EDUCATION

Living and Learning as a Community

By Pamela Riggs-Gelasco, Ph.D. (Chemistry & Biochemistry)

In Fall of 2009, HHMI helped sponsor the introduction of a neuroscience themed learning community (LC) as part of the College’s First Year Experience. Dr. Mark Hurd (Psychology) and Deb Bidwell (Biology) linked introductory classes in Psychology and Biology for a group of 40 students. Peer-led synthesis seminars were used to enrich the content of the course and to introduce students to College programs and resources. Highlights of the semester included participation in the Alzheimer’s Walk, learning about research and careers in neuroscience, and meeting with Ms. Karen Eippert to talk about pre-health career options. The neuroscience peer facilitators were Alexandra Bache (Psychology & Biology major, Neuroscience minor, ’11) and Alicia Bonanno (Biochemistry major and Neuroscience minor, ’10).

In the Fall of 2009, we also doubled the number of students participating in the Chemistry-Biology LC for incoming freshmen. The 68 participating students were enrolled in both introductory Biology and Chemistry; in addition, the students met weekly in supplemental instruction sessions and in their synthesis seminar. As in other First Year Experience courses on campus, the students were challenged with more writing and to participate in community service activities. In September, some of the students and faculty members participated in the annual Beach Sweep event, which involved climbing into the marsh to remove
trash from the Waterfront Park area. Students also helped out at a workshop for K-12 teachers and got involved in doing chemistry magic shows for visiting groups of K-12 students. In order to educate the LC students about the challenges of post-graduate study, they had a panel discussion with CofC alumni who are now in graduate school and medical school. They also met with Ms. Karen Eippert, the College’s Pre-health advisor. Some of this year’s Pre-med LC students shared a floor in the McConnell Dormitory, which facilitated study sessions and social networking. Faculty members leading the Pre-med learning community were Dr. Wendy Cory (Chemistry), Kathleen Janech (Biology) and Dr. Pam Riggs-Gelasco (Chemistry). Peer leaders for 2009 were Matt Keller (Biochemistry, ’10) and Courtney Williams (Biology and Neuroscience minor, ’10).

New Neuroscience Laboratory Course

By Jeffrey Triblehorn, Ph.D. (Biology & Neuroscience)

In Spring 2011, the new HHMI-funded neuroscience laboratory course entitled “Techniques in Neuroscience” will be taught for the first time. The lab itself includes four experimental setups, each consisting of a Leica dissection microscope, two amplifiers for performing intracellular or extracellular neuro-physiological recordings, a rat stereotaxic for brain surgeries, data acquisition hardware, and a computer for data acquisition, storage and analysis. There is also a fifth microscope for an instructor’s station. A digital camera will be added to the instructor’s microscope and as well as a sliding frozen microtome for sectioning brains in preparation for histological procedures. The equipment also includes a behavioral observation setup, which automatically collects and analyzes behavioral data from several setups simultaneously. The course is designed to be completely “hands-on,” with students performing all of the dissections, setting up the equipment, obtaining and analyzing the data, and presenting their data and conclusions in written form. Students will learn a variety of technique including microsurgery, stereotaxic surgery, multiple electrophysiological methods, behavioral observation, tract tracing and other histological techniques. Using both invertebrate and vertebrate animals, they will use these methods to investigate many neurobiological concepts including the cellular and integrative properties of neurons, sensorimotor integration, how the brain organizes information in the brain, sensory processing, neural plasticity, and animal models of disease.

UNDERGRADUATE SCIENCE RESEARCH

Undergraduate research students from Biology, Chemistry, Physics, and Psychology received scholarships from HHMI to conduct summer research projects with the College of Charleston faculty

This past summer, 25 students were awarded scholarships from the HHMI program to engage in cutting edge research at the College of Charleston. The program demonstrates a commitment of HHMI and the College of Charleston faculty to provide research opportunities to undergraduate students. Dr. Agnes Ayme-Southgate (Biology) was the Program Director. HHMI gave scholarships to faculty with a demonstrated commitment to summer research in an effort to increase the number of student research opportunities which were often limited by funding for student stipends. The $4,000 awards provided
student stipends, a small faculty stipend and project supply money. In addition to the 10 weeks of faculty-guided research, students participated in a Biomedical Research Skills Summer course run by Biology faculty, Drs. Ayme-Southgate and Korey, and presented their work at a poster session on Convocation Day.

This year’s recipients are shown on pages 3 and 4.

- Kathryn Anderson/Dr. Lavrich Chemistry & Biochemistry
  - Synthesis of modified natural peptides: Towards the control of secondary structure adopted by small peptides

- Rachel Anderson/Dr. Kuthirummal Physics
  - Identification and Quantitation of Ibuprofen Enantiomers by Electrospray Ionization Mass Spectrometry

- Ashton Bartley/Dr. Wyatt Chemistry & Biochemistry
  - Synthesis of Nitrogen Containing Derivatives of the Antibiotic Cytosporone E for Structure Activity Relationship Studies

- Edward Cook/Dr. Krantzman Chemistry & Biochemistry
  - Molecular Dynamics Simulations to Explore Effects of Chemistry in High Energy C60 Bombardment

- Tyler Dobbins/Dr. Triblehorn Biology
  - Comparative study of the cercal-giant interneuron sensory system in three cockroach species (Order Blattaria)

- Stephen Ferguson/Dr. Cory Chemistry & Biochemistry
  - Functional genomics and biophysical studies of the insect projectin protein

- Erica Flores/Dr. Byrum Biology
  - Myoregulatory gene expression in the sea urchin

- Whitney Gibbs/Dr. Riggs-Gelasco Chemistry & Biochemistry
  - Circadian Rhythms in the Starlet Sea Anemone, Nematostella vectensis

- Catherine Harpe/Dr. Triblehorn Biology
  - Coexpression of the proteins required for ribonucleotide reduction in C. ammoniagenes

- Stephanie Eldridge/Dr. Ayme-Southgate/Biology
  - A comparison of the wind-detecting cercal-giant interneuron sensory system between a cricket, a mantis, and a beetle species

- William Hendricks/Dr. Meyer-Bernstein/Biology
  - Control of Peptide Secondary Structure through Targeted Modifications of Side chain and/or Backbone Functional Groups

- Andrew Khalil/Dr. Lavrich Chemistry & Biochemistry
  - Strong Base Multiple Anion Syntheses of Pyran/Pyranones and Related Heterocyclic Compounds

- Katiyln Cross/Dr. Rutter Biology
  - Development of a Novel Anti-cancer agent based on the Combrastatin A-4 and the Antibiotic Cytosporone E

- Andrea DeSantis/Dr. Cory Chemistry & Biochemistry
  - Research in circadian rhythms

- Shabree Knick/Dr. Beam Chemistry & Biochemistry
  - Nanobiomaterials for bone ingrowth and osseointegration: Hydroxyapatite-doped polymers

- Taylor McAneney/Dr. Wyatt Chemistry & Biochemistry
  - ComputationaI investigation of neural networks response based on the phase response curve

- Erin McPherson/Dr. Meyer-Bernstein/Biology
  - Computationsal investigation of neural networks response based on the phase response curve

- Robert Raidt/Dr. Oprisan Physics
  - Computational investigation of neural networks response based on the phase response curve
Palmiotyl Acyl-Transferases Play a Role in the Control of Circadian Rhythms

Development and characterization of multi-functional nanomaterials for cancer therapy

Computational investigation of Hodgkin-Huxley model and its connection to the phase response curve

The relationship between foraging mode and diet in the Australian Water Skink, Eulamprus quoyi

Affinity purification of the ribonucleotide reductase C. ammoniagenes R2 protein

Do Palmiotyl Acyl-Transferases Play a Role in the Control of Circadian Rhythms

Development of a Stability Indicating Assay for Ceterizine in Tablets

Effects of caffeine on larval and adult AB zebrafish

Dr. Triblehorn's lab in the Biology Department.

Dr. Cory's lab in the Chemistry and Biochemistry Department.

Dr. Riggs-Gelasco's lab in the Chemistry and Biochemistry Department.

Dr. Kuthirummal's lab in the Physics and Astronomy Department.

Dr. Triblehorn's lab in the Biology Department.

Dr. Cory's lab in the Chemistry and Biochemistry Department.

Dr. Riggs-Gelasco's lab in the Chemistry and Biochemistry Department.

Dr. Kuthirummal's lab in the Physics and Astronomy Department.
Stephen Ferguson (Biochemistry major) presenting his poster during the poster session on Convocation Day.

Erica Flores (Biology major) presenting her poster during the poster session on Convocation Day.

Whitney Gibbs (Biochemistry major) presenting her poster during the poster session on Convocation Day.

William Hendricks & Erin McPherson (both Biology majors), presenting their poster during the poster session on Convocation Day.

Andrew Smith (Physics major) presenting his poster during the poster session on Convocation Day.

Morgan Zipperly & Sarah Crotts (both Psychology majors), presenting their poster during the poster session on Convocation Day.
Brain Awareness Week

Brain Awareness Week (BAW) is an international campaign dedicated to advancing public awareness about the progress and benefits of brain research. Building upon last year’s success, the College of Charleston Neuroscience Program continued to expand their involvement in BAW to share their excitement for neuroscience with the Charleston community.

In March 2010, HHMI sponsored the 2nd annual Brain Awareness Week public campaign held at the Children’s Museum of the Lowcountry (CML). This past year, Dr. Meyer-Bernstein and twelve neuroscience undergraduate students participated in the planning, organizing and execution of four days of events at the CML during BAW. The largest event, co-sponsored by CML and the Junior League of Charleston, targeted Title One schools, outreach centers at local churches and local agencies for this event. Our college students brought with them some of the activities they had developed, as well as coloring and labeling pages on the brain and nervous system, informational displays, take home activity books, pencils and stickers and lots of pipe cleaners to make neurons. This event reached out to over 300 kids and their families in the Charleston community. The remaining visits to the CML involved more detailed education about the senses, the brain and nervous system using brain models, optical illusions, smell and touch jars and learning and memory tasks. Taken together, these visits to the CML involved over 400 school-age children.

In addition to the BAW events at the CML, this year we partnered with the Neuroscience graduate students and post-docs from MUSC and went out into community schools to educate kids about the brain and the nervous system. Together, we visited 19 different classes in 6 local schools reaching over 500 kids. We were able to expose children to aspects of science that they may never have the opportunity to see in their own curriculum.

Projects for School Age Children:
- Brain Awareness Week
- Soap Making with the Charleston Children’s Garden Project
- Spooky Science for Educators workshop

Dr. Meyer-Bernstein (Biology & Neuroscience) distributes Brain Awareness pamphlets to people during the Brain Awareness Week at the Children’s Museum of the Lowcountry.
Soap Making with the Charleston Children’s Garden Project

By Madison Hohman (Neuroscience Program)

If you walked into the New Science Building on the College of Charleston campus this summer, you may have heard a strange noise coming from the hallways and organic chemistry labs. This was not the noise of new machinery conducting ground-breaking research or summer interns hard at work in their new scientific exploration, but rather it was the unmistakable laughter of children. This past summer, the College of Charleston with funding from the Howard Hughes Medical Institute, invited children working with the Charleston Area Children’s Garden Project to campus. They came to campus for a rare experience — to be a college student for a day.

In total, 97 children from at-risk Charleston area communities came to enjoy a hands-on experience. Split into 7 groups, the children arrived each morning to class; after being introduced to the college, they were taken to the organic chemistry lab where they donned safety gear. Dr. Neal Tonks gave them a lesson on the experiment they would be performing on that day. Each child chose a partner and a fume hood with which to work. In that hood, they found various ingredients with which they would be making soap. Some of the materials consisted of herbs that they had been growing in their summer gardens under the facilitation of the Charleston Area Children’s Garden Project. Each step of the soap making was supervised by College of Charleston chemistry students and faculty. As the children began to add their products, the chaperones explained the saponification reaction. This reaction was occurring between the oils and the sodium hydroxide. Additionally, chlorophyll came out of the mint leaf to color their soap as the cell walls degraded in heat and isopropyl alcohol. The children were able to watch as the oils and sodium hydroxide began to gradually change color and seemed to take on the properties of a different substance completely. While this reaction began to occur, the children were sent off to the Geology Museum where they could take a step away from soap making experience a small piece of the past. Dr. William Lindstrom spoke with the students about all the amazing things that the College of Charleston’s Mathematics and Sciences Department could bring to their lives. He gave the children a tour of the Geology Museum where they were met by Dr. Mitchell Colgan to learn about the ancient species of Charleston and some of the characteristics of the giant reptiles that once walked this earth. However, a rumble in the children’s stomachs could be heard as they learned about the bones now strewn on the walls. So as hunger set in, the children moved on to lunch in the beautiful science building’s back lawn. At lunch, the children had the opportunity to eat with the student volunteers and some of the College of Charleston faculty. Here they had a chance to wish to lead as a student and maybe even future...
Soap Making...

(Continued from page 7)

scientist at the College of Charleston. This moment of conversation was what the entirety of the trip was based on, although the children may have simply thought of it as lunch. The primary goal of this project was to engage the children in an academic community. This interaction then might inspire them to follow, after an exciting interaction with multiple departments, disciplines and enthusiastic academics. The children had the opportunity to participate in programs like a college student. The hope is that this involvement would encourage the children to further investigate the legitimate possibilities of higher education in their future.

As lunch came to an end, we moved back down to the organic chemistry labs. After donning the safety gear again, we found that while we were gone soap magically appeared in our Erlenmeyer Flasks. The children then added their own herbal fragrances, color and decorations and molded the soap to their liking. The soap was left to cool while Dr. Tonks reviewed what we had all learned on that mid-summer’s day. Each child was able to take away their own bar of soap along with the memories of the fantastic nature of the sciences at the College of Charleston.

Spooky Science for Educators Workshop

By Starr Jordan (LHSM)

The Lowcountry Hall of Science and Math (LHSM) and the College of Charleston (CoFC) HHMI grant hosted the workshop “Spooky Science for Educators” on October 17, 2009. The purpose of the four-hour workshop was to provide K-12 educators with hands-on activities and demonstrations they could use to engage students in chemistry and physical science during National Chemistry Week and Halloween. The activities covered topics such as polymers, physical and chemical changes, pressure, catalysts, chemiluminescence, phosphorescence, chromatography, circuits, and sound.

Christian Harding and Matthew Keller, recent CoFC graduates and members of the Gamma Delta Chapter of the Alpha Chi Sigma Chemistry Fraternity, also presented demonstrations and prepared chemicals for the educators. Each participant paid a registration fee of $15 but received well over $100 worth of materials. The workshop was limited to 20 educators. Funding for the materials was provided by the LHSM and the HHMI grant. Due to the interest in the workshop and continued communication, the LHSM and CoFC Informational Technology Department created a listserv for workshop participants and presenters. The listserv allowed the educators to share more ideas and tips with their colleagues as they tested the activities and demonstrations in their own classrooms.

Based on the workshop popularity and evaluations, Starr Jordan (LHSM) and co-presenter Denie Ravenel (St. Johns High School) offered a mini-workshop at the South Carolina Science Council Conference in November 2010.
OUTREACH for COLLEGES and UNIVERSITIES

Symposium for Young Neuroscience and Professors of the Southeast (SYNAPSE)

By Mark Hurd, Ph.D. (Psychology & Neuroscience)

Faculty (Drs. Mark Hurd, Chris Korey, Elizabeth Meyer-Bernstein) and 10 students from the College of Charleston attended the 2010 SYNAPSE meeting held at Wake Forest University. HHMI funded faculty travel this year for the trip to Wake Forest. College of Charleston student, Thomas Dunn gave a talk and the remaining students, presented posters. Featured speakers included Dr. Linda Bartoshuk (University of Florida) who gave a talk entitled “Behavioral Neuroscience: Taste Psychophysics From the Laboratory to the Table” and Dr. Sharon Letchworth from Targacept provided the closing address, Neuroscience Drug Development-Past, Present and Future.”

Dr. Hurd authored a paper entitled “SYNAPSE, Symposium for Young Neuroscientists and Professors of the Southeast: A One-day, Regional Neuroscience Meeting Focusing on Undergraduate Research,” in collaboration with Drs. Barbara Lom (Davidson College) and Wayne Silver (Wake Forest University). This paper has been accepted at the Journal of Undergraduate Neuroscience Education for publication. Dr. Korey also presented a poster on SYNAPSE at the 2010 Society for Neuroscience conference with Drs. Silver and Susan Fahrbach of Wake Forest. The title of their poster was “Symposium for Young Neuroscientists and Professors of the Southeast 2010.”

New Faculty Spotlight

Dr. Marcello Forconi joined the Chemistry and Biochemistry Department at the College of Charleston in the Fall 2010. Dr. Forconi received his B.S. and M.S. in Industrial Chemistry from the University of Bologna, Italy, and earned his Ph.D. in Chemistry from the University of Sheffield, United Kingdom. He then went on to a post-doctoral position in the lab of Dr. Daniel Herschlag in the Biochemistry Department at Stanford University, where he also worked as a Research Scientist. His research interests include the use of chemical modifications to elucidate the structure-function relationship in RNA and protein enzymes, the evolution of catalysis in biological macromolecules, and the use of small model compounds to understand the basic properties of enzymatic catalysis. Dr. Forconi’s hire was supported by the HHMI grant.