

2009/10 Annual Report

July 2010

CSU

The California State University

PROGRAM FOR EDUCATION AND RESEARCH IN BIOTECHNOLOGY (CSUPERB)

CSUPERB's mission is to develop a professional biotechnology workforce by mobilizing and supporting collaborative CSU student and faculty research, innovating educational practices, and responding to and anticipating the needs of the life sciences industry.

One of CSUPERB's strategic goals is to expand biotechnology research opportunities in the CSU. We believe that the best way to engage, recruit, and retain students in life sciences careers is to provide access to and opportunities in real-world biotechnology research settings. Likewise, we know that faculty scholars who work on cutting-edge research projects bring that knowledge into the CSU biotechnology curriculum and enrich student learning.

To assess program impact, reports are collected from faculty funded through the three major, competitive CSUPERB grants programs: Faculty-Student Collaborative Research Seed, Entrepreneurial Joint Venture (JV) and Programmatic grants. We now have three years' of reporting from faculty funded during AY 05-06. A third of them garnered significant (>\$100,000) follow-on grants; half of those were multiple year grants totaling more than \$275,000. NIH, NSF, the Frasch (ACS) Foundation, the Sloan Foundation and Chevron were the funding sponsors. The funding mechanisms targeted early stage projects, undergraduate research, and curriculum development. We already know that 37% of the faculty funded in AY 06-07 have garnered multiple year grants (>\$100,000) as well. These funding success rates are encouraging



Sonoma State University faculty and students were integral participants in the City of Santa Rosa's F.A.B. project and launch day (May 10, 2010). *Top photo:* Shaun Horne, Linden Schneider, Aaron Agostini, Mike Cohen, Caden Hare, and Rachel McCormick from Sonoma State celebrate the project launch at the Laguna Treatment Plant. *Bottom photo:* Representative Lynn Woolsey (Sixth Congressional District) was able to escape rain showers during the F.A.B. launch in an electric-powered truck (green biomass digesters are in the background).



and suggest CSUPERB faculty are competing well at the national level.

However, outcomes aren't always reflected in one metric. Michael Cohen's (Sonoma State, Biology, JV Grant 2008) work with the City of Santa Rosa on the F.A.B. (Fuel from Aquatic Biomass) project is one example. The team, including Sonoma State students in Dr. Cohen's group, aims to develop efficient bioenergy production processes at the Laguna Subregional Treatment Plant and some of their ideas are already in use. The trucks at the plant run on electricity generated from biogas combustion! Dr. Cohen incorporates aspects of the research project into his Bacteriology, Environmental Microbiology and Biotechnology courses at Sonoma State, bringing compelling, real-world relevance to his classroom students as well. CSUPERB is proud that the research conducted by Dr. Cohen's team of Sonoma State students has already had a tangible effect on their community. These effects are sustainable and incalculable when you consider the skills and enthusiasm these students take forward into their careers!

2009/10 Program Highlights

- CSU Biocompass website launched, featuring biotechnology industry-responsive curriculum offerings across the CSU (see: www.csubiocompass.org)
- CSUPERB Biofuels Taskforce identified 45 faculty from 14 CSU university campuses involved in bioenergy projects
- 2010 Annual CSU Biotechnology Symposium in Santa Clara drew 594 participants and featured 220 posters
- CSUPERB helped mobilize two successful consortia, led by SDSU and SJSU, that won nearly \$11 million in federal Department of Labor grants for biotechnology workforce development
- Three new Bridges to Stem Cell Research grants were awarded to CSU campuses by the California Institute for Regenerative Medicine
- CSU Channel Islands, CSU Dominguez Hills and San Diego State University worked together and with industry experts to launch a shared, online certificate for quality assurance professionals working in the biotechnology industry - work funded by the SBA grant to CSUPERB

SAVE THE DATE! The 23rd Annual CSU Biotechnology Symposium will be held January 7-8, 2011, at the Hyatt Regency Orange County!

CSUPERB 09/10 Operating Budget

Salaries & Office Operations	\$532,656
Program & Grants Administration	\$169,953
Symposium	\$220,000
Grants & Awards	\$630,464
SBA-funded Workforce Training Center Project (L.A.)	\$379,074
Total	\$1,932,147



CSU Los Angeles biotechnology faculty and students at lunch during the Symposium in Santa Clara.

CSUPERB is: CSU Faculty Researchers

The 2010 CSUPERB Faculty Research Award winner is Dr. **Anca Segall**, professor of biology at San Diego State University. The award recognizes outstanding biotechnology researchers across the CSU. After completing her doctorate at University of Utah, she worked as a postdoc at the DuPont Company and at the NIH. After joining SDSU she has garnered continuous R01 funding from NIH to study site-specific recombination. In addition, Dr. Segall won an NSF-CAREER award, part of which she used to develop a summer course to teach undergraduates about independent research. She also has close ties to the biotechnology industry, out-licensing technology to Invitrogen (now Life Technologies) and co-founding Mpex Pharmaceuticals. Importantly, during her career at SDSU, Dr. Segall has mentored nearly 100 students who have trained in her laboratory and now work in all segments of the biotechnology industry – academia, research institutes and companies. Dr. Segall exemplifies the teacher-scholar paradigm – bringing cutting-edge science to students in the classroom, laboratory and the community.



From left to right: Susan Baxter (CSUPERB), Dean Stanley Maloy (SDSU, Dean of Sciences), Anca Segall (SDSU, Biology) and Terry Frey (SDSU, Biology Chair) at the award presentation during the 22nd CSU Biotechnology Symposium.

22nd Annual CSU Biotechnology Symposium Oversubscribed

The CSU Biotechnology Symposium moved north to the Santa Clara Marriott in January and we were at capacity with 594 participants in attendance. CSU faculty and students made up 80% of the attendees and represented 22 of the 23 CSU campuses. CSU Fullerton (62), San José State (49) and CSU Fresno (41) sent the greatest numbers of symposium participants this year. We owe thanks to our sponsors: Keck Graduate Institute, Cal Poly San Luis Obispo, BayBio, Abbott, Amgen and the Orange County Regulatory Affairs Discussion Group. 100% of the faculty and 98% of the students responding to the symposium survey would recommend the symposium to their peers!

A record-number 294 poster abstracts submitted this year drove the overall attendance numbers. The 220 posters selected by a faculty committee represented the work of 289 student presenters (148 undergraduates and 141 graduate students) from 137 faculty-mentored research laboratories at 22 CSU campuses across California. 33 students competed in the prestigious Eden and Nagel Award competitions, developing important communication and leadership skills by presenting their research results to selection committees and symposium participants. 18 posters described Professional Science Master's and CIRM-funded Bridges to Stem Cell Research programs, providing a nexus at the symposium for administrators and students involved in these new and growing programs and partnerships.

We continue to tune the symposium programs so that speakers represent all phases of innovation – fundamental discovery research, new technology applications, and hands-on know-how related to specific systems. This rich mix is the strength of the symposium, showcasing and networking enthusiastic CSU students, innovative researchers, driven entrepreneurs and dedicated teachers. The 2010 program featured two special sessions: one on stem cell research and development and one on personalized medicine approaches to cancer treatment. Eric Schadt, Chief Scientific Officer at Pacific Biosciences and Cal Poly SLO alum, wowed the crowd with new DNA sequencing technology but also made a strong case for integrating more applied mathematics into the teaching of biology. In addition to the poster sessions, break-out sessions allowed faculty to work on partnering for economic development and active learning strategies for biotechnology education. The Career Networking Session remains popular with students and grows a little bit each year, recruiting more industry partners to discuss their career paths and jobs. During a very tough economic year, the CSU Biotechnology Symposium provided a bright spot and forward-looking forum for California.

CSUPERB is: Industry Partners



Peggy Pence is an example of the many industry partners who enthusiastically 'roll up their sleeves' to work with CSUPERB to keep CSU curriculum up-to-date and relevant to industry. Dr. Pence is the President and CEO of Symbion Research International. Since 1998 she has served on advisory boards at CSU Channel Islands and this year gave her time to help out on CSUPERB's Small Business Administration grant-funded project. Dr. Pence is a clinical development and regulatory affairs expert, having accumulated over 37 years of experience, beginning at Eli Lilly and followed by jobs at start-up biotechnology companies that became well-known names in the industry, including Amgen and Serono, before founding Symbion. Her experience, contributions and leadership were recognized by her peers in 2009 when she was named a Regulatory Affairs Professionals Society (RAPS) Fellow. When we asked Dr. Pence why she was so willing to give back, she said, "A friend once expressed - life has three distinct phases: the early years are a time for training, the mid-years are a time for testing, and the mature years are the time for teaching...I am at the time for teaching. I consider it my honor and a privilege to mentor, and to share what I have learned."

CSUPERB Legislator of the Year



Susan Baxter, **Representative Michael Honda** (15th Congressional District) and George Conant (CSU Office of Federal Relations) met in Washington, D.C., in April to present the 2010 CSUPERB Legislator of the Year award. Mr. Honda was honored by CSUPERB for his outstanding support of science, technology, engineering and mathematics education and research, as part of his work on Congressional subcommittees and within his home district.



Bob Koch, 2010 Andreoli Award winner, with some of CSUPERB's leadership and staff at the Symposium in Santa Clara. Front Row, L to R: Dean Laura Kingsford (CSU Long Beach), Bob Koch (CSU Fullerton), Dean Stanley Maloy (SDSU). Back Row, L to R: Pam Branger (CSUPERB), Eric Nedelman (CSUPERB), Rupinder Bhathal (CSUPERB), Mike Goldman (SFSU), Susan Baxter (CSUPERB), Dean Steve Murray (CSU Fullerton), Rajni Garg (CSUPERB), James Schmitt (CSUPERB).

Letter from the Executive Director

Dear Colleagues:

CSUPERB's mission statement includes the somewhat inscrutable phrase, "mobilize and support." This year we proved to ourselves that, indeed, "mobilizing" leads to support! We sent emails, hosted teleconferences, held webinars and organized workshops to let faculty and administrators at the CSU universities know about biotechnology-related funding opportunities associated with the American Recovery and Reinvestment Act (ARRA) of 2009. As of April 2010, 29% (about \$9 million) of the ARRA awards made to the CSU were to support biotechnology-related projects. Much work this year involved making connections between campuses and external partners, including biotechnology industry associations and workforce investment boards (WIBs). At the symposium in January, CSU and CCC faculty and administrators met with WIB and regional economic development professionals to facilitate partnering around a series of workforce development projects. Participants presented lessons learned from two regional consortia, led by SDSU and SJSU, who went on to win large (~\$5 million) federal Department of Labor grants in February. These grants allow regions to address biotechnology workforce needs and give campuses needed agility in a time characterized by budget cuts. Similar to tactics used to increase biotechnology research opportunities system-wide, we continue to find that working with external partners only enhances our ability to serve California's students and communities.

Lastly, I want to save space here to thank Bob Koch, CSUPERB's long-serving Faculty Consensus Group chair, who is moving on this summer to become acting Dean of Natural Sciences and Mathematics at CSU Fullerton. We honored him in January with the Andreoli Award, but we owe CSUPERB's vision of faculty-driven change and system-wide mobilization to his very practical and focused direction.

CSUPERB is: New CSU Faculty



Blake Gillespie's (Faculty-Student Seed Grant, 2007) research laboratory is focused on protein folding and stability. He teaches biochemistry at CSU Channel Islands, but also about "Mutants, Mad Cows and Modified Foods" at the Osher Lifelong Learning Institute. In the Fall 2007 round of Seed grants, Dr. Gillespie was awarded funds to investigate a copper-binding protein as part of a long-term goal to study protein conformational changes and ligand binding. In his final report, he wrote, "This grant has also opened the door to a radical realignment of my department's pedagogical approach in our biochemistry lab classes. We are now beginning to include research questions and methods directly into undergraduate instructional labs...but perhaps most importantly, it established me as a credible prospect in the eyes of other funding sources." In Fall 2009 the National Science Foundation (NSF) made a \$920,552 Faculty Early Career Development (CAREER) Award to Dr. Gillespie, rewarding his creativity and effectiveness at integrating research and education. Dr. Gillespie now serves as a CSUPERB Faculty Consensus Group representative from CSU Channel Islands. Tellingly, he served as chair for the Crellin Pauling Student Teaching Award Selection Committee last year, honoring up-and-coming biotechnology teacher-scholars.



Top: **Blake Gillespie** with his new 500 MHz NMR at CSU Channel Islands. Bottom: David Pauling, Amelia Manlove (CSU East Bay, 2010 Crellin Pauling Student Teaching Award winner) and Dr. Gillespie at the CSU Biotechnology Symposium in Santa Clara.

2009-2010 CSUPERB Grants & Awards Program Summary

Participation

Total Proposals, Applications, and Nominations Received (including all competitive grants and awards programs)	290
Number of CSU Campuses Applying	21

Grants & Awards

	# Awards / Total Award Dollars
Faculty-Student Collaborative Research Seed Grants	27 / \$403,474
Entrepreneurial Joint Venture Matching Grants	5 / \$124,293
Programmatic Grants	5 / \$70,484
Travel Grants (Faculty and Student)	45 / \$41,797
Howell Foundation-CSUPERB Research Scholar Awards	11 / \$33,000
Symposium Awards	5 / \$6250
Total # CSUPERB Awards / Grant & Award Dollars:	98 / \$679,298
Number of CSU Campuses Receiving Grants & Awards:	21

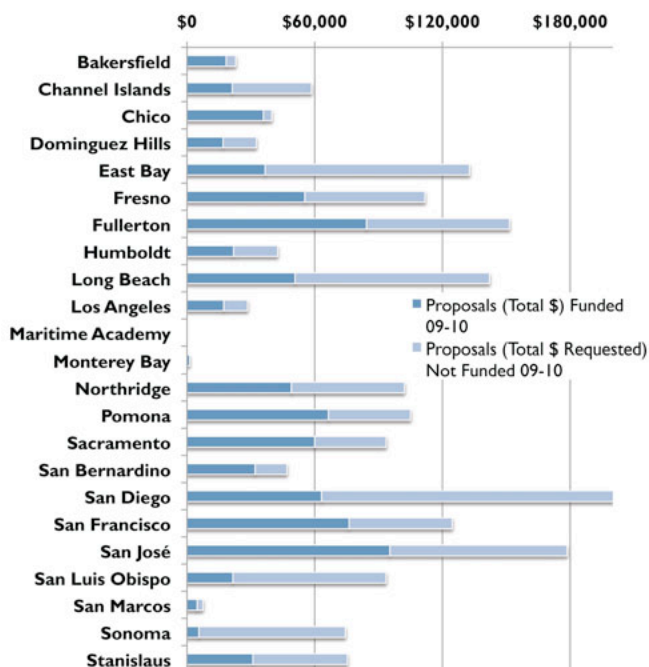
CSUPERB Grants Program Impact

(Based on final and long-term reports from faculty funded by Seed, Joint Venture and Programmatic grants only*)

	AY 05/06	AY 06/07	AY 07/08
CSUPERB Total Awards	\$474,133	\$492,068	\$430,764
CSU Faculty Involved	97	94	70
Students Involved	190	174	100
Peer Reviewed Publications	32	41	11
Follow-on Funding Received by PIs*	\$1,342,118	\$4,672,564	\$2,458,160
Within 3 months of grant end date (final reports)			
Total Follow-on Funding Received by PIs*	\$5,598,759	\$7,208,518	\$5,921,440**
As of 6/17/10 (based on final and long-term reports)			
Percentage Return-on-Investment	1181%	1465%	1375%
Total follow-on funding \$ / CSUPERB total award \$			

* Impact reporting is based on final and long-term reports received from CSUPERB PIs as of 6/17/10. Overall final reporting rates were >90%; long-term reporting rates are 18-65%. Changes in follow-on funding totals reported relative to previous annual reports are expected since the totals are aggregates of multiple reporting cycles, received over 3 years after grant end date.

** Follow-on funding based on long-term reports from grants made in the first half of AY 07/08 only; the remainder is not due until 2011.



2009-2010 CSUPERB Funding By Campus

The figure to the left illustrates CSU system-wide award data and interest in CSUPERB grants and awards programs. The data summarized includes grants, awards, and symposium participation funded by CSUPERB at each university. Proposals not funded are indicative of campus interest in CSUPERB programs, reflecting faculty-driven biotechnology projects requiring additional resources.

2009-2010 CSUPERB Leadership

Presidents' Commission

Stephen L. Weber, Chair
San Diego State University

Warren J. Baker
Cal Poly San Luis Obispo

Mohammad H. Qayoumi
CSU East Bay

Benjamin F. Quillian
CSU Executive Vice Chancellor

Rollin C. Richmond
Humboldt State University

James M. Rosser
CSU Los Angeles

Strategic Planning Council

Robert Koch, Chair
CSU Fullerton

Jill Adler-Moore
Cal Poly Pomona

Charles Boyer, Dean
CSU Fresno

Daryl Eggers
San Jose State University

Michael Goldman
San Francisco State University

Laura Kingsford, Dean
CSU Long Beach

Stanley Maloy, Dean
San Diego State University

Katherine McReynolds
CSU Sacramento

H. Keith Moo-Young, Dean
CSU Los Angeles

Bianca Mothe
CSU San Marcos

Steve Murray, Dean
CSU Fullerton

James Prince
CSU Fresno

S. K. Ramesh, Dean
CSU Northridge

Sandra Sharp
CSU Los Angeles

Donald Straney, Dean
Cal Poly Pomona

Koni Stone
CSU Stanislaus

Jacob Varkey
Humboldt State University

California State University
Program for Education and Research in
Biotechnology (CSUPERB)
Program Office @ San Diego State University
5500 Campanile Drive
San Diego, CA 92182-1011
www.calstate.edu/csUPERB

Susan Baxter (Executive Director)
Phone: (619) 594-2822
Email: sbaxter@mail.sdsu.edu