OAK CREST INSTITUTE OF SCIENCE
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tackling today's world of environmental and medical challenges

Collaborative Effort Spells Success... The pH Meter Project

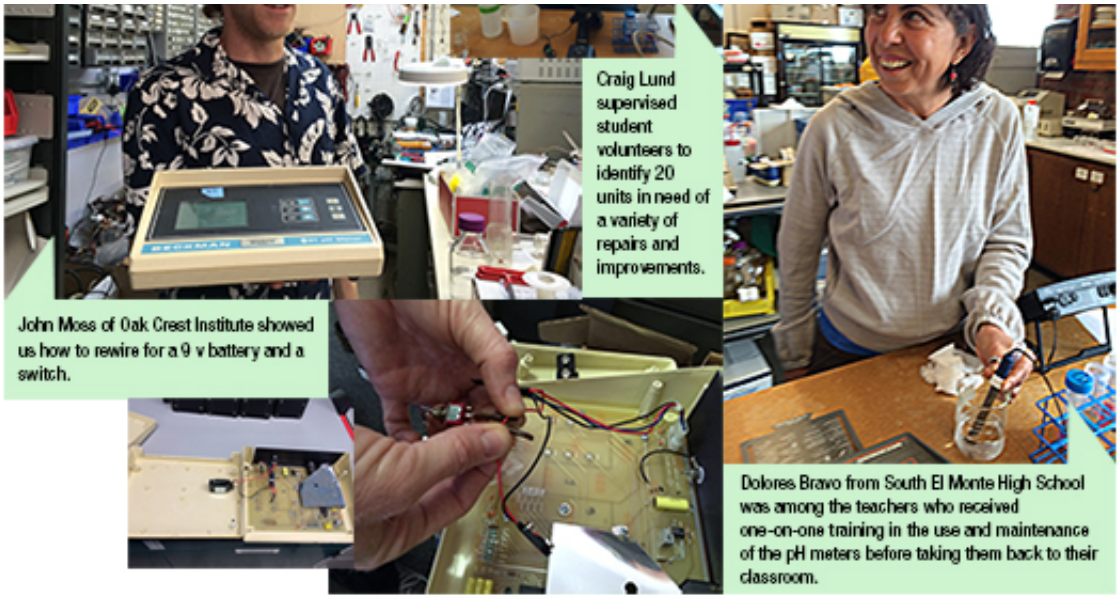
In corporate America one will sometimes see unfriendly competition between two companies. But in the scientific world, collaboration is more common than one might think. A great example of this is the recent pH meter project, which was a joint effort between the Los Angeles/Orange County Biotech Center (LA/OC), the Oak Crest Institute of Science and the Pasadena Bioscience Collaborative (PBC).

Christopher Holly of Paseadea Bioscience Collaborative did the soldering and rewiring.

The project began when the Natural Sciences Division at Pasadena City College moved to their new location at the Science Village. During the move, the group salvaged many old but still useful pH meters. The meters were sent to the LA/OC Biotech Center in hopes that local high school students could use the equipment in their science classes.

Wendie Johnston, director at the LA/OC Biotech Center, reached out to staff at Oak Crest and PBC to gain their assistance in testing and possibly refurbishing the equipment.

The first step in the refurbishment project was to run diagnostic tests to determine which units could be fixed. Student interns like Craig Lund, a former PCC student and Oak Crest intern and current Chapman University student, supervised student volunteers to run these tests and identified 20 such units that needed a variety of repairs and improvements but would serve classrooms for many years if fixed.



New electrodes for the meters were purchased by LA/OC Biotech Center and Oak Crest covered the cost of purchasing the pH standard solutions. Some of the meters were a bit outdated as they used six D cell batteries and had no wall plug. John Moss, senior faculty at Oak Crest, showed the group how to rewire the meters for a 9-volt battery and a switch; Christopher Holly of PBC did the rewiring with materials supplied by PBC.

Once the equipment upgrades were completed, Sherry Tsai, assistant faculty at Oak Crest and site director for the Greater Los Angeles area Amgen Biotech Experience, contacted local teachers enrolled in the Amgen Biotech Experience to find those currently using pH measurements in their projects.

The pH meters were then donated to:

- Ann Cortina - West High School
- Monica Barsever - Alverno High School
- Patty Jimenez - Bell Gardens High School
- Fidela Robertson and Elizabeth Gonzalez - Norwalk High School
- Dolores Bravo - South El Monte High School

(In addition to their participation in the Amgen Biotech Experience, Ann, Patty, and Dolores have also participated in the Summer Research Connection, hosted annually by Oak Crest and Caltech.)

The collaborative efforts between the LA/OC Biotech Center, Oak Crest and PBC prove that there is strength in numbers. By working together the group was able to not only save the school districts hundreds of dollars, they also helped a countless number of high school students advance their knowledge in environmental science.

Student Profile: PAUL PRIEGO

Paul Priego, 23, is a self-proclaimed nerd and proud of it. Currently a student at Pasadena City College (PCC), he had plans to major in anthropology. But while taking college algebra and everything in between up to the most advanced math class at PCC (Differential Equations), Paul began to rethink his original decision.

“I discovered in community college that I was good at chemistry and math so I decided to explore my career options in those areas instead,” said Paul. “I wanted a career where I could make a difference in the world and I thought science might be the answer.”

While enrolled in classes at PCC Paul decided to look for opportunities to gain hands-on experience in a science lab. That’s when he found Oak Crest. He applied for and received an internship last year in the National Science Foundation Fellowship Program at Oak Crest. “I was one of 35 applicants, so I was thrilled when I got selected,” said Paul. “I worked on the isoprene project, which

Paul Priego, Rose Hills Fellow

involved investigating reaction pathways for the formation of the most common photo oxidation products of isoprene, one of the most abundant natural organic compounds other than methane gas."

Wanting to gain even more of an academic advantage over other students who would be applying to various four-year universities in the coming months, Paul applied for one of eight spots this year in The Rose Hills Foundation Fellowship Program at Oak Crest. The Rose Hills Fellowships are paid, 20 hour per week positions, which allow students to be concurrently enrolled in classes at their home institutions without having to seek outside employment.

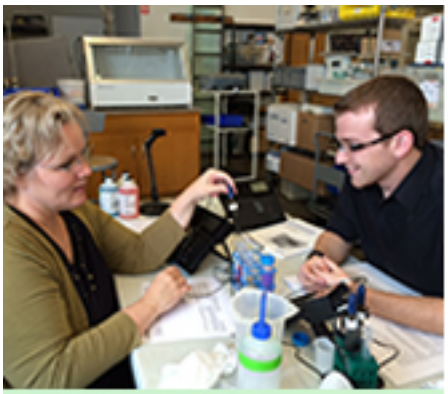
The Rose Hill Fellows work in teams of two and receive individualized mentoring by an Oak Crest scientist. Two tiers of Fellowships are offered: (1) for students who plan to transfer to 4-year colleges and pursue STEM majors; and (2) for students who plan to enter the workforce after obtaining their associate degree. The students work in teams of two and receive individualized mentoring by an Oak Crest scientist in the following subject areas: microbial ecology, natural products research and atmospheric chemistry.

"Some of my friends have gone to other places and they are complaining that they only get to do 'basic' lab work," added Paul. "At Oak Crest, I'm involved in actual environmental research that is being conducted by their scientists. This is real-life science, not a textbook project," he said.

As a Rose Hills Fellow, Paul is currently working on the vehicle exhaust project with senior faculty Drs. Marc Baum and John Moss. "The best part is the positive reinforcement that I receive from my mentors," said Paul "When he (Marc) knows that I know how to solve a certain problem he doesn't give me answer. He let's me think it through and then encourages me to try again if I make a mistake. It's so gratifying when you know what you're doing and you get support from a professional in the field that you want to enter. It gives your confidence a huge boost," he added.

As a result of his experience at Oak Crest, Paul said he wants to specialize in renewable energy and perform analytical chemistry as his profession. Paul has been accepted to the University of California, Riverside (UCR) where he will begin classes next fall. In addition to his class work, Paul will be broadening his knowledge while serving as a research assistant. After that it's off to grad school and beyond. "It's great being here (Oak Crest). I'm very grateful for all that I've learned. And, I like hanging out with other 'nerds'," he added.

The Need for STEM Programs



An L.A. County K-12 teacher experiences science first-hand during an Amgen Biotech Experience professional development workshop.

A recent article by the U.S. Department of Education states that the United States is at risk of losing its global leadership position if more isn't done to increase the interest in STEM (science, technology, engineering and mathematics) disciplines in American high schools and colleges.

The need is so great that President Barack Obama has formed the Committee on STEM Education (CoSTEM) to address the problem. CoSTEM is comprised of 13 partner agencies, including all of the mission science agencies and the Department of Education. This group is being called upon to facilitate a cohesive national strategy, with new and repurposed funds, to reorganize STEM education programs and increase the impact of federal investments in the following five areas:

- Preschool-12 STEM instruction
- Increasing and sustaining public and youth engagement with STEM
- Improving the STEM experience of undergraduate students
- Better serving groups historically underrepresented in STEM fields
- Designing graduate education for tomorrow's STEM workforce

While efforts are underway on a national level, small scientific research facilities like the Oak Crest Institute of Science are doing their share to help meet the growing need for teachers and students who are proficient in the field of science.

The Summer Research Connection (SRC), Oak Crest's annual collaboration with the Caltech Classroom Connection, provides high school students and K-12 STEM teachers paid research internships at Caltech or Oak

Crest. Participants in the SRC conduct mentored research for over five weeks each summer on one of a variety of science or engineering fields. In addition to research, participants attend a variety of workshops and seminars on related topics.

As Director for the Greater Los Angeles site of the Amgen Biotech Experience (ABE), Oak Crest's Sherry Tsai is responsible for overseeing program activities in an area that includes Los Angeles, Orange, and Ventura Counties.

The Amgen Biotech Experience offers free professional development workshops for science teachers to learn contemporary biotechnology theory and lab techniques in order to conduct advanced labs in their own classrooms. All curriculum and supplies, as well as a three-week loan of research-grade lab equipment, are provided at no charge to participating teachers, allowing them to implement these labs in their schools. An international program, ABE serves more than 20,000 students annually from its Los Angeles site alone.

These unique learning opportunities allow K-12 teachers to go back to their classrooms empowered with new knowledge and support that will enable them to engage their students with cutting-edge scientific knowledge, hands-on curricula, and a fresh perspective for years to come.

Programs such as these are filling an important niche in secondary education as hundreds of teachers and thousands of students gain hands-on experience in science. These efforts are especially important when one considers that only 16% of American high school seniors today are proficient in mathematics and interested in a STEM career.

There's no question that there's a great demand for STEM education. In fact, the need has never been greater. Support from the community, local government and private foundations are key to the continued growth of such vital organizations as the Oak Crest Institute of Science.

Visit www.ed.gov/stem for more information on President Obama's CoStem plan.

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ANNOUNCEMENTS

New Methodology Developed
Researchers from Oak Crest are being recognized for their development of a new scientific method designed to extract DNA from a variety of contaminated environments. The July 2014 issue of the Journal of Microbiological Methods features a paper written by Dr. Marc Baum, Dr. John Moss and Manjula Gunawardana focusing on this important new technique for the isolation of PCR quality DNA from natural asphalts and soil. This new methodology has an advantage over previously used commercial kits because it is inexpensive, simple and rapid. Scientists believe this new method, with its high (50-80%) DNA recovery yields, will provide a valuable addition to protocols in the field of petroleum and soil microbiology.