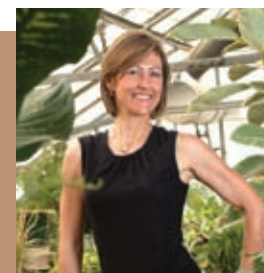
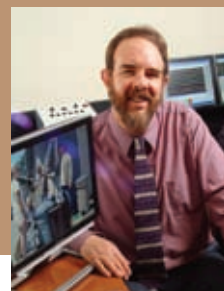


California State University, Fresno

Research and Creative Activities

New Century



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From the University President and Provost

Welcome



Ten years ago California State University, Fresno set a goal of becoming Central California's premiere interactive university. We are proud to say the university has achieved that goal. Fresno State expanded outreach to nontraditional students and community groups, just as it assumed responsibility for developing a range of new programs designed to serve the special needs of the San Joaquin Valley. In the process, the university has nurtured research and creative activities beyond our highest expectations.

Now we are setting our sights on achieving Carnegie Research Intensive status, with a special designation as an "Engaged" university. Achieving such an ambitious goal will require new commitments, greater energy, focused efforts and expanded resources.

Fresno State will need to invest in a more-sophisticated infrastructure to underscore the importance of research to our mission and to provide an institutional fulcrum to leverage faculty expertise. Infrastructure support will mean investing in people, equipment and facilities. We must continue to attract the highest quality faculty, who are adept at both research and teaching, and we will nourish them with ongoing support. We will need to expand our graduate program in key disciplines and tap the potential of what will be the Valley's finest library. Finally, we must find new and creative ways to tell the stories of faculty achievements in research, scholarship and creative activities.

In five years we will be on the threshold of Fresno State's 100th anniversary. We look forward to reaching that milestone by celebrating a period of research accomplishments never reached in the university's history.

John D. Welty
President

Jeronima Echeverria
Provost



The First Five Years

Between 2001 and 2005, California State University, Fresno experienced unprecedented growth in research and sponsored programs. External support in these areas reached \$183 million, more than doubling the \$81 million raised in the previous five years. Federal, state and private funding all increased dramatically, as faculty and staff initiated new academic studies and developed programs to enhance opportunities for students.

Federal agencies led the way in science, education and technology funding. The National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA) and the National Institutes of Health (NIH and NIMH) awarded nearly \$6 million dollars in highly competitive grants. These funds helped the university launch the SCORE, RISE and COR programs along with numerous other faculty research awards and student stipends in fields as diverse as biology, psychology, and linguistics. The U.S. Department of Education provided \$20 million to support mathematics education, curriculum and faculty development, technology infrastructure and deployment, and teacher training. The U.S. Department of Commerce provided millions more to expand the university's distance education capabilities in 22 remote sites and to jumpstart on-line entrepreneurship programs. The National Endowment for the Humanities (NEH) underwrote innovative high school humanities reform. The State Department supported international scholarly initiatives and the U.S. Department of Agriculture

funded nearly \$3 million for agricultural research and outreach.

State agencies also looked to Fresno State to greatly expand agricultural, social and educational research and to expand services in these areas. The California Department of Food and Agriculture, Energy Commission and Department of Fish and Game together awarded \$15 million for study and remediation programs related to soil salinity, wetlands, crop yields, water quality and conservation, plant infestation and pump efficiencies on hundreds of California's farms. The Department of Social Services provided \$7 million for programs serving health professionals and foster parents, and Caltrans granted nearly \$2 million for such diverse studies as seat belt use and paleontology research.

Private foundations also showed confidence in the Fresno State's research and service capabilities. The Kellogg Foundation awarded the university one of only 13 major grants in the nation for ENLACE, a program serving migrant students. The California Endowment and the Irvine Foundation invested heavily in the university's ability to improve health care, child welfare and education. The Ford Foundation funded economic development efforts in China and scores of other foundations provided generous support for programming efforts in virtually every discipline and for all constituencies.

All told, measured by the breadth, depth and quality of sponsored research and creative activities, whether undertaken under the auspices of external funding or conducted

with internal institutional support, the first five years of the 21st century have exceeded Fresno State's most ambitious expectations.

Looking Forward

As the university enters the century's second five years, it is posing fundamental questions about research and scholarship that will spark spirited debate and lead to positive change.

What critical factors contribute to a vital research program capable of invigorating an institution of higher education? How are those factors combined to meet the broader goals of a large public university that values teaching and community engagement alongside research and creative activity? How does a university achieve the proper balance between these goals? In what ways does faculty research translate into better teaching? How can a university measure the effectiveness of faculty research as it relates to professional growth and student learning? At what point does an institution change direction or set higher goals for itself?

Because Fresno State is a dynamic institution, the answers to these questions never will be fixed or final, but over the next five years the university will give expression to its research commitment in ways that already have engendered a reinterpretation of our mission and will continue to for years to come.

Thomas McClanahan
Associate Vice President for Research and Sponsored Programs



Alejandro Calderón-Urrea

Calderón-Urrea's research revolves around the study of nematodes, the parasitic worms that are linked to a major problem facing crop production in California's San Joaquin Valley and other agricultural centers of the world.

Designing new methods to protect plants

Biologist Alejandro Calderón-Urrea exemplifies many of the traits an engaged university with a growing commitment to research looks for in its faculty.

He values scientific inquiry not only for its theoretical value, but for its practical applications as well. The Colombian native also is a talented educator who knows how to inspire and guide students toward ambitious personal and professional goals.

"One of the reasons I teach," he says, "is to convey to students a more meaningful understanding of science. I want students to broaden their visions of the positive impact scientific research can have on solving many of the world's environmental challenges."

Calderón-Urrea's research revolves around the study of nematodes, parasitic worms that are linked to a major problem facing crop production in California's San Joaquin Valley and other agricultural centers of the world. Nematodes result in an estimated \$10 billion annual loss to U.S. agriculture, and nearly 10 times that figure worldwide.

Economic loss is not the only problem associated with plant pathogenic nematodes. Currently, the best defense against these pests is the use of methyl bromide, a chemical fraught with environmental hazards. Methyl bromide is being phased out of use in U.S. agriculture, and Calderón-Urrea's research may lead to an environmentally friendly replacement.

The 2001 academic year was an especially busy one for Calderón-Urrea. His teaching career reached a watershed in recognition of his years of dedication. He was awarded the McNair Outstanding Faculty Mentor Award and, having demonstrated his abilities in the classroom, he earned tenure and advanced to the rank of associate professor. That year his commitment to student research also found new expression when he joined the planning board for Fresno State's Central California Research Symposium (CCRS), a regional forum where university students, faculty and professionals come together each year to share their research with peers, advisors and other faculty. His commitment included actively mentoring science students, serving

on CCRS proposal review panels and judging the competition.

By 2005, Calderón-Urrea had become one of the university's most active and creative researchers. In the spring, he received the Claude C. Laval, Jr. Award for Innovative Technology and Research. Later that year the university was awarded a major grant from the National Institutes of Health (NIH) to implement RISE, a program for minority students pursuing careers in biomedical fields. RISE represents a milestone for the university in its progress toward achieving Carnegie Research Intensive status, and it will open many new doors for Fresno State students. Calderón-Urrea's leadership was instrumental in securing RISE, and he now shares management responsibilities with biologist Alice Wright.

As the university enters a new phase in its growth, it appears there will not only be many more years of research and teaching for Calderón-Urrea, but bright and challenging futures for his students as well.

He values scientific inquiry not only for its theoretical value, but for its practical applications as well.

2001

PROGRAM PROFILE: Support of Continuous Research Excellence Program (SCORE)

Scientific researchers received more than \$2 million from the National Institutes of Health to conduct biomedical research

projects. Directed by Shirley Kovacs, chair of the Department of Biology, researchers included Alejandro Calderón-Urrea,

James Prince, Maurice Cohen, Christine Edmondson and Mamta Rowat.



Careers and Technology Professional Development Project (HECT), providing in-service experiences for teachers. Funded by the California Department of Education Home Economics Unit, HECT helps teachers maximize students' academic achievement while simultaneously connecting teachers with business and industry partners. That combination ultimately helps students obtain high-skill, high-wage jobs in industries such as hospitality, food service, fashion, child development and education. A faculty member since 1971, Dilbeck says Fresno State has continued to attract state funding and talented professionals because the campus demonstrates a sincere commitment to serving the evolving needs of educators. "The University is known by teachers and students throughout the state who have been positively impacted by the HECT project," she says, "and when I see my former students in leadership roles, I know we can be proud of our efforts."

Barlow Der Mugrdechian

Barlow Der Mugrdechian has been instrumental in developing "all things Armenian" at Fresno State. In addition to working as the adviser to the Armenian Students Organization, he has cultivated a partnership between Fresno State and Yerevan State University, the largest

university in Armenia. In 1999, Der Mugrdechian was awarded a \$104,000 grant for a Faculty Development Program in Business and Economics between the two universities. That grant was extended for an additional \$300,000. He traveled to Armenia several times with students and faculty, including a 2004 trip with Fresno State President John D. Welty. In Armenia, Dr. Welty signed a five-year extension of the agreement that pledges the two universities to work together in areas of mutual interest, including business and Armenian history and language. Der Mugrdechian's creative work extends to hosting a weekly radio show, "All Things Armenian," on Fresno State's radio station, KFSR-90.7. The program features interviews with noted Armenian guests and music by Armenian composers and musicians.

Carol Fry Bohlin

Mathematics education professor Carol Fry Bohlin believes in taking steps to empower teachers: "I am passionate about helping teachers increase their mathematical competence and confidence so that they can go far beyond merely covering mathematics topics to uncover the beauty and power of mathematics in their classrooms, thus helping to increase their

students' knowledge of and enthusiasm for this fascinating subject." As part of her efforts, she helped develop Strategies for Teacher Excellence Promoting Student Success (STEPSS), a six-year, \$3.9-million project funded by the National Science Foundation. STEPSS is designed to strengthen and enhance the mathematics content knowledge and teaching skills of K-6 teachers, administrators and pre-service teachers in the Visalia Unified School District. As project co-director and coordinator of the master's program for STEPSS teachers, Bohlin's research entailed collecting attitudinal and mathematics performance data to measure the effectiveness of the program. The results showed a positive relationship between teacher involvement in STEPSS activities and their students' performance on mathematics assessments and attitudes toward mathematics. In addition to having spearheaded the San Joaquin Valley Math Project for 15 years, Bohlin is the founding editor of the weekly news journal California Online Mathematics Education Times and founding president of the California Association of Mathematics Teacher Educators.



K.C. Chen

K.C. Chen's research focuses on the solution of theoretical and practical problems in finance, something his Student Investment Fund students put to the test every semester. To help them learn the risks and rewards of investing, they actually invest \$100,000 from the Craig School of Business endowment and private funds. Chen helps them in making the final investment decisions, but he does not prevent them from learning the hard way. "I allow them to make mistakes," he said. "It's part of the educational costs." Regarded as the school's most-productive researcher by the former dean of the Craig School, Chen has gained widespread recognition for his work, including the 2001 *Provost's Award for Distinguished Achievement in Research*,

Scholarship or Creative Activity. Known for teaching corporate financial management and investments, his research has led to 23 refereed journals, four book chapters, three instructional books, 21 refereed proceedings and 37 conference presentations. A past editor of the International Journal of Business and chair of the Fresno State Department of Finance and Business Law, Chen currently researches pricing new securities and financial engineering. With colleague John Mahoney, he also won funding to sustain the undergraduate degree option in real estate.

Shirley Kovacs

Faculty and student research in biomedical and behavioral areas has increased dramatically with the establishment of the Support of Continuous Research Excellence Program (SCORE). Under the leadership of biologist Shirley Kovacs, coupled with the active involvement of science faculty members Alejandro Calderon-Urrea, Jim Prince, Jorge Benitez, Maurice Cohen and Christine Edmondson, the program has brought Fresno State more than \$5 million from the National Institutes of Health. SCORE's purpose is to develop biomedical research faculty at minority-serving institutions committed to improving competitive research programs and increasing the number of underrepresented

minorities professionally engaged in biomedical research. These lofty goals are achieved in part by providing financial assistance to competitive developing research programs in all areas of biomedical and behavioral research at institutions with significant underrepresented minority student enrollments. The program supports faculty-initiated, scientifically meritorious research projects, including pilot projects. Support for faculty participating in these projects is preparatory to seeking more substantial funding from other NIH research programs.



"When I see my former students in leadership roles, I know we can be proud of our efforts."

Nina Dilbeck

University Business Center (UBC)

IN 2001, the UBC launched Accelerator Online with two \$500,000 grants from the U.S. Department of Commerce and the California Department of Trade and

Commerce. The UBC also attracted grants of more than \$1 million for a variety of cutting-edge business development programs.

Lyles Center

THE LYLES CENTER offers consulting and evaluation services for innovators and entrepreneurs of all ages, from elementary students to adults. In 2001, the Lyles Center

received more than \$300,000 in grants for a range of projects including stipends for graduate students to consult with entrepreneurs, expanding course offerings

and conducting entrepreneur competitions for elementary and high school students.



Barbara Owen

With support from Fresno State intramural funds, Owen began an intensive program of study that resulted in her now-classic work, *In the Mix: Struggle and Survival in a Women's Prison*, which describes the gendered nature of punishment in the contemporary prison through detailed narratives obtained during interviews with scores of incarcerated women.

Exploring women's pathways to prison

Fresno State criminologist Barbara Owen explores women's pathways to prison and the ways in which women "do their time." Before coming to the university from the Federal Bureau of Prisons in 1990, her work – like most prison studies – examined male prisons. Little did she know that the then-California Department of Corrections was building the world's largest prison for women 26 miles away near Chowchilla. Once she visited the Central California Women's Facility, she began to focus on gender issues surrounding crime and prison. With support from Fresno State intramural funds, she began an intensive program of study that resulted in her now-classic work, *In the Mix: Struggle and Survival in a Women's Prison*. This book describes the gendered nature of punishment in the contemporary prison through detailed narratives obtained during her intensive interviews with scores of incarcerated women.

Although she expected some academic reaction to the book, she was surprised that the research also came to the attention of both prison managers and activists concerned with the rising numbers of

women in prison. One of her favorite invitations came from a warden in a large southwestern state who called and said, "I just read your book. Why don't you come out here and tell us what we are doing wrong?"

In 2003, she co-authored a major funded report for the National Institute of Corrections, "Gender-Responsive Strategies: Research, Practice, and Guiding Principles for Women Offenders," available on the NIC Web site. The report received the University of Cincinnati award in 2003 for outstanding contributions to the criminal justice field. These gender-responsive strategies have become the foundation for practices throughout the country. In 2005, she began to work half-time for the newly renamed California Department of Corrections and Rehabilitation, focusing on improving operational practice for women prisoners by creating women-centered policy, practice and programs for the 11,000 women imprisoned in California.

Owen has received grants from federal and state sources to examine, among other issues, female recidivism and policies

relating to girls and young women in California's juvenile justice system. She also is working extensively on the Prison Rape Elimination Act, developing research and training. While this work initially returned her to the world of male prisons, she is developing a concentrated study of sexual violence in women's prisons as well.

Owen received the 2002 *Provost's Award for Excellence in Research*. Since then, the university and the College of Social Sciences have continued to support her research efforts, including financial support for her current book, "Changing Lives," a study of prison-based drug treatment, as well as underwriting her expenses for a presentation on female recidivism at an international conference.

2002

Owen received the 2002 *Provost's Award for Excellence in Research*. Since then, the university and the College of Social Sciences have continued to support her research efforts, including financial support for her current book, *Changing Lives*, a study of prison-based drug treatment.

PROGRAM PROFILE: Agricultural Research Initiative (ARI)

Fresno State's California Agricultural Technology Institute (CATI) is the centerpiece of the ARI, a multimillion-dollar research initiative designed to improve the

economic efficiency, productivity, profitability and sustainability of California agriculture and its allied industries. Three other CSU campuses, Cal Poly Pomona, Cal

Poly San Luis Obispo and Chico State, are part of this statewide focus on agriculture.





Sanliang Gu

Viticulturist Sanliang Gu's goal is to improve the fruit quality of wine grapes in Central California. His numerous research grants, publications and honors indicate he is having success. As Ricchiuti Chair of Viticulture in the Department of Viticulture and Enology, he devotes most efforts to research, although he is an enthusiastic teacher. He works closely with the grape industry and government agencies to develop and conduct projects leading to practical applications. In a recent award from the U.S. Department of Agriculture

(USDA), Gu looked at the impact of "hang time" on wine grape fruit quality and vine health. Other major research grants allowed him to study the feasibility of air injection under subsurface drip irrigation, the influence that training systems have on pruning practices and soil types on Eutypa dieback, the effect of partial rootzone drying and the performance of new USDA-ARS rootstocks. Gu's work was recognized with the Outstanding Research and Scholarly Activity Award in 2004 from the College of Agricultural Sciences and Technology. "Research is about something new, not day-to-day routine matters," he

says. "I get excited when a project is funded, but the most exciting part of my work is seeing the results of my efforts shared with others not only in professional journals, but also in the classroom."

Alice Wright

From the time she was in junior high, biologist Alice Wright knew she was headed for a science career. She loved "exploring things" through laboratory experiments, so she set her sights on research. Today, this research revolves around microbiology and agro-chemicals. She is investigating how agricultural practices such as chemical applications and irrigation methods affect microbiological communities and individual microbes that live in the soil and how microbes affect the chemicals applied to the soil. With funding from the Fresno State-based Agricultural Research Initiative and California Agricultural Technology Institute, she is studying genetic diversity of pesticide degradation of agricultural soils. In addition, a major award from the California Department of Food and Agriculture has allowed her to study the effect of vine root aeration on table grape productivity. Wright says the research will help scientists and farmers understand what happens to bacteria and what the microbes are doing to the chemicals, which may eventually help them make decisions

regarding what kinds of chemicals to use. Results also may lead to innovations in bioremediation and the genetic engineering of microorganisms to degrade persistent pollutants. Highly regarded in the classroom as well as the laboratory, Wright received the 2005 Provost's Award for Graduate Teaching and Mentoring.

Ali Peyvandi

International students add value to a university by providing diverse perspectives unique to their cultural backgrounds. In turn, universities enhance the ability of foreign students to develop the skills that will be needed in a global society. Ali Peyvandi, director of the Craig School of Business' International Business Program, certainly has done more than his share to help the campus enroll and embrace students from around the world. His efforts have increased enrollment of international students in the Craig School from 20 to more than 100 in the two years since he originated the graduate program for international students and developed an agreement with two German universities to send students to complete their MBAs. Peyvandi, who holds the endowed chair of Joy D. Covey Professor of International Business, was recognized in



2002 with the Provost's Award for Graduate Teaching and Mentoring. He has consulted with multinational corporations, the World Bank and governmental agencies on accounting and management issues. Peyvandi and colleagues have obtained significant grant funding to train students seeking careers in export businesses and to help promote businesses that hire these students. His recent research publication article is "Assessing Currency Exchange Rate Exposure Using Geographic Segment Disclosures" in the Advances in International Accounting Journal.

Sharon Benes

The soil below our feet is not just dirt to Sharon Benes, one of Fresno State's



foremost plant scientists. In fact, proper soil management is a very credible way to make crops productive. Concentrating her research on salt management practices for the west San Joaquin Valley, Benes has identified salt-tolerant plants, including forages, for systems that reuse saline drainage water for irrigation. Her work is an example of how university researchers develop practical applications and benefits for Valley concerns – in this case, utilizing agricultural wastewater to produce forages for the local animal industry and improving soil quality with sub-surface drainage systems. The issue has statewide and international implications. An estimated 4.5 million agricultural acres in California are salt-affected, and worldwide nearly one-fifth of irrigated lands are salt-affected. Benes says colleagues in Australia, Israel, India and Pakistan are working on related salinity/soil management research issues. "It's exciting to see how we can sometimes reclaim marginal land and grow higher value, salt-sensitive crops because of proper soil and water management," she says. Benes' expertise also is useful to animal producers, food processors and municipalities that, at times, need to dispose of saline wastewaters in an environmentally responsible manner.

Wade Gilbert

Getting in shape is serious business to Wade Gilbert. A kinesiology professor, he is creator of School-based Healthy Activity Program for Exercise (SHAPE), a research and intervention project to help high school students improve their physical activity, fitness, body composition and attitudes about activity. Gilbert's research for SHAPE takes him to places such as culturally diverse McLane High School in Fresno. "Students wear pedometers for seven days as part of the pre- and post-intervention data collection," explains Gilbert. "They also complete an endurance run test to measure cardiorespiratory endurance." Several Fresno State faculty members are partnering with Gilbert on this project, including Jenelle Gilbert, Michael Coles, Robert Pettitt and Bernard Arenz. Gilbert recruited three graduate students to help. Beyond helping the students, SHAPE also provides support for faculty and staff at school sites. "We have trained the teachers to implement the intervention," says Gilbert. "The idea behind SHAPE is a schoolwide initiative. Our aim is to make physical activity a cultural norm." Students and faculty involved in SHAPE are encouraged to get family members involved in fitness. Part of their homework is inviting a friend or family member to a free class such as aerobics, sponsored by the Mayor's Fitness Council.



"It's exciting to see how we can sometimes reclaim marginal land and grow higher value, salt-sensitive crops because of proper soil and water management."

Sharon Benes

Central California Center for Health and Human Services (CCCHHS)

CCCHHS, a research center of the College of Health and Human Services, is the nexus for a cluster of active centers and institutes focusing on public health,

practitioner training, foster parent training and children's services. In 2002, the center launched the Central Valley Health Policy Institute with a

multimillion-dollar grant from The California Endowment.

Social Research Laboratory (SRL)

THE SOCIAL RESEARCH LABORATORY specializes in conducting computer-assisted telephone interviewing through its state-of-the-art software and lab facilities. The SRL

conducts customer surveys on quality of life, needs assessment, workplace satisfaction and other special purposes for public and private organizations. In 2002, the SRL was awarded

more than \$150,000 in grants to conduct a major survey of residents in Fresno and Madera counties, focusing on drug and alcohol issues related to employment.





Shigeko Okamoto

In her newly published collection of articles, “Japanese Language, Gender, and Ideology: Cultural Models and Real People,” Okamoto and other authors investigated the speech patterns of Japanese women in diverse contexts and walks of life.

Unraveling how the meaning of words influences society

Our understanding of the world is shaped, in a fundamental way, by language. Linguist Shigeko Okamoto is unraveling how the meaning of words influences society and culture throughout the world.

A native of Japan, Okamoto is a leading researcher in the field of Japanese sociolinguistics, specializing in the relationships between language and society. In her newly published collection of articles, “Japanese Language, Gender, and Ideology: Cultural Models and Real People,” she and other authors investigated the speech patterns of Japanese women in diverse contexts and walks of life. Her research reveals how the expectations that Japanese culture places on women is revealed in unique patterns of speech and their social meanings.

“My expertise is in the diversity and complexity of language use,” she says. “What does it mean when you use different speech patterns and who is likely to use them?” In addition to gender, she has worked on a number of other sociolinguistic topics, including linguistic

politeness, communication styles and dialects. All these studies are empirical, based on her analyses of conversational data, which demonstrate that linguistic choices speakers make in specific social contexts are much more complex than the accounts given based on cultural stereotypes.

In addition to her publications, Okamoto shares her research findings in national and international venues. She recently taught a course at the Summer Institute of the Linguistic Society of America and spoke at the University of Kyoto for the 2005 Symposium on Written and Spoken Language. Okamoto’s talk focused on regional dialects, which have been undergoing the process of standardization due to a variety of factors related to the modernization of Japan, in particular the government’s language policy, which mandates that only standard Japanese be taught in schools.

“Shigeko Okamoto is a highly accomplished researcher with an international profile,” says Ritva Laury, a former colleague at

Fresno State who now is a professor at the University of Helsinki, Finland. “She has published an impressive number of articles and book chapters on a wide range of topics in the most respected venues, and is also a co-author of one book and a co-editor of two volumes.”

Her research in the field of language and gender is extremely well-regarded, says University of California at Davis linguistic anthropologist Janet Shibamoto Smith. “Her work has been one of the major forces serving to bring Japanese language and gender issues to center stage in recent years.”

In addition to gender, Okamoto has worked on a number of other sociolinguistic topics, including linguistic politeness, communication styles and dialects.

2003

PROGRAM PROFILE: Title V

In 2003, Fresno State won two highly competitive major awards totaling more than \$5 million from the U.S. Department of Education for Title V projects that

provided support for extraordinary improvements at the campus and at West Hills Community College in Coalinga. These programs provided substantial

technology enhancement, online course creation and professional development for faculty across disciplinary and institutional lines.



Aribilola S. Omolayo

Geography professor Aribilola S. Omolayo doesn't just talk about the weather, he does research to better understand patterns and changes to address a variety of challenges ranging from greenhouse gases in the San Joaquin Valley to hydrological designs in Australia. He's even collected data on the Mono Winds in the Bass Lake area of the Sierra foothills. His "Violent Weather: Study Guide" is an easy-to-follow book that many professors recommend to their students. Omolayo's most-recent project is with Fresno State colleague Segun O.

Ogunjemiyo: a study measuring fluctuations in the region's greenhouse gases. The two propose to put a measurement tower on the Fresno State farm. If funding allows, other towers would be erected throughout the San Joaquin Valley to collect data to address such concerns as irrigation and health problems such as asthma. Omolayo also uses Geographic Information Systems and remote sensing to help pinpoint climate problems that beset farmers and offer solutions that can be applied to specific areas of their crops to cut costs.

Kathleen Curtis

Prevention is at the heart of Kathleen Curtis' research and its applications to make the San Joaquin Valley a healthier place to live. Curtis is associate dean of Fresno State's College of Health and Human Services and director of the university-based Central California Center for Health and Human Services. She teaches and trains health care professionals, pursues research with faculty colleagues and partners with community organizations to address disparities in access to preventative care and the needs of the disabled. With eight graduate students, Curtis developed a program of seated aerobics and flexibility and strengthening exercises for women with disabilities, then offered transportation to a Fresno health club. The partnership also involved Fresno State's kinesiology, physical therapy and food science and nutrition resources. Her efforts to improve regional health care earned Curtis the President's Award of Excellence for 2005 at Fresno State.

Phyllis Kuehn

Phyllis Kuehn's research on academic achievements coupled with her dedication to assisting students with their own

research, made an indelible impact in the Kremen School of Education during her 14-year career at Fresno State. Kuehn's own research examined how minority and underprepared students with the basic aptitude for university study, but lacking the academic language skills necessary for success, can gain access to and successfully compete in universities. With support of more than \$1.5 million, notably from three U.S. Department of Education grants as well as a prestigious National Science Foundation grant, Kuehn was able to extend her work on academic language to a national context and publish two books of materials for use with high school and beginning college students. Many of her doctoral students have contributed to the work with academic language through their dissertation research, showing the relationship between academic language and academic achievement in a variety of educational contexts. Kuehn was involved extensively in assisting doctoral students with their research design and analysis as director of the Joint Doctoral Program. She also initiated and co-directed the Center for Research, Evaluation, Assessment and Dissemination, which offers research and evaluation services to area schools. In 2003,

she was recognized for her efforts with the *Provost's Distinguished Achievement in Research, Scholarship or Creative Activity Award*.

Hye Ok Park

Librarians don't confine their work to books. They have embraced technology to improve functions in the library as well as the classroom. Librarian Hye Ok Park is recognized as a leader in introducing and implementing new ways to facilitate effective and innovative uses of technology. "It has always been exciting for me to explore how technology can be used to advance research and education," she says. A 2003 recipient of the *Provost's Technology in Education Award*, Park automated the Madden Library's operations, including the online public access catalog. She also introduced online e-resources to provide easier and remote access to research materials. Park is credited with implementing the Digital Campus operation and the campuswide e-learning programs. She oversaw the creation of a support unit to provide assistance in online course development and teaching by the faculty. Park also played a key role in securing a multimillion-dollar award



from the U.S. Department of Education to bolster Web-based instruction and better serve students from rural areas unable to attend classes. Park spearheaded development of the Digital Campus Abroad program, which has participants in Korea and China and prospects in Japan, Thailand and Singapore.



2003

"It has always been exciting for me to explore how technology can be used to advance research and education."

Hye Ok Park

Science and Math Education Center (SMEC)

TRAINING SCIENCE AND MATHEMATICS EDUCATORS is critical to improving educational excellence at all levels. The SMEC serves as the Valley's major

coordinating center for professional development workshops, summer institutes and in-service activities, and a variety of special projects. In 2003, the center was

awarded National Science Foundation funding to supplement significant state funding for activities.

Viticulture and Enology Research Center (VERC)

FRESNO STATE IS THE FIRST university in the United States with a license to produce, bottle, market and sell wine commercially. VERC's internationally recognized faculty

conduct leading-edge, applied research related to all aspects of grape growing and wine making, from vineyard management to pesticide research. They provide excellent

undergraduate and graduate education and an expansive array of services to the table grape, juice and wine industries in California and the nation.



Charles Krauter

Krauter is a leader in air quality research as it relates to production agriculture, most recently studying the source of pollution-causing emissions through field research at local dairies. His work could have long-term impacts on air quality and dairy production in the Central Valley.

Leading air quality research

Although Fresno State plant scientist Charles Krauter grew up on a farm in the southern San Joaquin Valley, he acknowledges that until five years ago, the closest he got to a dairy was “eating ice cream and drinking milk.”

Today, Krauter is a leader in air quality research as it relates to production agriculture, most recently studying the source of pollution-causing emissions through field research at local dairies. His work could have long-term impacts on air quality and dairy production in the Central Valley.

Krauter’s initial research focused on the potential impact that applied fertilizers and pesticides have on agricultural groundwater quality. In 2000, his work shifted focus to air quality when he initiated a research project with NASA’s Ames Research Center to quantify ammonia gas emissions as a source of pollution from fields following application of nitrogen-based fertilizers.

Through Fresno State’s California Agricultural Technology Institute (CATI),

Krauter has documented the source of ozone-causing gases from dairies. Dairy operations are the number one agricultural industry in the Central San Joaquin Valley, and a frequently cited stationary source of the Central Valley’s perennial air quality problems.

“In places like the Central Valley, which is one of the most polluted parts of the country, we need to find out what is there, where it comes from and what can be done to correct the problem,” says Krauter, who received the *Provost’s Award for Research* in 2004. “We need to find practical things that will improve our air quality.”

His most recent study is funded by the USDA and the State Air Resources Board, with matching funds from the CSU Agricultural Research Initiative (ARI). He is taking inventory of the reactive organic gasses, such as methane, that are emitted from commercial dairies.

“The more we dig into it, the more complicated it seems to be,” he says. “We’re about 40 years behind where we should be

in this research, but we should have results that will be useful within two years.”

Ultimately, Krauter hopes that by researching the source of these emissions, producers and regulators can find ways to translate that knowledge into new technologies and production practices for dairies that will have a beneficial impact on air quality.



Krauter’s work shifted focus to air quality when he initiated a research project with NASA’s Ames Research Center to quantify ammonia gas emissions as a source of pollution from fields following application of nitrogen-based fertilizers.

2004

PROGRAM PROFILE: Central California Research Symposium (CCRS)

Faculty mentors from all academic disciplines play a pivotal role in the CCRS, which offers undergraduate and graduate students from across

California the opportunity to present research findings in an atmosphere that fosters research methodologies, mentorship, professionalism and

collegiality. In 2004, the CCRS celebrated 25 years of service on behalf of student research.



Sharon Brown-Welty

Her students would agree that the definition of a mentor as trusted counselor or guide fits Sharon Brown-Welty. Going the extra mile for students helped bring her the 2003 *Provost's Graduate Teaching and Mentoring Award*. Brown-Welty is the CSU Director of the Joint Doctoral Program in Educational Leadership (JDPEL) and advises students seeking an Ed.D. to design and conduct research. "There is much emotion and joy in watching students and graduates undertake a research project about which they may question their ability to complete and seeing them gain confidence by the end," says Brown-Welty. "It brings tears to my eyes every single time!" Brown-Welty's high regard for research led to the creation of the Central Valley Education Research Consortium, which brings JDPEL graduates back to continue research and disseminate findings. The consortium has produced three studies on successful methods to improve schools and student achievement, and is studying effective

teaching practices in high schools. Brown-Welty and colleague Phyllis Kuehn created the Center for Research, Evaluation, Assessment and Dissemination to assist students in research design and statistical analysis. The center contracts with schools and school districts to put theory into practice.

Nagy Bengiamin

Nagy Bengiamin's research and teaching is concentrated on system modeling, automation and control. An electrical and computer engineering professor, his research includes developing mathematical models for energy, thermal testing and robotic systems. He utilizes the developed models in the design of sliding mode and fuzzy logic control methodologies that ensure a robust performance and efficient system automation. As a visiting researcher at NASA's Dryden Flight Research Laboratory, Bengiamin worked on the modeling and control of a temperature test system for materials used in aerospace applications. The findings of that project will be presented at an

international simulation conference. In another project, he worked collaboratively with colleagues at Antelope Valley College and Joe Walker Middle School to develop a virtual laboratory that uses data produced at NASA's Dryden Flight Loads Laboratory. He also is developing electromechanical systems to extract energy from naturally vibrating systems. That would facilitate developing self-powered electronics and reduce the burden of replacing batteries in biomedical applications that otherwise may require intrusive surgery. Findings of this research were presented at an international conference on systems engineering. In the robotics area, he published several papers on robust control of industrial robots. He teaches industrial and mobile robot systems, with hands-on activities, to engineering students.

Alfred Evans

"Russian society has taken me down avenues I never expected to be on, both personal and professional," says political scientist Alfred Evans. Since traveling to the former Soviet Union nearly 30 years ago for an academic research exchange, Evans has witnessed first-hand some of the most fundamental historic changes of the 20th century. He recalls that during his six-month stay he never once was invited into a Russian home. The government controlled the price and supply of most commodities, just as it put tight reins on citizen discussion and participation in decision-making. "The changes are so fundamental," says Evans. "Academic, social and economic freedom has taken root in Russia." Today, economic reform is perhaps the most visible sign that the former system has shifted on its axis. The market economy is reaching into all but a few industries. Other more subtle changes are at work as well. When American professionals and academics visit, for example, it is commonplace for them to stay with Russian families, and there are growing numbers of non-government citizen groups exerting impact on social policy.



Vickie Krenz

What started as a small study for health science professor Vickie Krenz has grown impressively over the past five years. Fueled by \$1.2 million in grants and contracts, she has studied tobacco use and prevention throughout the region, teen pregnancy among the San Joaquin Valley's Hmong residents. The tobacco prevention project is conducted with eight partner sites from Chico to San Diego. Her work with Madera County sought ways to reduce early unintended fatherhood through community engagement, youth leadership and increased responsibility of adolescent

boys and young men and youth participation in curricula and community support activities. Krenz has worked with diverse groups on public health issues as disparate as nutrition, diabetes, HIV/AIDS, agricultural pesticides, asthma and barriers to cervical cancer screening among Latinas. Her research on those critical health issues has made her well-known and respected throughout the Central Valley. Krenz's active engagement among the Hmong, Native Americans and migrant farmworkers led to a Community Service Award by Blue Cross of California.



"The changes are so fundamental.

Academic, social and economic freedom has taken root in Russia."

Alfred Evans

Water Centers and Institutes

FRESNO STATE SPECIALIZES in research, professional training and community education on water policy, monitoring and distribution through the California Water

Institute, the International Center for Water Technology and the Center for Irrigation Technology. In 2004, these centers attracted grant and contract support of \$2,173,013

for 17 projects to address local, regional, statewide, national and international needs.



Maddy Institute

THE MADDY INSTITUTE was created with a \$1-million endowment from the state and named to honor Ken Maddy, a Fresno State graduate who represented the Valley

in the California Legislature for nearly three decades. With a mission to elevate citizen participation and government performance at all levels through leadership education for

public service, the Maddy Institute trained scores of local leaders in 2002 with a major grant from the Great Valley Center.

Changing the face of human service

Driven to “serve the poorest of the poor,” Charles Arokiasamy has applied the principles of service he gained while studying for the priesthood in his native Malaysia to his work at Fresno State. His focus is on the disabled and severely disadvantaged and his vehicle is the university’s Rehabilitation Counseling Graduate Program (RCGP). Since taking the reins of RCGP in 1995, student enrollment has more than tripled from 29 graduate students to over 100. All are actively engaged in improving the lives of the disabled.

RCGP’s motto is “Changing the Face of Human Service.” Fresno State students receive hands-on training and work opportunities that prepare them to aid physical, mental and psychological challenges their clients need to address if they are to function in society. Before accepting the responsibilities inherent in such complex and taxing work, students are rigorously trained to identify a range of disabilities, develop practical employment plans for the disadvantaged and assess those plans as they unfold in the workplace.

Once they are fully trained on campus, students work in clinics at Fresno State, alongside staff from the Department of Counseling, Special Education and Rehabilitation, which Arokiasamy chairs.

“We want to help people with disabilities enter into the mainstream of life,” Arokiasamy says. “The objective is to find out what barriers these clients have to employment and what we can do to help break down those barriers and give them the resources to meet their personal goals.”

Beyond matching these clients with jobs, the clinics help prepare clients for the mainstream workforce by tackling everyday tasks that most people take for granted, such as seeing the dentist or gaining access to free medication.

Whereas Arokiasamy is an idealist when it comes to public service, he is a pragmatist when talk turns to financing such ambitious programs. He understands that there are definite limits to what state dollars, dedication and creativity can do, so he aggressively pursues funding from many sources.

In 2000, RCGP was awarded \$2.5 million in multiyear training grants from the U.S. Department of Education. That alone provided scholarships for almost half of his graduate students. Other sizeable grants from external sources have helped to turn Fresno State’s program into a model for student recruitment, practical training and, above all, community outreach.

According to Arokiasamy, “These grants and contracts support real-world experience for our students while also giving our clients, who are among the most needy, one-on-one attention to help empower their lives.”

2005

“These grants and contracts support real-world experience for our students while also giving our clients, who are among the most needy, one-on-one attention to help empower their lives.”

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PROGRAM PROFILE: RISE

Under the direction of biology professors Alejandro Calderón-Urrea and Alice Wright, Fresno State students benefit from the \$1-million program funded by the

National Institutes of Health. The program engages some of our most able faculty in planting seeds of interest for biomedical research early in students’ careers while

providing research opportunities for qualified minority students as well.



Dave Tyckoson

Dave Tyckoson says approachability is what it's all about for librarians, and his current research is designed to help librarians become even more accessible. His project includes 50 sets of digital photographs showing various scenes, including libraries, and he asks participants which person seems most approachable. The study concentrates on the behavioral aspects of being a librarian. "The idea is that I can tell what things we do to encourage you

to ask questions and what things we do to discourage you," he says. The American Library Association is so impressed with his work that it has given him an advance and will publish a book that he plans to write based on the results of his findings. In 2005, Tyckoson was awarded the Isadore Gilbert Mudge-R.R. Bowker Award from the American Library Association for his contribution to reference librarianship. The \$5,000 award helped to jumpstart Tyckoson's research, which he has presented

at several conferences and through an online course he teaches. "What really surprised me," he says, "was that this certainly hit a demand out there in the profession that was greater than I expected."

Riadh Munjy

Geomatics engineer Riadh Munjy is helping to save the lives of surveyors who work on California highways. After Callie "Joel" Buser, a field survey party chief for the California Department of Transportation, was struck and killed in 1992 by a driver under the influence of drugs, Caltrans stepped up its efforts to minimize dangers faced by its employees. Caltrans teamed up with Munjy and fellow Fresno State professor Mushtaq Hussain to find solutions that would increase roadside safety. Munjy's specialty is digital mapping, a technology that can be used to gather surveying information from airplanes, lifting the burden – and some of the danger – from Caltrans workers by using Global Positioning System technology. "We didn't just do the research," Munjy said. "We solved the problem and worked with Caltrans personnel to train them." Caltrans liked Munjy's approach so much it awarded him the Caltrans Research Innovation

Award in March 2004. Caltrans surveyors began awarding scholarships to deserving Fresno State geomatic engineering students in memory of Buser.

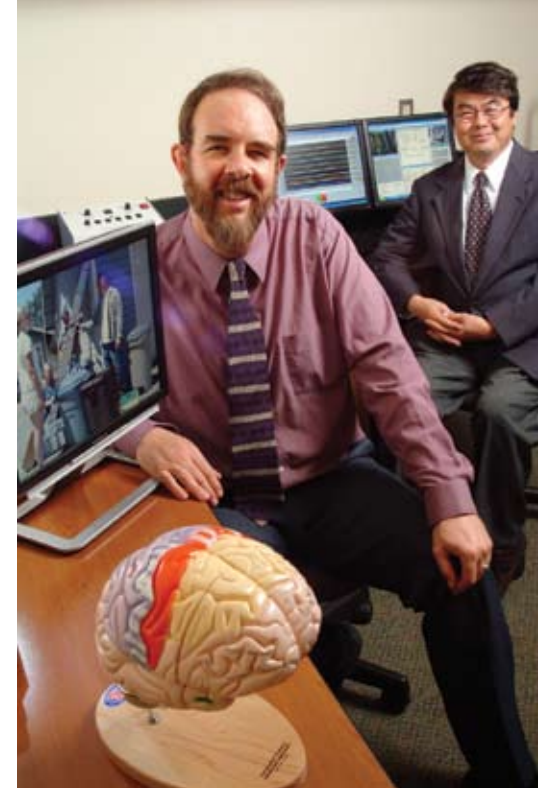
John A. Capitman

Recent research has highlighted troubling realities in the health care industry. In spite of growing efforts to provide quality medical service on an equitable basis, race, age, gender, ethnicity and social class continue to weigh heavily in decisions about who receives medical care. Why does this situation exist? How can we productively address it? These are two of many related questions that John Capitman attempts to answer through his research. Capitman is executive director of the Central Valley Health Policy Institute, which was established to focus discussion among health care providers, legislators, patients and others on the complex issues facing the San Joaquin Valley. At Brandeis University, Capitman earned national recognition for his studies of long-term care, substance abuse and racial and ethnic disparities in cancer care. Now, at Fresno State, he is building on that expertise

against the unique backdrop of the Central Valley to develop an extensive network of leaders who can add their own perspective and knowledge to the expanding challenges of health care access.

Matthew J. Sharps

In the blink of an eye, a gunman emerges and witnesses agree that he is about to shoot a woman. Is this a homicide in progress? What seems like an obvious "yes" quickly changes to "no" in psychologist Matthew J. Sharps' research lab at Fresno State. The reason? When the staged scene is replayed slowly on tape for research subjects, the suspect clearly is holding a cordless drill, not a gun. Sharps, winner of the 2005 *Provost's Award for Distinguished Achievement in Research*, conducts research on eyewitness identification of people and of weapons, and on how crime scenes are remembered and interpreted. These findings may prove to be critically important in improving the training of police officers, Homeland Security personnel, security guards and others. Aided by sophisticated neuroscience apparatus and capabilities in the new Science II building, Sharps and his students conduct research in cognitive aspects of addictive



behaviors and contextual reasoning. Their focus is on both the cognitive psychology of these areas and on the cognitive neuroscience underlying the relevant behaviors. An oft-honored professor and mentor, Sharps is the author of numerous publications on visual cognition and related topics. He has consulted on issues of eyewitness identification in more than 150 criminal cases.

2005

"We didn't just do the research. We solved the problem and worked with Caltrans personnel to train them."

Riadh Munjy

The ACT Center

FRESNO STATE houses the most active ACT Center in California. Affiliated with the international assessment organization, ACT, Inc., the center conducts employment

analysis, assessment and professional certifications for individuals, governmental agencies and businesses to aid in workforce development. In 2005, the center

conducted 10,000 assessments and online courses.

California Agricultural Technology Institute (CATI)

THE CALIFORNIA AGRICULTURAL TECHNOLOGY INSTITUTE administers an array of applied research and development projects focusing on agriculture and natural

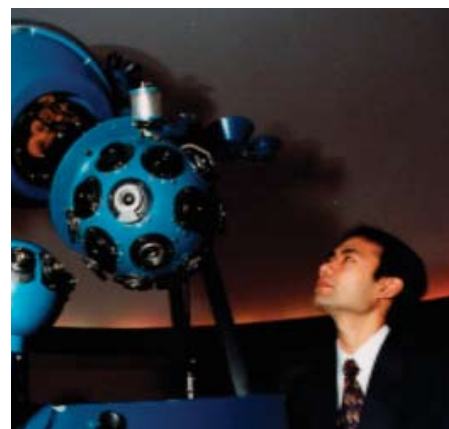
resources. Fresno State faculty from many disciplines conduct research broadly designed to improve the economic efficiency, productivity, profitability and sustainability

of California agriculture and its allied industries.

Claude Laval Jr. Award Recipients

Laval

The Claude C. Laval Jr. Award for Innovative Technology and Research was established in 1984 in honor of Mr. Laval, an inventor and longtime resident of Fresno. Made possible by a generous gift from Mr. and Mrs. Claude C. Laval III, this annual award has supported creative inquiry at Fresno State for 20 years.



2001 Junya Kasahara

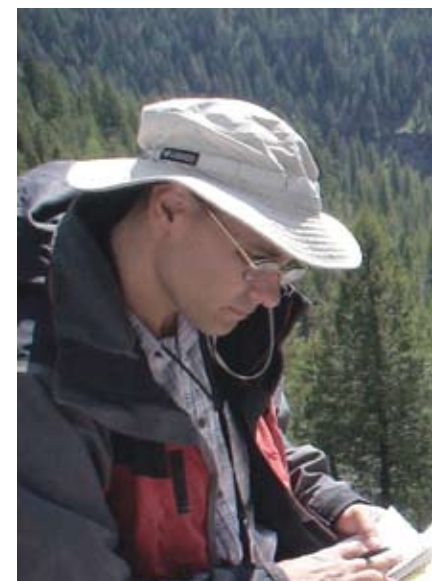
Traversing the world from Japan to the United States, Junya Kasahara is the only student to win the Claude Laval Jr. Award. Kasahara received the 2001 award for "Mapping the Large Scale Structure of the Universe with Hierarchical Image Segmentation." For the one-year project, Kasahara used a technique he learned while viewing satellite images of Earth to quantify the structure of the universe on its largest scale. Kasahara's faculty sponsor for the project was physicist Frederick Ringwald. The result of the research was that Kasahara was able to detect a possible star formation region among interstellar hydrogen gas. In practical terms, his work can help astronomers with observation. Kasahara is currently a Ph.D. candidate at the University of Utah. He says his research at Fresno State will contribute to his thesis on dark matter and cosmology.

2002 Gerald McMnamin

Gerald McMnamin's work in forensic linguistics frequently takes him to court, where he serves as an expert witness to help prove or disprove the authorship of various pieces of writing. For example, the well-known JonBenet Ramsey case required someone with his expertise to prove that her parents did not write the ransom note. "You look for style characteristics in their writing," he says. McMnamin studies the writing for unique characteristics, such as the way words are formed, abbreviations or the way sentences are put together. This helps him draw conclusions about the author of a piece. Sometimes he is challenged in court. That's why he proposed the American Writing Project. He was awarded the Claude Laval Jr. Award in 2002 for this proposal, which included gathering a sample of 400 randomly selected letters to the editor submitted to newspapers across the United States. These letters served as a sampling or "corpus" of American writing that could be analyzed for trends



and add weight to McMnamin's words in court. Students from Fresno State and Bullard High School helped to collect and record data, and the project culminated with a presentation to the American Society of Questioned Document Examiners.



2003 Keith Putirka

Earth and environmental scientist Keith Putirka takes research beyond the lab to study volcanic rocks in the Sierra Nevada mountains north of Yosemite National Park, in Yellowstone National Park and at Mauna Kea in Hawaii. According to Putirka, "Volcanic rocks bring up from the depths things that humans could not possibly bring up," helping scientists better understand what brings magma to the surface. Putirka and a fellow researcher are building a case for the new volcano formation model by tracing the incidence of a mineral called clinopyroxene. The varying presence of the mineral enables the scientists to determine exactly how deep magma was formed. They have been studying the Springerville

volcanic field in Arizona to track how magma has changed chemically as it traveled up to the surface. Putirka's research on volcanism brought him the 2003 Claude Laval Jr. Award. He also works with an international team of scientists on analysis of samples of volcanic rock. At Mauna Kea in Hawaii, the largest mountain on our planet, scientists send him rock samples to examine. The latest findings of Putirka's research were published in *Geochemistry, Geophysics and Geosystems*.

2004 Mamta Rawat

Biologist Mamta Rawat is quick to quote the statistics that drive her research. With 2 million people dying from the disease every year, tuberculosis is the leading cause of death from bacteria. "A lot of people who have this disease have a latent phase," says Rawat. "You are infected, but it's latent until you have a reaction." Rawat spends countless hours each week in the lab, exploring the role of mycothiol in



tuberculosis in an effort to find drugs that can help fight the disease. One issue is the increase in multidrug resistant strains of the disease. Her research also explores bioremediation, which is the use of natural microorganisms to clean up pollution. She examines how mycobacteria might be used to help degrade natural organic material as well as man-made pollutants in contaminating soils. Rawat received the 2004 Claude Laval Jr. Award for this innovative research project, and her work has been published in various journals, including *Planta* and the *Journal of Biological Chemistry*.

2005 Alejandro Calderón-Urrea

From the research lab to the dance floor, Alejandro Calderón-Urrea is a man of many talents. An associate professor of developmental biology, Calderón-Urrea's research focuses on the process of programmed cell death in plants. But as he once told a BBC Radio audience, his diverse interests are not limited to the lab. Talking about the role genetics plays in an individual's physical abilities, he revealed his love of dancing. According to Calderón-Urrea, skilled dancers can thank good genes and a supportive cultural environment. Dancers are scarce in the halls of the biology department, but only because faculty and students are busy working in such a productive setting. After receiving the Claude Laval, Jr. Award for Innovative Technology and

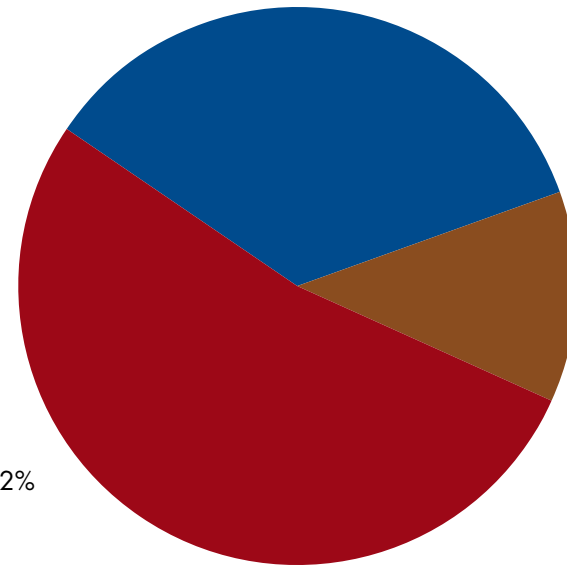


Research in 2005, Calderón-Urrea was able to improve the equipment in his research lab, which includes a sophisticated four-dimensional microscope and advanced computer software. The technology helps in designing new methods to protect plants against parasitic nematodes. With the microscope, Calderón-Urrea and his research team can take pictures over a 14-day period of the development of the nematode. Later, these photos are used to create a four-dimensional image. "You can see it happening in front of your eyes," says Calderón-Urrea. "It's really cool." Calderón-Urrea works with 10 graduate and undergraduate students on the research, which he estimates will take five to 10 years to complete.

Awarded Grants and Contracts by Funding Sources

Year	2000-01	2001-02	2002-03	2003-04	2004-05	Total
Federal	\$9,549,289	\$14,707,998	\$14,263,521	\$14,055,871	\$10,750,986	\$63,327,665
State	\$16,047,703	\$19,894,047	\$30,203,275	\$19,442,142	\$12,978,958	\$98,566,125
Private/Other	\$7,921,396	\$3,541,374	\$3,320,875	\$3,307,845	\$3,212,363	\$21,303,853
Total	\$33,518,388	\$38,143,419	\$47,787,671	\$36,805,858	\$26,942,307	\$183,197,643

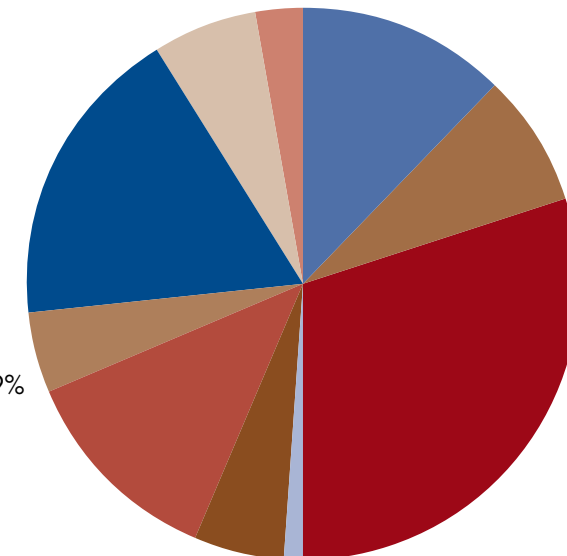
Federal 35%
State 53%
Private/Other 12%



Distribution of Funds by College

Year	Admin	Student Aff	Ag	Arts & H	Business	Educ	Engrg	Hlth & HS	Sci&Math	Soc Sci	Total
June 00/01	\$3,433,253	\$3,182,608	\$5,812,598	\$1,193,287	\$4,376,941	\$4,211,475	\$591,095	\$7,695,062	\$2,256,018	\$766,051	\$33,518,388
June 01/02	\$4,529,163	\$1,958,565	\$11,977,962	\$754,949	\$2,033,565	\$4,011,468	\$1,184,028	\$9,286,432	\$1,851,025	\$556,262	\$38,143,419
June 02/03	\$4,342,195	\$3,662,348	\$15,796,730	\$228,917	\$2,289,099	\$6,429,180	\$2,909,966	\$8,397,157	\$2,875,315	\$856,764	\$47,787,671
June 03/04	\$6,135,581	\$2,418,435	\$12,590,494	\$165,894	\$606,040	\$4,991,201	\$1,493,551	\$4,250,082	\$3,210,898	\$943,682	\$36,805,858
June 04/05	\$4,090,863	\$3,243,640	\$8,411,558	\$83,404	\$459,781	\$2,400,895	\$2,409,517	\$3,152,589	\$1,092,656	\$1,597,404	\$26,942,307
Total	\$22,531,055	\$14,465,596	\$54,589,342	\$2,426,451	\$9,765,426	\$22,044,219	\$8,588,157	\$32,781,322	\$11,285,912	\$4,720,163	\$183,197,643

Administration 12.30%
Student Affairs 7.90%
Agriculture 29.80%
Arts & Humanities 1.32%
Business 5.33%
Education 12.03%
Engineering 4.69%
Health & Human Services 17.89%
Science & Math 6.16%
Social Science 2.58%



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