SC

Caroline Dietz and Gorka Sancho, Department of Biology

The dynamic oceanographic regime of the continental shelf waters off Charleston, SC was analyzed during three oceanographic cruises (Nov. 2003 and 2004; May 2004). Hydrographic profiles of temperature, salinity, density, and fluorescence were constructed using CTD data collected from nine stations along a transect perpendicular to the coastline. Fluorometer data were calibrated against chlorophyll pigments extracted from phytoplankton collected with Niskin bottles attached to the CTD profiler. In November, water column mixing was evident across the continental shelf and the surface waters of the upper slope. In May, the water column was weakly to strongly stratified in the middle shelf, outer shelf, and upper slope. No stratification was observed in the inner shelf. Chlorophyll concentrations in both November and May were the greatest in the inner shelf. By establishing a model of the water column across the continental shelf, future studies involving the area will be more efficiently and accurately assessed.

A Method for Manufacturing Polymeric Parabolic Mirrors

K. Lisa Brodhacker¹, Wally A. Scrivens¹, and Terry R. Richardson²
¹Department of Chemistry & Biochemistry, University of South Carolina
²Department of Physics and Astronomy, CofC

Reflecting telescopes, which utilize mirrors instead of lenses, have been collecting astronomical data for hundreds of years. Most telescope mirrors are made out of glass and age quite expensive and heavy so the process of making inexpensive and lighter mirrors is of great interest. Spin-casting epoxy mirrors provides the ability to prepare parabolic surfaces ready for plating without further polishing. Details of materials, equipment, and procedures are given.
Functional Analysis of the Stabilization of the Proto-oncogene bcl-2 mRNA in Human Leukemia Cells

David Burmeister, Tapas Sengupta, and Eleanor Spicer, Department of Biochemistry, MUSC

Overexpression of the oncogene bcl-2 leads to abnormal cell survival by inhibiting apoptosis. The amount of bcl-2 protein in a cell is determined in part by post-transcriptional regulatory mechanisms, which control the stability of bcl-2 mRNA. Recent studies have shown that A-U rich elements (AREs) in the 3' untranslated region (UTR) of bcl-2 mRNA may play a role in regulating the stability of the message. Previously it has been shown that the RNA binding protein nucleolin can bind to the first ARE (ARE 1) which stabilizes bcl-2 mRNA and thereby helps cell survival. Other proteins may be involved in formation of bcl-2 mRNA-protein complexes possibly altering the amount of bcl-2 mRNA or protein. Preliminary results suggest that there may be other stabilizing, or destabilizing proteins that affect this mechanism. Of equal importance is the specific region of ARE 1 that is directly involved in this complex, and examining whether the other three potential AREs also have destabilizing ability.

Circadian Oscillations of Signaling Molecules in Mouse Peripheral Tissues

Ashley Nazario and Elizabeth Meyer-Bernstein, Department of Biology

A clock in the brain regulates daily oscillations in physiology and behavior. Outside the brain, clock proteins control local oscillations by relying on timing cues from the brain clock. However, the mechanisms underlying this process are unknown. G-protein linked signaling cascades have been associated with the clock system and may play a role in peripheral oscillations. We sought to determine the relevance of pathway components by evaluating protein oscillations in mouse liver and eye tissues. Because of its role in the Drosophila clock, our analysis focused on the cascade that utilizes phospholipase C b4 (PLCb4) including the G-protein, Ga_{11}. Ga_{11} has been linked to the PLCb4 pathway and is found to associate with receptors in the mammalian brain clock. Data indicate a robust oscillation of PLCb4 in liver and a modest oscillation in the eye. Analysis of Ga_{11} has revealed mild oscillations in both the eye and the liver. Supported by the College of Charleston 4th Century Initiative Undergraduate Research & Creative Activities Grants (SUR and AYRA) & NIH SC-BRIN grant.

Does the visual system contribute to circadian entrainment in Drosophila melanogaster?

Rachel Fuller and Elizabeth Meyer-Bernstein, Department of Biology

In most organisms there is a daily rhythm in visual sensitivity believed to be an output of the retinal circadian clock. In Drosophila melanogaster, an interaction between NorpA (no response potential A, a
phospholipase C) and clock proteins underlies this rhythm. Although the visual system is not necessary for an organism to entrain to an external photoperiod, evidence suggests that an aberrant pathway may alter the organism's response to light. Thus, a disruption in the interaction may alter the circadian light response. This hypothesis was tested by assessing the ability of a non-saturating light pulse to reset the rest:activity rhythm in the Canton S and \textit{norpA}^{p24} mutant fly strains. Light was administered at various time points through a 24 hour period and the magnitude of shift was calculated. Data show a greater shift in the \textit{norpA}^{p24} strain when flies are pulsed in the early night, suggesting a greater light sensitivity. Supported by the NIH SC-BRIN grant.

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\textbf{Cloning, Overexpression and Purification of Manganese Catalase from \textit{Lactobacillus Plantarum}}

Jolene Duncan-Gould, Kiesha McCausland and Pamela Riggs-Gelasco, Department of Chemistry and Biochemistry

The enzyme catalase detoxifies hydrogen peroxide by converting it to water and oxygen, a reaction that prevents oxidative damage to the cell. The reaction is normally catalyzed in a heme (iron) protein. As the genomes of more microorganisms are published, however, it is clear that some bacteria, including the two human pathogens \textit{Bacillus anthracis} and \textit{Bacillus cereus}, utilize a dinuclear manganese enzyme to catalyze this critical reaction. Given that major human pathogens utilize a markedly different enzyme for this vital detoxification, it follows that the manganese catalases of these bacterial species might be targeted with an appropriately designed drug. These recent literature reports happen to coincide with our interest in the Mn catalase from \textit{Lactobacillus plantarum} as a model for a manganese dependent ribonucleotide reductase, itself a target for anticancer, antiviral and antibacterial drugs. We report here our efforts to clone, overexpress and purify the Manganese catalase from \textit{L. plantarum}.

12

\textbf{Reaction Products of Phenolic Compounds with Chlorine Bleach}

Christopher L. Bolton and W. Frank Kinard, Department of Chemistry and Biochemistry

In previous studies, we have shown that household chlorine bleach can react with a common chemical disinfectant, phenol, to form hazardous compounds. This work follows up on the initial investigations and shows that many other chlorinated products can be formed from simple substituted phenols. These model phenolic compounds can be viewed as homologues for many naturally occurring molecules and polymer fragments which contain phenol functional groups. In addition, this study examined the reactions of Fenton's Reagent, Fe(II) and hydrogen peroxide, as a possible remediation process for destroying the hazardous chlorinated products. Conditions for optimum reagent ratios and reaction times were determined.

13

\textbf{Optical Characterization of Photofrin™-Sensitized Tissue Phantom}
David Hall and Linda Jones, Department of Physics & Astronomy

Photodynamic therapy (PDT) with the photosensitizer Photofrin has been approved by the FDA as an alternative treatment for esophageal cancer and has been extensively applied to ablation of high-grade dysplasia in Barrett's esophagus. A major issue in clinical PDT is delivering an ineffective and accurate depth of injury with minimal damage to normal tissues and complications such as strictures. Our research group in the Department of Physics is working with physicians at Mayo Clinic Jacksonville to develop methods capable of more precise light dosimetry in order to reduce both under and over treatment effects. The objective of the Fall 2004 research was to optically characterize a multilayered tissue phantom by analyzing reflectance and transmittance spectra. Current research is determining the effects of Photofrin™ on fiber optic reflectance spectra.

Habitat Characterization of an Outer Continental Shelf Hardground: Lionfish Ledge

Hannah Giddens¹ and Leslie Sautter²
¹ Department of Biology
² Department of Geology

Habitat characterization of Lionfish Ledge was conducted with video and sediment samples collected aboard the R/V Savannah between May 18 and May 22, 2004, as part of the larger Charleston Transects program. Lionfish Ledge was located using a 100-kHz sidescan sonar, video images were recorded during a remotely operated vehicle (ROV) transect on and across the ledge, and sediment samples were collected with a Smith-MacIntyre grab sampler. Video image analysis quantified and described substrate characteristics and morphologies. The ROV transect consisted of 84.7% sediment and 15.3% hard substrate. Grab sample analysis showed coarse and medium grain sizes dominated samples and relative abundances of biogenic and lithogenic materials varied. Megafaunal invertebrate population density was described for hard and soft substrate; results should be considered preliminary due to lack of video resolution. Two lionfish, Pterois volitans, were observed in the area of highest relief. Further studies are needed to characterize fish and invertebrate communities.

An Introduction to Biological Concepts through Fish Spawning Events: A Web-Based Resource

Hannah Giddens and Gorka Sancho, Department of Biology

What better way to get students excited about biology than to teach them basic biological concepts through an interesting case study on reef fish reproduction? The complexity of reef fish spawning events is conducive to presenting a variety of basic biological and ecological topics. Through a web page we intend to provide teachers and students with interesting examples covering topics such as natural selection, evolutionary selective pressures, Darwinian fitness, sex change and hermaphroditism, group and pair spawning behaviors, and diel, tidal, and lunar influences on spawning cycles. The completed website will provide visitors with background information, definitions of biological terms, and downloadable videos of
Nutrient Cycling in a South Carolina Tidal Salt Marsh

Christel Lopez, Emily Sekula, Lauren Kolowith, Liza Johnson, Timothy Callahan, Department of Geology and Environmental Geosciences

Tidal salt marshes are highly productive systems that dominate the coastline of the southeastern United States. In this study, the freshwater influence on marsh nutrient cycling was examined through a compilation of two years of seasonal data collection at a relatively undisturbed tidal salt marsh at Dixie Plantation, SC. Porewater diffusion cores were emplaced along two transects from the major tidal source towards the inland maritime forests. Porewater ammonium, phosphate and sulfate were analyzed spectrophotometrically. In addition, freshwater samples from water table wells in the adjacent upland area were analyzed for ammonium and phosphate as well. Based on these data, as well as observations of the surrounding vegetation and tidal cycles, it is concluded that the groundwater only significantly affects the high marsh, while the low marsh is predominantly influenced by the large tidal creek that connects to the Stono River.

An Analysis of Microfossil Assemblages Across the Continental Shelf off the Coast of Charleston, SC

Adriane Cushman and Leslie Sautter, Department of Geology and Environmental Geosciences

Sediment samples were collected in November 2004 on the continental shelf off the coast of Charleston, SC aboard the R/V Savannah. Seven samples were dried and split, then grains were counted and identified as biogenic or non-biogenic sediment. The percent of biogenics present was calculated, and biogenics were divided into microfossil taxa. Results show that the inner-, middle-, and outer-shelf samples consistently contain less than 10% biogenic sediment, most of which is fragments of bivalves and other hard part remains of organisms. In contrast, the shelf-edge station, which is influenced by the Gulf Stream and far from the source of lithogenic material, consists of nearly 70% biogenic sediment. Planktonic and benthic foraminifera, echinoderm and coral fragments are present along with numerous bivalve shell fragments.

Measurement of Inspiratory Capacity during Exercise from Patients with Severe Emphysema

Charlie Strange\(^1\) and Stefanie Reed\(^2\)

\(^1\)MUSC Department of Pulmonary & Critical Care Medicine, Allergy & Clinical Immunology

\(^2\)College of Charleston Department of Biology
Emphysema is a disease characterized by the gradual deterioration of lung tissue. The damaged tissue prevents the normal movement of air and absorption of oxygen through the lungs. Because the airways collapse on expiration, the air becomes trapped in the lung causing hyperinflation. Hyperinflation that worsens during exercise is called dynamic hyperinflation. This study investigates the magnitude of dynamic hyperinflation in a cohort of X individuals with severe emphysema who have enrolled in the VENT study (Valve for Emphysema PalliatioN Trial) clinical study at the Medical University of South Carolina. A standard CPET (cardiopulmonary exercise stress test) was used to obtain tidal and inspiratory capacity volumes, later used in calculating residual volumes. The impact of endobronchial valves on these values will be assessed in future patients before and after the interventional procedure to further define the mechanisms of symptomatic improvement following endobronchial valves for severe emphysema.

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**Discovery of an Ancient River Channel on the Middle Continental Shelf off Charleston, SC**

Philip Antman¹, Leslie Sautter², and Scott Harris³
¹Department of Biology, CofC
²Department of Geology, CofC
³Department of Marine Science, Coastal Carolina University

In May 2004, a segment of the continental shelf off Charleston, SC was surveyed during Leg 02 of the College of Charleston's Transects Program, aboard the R/V Savannah. Using side-scan sonar mapping, remotely operated vehicle (ROV) videotaping, and a sediment grab sampler, a large relict meandering river channel was discovered incised into the underlying hardground, at a depth of ~20 m. Data from three ROV dives were used to characterize substrate distributions in the area, and varying geomorphologies of exposed hard- and soft-substrate ground areas were quantified. Sediment samples taken at various distances from the channel were used to determine the feature's possible origin. This meandering channel appears to be similar to modern tidal creeks of the South Carolina Lowcountry, and, with additional investigation, may be identified as being located near the 10,000 y.b.p. shoreline.

20

**The Aging Process after Spinal Cord Injury**

Nythea Campbell, Department of Biostatistics, Bioinformatics, & Epidemiology, Medical University of South Carolina

Spinal Cord Injury (SCI) is a devastating condition often affecting young and healthy individuals around the world. This debilitating condition not only creates enormous physical and emotional cost to individuals, but also is a significant financial burden to society at large. The years after SCI may be associated with acceleration of the aging process because of diminished physiologic reserves and increased demands on functioning body systems. People aging with SCI are vulnerable to medical complications, and additional help is required to function. Knowledge of the effect of these factors, particularly number of years post...
injury, race, sex, and residence should increase awareness that more help with activities of daily living may be needed over time. This study should help to anticipate functional declines, to provide support and assistance to maintain functional independence to prevent additional complications, and thereby to enhance quality of life.

21

Do pelagic predators feed at fish aggregating devices (FADs)?
Kelly M. Buck and Gorka Sancho, Department of Biology

Pelagic fishes aggregated around drifting fish aggregating devices (FADs) in the Indian Ocean were collected to investigate their trophic ecology, and determine whether they feed on fauna associated with the drifting FADs. Stomach content analysis of yellowfin tuna (*Thunnus albacares*), dolphinfish (*Coryphaena hippurus*), and wahoo (*Acanthocybium solandri*) collected in fall and spring reveal various interesting patterns. A clear seasonal dietary shift is observed for all three species, with diets dominated by pelagic crustaceans in the fall and epipelagic fish in the spring. A high amount of diet overlap between all three predatory species occurred in the fall. Stomach fullness was not correlated with time of collection, indicating no lack of rigid diel feeding patterns. None of the three predatory species fed on fish species (i.e. *Canthidermis maculatus*, *Kyphosus spp.*), *Decapterus spp.* and *Seriolarivolina*) also aggregated in large numbers around drifting floating objects planted by tuna purse-seiners.

22

Factors Affecting Longleaf Pine Growth
Amanda Whitehurst and P. Dustan, Department of Biology

The growth rates of longleaf pines were studied by following the growth of individual seedlings, which were measured twice a year over a course of eight and a half years. The experiment was composed of seedlings that planted on two differing plots, one with hardwood trees and one without, in order to determine if the presence of oak trees effects longleaf seedling growth. Seedling growth rate was positively correlated with plant height with high variability between the individual seedlings. The amount of time the seedlings remain in the grass stage also varied greatly from tree to tree. Seedling growth rate did not vary between experimental plots; however, the tallest trees occurred on the plot without oaks and dead seedlings frequently occurred in the shade of larger trees.

23

Computer Aided Simulations of Watershed Scale Hydrology using DRAINWAT
W. Adam Brightwell¹, Devendra M. Amatya², and Timothy J. Callahan³
¹Department of Computer Science, CofC
²USDA-Forest Service, Southern Research Station, Center for Forested Wetlands Research, Charleston, SC
³Department of Geology and Environmental Geosciences, CofC
DRAINWAT is a DRAINMOD-based computer program in FORTRAN language developed to simulate the hydrology of watersheds comprising of fields with various landuses and in-stream hydraulics of flow routing through drainage-stream networks. The watershed-scale model DRAINWAT simulates surface runoff, subsurface drainage, evapotranspiration, interception of precipitation, and water table depth in forested watersheds. Originally, a DOS version of the model was available to build input files containing all necessary data in a text format for a given simulation. Using JAVA and XERCES of the Apache XML Project, we created a graphical user interface (GUI) with a series of user-friendly windows for inputs and analysis of output data for this model. Compatibility, reliability, and ease of use for operational purposes were taken into consideration during the design and implementation of this computer-aided project. Currently, this new version of DRAINWAT with the GUI is in the testing phase; preliminary results will be presented.

24

Greenhouse Gas Emissions from Soils in Southeastern U.S. Forests: A Pilot Study

Emily N. Sekula, Carl C. Trettin, and Timothy J. Callahan

1Department of Geology and Environmental Geosciences, CofC
2USDA-Forest Service, Southern Research Station, Center for Forested Wetlands Research, Charleston, SC

Quantifying sources and sinks of greenhouse gases is important in global warming research. Other than carbon dioxide, two important trace gases are methane and nitrous oxide. Wetlands are sinks for carbon dioxide and sources for the majority (22.5%) of methane. Some farmlands have been restored to wetlands in hopes of sequestering atmospheric carbon. Using static chambers and gas chromatography, we wanted to quantify methane and nitrous oxide emissions at a site in the Francis Marion National Forest near Charleston, South Carolina. Data from soil mesocosms under varied hydrologic conditions showed an increase of carbon dioxide and methane over time. Decreasing the water level in the mesocosms reduced methane gas flux. No nitrous oxide emissions were detected from the mesocosms, yet after nitrate amendments, nitrous oxide gas was measured and both carbon dioxide and methane emissions were decreased. Future research will provide comparative data to restored forested wetlands in temperate climates.

25

Stress or Geometry: Proposed models for Mesozoic dike emplacement and the break-up of Pangea

C. Travis Debnam and Erin K. Beutel, Department of Geology and Environmental Geosciences

Past studies indicate that the majority of Mesozoic diabase dikes within the Carolinas have dominantly northwest trending orientations, however recent work in South Carolina and the Piedmont of North Carolina has yielded numerous previously unmapped dikes, with multiple orientations and cross cutting relationships. The Carolina dike swarms are associated with the Central Atlantic Magmatic Province (CAMP) and the break-up of Pangea. Cross cutting relationships and radiometric dating indicate that the extensional stress field in the Carolinas rotated from NW-SE to E-W to NE-SW in a 2 m.y.. These observations are contrary to previous studies that attribute the northwest trending dikes in the Carolinas to a deep mantle plume that produced a pattern of radial diking. From this data we have constructed several finite element models that test possible rifting sequences and geometry, as well as possible stress field orientations. Preliminary results
indicate that the sequence and geometry of the rifting of Pangea played a key role in dike emplacement.

26

Characterization of Ferromagnetic Fluids

Kevin Young and Jeffrey L. Wragg, Department of Physics and Astronomy

Ferromagnetic fluids, or ferrofluids, are a novel class of materials which are composed of sub-domain sized ferromagnetic particles suspended in a solvent and separated by a surfactant. These particles display a number of unusual behaviors in the presence of strong magnetic fields and field gradients. These behaviors include magnified surface instabilities, appearing as spikes on the fluid surface; increased viscosity in the presence of strong fields; and attraction to high field gradients. Preliminary qualitative measurements of magnetization vs. field strength have been made and indicate that effects are measurable with current equipment, though new techniques must be developed to produce more precise data.

27

The Effects of Calmodulin and Ca2+ Manipulation in Elongating Pollen Tubes of Norway Spruce

Eric Marom and Mark Lazzaro, Department of Biology

Conifer pollen tubes differ significantly from angiosperm pollen tubes with respect to the cytoskeleton and dependent processes such as streaming. The unique motor protein KCBP contains a calmodulin binding domain which confers calmodulin-Ca2+ regulation. Previous experiments in conifer pollen implicate KCBP in inducing microtubule reorganization that stops microfilament dependent streaming. The two signal transduction pathways of Ca2+ and cAMP linked through CaM likely modulate KCBP mediated streaming. These pathways were manipulated through the perfusion of agents that change cAMP levels and CaM activity onto actively growing pollen tubes. Forskolin, an adenylyl cyclase activator, and 8-Br-cAMP, a cAMP analogue, decreased growth rates. Perfusion with 2',5'-dideoxyadenosine, an adenylyl cyclase inhibitor, did not produce any notable effects. Perfusions with W12, a CaM antagonist, are currently being conducted. It is possible that the results obtained from perfusion with 8-Br-cAMP and 2',5'-dideoxyadenosine, opposite those found in angiosperms, are due to affecting KCBP activity.

28

Determination of the Hubble Parameter from Galaxy Clusters in the Sloan Digital Sky Survey (SDSS)

Jennifer Andrews¹, Joseph Noelker¹, Melissa Sims¹, Erin Smith², Lisa Solinger¹, and Robert Dukes¹
¹Department of Physics and Astronomy, CofC
²Department of Art History, CofC
SDSS is a photometric/spectrographic survey ultimately designed to cover approximately 25% of the entire sky. Data released thus far contains over 141 million unique objects. Over 400,000 of these are galaxies and quasars with spectra. Examining SDSS we identified over 400 galaxies, mostly in clusters, with spectra and hence redshifts available. We determined their distances through two crude techniques. The first assumes that the brightest galaxy in each cluster has the same absolute brightness while the second assumes that the largest galaxy in each cluster has the same actual diameter. These distances were calibrated on the basis of the basis of the distance of the published distance of M87 in the Virgo Cluster. In this poster we present a Hubble Diagram based on this data as well as a determination of the Hubble Parameter and hence the Hubble Age of the universe.

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**Ichthyoplankton Densities and Distribution across the continental shelf off Charleston, SC**

Michelle Bahm and Gorka Sancho, Department of Biology

In November 2004, the Transects Program (Leg 03) collected larval fishes along a transect line extending from the coast of Charleston, SC across the continental shelf and into the Gulf Stream. Fish larvae were collected by doing oblique tows with a 505 m mesh size bongo net. The larvae were counted and identified to determine densities and distribution of selected taxa. These data were compared to data collected in 2003 by the Transects Program (Leg 01), and data collected in 1973 as part of the SC Department of Natural Resources’ MARMAP Program. Results showed that fish larvae are more abundant in the middle shelf region, and a higher fish density was obtained in 2003 than in either 1973 or 2004. Pleuronectiform and Leptocephali larvae were the most abundant, with Clupeiform and Ophidiidae larvae being second. Although fish were found to be slightly more concentrated in 2003 than in 2004, overall densities and distributions have only minimally changed.

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**Abundance, Distribution and Diversity of Benthic Fishes from the Continental Shelf off Charleston, South Carolina**

Dana B. Hughlett and Gorka Sancho, Department of Biology

Small benthic fish populations off South Carolina's middle continental shelf have not been scientifically monitored for two decades. Spatial distribution, relative abundance and biodiversity of benthic fishes were examined from samples collected across the continental shelf off Charleston, SC, in November 2004. Eleven sites were sampled with a 1m beam trawl. A total of thirty-three species of fishes were identified across the entire shelf, with varying number of species at each station, ranging from 11 to 15. Each physiographic region of the shelf (Inner, Middle and Outer Shelf) was dominated by a different fish species. The Inner Shelf had the highest relative abundance of *Citharichthys sp.* (Whiffs), while the Middle Shelf was dominated by *Otophidium onostigmum* (Polka-dot cusk-eel), and the Outer Shelf was characterized by high abundance of both *Otophidium dormitator* (Sleeper cusk-eel) and *Urophycis regia* (Spotted hake). Biodiversity of fishes (Shannon-Weaver index) decreased with increasing distance from shore.
Digital Mapping of Crater Lake National Park, Oregon

Erin Snow and Robert Nusbaum, Department of Geology and Environmental Geosciences

ASTER satellite data of Crater Lake, Oregon was used to map rock units associated with the past eruptions and geologic activity of Mount Mazama. Bathymetric data of the crater floor was layered with a Digital Elevation Model (DEM) in ARC-GIS to create a shaded relief image highlighting the topography of the region. A VNIR/SWIR image was created using endmember extraction to identify different rock types in the region. This image was then layered with the DEM and compared to a USGS geologic map of the Mount Mazama area. A CIR image was created and layered with the DEM to show the extent of vegetation as well as which vegetation favors which rock unit as seen when compared to the USGS map and other results from the study. A TIR image was also created and layered with the DEM, however results from these data are inconclusive.

32

How do flies fly? Does projectin function as an elastic band?

Christy Larkins and Agnes Ayme-Southgate, Department of Biology

The research in the P.I.'s laboratory is focused towards understanding the function of the muscle protein, projectin, in the model system, Drosophila melanogaster. The Drosophila protein, projectin, is an essential component of myofibrils, the contractile units of muscles, and it is a long extended molecule with a predicted molecular weight of 1,000 kDa. In flight muscles, projectin is associated with the connecting filaments (C-filaments), which contribute to the myofibrils' elastic properties, whereas in embryonic and larval muscles projectin is associated with the protein myosin. The goal of this research project is to evaluate projectin's contribution during both the assembly of myofibrils and during flight. We will take advantage of the RNAi protocol coupled with the Gal4-UAS regulatory system to inhibit the synthesis of the projectin protein in different muscles. Using this approach we have fly stocks where there is no projectin in either the flight or embryonic muscles. These stocks are evaluated for the absence of projectin by immunofluorescence microscopy. The phenotypic effects on viability, muscle contractions, myofibril assembly and flight will be presented.

Study of the interactions of the Drosophila projectin protein during development

Kristen Williams and Agnes Ayme-Southgate, Department of Biology

Drosophila melanogaster is being used as a model organism with which to study myofibril assembly and growth of the sarcomere in striated muscle. Projectin is a muscle protein in the insect Drosophila. It has a molecular weight of 1,000 kDa. Projectin's large size and modular organization suggests that it plays a major role in the construction of the myofibrils as well as in the elastic property of the sarcomeres. A unique region found towards the NH2-terminus of the protein, called the PEVK domain, is thought to be responsible
for interactions with actin and elasticity. The goal of the project is to ascertain the role of the PEVK sequence in projectin assembly and elasticity. A gene encoding a fusion protein between the green fluorescence protein (GFP) and projectin's PEVK domain was reintroduced into the Drosophila germline by P-element transformation. Binding of the projectin-GFP fusion on pupal and adult muscle was detected using immunofluorescence microscopy through the entire pupation stage, which is the period for the development of the insect flight muscles. Implication for sarcomere assembly will be discussed.

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Study of the interactions of the Drosophila projectin protein during development

Rachel Fowler, Maggie Winkowski and Agnes Ayme-Southgate, Department of Biology

Drosophila melanogaster is being used as a model organism with which to study myofibril assembly and growth of the sarcomere in striated muscle. Projectin is a muscle protein in the insect Drosophila and a component of the myofibrils. The projectin protein has a molecular weight of 1,000 kDa, and its large size and modular organization suggests that it may play a crucial role in the construction of the myofibrils. A region of the protein found towards the COOH-terminus of the protein is composed of three domains called the Ig domains which are thought to be responsible for interactions with the myosin thick filaments. The goal of the project is to ascertain the role of the Ig domains in projectin assembly. A gene encoding a fusion protein between the green fluorescence protein (GFP) and projectin's COOH-Ig domain was reintroduced into the Drosophila germline by P-element transformation. Binding of the projectin-GFP fusion on pupal and adult muscle was detected using immunofluorescence microscopy through the entire pupation stage, which is the period for the development of the insect flight muscles. Implication for sarcomere assembly will be discussed.

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Expression of lysozyme in the Pacific white shrimp, Litopenaeus vannamei, after exposure to hypoxia and challenge with Vibrio campbellii

Erin J. Burge, Daniel J. Madigan, Louis E. Burnett and Karen G. Burnett, Grice Marine Laboratory, College of Charleston and Hollings Marine Laboratory

In crustaceans, environmental perturbation or pathogen challenge causes a significant decrease in the number of circulating hemocytes, the primary mediator of cell-based immunity. It has been suggested that hemocytes migrate into the tissues during bacterial clearance, but no suitable molecular markers currently exist for tracking this migration. These experiments evaluated lysozyme mRNA as a molecular marker of hemocyte trafficking by monitoring changes in transcript number. In a timecourse experiment, shrimp tissues were sampled from 0.25 to 48 hours post-injection with 2e4 V. campbellii/g or saline, and hemocyte lysozyme mRNA expression was monitored and correlated with total circulating hemocyte numbers. In another experiment, shrimp were exposed to hypoxia (4 kPa) or normoxia (>20 kPa) for 4 hours and then injected with V. campbellii and returned to hypoxia or normoxia. Four hours later, lysozyme transcription was quantified. Analysis showed that lysozyme is an accurate molecular marker of hemocyte distribution, and that transcription was highest in hemocytes and lymphoid tissue. Both lysozyme transcripts and circulating hemocyte numbers significantly decreased in shrimp within 4 hours of injection. Vibrio injection, but not exposure to hypoxia, modified tissue distribution of hemocytes in L. vannamei. Lysozyme
expression was neither induced nor suppressed within 48 hours of a Vibrio-injection.

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Pathological Changes in the Copepod, Oithona colcarva, Infected by the Nematode, Margolisianum bulbosum

Leah Crowe and Isaure DeBuron, Department of Biology

The philometrid nematode Margolisianum bulbosum parasitizes the copepod Oithona colcarva and inhibits its activity. Mechanisms that induce such behavior modification are unknown. We hypothesized that striated muscles and nerves could be affected by the parasite because of their role in the escape response of the copepod. We used transmission electron microscopy to study the ultrastructure of striated muscles and nerves in control (uninfected) and in 1 and 3 day post infection copepods. Results showed that in infected copepods the myofibrils were unaffected while the mitochondria of the muscle fibers appeared enlarged and vacuolated. Nerve fibers were observed in infected copepods but not in control and thus could not be compared. These ultrastructural changes cannot be directly linked to the presence of the parasitic larvae as they may be caused by the aging of the infected copepods. Further research using older uninfected copepods will be necessary. Supported by the 4th Century Initiative of the College of Charleston.

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The Evolution of Learned Vocalizations

Rachel Levkowicz, Suzanne Mickey, Morgan Bivens, Lauren Diamant, and Melissa Hughes, Department of Biology

How do learned behaviors evolve? The molecular genetic revolution has facilitated great increases in our understanding of how genetically transmitted traits evolve; however, our understanding of the evolution of traits transmitted via non-genetic mechanisms, such as learning, has lagged considerably further behind. Many complex behaviors in humans and other animals are learned, but we know little regarding how learned behaviors evolve, a process often referred to as cultural evolution. Song in songbirds is an excellent model system for the study of cultural evolution, because the mechanisms of song learning are well known, and because learned variation in songs can have a profound effect on song function, and in turn, on the evolutionary fitness of the singer. In this study, we are measuring cultural evolution of vocal dialects in song sparrows.

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Characterization of Vaccinia Virus Late Transcription Factor A1L through Site-Directed Mutagenesis and Protein-Protein Interaction Assays

Paige De Benedittis1, Stephanie Dellig1, and Cynthia Wright2

1Department of Biology, CofC
Vaccinia virus is a safe model to study the poxvirus life cycle. We are interested in understanding the viral transcriptional factors A1l and G8R, which help activate genes expressed late in the viral life cycle. In previous studies, we have demonstrated protein-protein interactions between A1L and itself as well as A1L and G8R. To determine areas of A1L responsible for protein-protein or protein-DNA interactions, a series of A1L truncations were produced by site-directed mutagenesis. Full-length wild type and each truncated protein were overexpressed and purified from bacteria. A sample of these purified proteins were bound to a resin and soluble proteins were made as well. The truncated proteins on the resin were then used in a pull-down assay with soluble wild type A1L protein in order to determine how truncations affected the A1L self-interaction. The truncations will also be used to study how A1L interacts with promoter DNA.

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The Effect of an Urban Heat Island on Coastal Sea Breeze

Tim Kent and Laney Mills, Department of Physics and Astronomy

The common explanation for the sea breeze circulation is mostly descriptive and not adaptable to quantitative calculations. This poster presents a quantitative explanation for the sea breeze dynamic and estimates the extent to which an urban heat island affects the coastal sea breeze. The project is a theoretical model that uses the Stella numerical modeling program. A typical sea breeze event is set up in the Stella model for which the coastal land and therefore the air above is heated more rapidly than the nearby body of water and its overlying air mass. The model is run for a system with an urban heat island and without one. The projected wind speed due to pressure gradients caused by the differential heating over land and water is computed to be in fair agreement with common measured values.

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Remote sensing and hyperspectral data analysis for examining soil chemistry and slope stability of the Boron Open Pit Mine, Boron, CA

James Brown and Robert Nusbaum, Department of Geology and Environmental Sciences

The Boron open pit mine is one of the largest ore deposits of borates in the world today. By using high resolution (2m) hyperspectral imagery of the open pit mine it is possible to determine the mineralogic diversity on the basis of specific spectral absorption features. By analyzing hyperspectral reflectance data using ENVI remote sensing software, we mapped the abundance of endmembers using three different techniques. We mapped the 1-mile diameter open pit using a Spectral Angle Mapper (SAM) algorithm using both JPL Spectral library endmembers and endmembers generated from hyperspectral data. We also mapped the area using Mixture Tuned Matched Filtering (MTMF) algorithm. The presence of montmorillonite, a major constituent of the area, is significant because it is an unstable clay and in high concentrations will decrease slope stability. Results will be discussed at the 17th SSM Research Poster Session at the Hollings Science Center.
A Tale of Two Stars: Analysis of Light Variations in Candidate Slowly Pulsating B and Gamma Doradus Variables

Sarah Sonnett and Robert J. Dukes, Jr., Dept. of Physics and Astronomy

Both HD199122 and HD213617 are found to be periodic with frequencies within the characteristic range of g-mode pulsation for either the Slowly Pulsating B Stars (SPBs) or the Gamma Doradus stars. HD199122 appeared on a list of SPB stars found through Hipparcos data examination by Koen (MNRAS, 321, 44, 2001). However, its reported spectral type A2 is late for a SPB. Using Stromgren uvby photometry, we have examined over 800 differential measures of this star. We find four clear frequencies of \( f_1 = 0.80209 \text{ c/d}, f_2 = 0.82443 \text{ c/d}, f_3 = 0.84811 \text{ c/d}, \) and \( f_4 = 0.41932 \text{ c/d} \). A preliminary analysis of Hipparcos satellite data for HD213617 proposes a frequency of 0.55672 (Handler, G., MNRAS, 309, L19-L23, 1999). However, Castellano (private communication) has found a period closer to 0.8 c/d from his Hipparcos data analysis. We are presently obtaining observations for both subjects and will continue analysis as data arrives.

Determination of Absorption of Individual Layers of Esophageal Tissue via Photoacoustic Spectroscopy

Jacqueline Maurer, Narayanan Kuthirummal and Linda Jones, Department of Physics and Astronomy

We have developed and calibrated a photoacoustic spectrometer system to obtain the absorption profiles in esophageal tissues at various depths. Several spectra have been taken in the 300-700 nm range from different layers of pig esophagus and then normalized against carbon black spectrum in the corresponding wavelength region to get the true absorption features. The spectral features show that we could clearly distinguish the esophageal layers spectroscopically. The outermost layer absorbs significantly more visible light than the inner layer. We have also obtained the photoacoustic spectra of photofrin™ (a photosensitizer used in photodynamic therapy). This information will be used in later tests to determine where the photosensitizer localizes in the esophagus after intravenous injection.

Distribution of Benthic Meiofauna Across the Continental Shelf off the Coast of Charleston, SC

Chris Giguere\(^1\), Gorka Sancho\(^1\), and Leslie Sautter\(^2\)

\(^1\) Biology Department
\(^2\) Geology Department

An evaluation of the characterization of benthic meiofauna found along the continental shelf off the coast of Charleston, South Carolina is examined. Actual abundances of various categories of organisms are reported for 8 stations along a transect perpendicular to the coast. Total number of organisms per standardized volume
Organism abundance tends to be related to mean grain size, in that coarse sediments contain greater numbers of organisms. Taxonomic richness is also calculated for each station using a modified Shannon-Weaver Index. Taxonomic richness is compared to mean grain size for each station, and a correlation is determined. Taxonomic richness had a stronger relationship to mean grain size. Stations with coarse sediment appear to contain a higher degree of taxonomic richness.

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**Abundance of chaetognaths (arrow worms) across the continental shelf off Charleston, South Carolina**

Brooke Pehr and Gorka Sancho, Department of Biology

Using night tows from a bongo net, abundance of chaetognaths was calculated at 7 stations off the coast of Charleston, SC in May 2004. Oceanographic conditions and zooplankton biomass estimates were considered as possible variables influencing chaetognath abundances. A positive correlation was found between chaetognath abundance and total zooplankton biomass estimates, which we attribute to chaetognaths preying on other zooplankton, especially copepods. No correlation was found between abundance and distance from shore. While we found the highest density of chaetognaths at the station with the coldest average water column temperature and one of the highest salinity averages, we did not find a correlation between temperature, salinity, and chaetognath abundance as a whole. We conclude that chaetognath abundance does vary across the shelf and is most closely related to abundance of other zooplankton.

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**Commissioning the Etelman Observatory's half meter Automated Telescope**

Linwood E. Wadsworth, Jr. and James E. Neff, Department of Physics and Astronomy

The college of Charleston, the University of the Virgin islands, and South Carolina State University have, with a matching grant from NSF, purchased and installed a new research-grade half meter automated Cassegrain telescope in St. Thomas. The new telescope must be calibrated and tested before any scientific use is possible. The task of commissioning the half meter telescope will be accomplished through: optimizing the pointing model using the Talon software bundle, characterizing the Marconi Scientific CCD Sensor in terms of readout noise, dark current, system gain, and bad pixel masking, and performing tasks necessary to improve the scientific performance of the telescope and instrumentation. Images with then be produced to demonstrate the performance capabilities of the telescope with IRAF, IDL, and Talon software.

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**Least-Cost Path Analysis and Interregional Interaction in the Gksu Valley, Turkey**

James Newhard¹, Allen Rutherford², Norman Levine³, and Hugh Elton⁴

¹Department of Classics
Excavations at Kilise Tepe in the mid-90s indicated a shift in ceramic forms during the Middle Bronze Age from ware types similar to the lower Cilician sites of Tarsus and Mersin to forms more similar to the Central Anatolian Plateau. The causes for this shift are unknown. One suggestion is that a declining need for obsidian changed the relationship between the two regions. Least-cost pathway analysis was performed focusing upon possible routes from the Central Anatolian Plateau and obsidian sources to the sites of Mersin, Tarsus, and Kilise Tepe. Analysis shows that when the focus is upon obsidian acquisition, the least-cost route from Kilise Tepe passes through Mersin and Tarsus. When this focus is removed, the route changes to one focused upon communication with the Anatolian Plateau. This analysis suggests that a decreased interest in obsidian acquisition caused a shift in interest form the plain to plateau.

Strain net analysis of the western terminus region, Matanuska Glacier, Alaska

Jones, N. Fant¹, Beutel, Erin K.¹, Ham, Nelson², Lawson, Daniel³, and Goetz, Staci⁴
¹Dept of Geology and Environmental Geosciences, CofC
²Geology, Saint Norbert College
³CRREL, Hanover, NH
⁴Department of Geology, Central Michigan University

The Matanuska Glacier's ice surface in the western terminus region is characterized by varying thicknesses of supraglacial debris. The clean ice zone, the semi-debris-covered zone, and the debris-covered ice zone with 0-1mm, 1 mm to 5 cm, and 5 cm-25 cm of debris cover respectively. The thickness of debris-cover has been hypothesized to reflect the ice surface velocity and the stability of the ice surface, as it relates to vegetation succession. To test these hypotheses, we examined the deformation of the ice surface within each of the debris zones. Three strain nets were constructed approximately 500 meters from the margin of the glacier within each zone. Measurements during June and July of 2004 were taken with a Total Station and prism to accurately measure changes in distances across each strain net. Analysis of these measurements showed that the ice margin is currently advancing about 3 meters per year, but little to no change in horizontal or vertical distance across any of the strain-nets was detected.

Morphometric Shape Analysis of Intraspecific Variation in Indo-Pacific Coral Gobies(Teleostei: Gobiidae)

Adair Dempsey and Antony S. Harold, Grice Marine Laboratory, Department of Biology

Gobies of the genus Gobiodon inhabit coral reefs of the Indo-Pacific Region and have an obligate commensal association with corals mainly of the family Acroporidae. Different species of these fishes tend to inhabit different species of coral. Two of the species mainly encountered on these corals are G. rivulatus and G. quinquestrigatus, and although these species have some minor differences in pigmentation
there continues to be disagreement among ichthyologists as to whether or not they are both valid species. I used a morphometric shape analysis to compare numerous specimens in an attempt to address this issue. Morphometric measurements were taken between homologous landmarks using digital metric calipers interfaced with a computer. Measurements from G. rivulatus specimens from the Seychelles were compiled with data in an existing database for G. rivulatus from the Pacific, G. quinquestrigatus specimens from the Comoros, and G. quinquestrigatus specimens collected at numerous locations across the Indo-Pacific. Sheared principle components analysis was run on the four groups to see what differences, if any, existed between the two species. Plots of the principal component scores show that G. rivulatus and G. quinquestrigatus are likely to be distinct species and, furthermore, that the population G. quinquestrigatus from the Comoros Islands may represent an undescribed species.

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Evaluation of a Web-based survey on the effectiveness of a child sexual abuse prevention program

Morgan Pleasant and Trisha Bennett, Department of Psychology

In response to the high prevalence of child sexual abuse (CSA), numerous programs have been focused on its prevention. This study evaluated the efficacy of child sexual abuse information provided by Darkness to Light (D2L), a non-profit organization that works to place the burden of preventing CSA on adults. Participants completed web-based surveys based on D2L's "7 Steps to Protecting Our Children." A pretest was completed by 854 participants, the posttest by 169, and the follow-up test by 85. For the participants who took both a pre and a post test, results showed a significant increase in knowledge regarding CSA prevention ($t(169) = 16.804$, $p = .000$). These results indicate that exposure to the 7 Steps is an effective way to increase knowledge about the prevalence and prevention of CSA.

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Spatial Distribution of Echinodermata across the continental shelf off Charleston, South Carolina

Lauren Halloran¹, Leslie Sautter², and Gorka Sancho¹

1 Department of Biology
2 Department of Geology

Using a dredge and a beam trawl, echinoderm specimens were collected in November 2004 at 14 stations across the continental shelf off Charleston, SC, from the R/V Savannah. The abundance of each species was compared to the depth profile across the shelf to assess species dominance at specific depth ranges. Beam trawl collections showed no change in dominance of asteroids or ophiuroids across the shelf. The dominant species of Subclass Asteroidea was Luidia clathrata, whereas Ophiolepsis elegans was the dominant species of Subclass Ophiuroidea. A change in dominance across the shelf was observed in Class Echinoidea specimens, where the two dominant species at shallower depths (10 ? 20 m) were Lytechinus variegatus and Arbacia punctulata. Stylocidaris affinis was the dominant echinoid at depths greater than 50 m. Dredge data indicated Leodia sexiesperforata, Encope michelini, Clypeaster subdepressus were dominant species across the shelf, specifically in the mid shelf region between depths of 30 - 40 m.
spiro(Benzisothiazole dioxides - isoxazolines) and Pyrazole-ortho-Benzenesulfonamides: Synthesis and Characterization

Bonnie J. Grant, Carolyn L Sober, Michelle A. Meierhoefer, Jarrett H.Vella, Renzy Raju, Nidhi S. Patel, Leah D. Crowe, Clyde R. Metz, and Charles F. Beam, Department of Chemistry and Biochemistry

Select C(alpha),N-phenylhydrazones were treated with excess lithium diisopropylamide, (LDA), followed by condensation with Me 2-(aminosulfonyl)benzoate to give C-acylated intermediates that were not isolated, but acid cyclized with aq. HCl to afford new pyrazole-ortho-benzenesulfonamides. X-ray anal. and two dimensional magnetic resonance, NMR [DEPT, HMQC] spectra were essential in confirming the structure of the products.

Several dilithiated C(alpha),O-oximes were prepd. in excess LDA, condensed with Me 2-(aminosulfonyl)benzoate followed by acid cyclization of intermediates to spiro(benzisothiazole dioxides-dihydroisoxazole) dioxides instead of isoxazole-ortho-benzenesulfonamides. X-ray anal. of a representative product was necessary.

Dilithiated C(alpha),N-carboalkoxyhydrazones were prepd. in excess LDA, condensed with Me 2-(aminosulfonyl)benzoate followed by acid cyclization of intermediate products to N-H pyrazole-ortho-benzenesulfonamides instead of N-carboalkoxy-pyrazole-ortho-benzenesulfonamides. Additional X-ray crystal studies are warranted. The newly prepared compounds will also be tested for agricultural biological potential.

Dihydronaphthisoxazoles and Tetrahydronaphthisoxazoles: Synthesis and Characterization

Jarrett H. Vella, Bonnie J. Grant, Carolyn L Sober, Michelle A. Meierhoefer, Nidhi S. Patel, Clyde R. Metz, and Charles F. Beam, Department of Chemistry and Biochemistry

One-tetralone was condensed with hydroxylamine to afford 1-tetralone oxime. The starting material was then dilithiated with excess lithium diisopropylamide (LDA) or excess n-butyllithium (n-BuLi) to afford a 1,4-dianion, which then underwent an overnight aldol-type condensation with select electron-enriched benzaldehydes [oxime: LDA (n-BuLi): aldehyde 1:2 or 3 (2):1]. Inverse neutralization of the reaction mixture was then followed by treatment with aqueous acid followed by heating under reflux to afford new trans-3-phenyl-3,3a,4,5-tetrahydronapth[1,2-c]isoxazoles as a racemic mixture.

The yields of products ranged from 33%-69%, and they were characterized by H-1, C-13, DEPT, and HMQC. An X-ray crystal structure was obtained for a representative sample such as 3-(4-methoxyphenyl)-3,3a,4,5-tetrahydronapth[1,2-c]isoxazole.

Tetrahydronaphthisoxazoles are useful for spectral studies; the isoxazole ring in particular can have agricultural potential as bactericides, herbicides, pesticides, fungicides, and as plant growth enhancers. The compounds will be tested for agricultural biological potential.
**1H-Pyrazole-5-carboxamides and 5-Isoxazolecarboxamides: Multiple Anion Synthesis and Characterization**

Nidhi S. Patel, Leah D. Crowe, Carolyn L Sober, Bonnie J. Grant, Michelle A. Meierhoefer, Jarrett H. Vella, Renzy Raju, Clyde R. Metz, and Charles F. Beam, Department of Chemistry and Biochemistry

C(alpha),N-Dilithiophenylhydrazones were prepd. in excess lithium diisopropylamide (LDA) and condensed with Et oxanilates or Et oxamate to give C-acylated intermediates that could be isolated or cyclized directly with aq. hydrochloric acid/tetrahydrofuran (THF) to the targeted 1H-pyrazole-5-carboxamides.

The prepn. of dilithiated C(alpha),N-carbomethoxyhydrazones in excess LDA is quite straightforward along with their condensation with Et oxanilates to afford C-acylated intermediates that can be isolated. The intermediate compds. may undergo a single cyclization to the desired pyrazoles, or once the pyrazoles are formed this compd. can undergo a second cyclization to a new fused-ring system, pyrazolo-imidazolediones.

Select C(alpha),O-oximes, such as 3,4-dimethylacetophenone oxime, were dilithiated in excess LDA, followed by condensation with Et oxanilates to afford C-acylated intermediates that can be cyclized directly with dil. HCl/THF, or isolated and acid-cyclized to 5-isoxazolecarboxamides using methanesulfonic acid and a water trap.

Also, the azole-carboxamides are of interest because of their potential biol. activity in agriculture.

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**3-Substituted 1,2-Benzisothiazole-1,1-Dioxides/beta-ketoesters: Synthesis and Characterization**

Michelle A. Meierhoefer, Bonnie J. Grant, Carolyn L Sober, Jarrett H. Vella, Clyde R. Metz, and Charles F. Beam, Department of Chemistry and Biochemistry

Several beta-ketoesters were dilithiated with excess lithium diisopropylamide (LDA) followed by condensation with Me 2-(aminosulfonyl)benzoate to give intermediates that were not isolated but cyclized to 3-substituted 1,2-benzisothiazole-1,1-dioxides (BIDs). The same dilithiated beta-ketoesters were condensed with saccharin under identical conditions to afford the same products, but usually with less consistent results. Only a single tautomer resulted after recrystn. from ethanol. The successful condensations involving saccharin also gave the same tautomer, but only after several recrystns. from ethanol. Generally, tetramethylethlenediamine (TMEDA) improved the yield of products, and it was necessary for the successful condensation of the lithiated ester-sulfonamide with dilithiated alpha-acetyl-gamma-butyrolactone, even though the yield was 36%.

When the products were characterized by absorption spectra, a consistent single tautomer was noted. Also, an X-ray structure was successful for the same single ylidine tautomer.
The products and their derivs. are also good candidates for biol. testing in agriculture.

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The effect of problem-based learning in non-majors' biology on student confidence and interest in science

Heather McDonald, Department of Biology

Students taking second semester introductory Biology for non-majors were given the Student Assessment of Learning Gains survey, which measures their confidence with and interest in science and related topics. The survey was done both at the beginning and the end of the semester, and the students' surveys were then grouped by the method of teaching used in their first semester Biology course (either problem-based learning or the traditional lecture method). The results showed that although the students who took the course with the problem based learning format reported higher confidence and interest on both the pre and the post survey, the differences between the groups were much greater at the beginning of the semester than at the end. This indicates that although the problem-based learning method creates students who are more confident and interested, these gains do not last when use of the method is discontinued.

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Sediment Analysis of the Continental Shelf of Charleston, SC

Ransom White and Leslie Sautter, Department of Geology

Sediment analysis is a valuable tool for predicting water current flow patterns and energy. The ideal continental shelf model progresses from coarse grained sediments near shore to finer sediments off shore; passing over the inner-, mid-, and outer-shelf, and shelf edge. Research conducted in November 2004 on the continental shelf off Charleston, South Carolina, was designed to examine sediment grain size and composition. Fifteen sediment samples were collected along two transects, from the inner shelf to the shelf edge. The Gulf Stream appears to cause sediment size variations to deviate slightly from the model of a typical continental shelf. Grains get coarser as distance from shore increases to the outer shelf, but shelf edge sediments are finer. The Gulf Stream allows fine biogenics to settle off shore but not lithogenics. The coarse shelf sediments are relict beach deposits meaning the Gulf Stream prevents deposition at the mid-outer shelf.

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The Micro Mollusks of the Blake Plateau

Thomas Smith and Leslie Sautter, Department of Geology

The deep ocean benthic micro mollusks have been a group of organisms neglected by science since the late 19th century. They still remain largely unknown with inadequate and out-dated literature as the only references available. This study is the beginning of a much larger, continuous study to rediscover and classify these small marine gastropods in an up to date format. Samples of deep ocean sediment were taken.
from the Blake Plateau, located past the continental shelf in the southeast United States. These samples were dried, sifted and sorted through in order to obtain the micro mollusks that were later identified. The mollusks were separated into families and compared in relative abundance. Species diversity is also considered from the different localities. Following identification, these specimens were also compared to the sediment in which they lived. The results show that both sediment type and depth affect the distribution of the organisms.

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Autumn Phytoplankton Species Composition and Distribution Across the Continental Shelf from the Coast of Charleston, S.C., USA to the Gulf Stream

Elizabeth B. Symon¹, Steve L. Morton² and Gorka Sancho¹
¹Department of Biology, CofC
²NOS/NOAA, Hollings Marine Laboratory

Few studies have been done on phytoplankton off shelf waters in the southeast coast of the U.S. In November 2004, College of Charleston students embarked on an oceanographic cruise aboard the R/V Savannah along two parallel transect lines off Charleston, S.C. to the Gulf Stream. Phytoplankton samples were collected using Niskin bottles. Filtered samples were analyzed using Scanning Electron Microscopy to identify phytoplankton species. Cell counts using light microscopy were done to estimate the relative abundance of different phytoplankton groups and determine the ratio of diatoms (class Bacillariophyceae) to dinoflagellates (class Dinophyceae). The Shannon-Weaver Diversity Index was calculated to assess any correlation between phytoplankton diversity and distance from shore. Surface maps of chlorophyll concentration, temperature, and salinity were analyzed to help interpret phytoplankton species composition and distribution results. Results showed diatoms dominated over dinoflagellates while species composition varied. A slight positive correlation between diversity and distance from shore was observed.

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Benthic Foraminifera Distribution across the Continental Shelf off Charleston, South Carolina

Ross Martin, Nicole Abdul, and Leslie Sautter, Department of Geology

In November 2003 (Transect Program, Leg 01) 8 sediment stations were sampled from the inner shelf to the shelf edge, off the coast of Charleston, SC, from aboard the R/V Savannah. Benthic foraminifera were extracted from sediment to study their distribution and abundance which had only been documented by previous Transect research. Specimens were identified to the genus level, and relative abundances (%) were calculated. Twenty-seven genera were identified, 9 of which accounted for more than five percent at one or more stations. Hanzawaia was the dominant genus at 7 of the 8 stations, whereas Textularia was dominant at the outer shelf station. Cibicidoides was the second most abundant genus at all but station #7, located on the mid-shelf. These data differ from Abdul and Sautter, despite replication of methodology. Further studies are very necessary to determine the dominant genera year round.
Distribution of benthic meiofauna crustaceans across the Continental shelf off Charleston, SC

Alison Cawood and Gorka Sancho, Department of Biology

Benthic meiofaunal communities can vary tremendously, depending on a variety of factors such as sediment type, mean grain size, water depth, and temperature. There has been little work done on the benthic meiofaunal crustaceans of the South Atlantic Bight, and no work has been done on the groups of crustaceans that inhabit the continental shelf of this area. A Smith-McIntyre grab sampler was used to collect sediments along two parallel cross-shelf transects off Charleston, SC in November 2004. Ten groups of crustaceans were found, representing fourteen families. No correlation was observed between the abundance of crustaceans and abiotic factors, such as depth, temperature, salinity, or mean grain size. Perhaps the crustacean abundance is being controlled by other factors such as the type of environment (e.g., live bottom) or other environmental factors (e.g., nutrient availability and/or predator abundance).

A revision of the genus Chiridotea (Isopoda: Chaetiliidae)

Alison M. Cawood, Department of Biology

A review of the isopod genus Chiridotea is presented. Five species are herein recognized from the eastern United States and the Gulf of Mexico (Chiridotea almyra, C. arenicola, C. coeca, C. excavata and C. tuftsii). C. nigrescens Wigley is recorded here as a junior synonym of C. coeca. A key is presented for the adults of each species.

Ground-Truthing Shelf-Edge Sidescan Sonar Imagery

Chris Stubbs1, Leslie Sautter1, and Prentiss Lund2

1 Department of Geology
2 ROK Technologies

In May 2004, sidescan sonar data were collected along the continental shelf edge off of Charleston, SC, and compared to remotely operated vehicle (ROV) video and sediment to generate preliminary ground-truthing and habitat characterization of a 4 km² region of the continental shelf edge. Further comprehensive sidescan data of the same and adjacent areas were collected in November 2004, and processed into an image mosaic with associated ROV and grab sample data. Interpretations were made for the full 16 km² sidescan region based on the features identified in the May 2004 region. Potential broken rock pavement, mega-ripple formations and homogenized sediment beds have been identified in the extended region. The November 2004 sidescan data are useful for identifying large trends on the sea floor. This research will provide background for more extensive study and sampling in May 2005.
Analysis of seasonal patterns of Atlantic sharpnose shark (*Rhizoprionodon terraenovae*) in coastal waters of South Carolina

Jacqueline E. Thrasher¹, Gorka Sancho¹, and Glenn Ulrich²
¹Department of Biology
²South Carolina, Department Natural Resources

Seasonal population trends of Atlantic sharpnose sharks (*Rhizoprionodon terraenovae*) were analyzed from 4684 specimens collected by the South Carolina Department of Natural Resources from coastal waters surrounding the greater Charleston area between March 1998 through December 2002. Specimens were collected using longlines, gillnets, and hook and line method. Preliminary analyses of the data show strong seasonal fidelity of adults and pups to certain locations. Pups were most abundant within estuaries during the spring and summer months, and adults were most commonly captured in nearshore oceanic waters during the spring, summer, and fall. Males were more abundant than female adult sharks, indicating the possible sexual segregation of adult Atlantic sharpnose sharks in certain coastal environments. Data on fishing gear selectivity of female and male adult and pup geographical distributions will be further examined.

Neurobehavioral Assessment of Rats Developmentally Exposed to Ammonium Perchlorate

Robert Ingram, C. David Hackett, and John J. Widholm, Department of Psychology

Widespread detection of Ammonium Perchlorate (AP) in groundwater has raised concern about the ability of AP exposure to alter neurobehavioral development in children. The current study was undertaken to assess the potential for developmental AP exposure to impair neurobehavioral function using a rat model. Pregnant female rats were exposed throughout gestation and lactation to either 0 or 30 mg/kg of AP. The offspring from the exposed dams were tested on a neurobehavioral test battery that assessed various aspects of motor and cognitive function. Overall, the effects of developmental AP exposure on neurobehavioral function were minimal. Assessment of motor function revealed an AP-induced impairment on a balance beam task but did not reveal changes in spontaneous wheel-running or open-field activity. No effects on cognitive function were observed in either spatial discrimination/reversal learning or spatial alternation performance. Studies examining the effect of developmental AP exposure on other cognitive and/or neurobehavioral domains are currently underway.

Photoacoustic Investigations of the Reactions Between Eye Lens Proteins and Cobalt (II) Chloride
We set up an experimental facility for photoacoustic spectroscopy. The instruments were interfaced through an IEEE-488 general-purpose interface bus, and controlled using LabView software. The system was optimized and calibrated using the absorption lines from holmium oxide. A signal-to-noise ratio of 100:2 was achieved for the spectrum of carbon lampblack. We used the setup to observe the reaction between the eye lens protein alpha-crystallin and cobalt(II) chloride hexahydrate in a methanol solution. A change in absorption from blue to red was observed upon reaction. Photoacoustic spectroscopy suggests a change in configuration of cobalt(II) chloride from octahedral to tetrahedral geometry.

Esperanto, Zipf's Law, and the Scaling Properties of Natural Languages

Jason Trinklein, Luca Pellicoro, Bill Manaris, and Charles Shapiro, Department of Computer Science

Esperanto is an "artificial" language developed by linguists to be simple, regular and thus easy to learn. Unlike natural languages (e.g., English, German, and French), which have evolved naturally over thousands of years, Esperanto was created by L. Zamenhof around 1887. Due to its artificial regularity, it has been suggested that Esperanto may not exhibit the scaling (fractal) properties of natural languages, and thus, subconsciously, might feel unnatural to humans.

Zipf's law models the scaling properties of many phenomena in human ecology, including natural languages. In particular, it captures inverse (power-law) relationships between frequency and statistical rank (or size) of events in such phenomena.

To explore the validity of the hypothesis, we use Zipf's law to capture the scaling properties of various natural languages and Esperanto. Our measurements include rank-frequency distributions of words, word lengths, word distances, and sentence lengths. These are applied on books available electronically in different languages.

Agricultural Soil Usage of Charleston County

Jaclyn Colvin, Kyle Kelso, Megan Barkes, Katherina Diemer, Janet Johnson, Norman Levine and Briget Doyle, Department of Geology and Environmental Geosciences

This project was to design a map atlas as a reference for local and prospective out-of-state farmers to decide what areas are suitable for growing desired crops in the Charleston County area. The maps were chosen to show local terrain dynamics applying to favorable conditions of crop growth for human consumption. Maps displayed include the physical and chemical properties of the soils as well as the major crops grown within Charleston County. The maps were created using the Charleston County Soil Survey from the Natural Resource Conservation Service and the Geographic Information Systems program ArcGIS 9.0 by ESRI.
Charleston County Soil Atlas for Native Habitat Restoration

Glen Landon, Mark Messersmith, Amy Scaroni, Kristina Johnson, Bob Swarthout, Norman Levine, and Briget Doyle, Department of Geology and Environmental Geosciences

The map atlas for native habitat restoration in Charleston County, SC, has been created to provide parties interested in land reclamation with geographic representations of the soil characteristics essential for natural habitat restoration. The map atlas focuses on the area of Charleston County within Francis Marion National Forest. The atlas will allow the user to locate areas with favorable qualities to restore a thriving community of native plants. Additionally, maps synthesizing the soil characteristic data to display areas identified as amenable to the restoration of certain habitats have been included. Using combinations of these maps should provide the user with enough information to make an informed decision on where to begin a habitat restoration project within Charleston County with a concentration on the Francis Marion National Forest. The maps were prepared using ArcGIS 9.0.

Snail Distributions Throughout South Carolina

Karla Cone, Jeremy Conkle, Stacie Dover, Jennifer Leiser, Kristan McKinne, Robert Dillon¹, Norman Levine², and Briget Doyle²
¹Department of Biology
²Department of Geology and Environmental Geosciences

The map atlas showing the distribution of each Genus of freshwater gastropods found in South Carolina consists of 16 maps. The information shown is based on the research of Dr. Robert T. Dillon. Each map displays the following information: the species of the Genus and their distribution; images of individual species; South Carolina’s four ecological regions; and land use. Following each map in the atlas is an exposition of all the species within that Genus. The information included is a detailed description of the habitat they occupy, an extended life history, as well as the taxonomy and systematics behind the lineage. The maps were prepared using ArcGIS 9.0 and are currently being converted into a web accessible site.

Engineering Properties of Charleston County Soils, 2004

Julie Banko, Marina Drazba, Fant Jones, Christel Lopez, Danielle Timmons and James Weeg, Norman Levine, and Briget Doyle, Department of Geology and Environmental Geosciences

The maps highlight the important soil characteristics that are either conducive to or unsuitable for engineering purposes. Maps focus on general properties of the soils available from the Digital Charleston County Soil Survey from the Natural Resource Conservation Service. The digital database lists over 200 soil properties that can be mapped using geographic information systems technology. The maps presented here are of those properties used by engineers to mitigate the effects of soil erosion, flooding across the county. These maps are also useful in creating ground water pollution potential models for the county. The maps
were prepared using ArcGIS 9.0.

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**Digital Mapping of Three Sisters Volcanoes, Cascade Range, Oregon**

Jenny Wellman and Robert L. Nusbaum, Geology and Environmental Geosciences

The focus of this project has been to use digital mapping data to isolate potentially hazardous areas in the Three Sisters Volcano Range in the Cascade Range, Oregon. To facilitate this, we analyzed digital elevation and ASTER satellite data (VNIR SWIR and TIR). Volcanic rock types and other spectral endmembers were characterized using reflectance spectra. We created maps of different types of volcanic rock, forested areas, and glacial ice types using MNF, PPI, and SAM techniques. These maps were draped over a 10-meter digital elevation model in Arc-GIS to study the relationship between potentially unstable rock and mountain slope. Of particular interest was our ability to isolate palagonite tuff, known to occur on the eastern side of North Sister. This particular altered tuff occurs on very a steep slope suggesting that it may present a potential debris flow hazard.

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**Applications of Molecular Modeling to Drug Design**

Kyle Strickland\(^1\), Kristin D. Krantzman\(^1\), James Giles\(^2\), and Shawn Sendlinger\(^2\)

\(^1\)Department of Chemistry and Biochemistry, CofC
\(^2\)Department of Chemistry, North Carolina Central University

The use of computational chemistry in the development of novel pharmaceuticals is becoming an increasingly important tool. In the past, drugs were simply screened for effectiveness. The recent increase in computing power and the exponential growth of the knowledge of protein structures has made it possible for organic compounds to tailored to both decrease harmful side effects and increase the potency. Molecular modeling can give insight into the overall stability of bound ligands to protein structures, and therefore, contribute vital information concerning the aptitude of potential drugs. Molecular modeling with the CaCHE software package has been used to examine the stability of different drugs for combating prostate cancer. Notably, in the human androgen receptor, the stability of the protein bound to synthetic molecules is greater than the protein bound to the native ligand testosterone. Several different compounds will be analyzed to determine what specific factors contribute most to the stability of different drugs.

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**Dispersal Patterns of American Sea Rocket, *Cakile edentula*, Seeds**

R. Chason and A. Strand, Department of Biology

*Cakile edentula*, a member of the family Brassicaceae, is a summer annual abundant between the shoreline and first dune ridge of beaches in South Carolina.*Cakile edentula*’s role as a fore dune colonizer
emphasizes the importance of understanding its method of seed dispersal. Agents of dispersal for Cakile seeds are wind and tide. This experiment was centered on the marked recapture of seeds from three equally spaced points along the beach gradient, perpendicular to the shore line, with a later marked recapture from a single point located on the leading edge of the first dune row. In the first experiment, seeds were dyed three different colors in order to place them with their release point. The marked recapture consisted of only one color for the sole group. The first experiment ran for one week and resulted in widespread dispersal inland and down wind from the release points. Experiment number two resulted in zero dispersal outside of 0.25m from release point. Greater dispersal in group number one is largely attributable to an extreme high tide and strong north-east wind, resulting in retention of large quantities of water in Grice Cove. With the average colonization of *C. edentula* being 35.0m from the high tide line, abiotic factors such as wind and tide are vital to dispersal of *C. edentula* seeds.

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**53 Persei Observations, 14 Years of Persistence Rewarded**

Robert Dukes and Laney Mills, Department of Physics and Astronomy

We report the analysis of fourteen years of observations of the non-radially pulsating star, 53 Persei, obtained with the Four-College Consortium Automatic Photoelectric Telescope (APT). In our data set, which runs from the fall of 1990 through the spring of 2004, we identify eleven frequencies including five combination terms. For terms of sufficient strength to permit adequate phase determination, their position on the amplitude ratio versus phase difference plot for Stromgren photometry from the models of Townsend (MNRAS, 330, 855, 2002) indicate that these are all l=1, g-modes. The strongest frequencies show a significant (u-b) color variation. There is also some indication of either a frequency splitting in the strongest terms and/or a slight change in these frequencies over the fourteen years of observation. This work has been supported in part by NSF grants to the College of Charleston.

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**Modeling Earthquake Fault Interactions Using IDL**

Mark Creech¹, Steven Jaume², Laney Mills¹

¹ Department of Physics and Astronomy
² Department of Geology

Earthquake dynamical rupture propagation and fault interaction can be studied using cellular automaton computer models. During dynamic rupture propagation (i.e. an earthquake) a fault releases and redistributes energy in order to achieve a state of equilibrium. Several distinct hierarchical fault networks were modeled as a grid of cells with varying sizes. Data was recorded for modeled earthquakes occurring on each distinct fault network and analyzed for any periodicities. The motivation behind this approach was to test whether or not differing geographical fault layouts could account for the occurrence of discontinuous or continuous behavior called Self-Organized Criticality. Our data shows that varying fault layouts do indeed affect the discontinuous versus continuous nature of the earthquake energy release of a fault system.
A Baseline Beach Survey: South End of Folly Beach, SC

Robert Joel Smith\(^1\) and Leslie Sautter\(^1\)
\(^1\)Department of Biology
\(^2\)Department of Geology

A 0.3 km segment of Folly Beach's southern end (benchmarks #2818 and 2813) was surveyed in February and March of 2005. In the one month period of study, substantial erosion occurred, following a nor'easter storm during a spring high tide. The unstable nature of Folly Beach has lead to several renourishment projects since 1993. Future nourishment of the southern portion of Folly is being planned for 2006. Our baseline study of the south end is the first of several attempts to determine pre-nourishment beach profiles. Additional baseline surveys of this area will be conducted to monitor the dispersion of the renourished sand by longshore transport following the 2006 project.

Studying Infant and Juvenile Onset NCL in Drosophila

Alysa Bell\(^1\), Haley Buff\(^1\), Erin E. Gallagher\(^1\), Alexis C. Smith\(^1\), Marcy E. MacDonald\(^2\), and Christopher A. Korey\(^1\)
\(^1\)Department of Biology, CofC
\(^2\)Molecular Neurogenetics Unit, MGH, Charlestown, MA

The most common of the pediatric neurodegenerative diseases (1 in 12,500 births) are a set of primarily recessive disorders termed Neuronal Ceroid Lipofuscinoses (NCLs). Drosophila has been an important model system for the study of human disease and has made important contributions to the understanding of several kinds of neuronal degeneration. A search of the Drosophila genome sequence reveals that only the infant onset (cln1/ppt1) and the juvenile onset (cln3) genes have homologs in the fruit fly. We have begun a preliminary characterization of the Drosophila cln3 gene and attempted to produce mutation in the gene by homologous recombination as the first step towards the development of a Batten disease model in the fruit fly. We are also interested in understanding the function of the infantile-onset gene Ppt1. We will present preliminary results from our gain-of-function modifier screen in which we have used the EP and EY overexpression lines to suppress or enhance neurodegeneration produced by DmPpt1 overexpression.

The Utility of LISSOM (Laterally Interconnected Synergetic Self-Organizing Model) to Simulate the Developing Mammalian Visual Cortex

Robert Colner and Mark Hurd, Department of Psychology

LISSOM (Laterally Interconnected Synergetic Self-Organizing Model) was utilized to investigate the effects of a deprived environment on the development of the mammalian visual cortex. This work provided
a computational neural network account of the results from Blakemore and Mitchell's 1973 paper, Environmental modification of the visual cortex and the neural basis of learning and memory. In their study, kittens were reared in a deprived environment consisting only of vertically oriented stripes. As a result, the kitten's visual cortex developed in an abnormal fashion. Later behavioral and neurophysiological analysis indicated that they were only able to respond to vertically oriented stimuli. The present simulation results demonstrate how a multi-layer neural network architecture driven by Hebbian self-organization can account for Blakemore's data. The application of the LISSOM framework provides an explicit, computational account of the transformations that facilitate the dynamic process of cortical development.

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Investigations of Periodic Orbits in Triangular Billiards

Cassel Wesley Sloan¹, Annalisa M. Calini², and Laney R. Mills¹
¹Department of Physics and Astronomy
²Department of Mathematics

The dynamics of billiards, point particles hitting the sides of a billiard table elastically, has been the subject of recent renewed interest by both mathematicians and physicists. Even some of the simplest configurations give rise to many yet unanswered questions. This poster will discuss the existence of periodic orbits in triangular billiards, summarize what is known, formulate several interesting questions, and give a simple proof to a known result.

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Derivatives of the Antibiotic Cytosporone E

Nasar A. Siddiqi and Justin K. Wyatt, Department of Chemistry and Biochemistry

Cytosporone E, a novel antibiotic, was isolated as a racemic mixture from the antibacterial active broth of two endophytic fungi. We have recently finished the synthesis of this compound as a racemic mixture. Initial antibacterial testing results indicate that the natural product is effective against gram-positive bacteria and not gram-negative bacteria. A new project in our group involves developing and synthesizing derivatives to improve the antibiotic activity of the parent cytosporone E. We are going to present the modifications that are in progress and are planned in the future.

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The Localization of Phosphoinositide Binding Domain in Protein Phosphatase 1cγ

Catherine VanDerwerker¹, Jeff Jones², Yusuf Hannun² and Susan Morrison¹
¹College of Charleston, Department of Biology
²Department of Biochemistry and Molecular Biology, MUSC
Reviews of unpublished studies indicated a high affinity of binding of 6XHis-Protein Phosphatase 1cγ (PP1cγ) to monophosphorylated phosphoinositides by lipid-protein overlay assay. The amino acid sequence of PP1cγ supports these results, since it contains a PXXP motif, which is a known binding motif for phosphoinositides. Even though the motif is present in PP1cγ, it is possible that binding does not occur. By comparing the different results of from lipid-protein overlay assays and Time Resolved-Florescence Resonance Energy Transfer (TR-FRET) assay of different deletions and mutations of PP1cγ, it was hoped that it would be possible to determine the localization of the binding domain and the biochemical binding kinetics of the interaction between PP1cγ and phosphoinositides. A small amount of preliminary data was obtained, but no definite conclusion can be drawn due to a failure in obtaining any distinctive results, either positive or negative.

Detection Limit for the Apogee AP6Ep CCD on the 16" DFM Telescope

Kwayera Davis and Timothy Giblin, Department of Physics & Astronomy

We evaluate the observational performance of the AP6Ep CCD camera when used on the College of Charleston’s 16-inch Cassegrain telescope. Our goal is to provide a concise guide for future students that describes the observational capabilities of the system. Specifically, we are interested in determining the limiting magnitude (the apparent magnitude of the faintest object that is detectable for a given exposure time.) We calculate the limiting magnitude of the detector/telescope system taking into account atmospheric transmission, characteristics of the telescope optical system, and the noise properties of the CCD. We are also measuring the limiting magnitude from observations of the Double Cluster in Perseus. Here we present the important points of each method and relate them to the systems capabilities for astronomical research. From our calculation, we obtain a limiting magnitude of 15 with a S/N of 100:1 with all exposure times reaching approximately the same magnitude.