Bio-Link’s tenth annual Summer Fellows Forum 2008 was once again hosted by the National Center located at City College of San Francisco (CCSF) from June 2 through June 6 at the Clark Kerr Campus conference site in Berkeley, California. Fifty Fellows (community college instructors and high school teachers) from across the nation were selected by Bio-Link’s Regional Directors to participate in the weeklong forum. The forum entitled “Evolving Industry – Emerging Career Paths” consisted of a variety of concurrent workshops, informal meetings, two industry tours at Ernest Gallo Clinic & Research Center and at Cell Genesys, and at the conclusion of the forum the annual dinner banquet.

As in the past, this year’s forum afforded each fellow the opportunity to profile their program at their school or college, to network and to share ideas and


**Fifth Annual Community College Day**

On June 16, 2008, the Fifth Annual Community College Day (CCD) took place the day before the Biotechnology Industry Organization (BIO) 2008 International Convention in San Diego, California, with a special offer from BIO to the registrants. This year the CCD registration fee also included three full days of access to the BIO 2008 Exhibition Hall compliments of BIO.

The CCD offered a full day program with five sessions organized by Bio-Link and the California Community College Biotechnology Initiative to showcase community college workforce efforts. The photo below was taken at the “Faces of Success – Biotechnology Graduates” session facilitated by Dr. Elaine Johnson, Bio-Link Director. This entire program was a huge success with over 50 participants from across the U.S. The schedule/presentations can be viewed on the Bio-Link website under “Updates” by clicking on the link BIO 2008 Community College Program.
Bold New Direction For Bio-Link

This year has been one of introspection and evaluation of our mission and vision as well as one of listening and asking pointed questions about the future directions of the biotechnology and related industries. With encouragement from the National Science Foundation, Bio-Link asked for and received a supplement to continue as a National Resource Center through August 2009. In the meantime, NSF and AACC held an important meeting in Scottsdale, Arizona in April 2008. Fifty prominent biotechnology professionals from industry, government, professional organizations, and education gathered to discuss the future needs of the biotechnology industry for the next five years. As a result of this meeting, a report, “Educating Biotechnicians for Future Industry Needs,” has been generated. This report is available online at www.aacc.nche.edu/ateprogram under publications.

Bio-Link is paying close attention to the recommendations from this meeting as well as other indicators about the trends in education, industry, and entire regional areas of growth for the life sciences. The conference included keynote speakers as well as panels discussing five areas: Health and Medical, Industrial and Environmental, Food and Agriculture, Education, and Emerging Areas. One result of the conference was the call to eliminate barriers that industry uses to divide itself. There was consensus that every specialization and emerging area relies on technicians with strong fundamental technical skills.

Bio-Link will incorporate the recommendation from this conference into its future plans but will also explore ways of using the latest communication technology to discuss issues and to engage students. Bio-Link also intends to actively collaborate with other ATE projects and centers to enhance cross-disciplinary educational offerings and provide career information to students, counselors, parents, instructors, and the public. We anticipate an exciting role for the community and technical colleges in preparing the workforce.

Bio-Link Exhibits at BIO 2008

Bio-Link was one of the largest gathering of biotech exhibitors in history with 2,148 companies, 126 which were new, and more that 209,400 sq. feet of exhibition space, the largest ever, at the BIO 2008 International Biotechnology Convention & Exhibition in San Diego, California, June 20-22. BIO is a spectacular event in itself, with record breaking attendance – 20,108 attendees from 70 countries and 48 U.S. states, keynote luncheons with celebrity guest speakers, a huge selection of sessions, meetings, and fantastic receptions hosted at the USS Midway and the Gaslamp Quarter, the historic heart of San Diego.

Each exhibitor displayed organizational literature and handed out fantastic giveaways ranging from a variety of bags to stuffed animals to flashlights to pedometers to t-shirts to “Crocs” sandals. This year, Bio-Link gave away Carabineer key chains and pens in five fabulous colors with our logo imprint. Several exhibitors raffled off incredible prizes such as trips to Australia, Canada and Hawaii, GPS systems and iPods.

About 2000 attendees stopped by the Bio-Link booth for information and many new contacts were made. Much thanks go to Bio-Link’s own Elaine Johnson, Kathie Whelchel and Jim DeKloe for their assistance in the exhibit hall.

– Lisa Huffman-Martínez
National Center
Alamance Community College Biotech Instructor Named Educator of Year

Bill Woodruff, Department Head and instructor in Alamance Community College’s Biotechnology program, has been named “Educator of the Year” by the North Carolina Community College System (NCCCS) BioNetwork. The award was presented on April 9, 2008 at Forsyth Technical Community College during the annual BioForum state conference. It was presented to Woodruff “for extraordinary success in Biotechnology training and education.” Through Woodruff’s initiative, the Biotechnology curriculum at Alamance Community College (ACC) stands proudly at the forefront of other similar programs in the state. In 1985, ACC became the first North Carolina community college to offer a two-year associate’s degree in this advancing science, and is one of only a handful of two-year institutions that offer biotechnology in North Carolina. “We’ve been doing all the things spotlighted in the media recently for more than twenty years,” says Woodruff. “It would not be remiss to say that our program is a granddaddy of sorts to many others.”

“Among North Carolina community colleges, Bill is Mr. Biotechnology,” commented Dr. Janyth Fredrickson, ACC Executive Vice President. “Not only has he developed an outstanding program at ACC, he has helped colleges across the state develop their biotechnology programs.” Woodruff has been with ACC’s Biotechnology program almost from the beginning, serving as department head and instructor since 1987. ACC’s Biotechnology program has graduated more than 180 students, nearly all of whom have found careers with such employers as Laboratory Corporation of America, Inc., Syngenta Crop Protection Inc. in Greensboro, and Biogen Inc. and Diosynth RTP Inc., the latter two at Research Triangle Park (RTP).

Woodruff downplays his own importance, but it is no accident that he is the Southeast Regional Director for Bio-Link. Bill has been associated with Bio-Link from the beginning, as a Fellow at the very first Summer Fellows Forum in 1999 and then as a Regional Director at everyone since then. Woodruff is also allied with the National Center for the Biotechnology Workforce, located at Forsyth Technical Community College in Winston-Salem, North Carolina.

The program’s importance necessitated a move in fall 2007 to a new, expanded facility on the main campus. The Powell Biotechnology/Allied Health Building gave the program the entire third floor. One needs only examine the growth in enrollment over the past few years to justify the expansion: 24 students in 2002 to 49 in 2004 to 74 in 2007. “The additional space in the new facility now allows our students to utilize a Bioprocessing suite that consolidates all of the equipment and training into a single state-of-the-art area that is the first of its kind at a two-year college in the state,” says Woodruff.

With Woodruff as catalyst, the program owns more than $1 million worth of biotechnology equipment to give students the best possible education in this field. BioNetwork fully funded a $115,000 facility renovation and 20 liter CIP/SIP bioreactor, as well as a $51,139 grant to purchase three 1 liter bioreactors, all capable of growing cells from mammals. Another grant for $50,600 from LI-COR Inc. allowed the program to purchase an automated DNA sequencer/analyzer. Under Woodruff, ACC competes competitively with major universities in this discipline. It is progressive for a two-year college, offering students up to three laboratory courses per semester compared to the typical three labs offered over four years at some universities. This hands-on approach and small class size puts ACC’s Biotech graduates on an equal footing with those who graduate with a four-year degree in the same program.

For all the hype about this career field, it’s easy to forget exactly what biotechnology is all about. “Biotechnology really involves helping out our world,” says Woodruff, “using molecular biology to produce products in a cleaner and better manner than anything chemistry has been able to do. Most people probably don’t realize that human insulin is a biotechnology medicine, using bacteria with a human gene to make it. Biotech is really about using living organisms to solve human problems. The biotechnology industry has just exploded over the past few years, and it is extremely important that we keep our program constantly updated to give our students a real workplace environment in which to learn.”
discuss issues that will continue to build the link between education and industry. The fellows participated in workshops given by guest lecturers, who donated their time and supplies. Thank you to all the presenters, everyone appreciated your efforts!

Once again this year, a complete list of the forum presenters and workshops, along with many of the workshop PowerPoint presentations are available for review on the Bio-Link website homepage under Updates/Past Forums.

Some thirty others from CCSF and bay area industry also attended Bio-Link’s Tenth Annual Dinner Banquet on June 5. CCSF’s Dr. Alice Murillo, Vice Chancellor of Academic Affairs greeted and welcomed the fellows and guests along with BayBio Institute Executive Director, Rob Gamble. Bio-Link Director, Dr. Elaine Johnson introduced keynote speaker, Dr. Tami Goetz, from the State of Utah Governor’s Office of Economic Development, whose talk was entitled “Emerging Technologies and Dangerous Ideas: Creating the Next Generation of Big Thinkers”.

If you are interested in attending next year’s forum, watch for upcoming announcements and registration information on the Bio-Link website or in the Connections Winter 2009 issue.

– Lisa Huffman-Martinez
National Center

**Save the Date!**

**Bio-Link’s 11th Annual Summer Fellows Forum**

**June 1-5, 2009**

Clark Kerr Campus, Berkeley CA

More Info Coming Soon

[www.bio-link.org](http://www.bio-link.org)
Many students who graduate from biotechnology programs will most likely work for companies who use animal research. Animals will either be used as a model system to help researchers understand a disease and create new drugs, or to test the efficacy and safety of the products the company makes. It is important therefore, for instructors to meet this subject head-on and talk with their students about the problems they may face from animal rights activists. Most biotechnicians will be fine, but students should be aware that researchers’ homes have been firebombed, University labs have been targeted, and companies, in Seattle, at least, have been shot at.

It is not always an easy choice, but if we do not have animal research, we will not benefit from the new drugs and therapies that biotechnology makes possible. “The Animal Research War” by P. Micheal Conn and James Parker (published by Palgrave Macmillan, ISBN-13:978-0-230-60014-0) is an important book that should be required reading in any biotechnology program. This book covers the topics that all biotechnology students need to know: how animal research benefits society, the regulations that cover animal research, how to identify the organizations that sponsor terrorist activities, and the history of those organizations.

An important take home lesson from the book is the discussion of the philosophy that guides the use of animals in research and the rules designed to protect those animals. As Conn and Parker describe, there is a law called the “Animal Welfare Act,” first passed in 1966, that regulates animal research. Another set of regulations comes from the U.S. Public Health Service Act, which requires that all institutions receiving NIH, FDA, or CDC funds must adhere to the Guide for Care and Use of Laboratory Animals (National Research Council 1996). Institutions must have an Institutional Animal Care and Use Committee (IACUC) to oversee all studies that involve animal research. IACUCs are able to stop any study that they think is being carried out improperly and the ensure that studies follow the three R’s – replace, reduce, and refine.

Conn and Parker also provide an interesting field guide to the various groups involved in the animal rights movement. They present gripping tales of what it’s like to be a target for extremists and the price that society pays when scientists are driven away from biomedical work. They describe the philosophies and strategies used by different groups and the results. One of the most poignant parts of the book is where they discuss the casualties – the scientists who gave up their work and the students and doctors who have been scared away from working on human disease.

Many biotech students will not have to cross picket lines or worry about ALF terrorists when they start work, but some will. As instructors, we need to make sure those students who will are prepared. Some of this material has appeared previously in my blog at: http://scienceblogs.com/digitalbio.

– Sandra Porter
Geospiza, Inc.

Editor’s Note: Also look for “Second Life” by Sandra Porter in the October Genome Technology!
South Central Region
The South Central Region of Bio-Link has had an active past season. In Texas, Collin County took the lead in getting Introduction to Biotechnology adopted as academic credit so that now the course can be offered as dual credit both as a workforce course and as an academic course. In collaboration with Austin Community College (ACC), Amarillo College, and Lonestar Community College, Collin County is now presenting a second biotechnology course as an academic course for approval. The goal is to eventually have all six core biotechnology courses adopted as academic courses so that they will automatically transfer to any four-year Texas institution. The feeling is that this will benefit our students by providing them with more hands-on training and better preparedness for the job market, and that these courses would especially benefit the training of high school science teachers who will need to know how to manage and maintain labs in their profession, as well as to set up and troubleshoot lab exercises. In August, the ACC Biotechnology Department hosted a “Silencing Genomes” workshop presented by Bruce Nash of the Cold Spring Harbor Dolan DNA Learning Center. Instructors from as far away as Delaware attended to learn how to incorporate lab and bioinformatics exercises on RNA interference into their college courses.

Tulsa Community College (TCC) has continued to exhibit much growth in the biotechnology curriculum and the outreach to secondary schools. The NSF ATE Stimulating Enthusiasm, Exploration, and Discovery through Biotechnology Education (SEEDBed) project, included summer academies, high school foot-locker outreach, TCC faculty professional development, and other specialized training opportunities for secondary teachers. A total direct learning experience was presented to 1,619 individuals during the last school year and the project has been given national recognition for its excellence. TCC was informed that their Project SEEDBed Highlight was one of 13 Division of Research on Learning in Formal and Informal Settings selected for directorate-level approval for the year 2008, and furthermore was selected by the Advisory Committee for GPRA Performance Assessment to appear in their FY 2008 report to illustrate the National Science Foundation’s accomplishments under the Learning Outcomes Goal. During the summer of 2008, the TCC faculty taught four levels of biotechnology academies for middle school teachers, high school teachers, and high school students. The TCC faculty has also worked consistently to develop new for biotechnology AS, AAS and Certificate programs. This fall, the course of Cell Culture Techniques is offered for the first time, and in Spring 2009, Biotechnology Quality Assurance, Molecular Biology and Techniques, and Biotechnology Proteomics and Instrumentation will be offered for the first time.

Bossier Parish Community College will host our 2009 Regional Meeting May 29-31 in Bossier City, Louisiana. The topics and activities to be included in this meeting will be posted on the Bio-Link ListServ, and everyone is invited to attend.

– Patricia Phelps
South Central Regional Director

News from Oklahoma City Community College Biotechnology
Programmatically, we have been developing and refining a life sciences techniques course, affectionately termed the “lab boot camp”. The target audience is the non-biotechnology community college student selected for a summer research experience at the University of Oklahoma Health Sciences Center. Prior to entering their assigned lab, these students are required to spend a week in our biotech lab learning basic molecular biology techniques and skills along with research lab “manners.” University mentors and student interns alike have endorsed this experience as a solid preparation for their summer research.

On the outreach side, we are entering the final year of our grant and shifting our emphasis towards sustainability. We held only two workshops this summer. One was with our teacher-leaders, who help us run our biotech equipment loaner centers now distributed throughout the state. The teacher leaders also help us run workshops and disseminate our laboratory experiments. Our basic workshop included four preservice teachers and two first-year teachers. The preservice teachers receive credit from the University of Oklahoma science education department for this workshop.

– Charlotte Mulvihill & Fabiola Spens
Oklahoma City Community College

Southwest Region
University Research Lab Partners With High School Biomanufacturing Certificate Program to Produce Recombinant Antigens
Students at Rodriguez High School (RHS) in Fairfield, California are participating in a unique educational experience with University of the Pacific in Stockton, California to advance basic research on the human pathogen Trichomonas vaginalis. Starting last spring, Dr. Kirk Land’s research laboratory outsourced a number of recombinant protein expression projects to the Biomanufacturing Certificate Program at RHS. “With the completion of the T. vaginalis genome project by TIGR in 2007, we have cloned a number of putative genes from this important human pathogen that may be involved in causing disease,” says Dr. Land. “We now just need the human power to express and purify all of these antigens and to test their biological functions. This collaboration creates a mutually beneficial situation for my master’s degree students who are trying to complete their thesis research in a timely fashion and the high school teacher and students who want to see direct application of their skill sets.”

Undergraduate and graduate students in the research lab at the University clone the genes, check their expression at a small-scale, write SOPs for their production, and then pass these procedures to the high school students for large-scale production. The antigens are expressed, purified, and quality control tested, and then returned to the University team for further work down the research pipeline. “My students get to see a direct application of their classroom knowledge, and they are very excited about it,” commented Mr. Kevin Scully, teacher at RHS. Dr. Land and Mr. Scully have agreed that any subsequent studies that lead to peer-reviewed publications will also include his high school students as co-authors. The chain formed here between high school and University research students also presents excellent mentoring opportunities for students who might be considering a career in the biosciences. Both Land and Scully agree that “This work provides a new example of educational and research collaboration.”

– Kirkwood Land
City College of San Francisco
North Central Region

New, Searchable Bio-Link Curriculum Clearinghouse

The Bio-Link Curriculum Clearinghouse of Curriculum and Instructional Materials is undergoing major improvements. While this process is still ongoing, the Clearinghouse has already been reorganized into a new, user-friendlier format! The Clearinghouse, which is a repository for materials relevant to biotechnology workforce education, is now searchable by keyword, resource type (instructional materials, bibliographies, etc.) and resource classification (biochemistry, molecular biology, etc.). If you are looking for a specific exercise for your classroom, the new Clearinghouse will help you quickly narrow your search. If you just want to browse to see what materials are available concerning a specific topic, you can do that also. The Clearinghouse also has a variety of Forums for discussion of questions and topics related to biotechnology education. Visit the Clearinghouse at www.bio-link.org/educators.htm and see what's new!

The Clearinghouse is actively seeking new materials geared towards biotechnology workforce education. Do you have a classroom activity or laboratory exercise that targets biotechnology technician education? The Clearinghouse is looking for materials in any area, but especially in regulatory affairs, environmental biotechnology, bioprocessing, bioethics, cell culture, forensics and molecular biology. If you have materials that work well for you, and you are willing to post them on the Clearinghouse, please email Mary Ellen Kraus at Madison Area Technical College: mekraus@matc madison.edu.

– Mary Ellen Kraus
Madison Area Technical College

Northwest Region

This past August, Shoreline Community College (SCC) held a three-day Biotechnology Summer Student Experience, organized by Adrienne Houck. Twelve students from five Seattle area high schools participated in the program. Teachers, who had worked with Adrienne in the SCC Biotechnology Outreach program throughout the school year, identified students who were interested in science, but needed different options to their post high school education other than a four-year institution. These students came from alternative high schools as well as traditional high schools from the Seattle School District.

The program began with students touring the SCC Biotechnology facilities and meeting with the Biotech program instructors to learn about careers in Biotechnology and the educational requirements to attain these careers. Particular emphasis was placed on the opportunities at community college Biotech programs and the possibility for students to use Running Start to fulfill first year requirements, making it possible to complete the Biotechnology Lab Specialist Program one year after high school. Students then got the hands on lab experience by practicing pipetting skills using the sun catcher lab adapted from SBEC and playing “Pipetting Battleship”, both using 96 well plates and Rainin pipettes. They also did a three-day bacterial transformation lab from the Bruce Wallace, Amgen curriculum. Students were given an opportunity to use SCC lab equipment much of which students had not used before and to see how a researcher would spend their day in the lab.

On the second day, Amgen's Pilot Manufacturing plant invited the students to tour their facility to see both basic research labs as well as the manufacturing process, including bioreactors of various sizes. Students were able to see the pipeline of drug therapies and see a perspective on biotechnology within the pharmaceutical field. Amgen provided a lunch with researchers and administrators joining the students.

A luncheon concluded the three-day event where students invited parents and friends to join them. Students also received a t-shirt and certificate for participating in the Biotechnology Summer Student Experience. It was a great first time event that we hope to do next summer. Students seemed to enjoy themselves and based on final day surveys would definitely encourage other students to participate.

– Guy Hamilton
Northwest Regional Director

Keep Those Surveys Coming In!

Kathie Whelchel is still collecting surveys for inclusion in Bio-Link’s National Directory of Biotechnology Programs in Two Year Colleges. It seems there are quite a few biotechnology programs that Bio-Link needs to know about! The “Quick Questionnaire” survey form is accessible on the Bio-Link website homepage listed under Biotech Programs. Once downloaded and completed, please send the survey to either kathiew7contacts@yahoo.com or to Elaine Johnson at ejohnson@biolink.ucsf.edu.
Bio-Link is committed to program improvement, instructor enhancement, communication, program assistance, and supporting school-to-career activities in the biotechnology area.

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