



THE VOYAGER

YOUR VEHICLE TO STELLAR OPPORTUNITIES

The New letter for COSMOS Alumni - September/October 2005 - Volume II, Issue 1

Hello COSMOS Alumni!

by Jennifer Judkins - UCD COSMOS Program Coordinator

First off, we'd like to welcome the COSMOS class of 2005 - with special mention to our first alumni class from UCSD! We now have a total of 2,477 COSMOS alumni and growing every year!

This newsletter is designed to keep you interested and engaged in math, science and the COSMOS community. In it, we will share ideas and events relating to math and science, provide special opportunities for COSMOS alumni, note changes to COSMOS programs and policies, and provide a

Mapping Cellular Signals

Mapping Cellular Signals is written by David Pescovitz and is a feature article in the September 2005 issue of *ScienceMatters@Berkeley*, an online publication of the College of Letters and Science at the University of California, Berkeley. The mission of *ScienceMatters@Berkeley* is to showcase the exciting scientific research underway in the College of Letters and Science and the College of Chemistry. To subscribe to *ScienceMatters@Berkeley*, visit <http://sciencematters.berkeley.edu>.

UC Berkeley professor Kevan Shokat is a chemist who thinks like a biologist. He's developing chemical tools to understand and manipulate the complex communications system at the heart of every cell. Eventually, his research could lead to a pharmacological map of the human cell that would guide the rapid development of new drugs to combat diseases like cancer and diabetes.

bridge between you and your fellow COSMOS alums. Please keep us posted if you change your email address and/or no longer wish to receive the e-newsletter. Simply follow the instructions at the bottom of this page to unsubscribe/change your address.

Please help us share the COSMOS experience with others! While the COSMOS staff is busy making presentations at conferences, student events, and classrooms all over California, we rely most heavily (*see Hello on page 4*)

"We look for biological questions that genetics and biochemistry can't easily answer and think of chemical tools to get at them," says Shokat, who is also a professor of cellular (*see Mapping on page 5*)



Kevan Shokat is also a researcher with the California Institute for Quantitative Biomedical Research (QB3) (Majed photo)

Stay Connected

COSMOS was created to provide an opportunity for talented and motivated high school students to explore science, technology, engineering and mathematics at the highest level. The program is required to conduct an annual evaluation and to submit a report to the state legislature every two years. Since the COSMOS mission is to prepare and encourage students to pursue a career in a field related to science, the evaluation team collects information about the educational and career choices made by program participants.

Dr. Rena Dorph and David Goldstein, our evaluators are very interested in learning what COSMOS alumni study, where, and which fields you go into after completing your studies.

Please help us keep track of you and your careers:

- **Fill out a short alumni survey each year.** You can fill this out either online or on paper. If you do not receive the survey (online or via snailmail) by the end of October each year, that means we do not have a valid address or email. If this is the case, please:
- **Update your contact information for us.** Log on to COSMOS at <http://www.ucop.edu/cosmos/welcome.html> (there is an alumni link) so that you can update your record. (*see Connected on page 4*)

See Page 2 for Upcoming Science Exhibits and Events

The Voyager is sent to all COSMOS alumni. Please keep us informed of any changes in your contact information by sending an email to cosmos@ucdavis.edu. If you prefer not to receive this newsletter, send an email stating so to cosmos@ucdavis.edu. Be sure to include your full name, COSMOS year, and campus attended in all correspondence.

IN FOCUS: SCIENCE ACTIVITIES IN THE BAY AREA

Each issue, The Voyager will highlight science activities occurring in different regions throughout California. We start in the Bay Area.

The Nobel Prize Exhibit – San Francisco Exploratorium

Visit the West Coast Premiere of *The Nobel Prize: 100 Years of Creativity*. This exhibit provides an historic overview of the Nobel Prize and its founder, Alfred Nobel. The exhibition also features multimedia, still and film images of Nobel Laureates, and personal tools of Prize winners. Accompanying the exhibition are special events throughout the Bay Area. The exhibit runs through October 2, 2005 so get to the Exploratorium soon! The exhibit is included with museum admission. For more information, visit www.exploratorium.edu/nobel.

Amazing Light Symposium – Pauley Ballroom, UC Berkeley

Amazing Light: Visions for Discovery is a three day symposium

featuring talks that aim to investigate key areas linked to discovering new aspects of the quantum-mechanical behavior of light. Primary foci are to explore the persistence of questions and unknowns in physics; to emphasize the continuing potential and excitement of the field; and to consider promising and ambitious domains for future research. The symposium is part of a major project honoring the leadership and vision of physicist and Nobel laureate Charles Hard Townes. *Amazing Light: Visions for Discovery* is scheduled for October 6-8, 2005. For more information about the program agenda and registration, visit www.foundationalquestions.net/townes/symposium.asp.

Game On! – San Jose Tech Museum

The *Game On! The History, Culture and Future of Videogames* exhibit is making its West Coast premiere from September 30-January 2, 2006 at The Tech. Be

Upcoming Exhibits and Events

The next issue will focus on Southern California events

The Nobel Prize: 100 Years of Creativity

San Francisco Exploratorium
Runs through October 2, 2005

Amazing Light: Visions for Discovery

Pauley Ballroom, UC Berkeley
October 6-8, 2005

Game On! The History, Culture and Future of Videogames

San Jose Tech Museum
September 30, 2005 - January 2, 2006

Wonderfest: Festival of Science

UC Berkeley and Stanford University
November 5-6, 2005

*Note: The COSMOS Program neither endorses nor sponsors these events.

sure to experience this highly interactive exhibit while it is in town! The exhibit examines videogames from the game design process, to the culture among gamers and beyond. (*see Activities on page 5*)

Scholarship Opportunities: Is Intel in Your Future?

COSMOS has a special relationship with annual INTEL Regional Science & Engineering Fairs (Affiliated with the Intel International Science and Engineering Fair) and INTEL IPYS (Promising Young Scientist)

- Greater Sacramento Area (<http://www.srsefair.org>)
- Greater San Diego Area ([GSDSEF.org](http://www.gsdsef.org))
- Synopsys Santa Clara Valley (www.science-fair.org for Silicon Valley)

We encourage all COSMOS alumni (and applicants) to look into these excellent opportunities and plan now to enter an INTEL science fair near you. COSMOS Alumna Amber Irish Hess was one of four California Finalists this past year!

Get help and coaching at student/parent/teacher “clinics” starting in September.

see http://www.sciserv.org/iseff/aff_fairs/fairlist/californ.asp and http://www.sciserv.org/iseff/students/tips_advice.asp

For more information on creating a successful science fair project, visit <http://www.cosmos.ucdavis.edu/2006/sfi.html>

Introducing UC Merced

Source: http://www.ucmerced.edu/news_articles/09092005_it_s_official_uc.asp

On September 5, 2005, the University of California officially opened its tenth campus – the University of California, Merced. The campus is the first UC in California’s fast-growing San Joaquin Valley and the first American research university of the 21st century.

The opening of UC Merced will help fulfill the University of California promise of access to qualified students, eventually offering enrollment to 25,000 students by the year 2030. Symbolizing the pioneering spirit of the first class, three students – a first-year student, a transfer student from Merced College and a graduate student – rode into the



Signifying the pioneering spirit of UC Merced’s founding faculty, staff, and students, a covered wagon led the procession into UC Merced’s Grand Opening Convocation.

opening ceremony in a covered wagon. They were followed by a lengthy procession of students, parents, founding faculty and staff, donors, trustees and UC officials.

UC Merced began classes this month with 55 founding faculty members recruited from some of the world’s leading universities. Approximately 1,000 students, including 38 graduate students, will comprise the inaugural class. Nearly 600 students moved into brand-new university housing and christened the state-of-the-art dining facility over the weekend. The remainder will commute or live in off-campus housing.

The university expects to add approximately 800 students per year for the next 30 years until the campus reaches capacity. For more information about the newest UC, visit <http://www.ucmerced.edu>.

COSMOS 2005 Testimonial



MICHELLE RODRIGUEZ
Norwalk High School,
Norwalk 12th grade
UCSD COSMOS 2005
Kinetic Sculpture & Clocks:
The Art & Design of Mechanical
Engineering and Design

(Bronston photo)

I first heard about COSMOS from my Millennium Project (a math and science program) teacher who encouraged several people to apply and I was one of those people. I got accepted into UC Irvine’s COSMOS program and was excited. My experience there was life changing. Not only did I learn of the important social skills in a new environment but I also learned the necessary concentration and time management involved with

being in college. Since we had to complete a whole science/research project in less than 2 weeks, we felt the inevitability to work as a team and not let the clock beat us. What

I liked best about COSMOS was the fact that it not only gave you a preview of the academic part of college but the social part as well. It taught me how to be more open to others’ opinions and realize there are others that are interested in and math as much as I am and that they too want to pursue a career in mathematics and/or science. With COSMOS opening so many opportunities to seek higher education, I have made more plans for my future education and career. I now want to *(see Testimonial on page 4)*

YES Competition

The Young Epidemiology Scholars (YES) Competition for original student research is designed to inspire talented students to investigate the many behavioral, biological, environmental and social factors that affect health and, based upon this knowledge, to identify ways to improve the health of the public.

The YES Competition offers college scholarship awards to high school *juniors and seniors* who conduct research projects that apply epidemiological methods of analysis to a health-related issue. The YES website provides guidelines to help you better understand the types of problems examined by epidemiologists, the methods they use to tackle them, and how you can make use of those methods in your project. *(see Yes on page 4)*

Hello (continued from page 1)

on YOU to inform others about the program. Please tell your teachers, counselors, peers, neighbors, and other community members about your summer experience. Your respective COSMOS offices would be happy to send you brochures, informational videos, and other information to share. Please contact us if you would like to make a presentation in your school or community – incentives may be offered.

For those of you who are still in high school and wish to return to COSMOS again, please see our updated returning student policy online at: <http://www.ucop.edu/cosmos/faqs.html>. While we enjoy seeing familiar faces in the program, our goal is to offer the COSMOS experience to as many talented students as possible. Our new policy will hopefully attain this goal as well as welcome some of you to experience another COSMOS campus. There are also other opportunities posted on the above website under “Student

Resources”. Be sure to check those out as well!

If you are now an undergrad (or for some of our alumni, even a graduate student) attending one of the COSMOS campuses (UCD, UCSC, UCI, or UCSD), please stop by the COSMOS office to say hi and let us know what you’re up to. We love hearing from our alumni and watching you develop into the next leaders of California and the nation! Even if you’re not on one of the four campuses, drop us an email and let us know where you’re attending college and what you’re majoring in.

As the COSMOS community continues to grow, we hope that you will continue to keep in touch and take advantage of the opportunities presented in these newsletters. If you have ideas or know of events that you would like to share with others, please send them to us at cosmos@ucdavis.edu and we will include them in the next newsletter.

Testimonial (continued from page 3)

major in chemistry at either UC San Diego or UC Irvine. I want to become a doctor and specialize in respiratory diseases and hopefully do some good in this world.

With COSMOS at UC Irvine having such a great impact on my life I decided to apply once more at the newer COSMOS site of UC San Diego. The reason I applied there is because it was known for its wide variety of research and resources. Yet again this program astonished me with everything it had to offer. The different

engineering fields that I learned about at this campus made me think of other options in the math and science field. Now as I enter Norwalk High School as a senior and am ready to apply to different colleges, I will always keep in mind what COSMOS has taught me about the different under rated fields of science and math. Since I got into both COSMOS summers on full financial aid, it has given me hope that despite my economic struggles I will be able to continue towards higher education.

Connected (from page 1)

• **Fill out a postcard and return it to us.** Postcards are mailed to graduating high school seniors to remind you to let us know where you are going next.

• **Contact us!** If you attribute part of your continued motivation to pursue STEM fields to something you did or learned about while at COSMOS or to acquaintances you made with fellow participants, professors, Teacher Fellows or others at COSMOS, please let us know by sending an email to dsgoldstein@berkeley.edu. You may also contact us if you have any questions or suggestions.

Thank you in advance for your help! By providing information about your future education and career activities, you help us learn about the impact of COSMOS. As a token of our appreciation, alumni who respond to future surveys will be eligible to win prizes. Look for descriptions of these prizes when you receive our alumni survey in a few weeks!

YES (from page 3)

Competition winners are awarded up to \$50,000 to cover the costs of higher education ***The deadline to submit your research project is February 1, 2006.*** For more information, visit <http://www.collegeboard.com/yes>.

WHAT'S NEW?

Have you or a COSMOS alumnus you know been recognized for academic achievement? If so, COSMOS wants to hear about it! Send an email to cosmos@ucdavis.edu and provide your full name, year and campus attended.

Mapping (continued from page 1)

and molecular pharmacology at the University of California, San Francisco, and affiliated with the Howard Hughes Medical Institute.

Shokat's laboratory focuses on kinases, enzymes that transfer energy stored within the cell to other proteins. The kinases act as control switches for many cellular activities, from development to death. However, with more than 500 kinases in every cell, identifying a specific kinase's functionality and manipulating it without affecting others in the protein family is no easy task. The pay-off could be huge though.

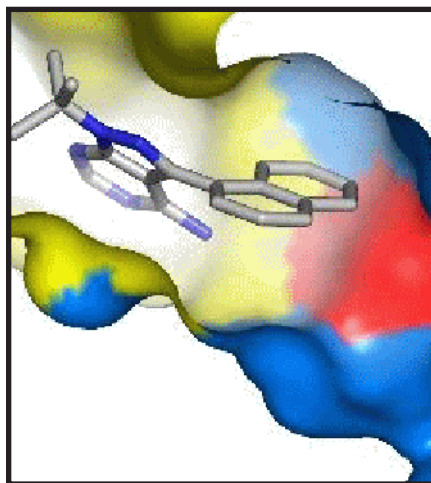
"The ability to understand how a specific kinase regulates signaling pathways would permit the development of new drugs and new strategies to control almost all disorders including cancer, neurological disorders, autoimmunity, and tissue rejection," he says.

For example, Shokat explains, inhibiting a particular kinase in a cancer cell could stimulate the death of that cell. On the other hand, simultaneously knocking out another kinase could result in dangerous side effects. To help understand each kinase's role in the cell, Shokat developed a chemical-genetic tool to selectively

Activities (from page 2)

Come experience the past forty years of electronic gaming, play over 100 games and be inspired to be the next innovator to make your mark in this exploding industry. For more information, visit www.thetech.org.

Wonderfest 2005 – UC Berkeley & Stanford University campuses
Wonderfest: Festival of Science



This illustration shows the active site of a protein kinase introducing a new active site pocket (red) that can be accessed by a tailor-made inhibitor molecule (grey and blue). (courtesy Daniel Rauh/Shokat Laboratory)

mutate kinases so that they can be individually switched on and off by introducing a drug into the body.

"It's like we changed the lock on the switch that turns the kinase on or off and now we have the key to it," he says. "So we can determine whether inhibiting that kinase is going to stop the spread of cancer, for example, or cause the animal to lose weight, indicating that it's not a good target for therapy."

Already, Shokat and his colleagues are mutating and testing more than one hundred kinases. Their aim is to identify the kinases that may be tied to asthma, diabetes, cancer, neurological disorders,

is a non-profit educational project created to promote public discourse about scientific questions. The event aspires to challenge unexamined beliefs, stimulate curiosity, promote careful reasoning, and encourage life-long learning. Articulate and accomplished researchers square off in debate to present public dialogues on some of the most

and even drug addiction. The technique is generic in that it can inhibit any of the mutated kinases they're studying with little modification.

"If inhibiting a mutated kinase affects a disease in the way we hope, a pharmaceutical company could then make an inhibitor for the wild type form of the kinase as it exists in the body," he says.

In April, Shokat and two collaborators demonstrated that their chemical-genetic technique could also shed light on how cells in the brain develop. Understanding how the growth of neurons are regulated could provide insight into diseases like Alzheimer's, Shokat says.

"Kinases are involved in almost every aspect of physiology," he says. "Yet people have no idea about the function of even the most well-studied kinases."

To that end, Shokat is also perfecting another chemical-genetic tool similar to the inhibitor approach that can reveal kinase function. Instead of targeting a mutated kinase with an inhibitor, a "tagging" molecule is delivered to the kinase. Shokat can then track the kinase as it travels along the signal pathways in the cell.

provocative scientific questions of our time. Join them November 5th and 6th to absorb, reflect, question, and challenge. Curriculum Guides will be made available to help make more formal connections between the topics presented and high school or college curricula. For more information, visit www.wonderfest.org.