Welcome to the inaugural C-MORE Scholars newsletter! We hope you enjoying reading about recent events and catching up with both current and past Scholars. If you have something you would like to share, please send it to Jessica Ayau at: jfayau@hawaii.edu

C-MORE Scholars Program Newsletter

C-MORE Scholars Program Updates

A Fond Farewell!
As the manager of the C-MORE Scholars program for the past 4 years, I have had the opportunity to meet many brilliant and talented students. I have also greatly enjoyed seeing these students succeed in their academic and research endeavors. Thus it is with a sad heart that I will be transitioning to a new position at Purdue University and passing the reins to Barb Bruno and Jessica Ayau. I want to thank all the Scholars, both past and present, for all the wonderful memories and fantastic times. Please stay in touch as I look forward to hearing about your future adventures! ~ Barbara G.

About the Program
The C-MORE Scholars program provides hands-on, closely mentored research experiences for full-time undergraduate students within the University of Hawai‘i (UH) system who are interested in ocean and earth science-related careers. Students, especially underrepresented students such as Native Hawaiians and Pacific Islanders, from all UH campuses are encouraged to apply. Three levels of awards are offered, depending on the student’s skills, knowledge and experience. All Scholars receive guidance and help from a mentor who is an ocean or earth scientist. Mentors can be chosen by the student, or we can help find a mentor based on the student’s interests. In addition to conducting research, all Scholars attend monthly meetings on career/professional development, participate in educational outreach and present their research results at the end of the year. More information about the scholars program can be found at: http://cmore.soest.hawaii.edu/scholars

New Applicants
The C-MORE Scholars program will be accepting applications for its 2012-2013 academic year cohort starting in late March 2012. Applications can be downloaded from the Program’s website. Please check the C-MORE website for more info.

Recent Events
C-MORE Scholars participate in a variety of outreach events provided by C-MORE. The accompanying pictures are of scholars volunteering at the SOEST Openhouse event on October 21 and 22.

Top: Paul Bump is teaching a child about the plankton food web. Left: Scholars alumni Brenner Wai and Sara Thomas teach some children about the shapes of microbes. Bottom: Vy Luu and Paul Bump show off the stuffed microbes raffled off at the event.
Scholars Orientation

On September 27, 2011 the new 2011-2012 cohort of C-MORE Scholars participated in a field study at Sand Island Beach Park as part of their orientation to the program. The focus of the study was the diversity of marine life in the intertidal zone. Students were given background information about the natural environment of the area and what the area was used for in the past. Students laid transects from the edge of the water to about 30 meters from shore. Quadrats were used to narrow down the area observed to a square foot section. Identification of the organisms was made every 3 meters. Students carefully lifted rock heads to reveal hidden critters.

The results of the study revealed that there was a fairly large diversity of organisms from algae to crustaceans to invertebrates in this area. Students learned that diversity of organisms is necessary for an ecosystem to function productively. It also was of course a fun activity for the new Scholars to get to know one another!
Interview: A Current Scholar’s Viewpoint

MONIKA FRAZIER

Monika is a senior at the University of Hawai‘i Hilo and will be graduating in December 2011. She has been a C-MORE Scholar since fall 2010.

Why did you decide to apply for the Scholars Program?

It’s a pretty random story actually! I initially met Barb Bruno and Barbara Gibson at a student conference for the Louis Stokes Alliance for Minority Participation (LSAMP) that was held at UH Mānoa. I had mentioned that I was going on National Student Exchange in the following spring to the California State University Monterey Bay, and they encouraged me to find a mentor to work with during the semester. After emailing countless professors, I didn’t end up finding a project to work on there during the semester, but thanks to Barb, C-MORE sponsored me as an intern in the Monterey Bay Aquarium Research Institute (MBARI) Summer Internship Program following my spring semester at CSUMB. After returning to UH Hilo the following fall, I applied for the C-MORE Scholars Program, and have participated every semester since!

How has the program impacted your undergraduate experience?

I have been able to conduct research with my mentor consecutively for multiple semesters, which allowed me to continue working on the same project. I now have gotten to the point where my results are starting to tell an interesting story about coral symbionts, and I have applied to present my research as a poster at the International Coral Reef Symposium (ICRS) next July in Australia! As a result of working with Dr. Takabayashi for so long, I've developed a good relationship with her, and she has offered me a graduate position through the Tropical Conservation Biology and Environmental Science masters program at UH Hilo. Though I wasn’t always able to participate in monthly meetings, the orientations and end-of-semester presentations were great experiences. I enjoyed getting to know all of the scholars because we all come from very different backgrounds and have a wide array of interests.

What research are you working on as a Scholar?

In my project, I am identifying nitrogen-fixing coral symbionts (microbes associated with corals, which reside within coral tissue). These symbionts can produce nutrients within the coral colony that can be used by algal symbionts for photosynthesis, the process by which corals receive the majority of their energy for growth and reproduction. My project involves collecting coral samples from the field, and identifying DNA sequences of these diazotrophs (nitrogen-fixers) using molecular techniques such as DNA extraction, polymerase chain reaction, and molecular cloning.

What are your long-term career goals?

I’m not sure exactly what my ideal career would be. I definitely want to live in Hawai‘i and have a meaningful job that allows me to improve the current state of resource management in Hawai‘i. I’m really open to any opportunities that come my way, but meanwhile I’m getting to know the things that I do and don’t like.

What do you plan on doing after you graduate?

After graduation in December, I plan on taking a few weeks...or months off to relax. I hope that I will study for the GRE and do some literature research for my master’s project during this time, but I’m flexible. Sometime in the spring, I hope to start some preliminary work on my master’s project. In July I’ll (hopefully) be in Australia and if funds allow, I want to explore Australia and maybe New Zealand for a while! Then in the fall it’s back to school!
Interview: A Past Scholar’s Viewpoint

SARA THOMAS

Sara Thomas graduated from the University of Hawai‘i at Mānoa Global Environmental Science Program in December 2009.

What have you been doing since you graduated with your B.S. degree?

I have been busy diving into microbial oceanography. Immediately after graduating, I helped build curriculum in ocean sciences, develop C-MORE science kits, as well as promote, prepare materials, and develop Ocean FEST in the C-MORE Education Office. I was accepted as a 2010 MBARI intern and spent my summer working with Dr. Julie Robidart and the Environmental Sample Processor (ESP) in Dr. Chris Scholin’s lab. Even though I was a C-MORE scholar for my last three semesters as an undergrad, this was actually my first opportunity to work on a project in microbial oceanography. My experiences with the ESP afforded me the opportunity to visit UCSC for an additional month post-internship to continue the collaboration with MBARI-UH-UCSC and work with the ESP. I learned so much from my internship that I also qualified for a full time research technician position in Dr. Matt Church’s laboratory for 2011, which provided yet another venue for me to expand upon my molecular skills. Under Dr. Church’s supervision, I participated in several Hawai‘i Ocean Time-series (HOT) cruises and analyzed countless samples for HOT as well as other C-MORE sponsored cruises. I continue to explore microbial oceanography as a graduate student of Dr. Church.

What aspects of the Scholars program did you enjoy the most? Did you feel being part of the program helped to prepare you for graduate school?

I enjoyed being a part of a cohort. Having the venue to get together with other undergraduate students who could relate to the thrills and troubles of research provided a sort of support group. It was easy to seek advice from my peers, expand our personal and professional networks, and it was fun to compare our individual research projects. The monthly meetings associated with the program were very informative of the countless opportunities, internships, and scholarships that are out there. It was through my participation in the program that I learned about the MBARI summer internship program.

What research are you working on for your master’s thesis?

I am currently in the process of tossing different thesis topics around with my mentor. My exact research for my master’s thesis is therefore to be determined.

How has graduate school been different from your undergrad experience thus far?

So far graduate school hasn’t been too different from my undergraduate experience. I expect this will change as I get further along in my research because classes will no longer be the centerpiece in my curriculum.

What advice can you give current Scholars about applying to/selecting a program for graduate school?

My advice is to not freak out if you don’t know what you want to do or research in graduate school. I thought I would enter a graduate program immediately after graduating, but instead I took a year and a half off. I am glad that I had because otherwise I would not have interned at MBARI and worked first hand with scientists at MBARI, UCSC, UH, and the HOT program. Ultimately, the time I took off from school helped me determine what I wanted to do while in a graduate program. So I say, take your time to explore your options, be open-minded to internships and job opportunities because otherwise you might end up rushing into a program you may not want to find yourself in.

What research are you working on for your master’s thesis?

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Interview: Get to Know your Mentors

GRIEG STEWARD (GRIEG@HAWAII.EDU)
Associate Professor, UH Mānoa
Oceanography

What kind of research do you do in your lab?

All of the projects in my lab relate to understanding the ecology of microorganisms. Most of my work has been in marine systems from polar to tropical waters, but has also included some work in freshwater and hypersaline lakes and estuaries. The main research areas are 1) the diversity and ecology of marine viruses with the objective of determining how viral infections affect plankton ecology and 2) the ecology of human pathogens in coastal waters, with the objective of understanding how changes to coastal environments influence risks of infection.

What advice do you have for undergrads who may be interested in working in your lab?

Get a good grounding in the basic sciences; everything is connected. In the long run, you need to find a particular line of research about which you are passionate, but in the beginning it is important to explore and get breadth of experience. That one most exciting thing upon which you decide to base your career tomorrow may be something you know nothing about today. Science is all about figuring out how things work, so I look for students who are not only strong academically, but also have enthusiasm for learning, a burning curiosity, and a penchant for puzzle solving.

Can you describe the path you took to get to where you are today in your career/research?

I was hooked on biology as a field of study in high school. When I went off to college, I had an interest in marine science but was more captivated at that time by neurobiology and the question of the origins of consciousness. I majored in neurobiology, but also held a part-time job in an insect virology laboratory. I started off washing dishes, but soon was engaged in the research and learned lots of basic techniques in molecular biology and virology. Working in a lab getting hands-on training helped me enormously in my class work, because it made a lot of the concepts tangible. After graduation, I found a job as a technician in a neurobiology lab studying how opiates, such as morphine, affect the transmission of pain signals. After several years, I decided that I was ready to return to school for a graduate degree. This was a big transition in my education, because, rather than continue training in neurobiology, I opted to pursue my other early interest Oceanography. My training in molecular biological techniques turned out to be very useful, because biological oceanography was just beginning to incorporate these methods and many labs were looking for students with this sort of experience. I had never thought about studying microbiology in the ocean, but during interviews at graduate schools I realized this was an area of global importance with an incredible range of opportunities. After weighing a few offers, I decided to enroll at Scripps Institution of Oceanography and work with Dr. Farooq Azam as my graduate advisor. My earlier work experience came in handy again, when, as we discussed possible dissertation topics, Dr. Farooq mentioned that not much was known about viruses in the ocean. The idea that viruses might be an ecologically important component of the ocean ecosystem had never crossed my mind before, but I felt an immediate affinity for the topic. I worked on the ecology of viruses for my dissertation, continued this work in two post-doctoral positions, one at Scripps and another at the Monterey Bay Aquarium Research Institute.

I mentioned earlier the importance of getting breadth and I found this can be helpful at many stages of one’s career. In my case, I took another post-doctoral position studying something other than marine viruses. I worked for two years at the University of California, Santa Cruz studying molecular ecology of nitrogen fixation. This break from studying viruses turned out to be a great opportunity. It refreshed my enthusiasm for discovery by allowing me to focus on an entirely new topic. It also broadened by technical and intellectual experiences and ultimately helped me be more competitive in the job market. It was during this time that I secured two job offers for faculty positions. I decided to take the position here at the University of Hawai’i and have had no regrets. It is an extraordinary place to work, especially for a marine scientist. Here, I am surrounded by outstanding colleagues and the sea itself as a natural laboratory.

Who is your role model or favorite scientist?

Graduate advisors have a profound influence over one’s scientific training, which can be good or bad, so one must choose carefully! I had a very positive experience, so my graduate advisor, Dr. Farooq Azam, has been the most influential role model for me. One of Farooq’s great strengths is his creativity. He is a critical thinker, but also an inveterate day dreamer. Advances in science seem to be built firmly on the foundation of prior knowledge, but often the way forward requires a leap of imagination. Dr. Farooq is never afraid to make that jump and, because of his intuitive feel for his subject, he often lands somewhere quite interesting. I also appreciated that Dr. Farooq treated all of us in the lab as his equals. We felt like partners in the enterprise of running the lab and its projects, which motivated us to think beyond our individual dissertation projects. It was an ideal learning environment for a graduate student like me who hoped to make his own career in academia. I have tried as best I can to emulate his approach to science and mentoring. I am also a fan of Dr. Richard Feynman for his clarity of thinking and directness in communication.
Opportunities for Current Scholars

**C-MORE SUMMER REU**

C-MORE offers current undergraduate C-MORE students the opportunity to participate in a paid REU during the summer 2012 with a C-MORE scientist at any C-MORE institution. Please see the C-MORE website below for more information:

http://cmore.soest.hawaii.edu/education/undergraduates/index.htm

**SUMMER INTERNSHIP PROGRAM MONTEREY BAY AQUARIUM RESEARCH INSTITUTE (MBARI)**

The 10-week MBARI Summer internship program is open to educators and college students (undergraduate and graduate level). The focus of the MBARI internship is on the professional development for interns — learning research techniques and improving communication and collaboration skills. Interns have an MBARI mentor who will supervise a specific project. Interns will also serve as peer-mentors to other interns. More information is available at:

http://www.mbari.org/education/internship/12interns/12announce.htm

**PARTNERSHIP EDUCATION PROGRAM WOODS HOLE OCEANOGRAPHIC INSTITUTION (WHOI)**

The Woods Hole Partnership Education Program (PEP) is supported by the Woods Hole Diversity Initiative to promote diversity in the Woods Hole science community. The program especially seeks students from minorities under-represented in ocean and environmental sciences — including African American, Hispanic, Native American, Alaska Natives, and Asian Pacific Island students. Participating students will spend the summer in Woods Hole gaining practical experience in marine and environmental science. The program consists of a four-week course at Woods Hole, followed by six-to-eight week research project. For more information, contact Lloyd French (508-495-2318) or Ambrose Jearld. More information is available at:

http://www.woodsholediversity.org/pep/
Where the Scholars ‘Fit’ Into C-MORE

By Paul Kemp (C-MORE Associate Director)

Have you wondered what C-MORE is, why it funds a Scholars program, or why the Scholars program places an emphasis on underrepresented minorities? Let me provide a little background information.

C-MORE, the Center for Microbial Oceanography: Research and Education, is one of 17 Science and Technology Centers (STCs) funded through the US National Science Foundation (NSF). STCs vary widely in their focus area (http://www.nsf.gov/od/oia/programs/stc/), and include subjects as different as information technology, climate change, materials science, oceanography, and water purification. Over the course of its 10-year lifetime, each Center will receive about $37 million from the NSF, and most of the Centers raise additional funding that can double or triple the amount of work they conduct.

STCs are some of the largest research programs funded by NSF and each involves dozens or hundreds of researchers, post-docs, students, technicians and administrative staff. The STCs are an investment in our future. NSF recognizes that some vitally important research can only be accomplished by a large, highly interdisciplinary team that has the freedom to explore challenging, difficult problems. STC science is expected to be transformative, to change the way we think about our science, and to give us a better understanding of our society, our planet and our future. The research conducted at an STC is often more bold and cutting-edge, sometimes more risky, and sometimes more expensive than “typical” research projects. STCs also have a mandate to contribute to society in ways beyond their immediate research achievements. They are expected to transfer their new knowledge to society, for example by offering their expertise to government, working with the private sector, creating public education and outreach programs, or holding workshops to discuss emerging issues. STCs also are expected to bring talented, creative people into the science and technology workforce. Our goal is to build a workforce that is as diverse as the general population.

The C-MORE strategy includes providing education, training and mentoring experiences at all levels, from pre-college students to faculty. New programs were created to target pre-college students and get them excited about science. The C-MORE team includes graduate students and recent PhDs, who work with junior faculty and senior scientists. Where do you fit in? The C-MORE Scholars is C-MORE's premier program to support talented undergraduate students, and provide opportunities for them to learn more about earth sciences in general, and microbial oceanography in particular.

You might have wondered "I'm a Scholar - am I part of C-MORE?" Yes, absolutely! Some of you already work with C-MORE researchers, some are working with other labs, but you are all a part of C-MORE. You should feel welcome to approach any member of C-MORE and introduce yourself, talk about what you do and ask questions. In a very real sense, you are Scholars because we hope that you will choose to pursue a career in science, and we want to keep you involved and excited about science. I hope you will take every opportunity to connect with the rest of the C-MORE community. We have a lot to offer!

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