

A microscopic image of plant tissue, likely a leaf cross-section, showing a dense network of red-stained cell walls. Several cells are highlighted with bright green fluorescence, indicating specific cellular components or structures. The overall appearance is a complex, wavy pattern of red lines with scattered green spots.

SAN DIEGO STATE UNIVERSITY
2018 - 2019
RESEARCH
HIGHLIGHTS



SAN DIEGO STATE
UNIVERSITY



SAN DIEGO STATE UNIVERSITY

2018-19 was a year of noteworthy successes and milestones here at San Diego State University.

The university received \$148.5 million to support critical research, representing a considerable 10 percent increase over the previous year and one of SDSU's best funding years on record. Dedicated researchers across disciplines were awarded a \$20 million five-year grant from the National Institutes of Health (NIH) to support health disparities research, the largest research award in SDSU history.

In November San Diego voters overwhelmingly approved the University's vision for the SDSU Mission Valley campus, which includes plans to build a research and innovation district that will bolster SDSU's research enterprise and community connections long into the future.

Some 312 principal investigators received 786 awards to support research that alters our understanding of the natural world and has promising potential to improve human lives.

University researchers investigated treatments for therapy-resistant cancer cells, developed mental health interventions for children with autism, studied water sanitation systems throughout the globe, and gained critical insight on how human muscles develop and are affected by genetic disease. In nearly every instance, graduate and undergraduate students worked alongside dedicated faculty, contributing to their discoveries and gaining valuable practical experience.

A complete listing of 2018-19 grants is available online at www.foundation.sdsu.edu/awards.html.

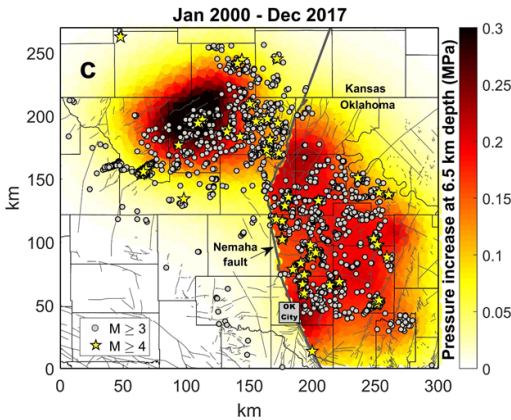
Stephen C. Welter
Vice President for Research and Dean of Graduate Affairs
San Diego State University



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Minimizing Man-Made Earthquakes

MATTHEW WEINGARTEN

Geological Sciences

Injection wells are used by oil and gas companies to dispose of fluid underground. However, this injection of waste fluids has the potential to cause “man-made” earthquakes. Geologist Matthew Weingarten is developing tools to mitigate injection-induced seismicity or man-made earthquakes. He uses hydrogeologic, geophysical and geo-mechanical data to build computational models of the interaction between fluids and faults in the subsurface.

Dr. Weingarten is creating a model of the Raton Basin in Colorado and New Mexico, where persistent injection-induced seismicity presents a hazard to the basin infrastructure and the local population. In addition to estimating the magnitude potential on the active fault zones, this work will demonstrate the effect of historical injection on the currently active fault zone, address how injection rate and volume declines have affected the active fault zones, and calculate how future injection could be optimized to minimize induced seismic hazard.

The U.S. Geological Survey supports this research.

- 1 An operator in Colorado drills a hydraulically fractured production well. Photo by CU-Boulder
- 2 Dr. Matthew Weingarten, Dr. Jenny Nakai and Dr. William Yeck align a seismometer during an installation in Colorado. Photo by David Oonk
- 3 A model predicts pressure changes from injection wells where hotter colors mean more pressure. Higher pressure changes are correlated with an increased likelihood of man-made activity in Oklahoma and Kansas. Image by Langenbruch, Weingarten and Zoback (2018)
- 4 Dr. Matthew Weingarten installs a telemetered seismometer station to record seismic activity in the vicinity of hydraulic fracturing production wells and injection wells. Photo by Dr. William Yeck
- 5 Dr. Matthew Weingarten. Photo by Jeremy Young

Online Dialogic Mathematics Videos

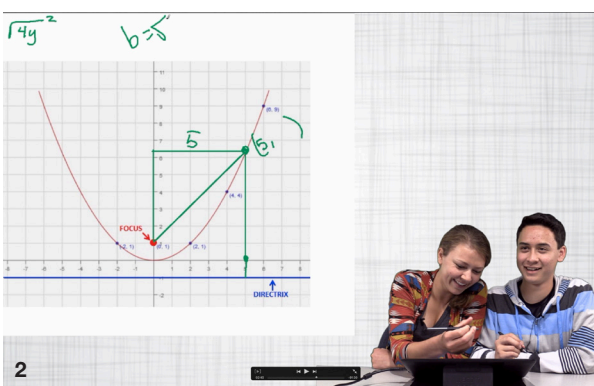
JOANNE LOBATO

*Mathematics and Statistics/
Center for Research in
Mathematics and Science
Education*

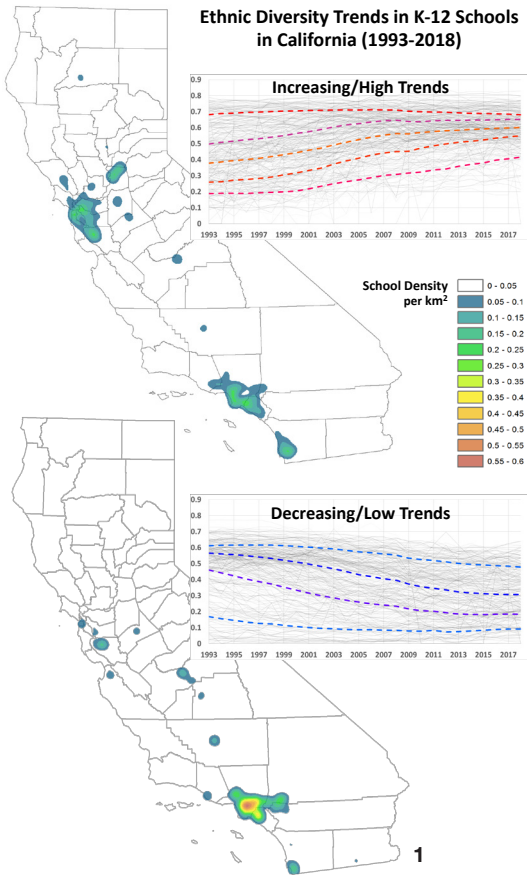
Despite the tremendous growth in the availability of mathematics videos online, these videos are surprisingly similar. Typically, a talking head or hand demonstrates step-by-step procedures. In contrast, Dr. Joanne Lobato and her team have created an alternative model that features pairs of students, highlighting their unscripted dialogue and explanations as they work together to tackle challenging math problems. This alternative model can be applied to the development of online videos for any STEM topic, for any age level.

Two prototype units (each with about 40 short videos) have been produced. The team is currently working to develop six more video units and conduct a series of research studies investigating high school students learning from the videos.

The National Science Foundation supports Dr. Lobato's research.



- 1 Film studio, located at SDSU's Center for Research in Mathematics and Science Education. Photo by Joanne Lobato
- 2 Screen shot from one of the project videos, available at www.mathtalk.org
- 3 Professor Lobato with doctoral students Javier Haro (front) and Mike Foster (rear/right) and Dr. Mike McKean (rear/left). Photo by Nicole Suarez



Modernizing Geography Education

ATSUSHI NARA Geography

Advances in geospatial technologies including geographical information systems, remote sensing and global positioning systems are producing large volumes of data to be managed and analyzed, requiring a workforce trained in geo-computational thinking.

Dr. Atsushi Nara is working with fellow SDSU geographer Dr. Thomas Herman and researchers from the American Association of Geographers, UC Riverside and Texas State University to identify ways to develop computational thinking in K-14 geography education. They are preparing teachers to use geospatially- and computationally-enriched curriculum and are guiding underrepresented groups toward careers that require geo-computational thinking.

These students will ultimately help predict and prevent crime, address environmental issues, visualize illness, plan cities, identify weather patterns, and provide information to the intelligence community for security/defense purposes.

Dr. Nara's research is supported by the National Science Foundation.



- 1 Maps highlighting geographic hotspots of increasing/high (top) and decreasing/low trends (bottom) in ethnic diversity in California K-12 education with 9 representative trend lines identified by data mining algorithms. Designed by Atsushi Nara
- 2 Dr. Atsushi Nara. Photo by Leslie L.J. Reilly
- 3 Researchers, teachers from the Sweetwater Union High School District, and students exchanged the realities and challenges in developing geocomputation curriculum at an SDSU summer workshop. Photo by Dr. Coline Doney

Autonomous Wildfire Detection

BARIS AKSANLI

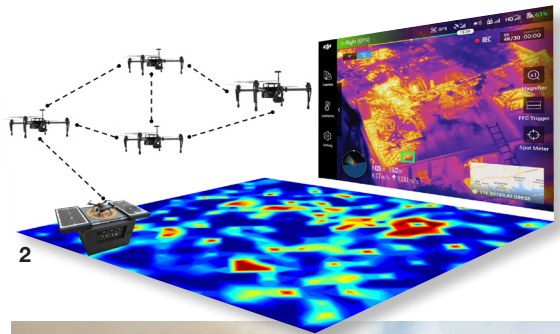
Electrical and Computer Engineering

The most critical aspect of mitigating wildfire-related damages is early detection. Current practices utilizing satellite imagery, watchtowers and manned aircraft are expensive, lack automation and rely on human response. The advancement of small intelligent systems such as smartphones, drones and self-driving vehicles enables the integration of these devices on small unmanned aerial vehicles (UAVs).

Dr. Baris Aksanli and his UCSD colleagues are examining ways to create autonomous and collaborative monitoring systems which improve the situational awareness of fire fighters and utilize supercomputer fire spread models, real-time data and early fire warning from an autonomous UAV fleet.

This work will not only alert emergency responders earlier and help them halt these costly and devastating wildfires, but could have significant impact on other environmental monitoring and search and rescue operations.

The National Science Foundation supports Dr. Aksanli's research.



Wildfires destroy millions of hectares of forest, ecological systems, and human infrastructure each year.

The costs of detection, monitoring and suppression, combined with the costs of evacuation and property damage, are in the tens of billions each year. – B. Aksanli

- 1 California wildfire map. Copyright © Jim McMahon/Mapman, by permission of Scholastic Inc.
- 2 UAV network for real-time wildfire monitoring. Image by Dr. Nikolay Atanasov
- 3 CAL FIRE firefighters responding to an incident in Northern California. Photo by Matt Rahn

NON SMOKING CASINO



Non-Smoking Casinos: Measuring the Impact on Tribal Gaming

DAVID KAMPER

American Indian Studies

As more adults identify as non-smokers and secondhand smoke is linked to heart disease, casinos are exploring ways to create profitable non-smoking spaces for their employees and patrons.

Nearly 800 commercial and tribal casinos across the U.S. have adopted smoke-free environments, many as a result of state regulation. Can these casinos remain competitive? Dr. David Kamper and Dr. Kate Spilde are evaluating the impact of tribal smoking policies on the economic success of tribal government gaming facilities in California. This research will provide tribal casino operators with practical data to enable informed decisions about balancing tribal smoking policies and maintaining the critical revenue generated by tribal gaming properties.

Using regression analyses to test for differences in the performance of slot machines in smoking and non-smoking sections, and surveying patrons and employees, Dr. Kamper's study will arm tribal policymakers with the information they need to determine the proper mix between smoking and non-smoking opportunities.

The California Department of Public Health supports this research.

- 1 Non-smoking section in a Southern California Tribal Casino. Photo by David Kamper
- 2 Dr. David Kamper. Photo by Courtney Harmon
- 3 Smoking section in a Southern California Tribal Casino. Photo by David Kamper

What's in the Water?

MATTHEW VERBYLA

Civil, Construction and Environmental Engineering

Students in the Safe WaTER Lab, led by Dr. Matthew Verbyla, study microorganisms in water and sanitation systems, to better inform the design of engineered systems that protect public health.

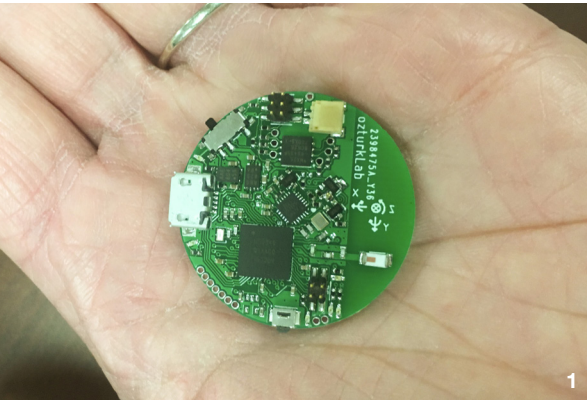
Working with the Global Water Pathogen Project (waterpathogens.org) and the digital science firm Agroknow, Dr. Verbyla and his students are translating research on water pathogens by producing online tools that enable global practitioners to access data from scientific literature to plan water and sanitation systems.

This work has taken them to Uganda, Brazil, and Switzerland to collaborate with water and sanitation authorities, universities, and agencies including the World Health Organization.

Dr. Verbyla's research is supported by the National Science Foundation and the Bill & Melinda Gates Foundation (via a subaward from Michigan State University).



- 1 Graduate student Isaac Musaaizi presenting the concept for a pathogen flow tool to stakeholders from the Ugandan government. Photo by Matthew Verbyla
- 2 The team from the Bill & Melinda Gates Foundation project, on a tour of the Lubigi Wastewater Treatment Plant in Uganda. Photo by Caroline Busingye
- 3 Graduate student Jose Calderon collecting samples from a wastewater treatment plant in Brazil. Photo by Fei Zhao



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**SDSU HealthLINK Center
for Transdisciplinary Health
Disparities Research**

GUADALUPE X. AYALA

Public Health

KRISTEN WELLS

Psychology

Dr. Guadalupe X. “Suchi” Ayala and Dr. Kristen Wells are co-directors of the SDSU HealthLINK Center, a transdisciplinary effort leveraging infrastructure, networks, and knowledge to improve minority health and reduce health disparities.

Using a team science approach, the SDSU HealthLINK Center supports technological innovations including the use of big data and wireless sensors for data collection and intervention delivery. The Center will also support pilot project funding and increase capacity in biomedical, measurement, data analytics and intervention methods.

Services will expand in 2020 with the opening of a clinical research center, wet lab, physiology lab, and tech hub.

SDSU HealthLINK Center research is supported by the National Institute on Minority Health and Health Disparities, part of the National Institutes of Health, under award number U54MD012397.



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1 Wireless sensor module for monitoring spine and neck motion. Several modules can be deployed on the body forming a body area network to study complex kinematic motion of the body. Photo by Dr. Kristen Wells

2 Dr. Tracy Finlayson and Dr. Guadalupe X. Ayala presenting at the annual Live Well Advance San Diego event. Photo by Karla Armenta

3 Co-directors Kristen Wells and Suchi Ayala (standing, center) join colleagues to celebrate SDSU HealthLINK's first anniversary. Photo by Alexis Chavez

Catalysis for Organic Synthesis and Clean Energy

DOUGLAS GROTJAHN

Chemistry and Biochemistry

The chemical and energy industries rely heavily on catalysis, which accounts for 35% of global GDP, and can help us solve global problems.

Water oxidation is part of storing sunlight energy by making hydrogen and oxygen from water. Most studies on water oxidation catalysts focus on making faster catalysts. Dr. Douglas Grotjahn is exploring new catalysts designed to be more robust, and is developing new tools to measure catalyst degradation, so as to help make solar fuels a practical reality.

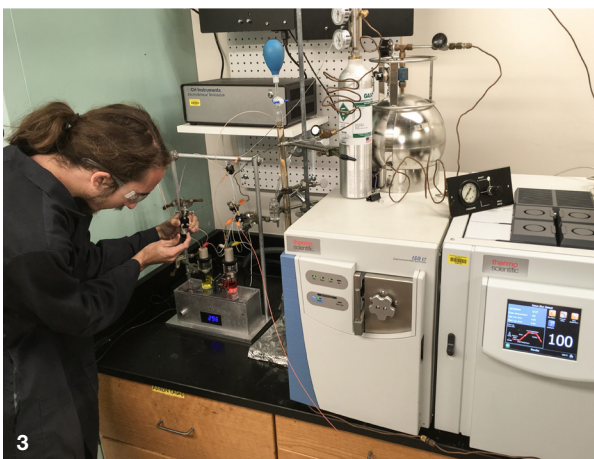
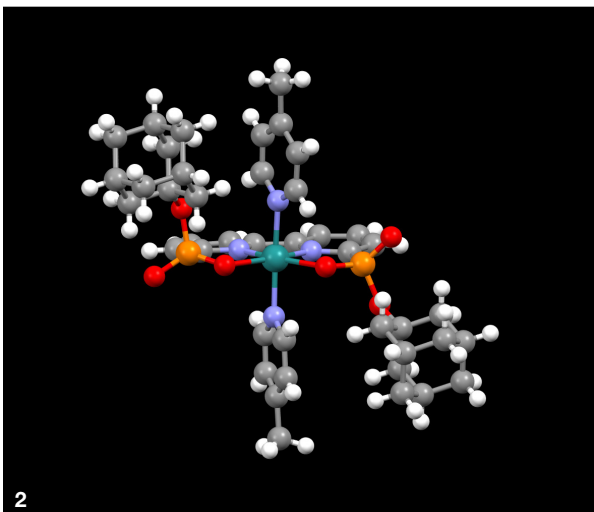
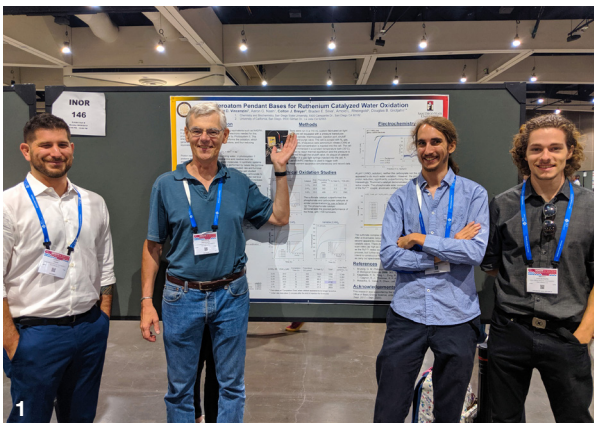
Using organic synthesis, Dr. Grotjahn and his team have been able to make catalysts for anti-Markovnikov hydration of alkynes, and selective isomerization of alkenes, which are 1,000 to 10,000 times faster than those without a base in the catalyst. These new bifunctional catalysts operate in new ways by transforming organic molecules more quickly, in higher yield, with fewer by-products, and less waste, which helps reduce pollution and the cost of making complex molecules like pharmaceuticals.

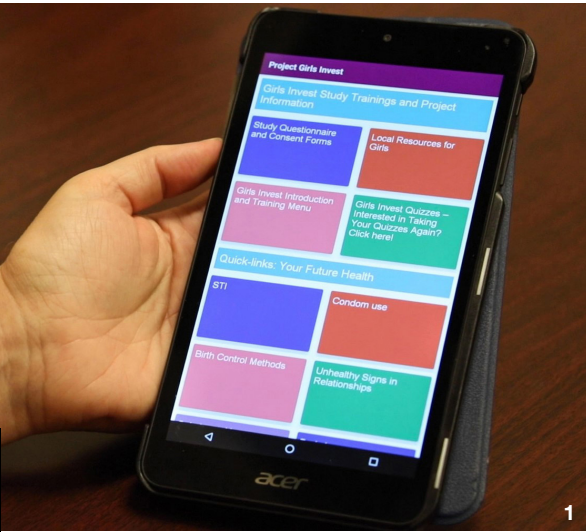
The U.S. Department of Energy supports Dr. Grotjahn's work with Drs. Diane Smith and Dale Chatfield; the National Science Foundation supports his work with Dr. Andy Cooksy.

1 Dr. Grotjahn and students Aaron Nash (L), Colton Breyer and Brett Vincenzini (R) at a national conference. Photo by Ashley Nguyen

2 X-ray crystal structure of a water oxidation catalyst. Image by Douglas Grotjahn

3 Colton Breyer working on new tools to study water oxidation catalysts. Photo by Douglas Grotjahn





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The Financial Lives of Girls

ELIZABETH REED

Public Health

Compared to boys, girls across the globe are more likely to face challenges that restrict their educational and career opportunities. Dr. Elizabeth Reed examines how these gender-based inequities contribute to economic vulnerability among girls and increase their risk for intimate partner violence and unintended pregnancy.

Dr. Reed has created “Girls Invest,” a mobile health and savings intervention that provides girls with a savings account where funds are deposited based on completion of mobile app-based trainings. Girls Invest supports underserved adolescent girls by improving their financial literacy and independence, and by providing the knowledge and tools they need to manage social and health challenges. Dr. Reed is examining the efficacy of Girls Invest locally among girls in San Diego and is also developing a Girls Invest program for girls in Nigeria.

This research is supported by the Eunice Kennedy Shriver National Institute on Child Health and Human Development, Wellspring Philanthropic Fund and Women’s Empowerment International.

1 Main menu of the Girls Invest app. Photo by Shana Thompson

Demonstration video: <https://www.youtube.com/watch?v=WHfygKu18ml&feature=youtu.be>

2 Girls Invest logo.

3 Dr. Elizabeth Reed (far left) with Alyssa Hernandez (SDSU graduate student), Emma Kahn (SDSU graduate student), Tran Tran (SDSU undergraduate student), and Livi Weinstein (SDSU undergraduate student). Photo by Shana Thompson

Helping Children Achieve their Full Potential

SARAH RIETH

Child and Family Development

According to Dr. Sarah Rieth, a clinical psychologist specializing in naturalistic, developmental behavioral interventions for autism, the earlier that support for a child and a family begins, the more effective that support will be in helping a child reach their full potential. Dr. Rieth's research focuses on the delivery of high-quality interventions in community settings and preparing interventionists to effectively implement parent-mediated, evidence-based approaches.

She is currently evaluating the efficacy of Project ImPACT for Toddlers, a parent-coaching intervention specifically for children under three. Results from pilot studies show the intervention improves parents' responsiveness and children's skills, and a randomized trial with over 200 families is currently underway.

The U.S. Department of Education supports Dr. Rieth's work, which is helping to equip the workforce to address the needs of young children with autism and their families.



- 1 Dr. Sarah Rieth. Photo courtesy of College of Education
- 2 Dr. Rieth (middle row, center) and project colleagues. Photo by Tiffany Wang
- 3 Dr. Rieth's work focuses on supporting children's early social communication skills, such as gestures. Photo by Sally Reed





Improving Mental Health Services for Youth with Autism Spectrum Disorder

KELSEY DICKSON

Child and Family Development

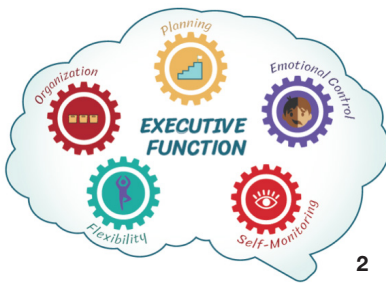
Children with autism spectrum disorder (ASD) are a rapidly expanding population with complex health care and service needs. High rates of co-occurring mental health conditions that necessitate mental health services are common.

There is a need for effective interventions that optimally address the complex mental health needs of youth with ASD in community mental health settings.

Executive functioning (EF) deficits underlie ASD and mental health conditions. An evidence-based EF intervention has been developed and tested for school settings.

With support from a prestigious K Award from the National Institute of Mental Health, Dr. Kelsey Dickson is using a community-partnered approach to adapt and test an EF intervention for implementation in mental health settings.

This work will help address the significant unmet mental health needs of youth with ASD.



One in 59 children is diagnosed with ASD

Boys are **4x more** likely to be diagnosed with autism than girls

Autism affects **all ethnic and socioeconomic groups**

Cost for autism care in the U.S. is projected to increase from **\$268 to \$461 billion** by 2025

Autism **can be** reliably **diagnosed** by an experienced professional by **age 2**

1 Dr. Kelsey Dickson. Photo courtesy of College of Education

2 Model of executive functioning and subsumed components or processes. Image courtesy of Unstuck and On Target (©3-C Institute for Social Development; Funding: NIMH 5R44MH109193)

3 Dr. Dickson and her research team reviewing data. From left: Graduate student Jack Lok, Dr. Dickson, Research Assistant Tana Holt. Photo by Gina May

Astronomical Archaeology

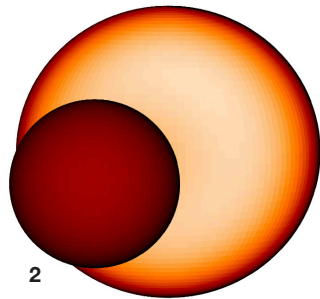
ERIC SANDQUIST

Astronomy

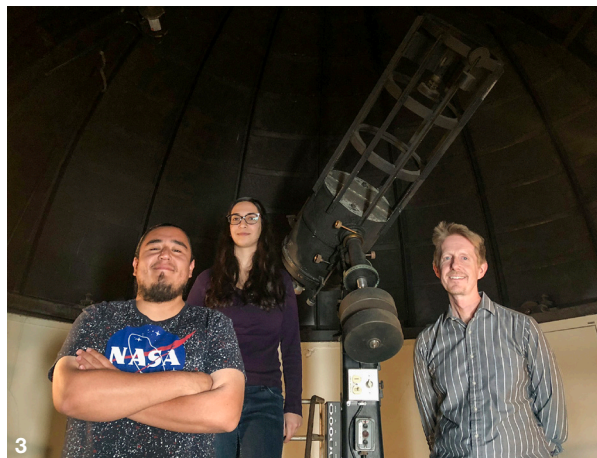
In astronomy, stars are the primary markers for measuring age, but precise and reliable ages are difficult to determine for most single stars. Ages are more important than ever as larger telescopes allow astronomers to study more distant and fainter populations of stars, and to probe the assembly of the Milky Way and other galaxies.

Dr. Eric Sandquist specializes in the internal physics of stars and the way they age. His team makes precise measurements of aging stars in binary pairs, and uses these ages to date star clusters they reside in. Stars in clusters were born at the same time, providing a testing ground for many different age measurement techniques. Dr. Sandquist has identified seven star clusters for study, covering a range from a youthful 100 million years (the Pleiades, pictured) to a Sun-like four billion years (the cluster M67).

This research is supported by the National Science Foundation.



- 1 Image of Pleiades by Davide De Martin & the ESA/ESO/NASA Photoshop FITS Liberator: ESA/Hubble.
- 2 A light-intensity model of an eclipsing binary star being used to determine the age of the cluster NGC 752 (about 1.5 billion years old). Image by Jerome Orosz
- 3 Eric Sandquist (right) with undergraduate students Jose Ruiz Casias and Yasmin Afshar. Photo by Jordan Ealy



Preventing Ovarian Tumor Recurrence

CARRIE D. HOUSE

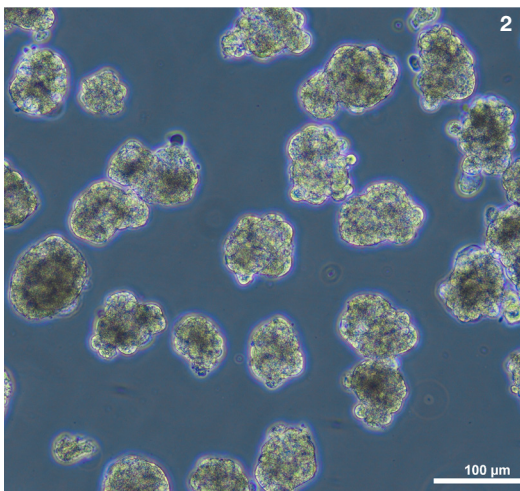
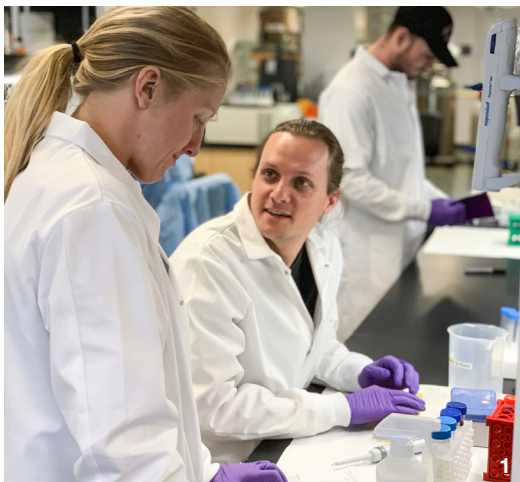
Biology

The leading cause of cancer mortality and morbidity is disease recurrence. This is true for ovarian cancer, the deadliest gynecological cancer, which takes the lives of more than 15,000 U.S. women each year.

Biologist Carrie House is studying tumor cells that are resistant to chemotherapy. These therapy-resistant cells, known as cancer stem cells, are capable of long-term self-renewal. Dr. House is examining the tumor microenvironment and activation of NF- κ B, a protein that controls cell survival, as a mechanism of drug resistance and recurrence. Blocking NF- κ B can cause tumor cells to stop dividing, to die or to become more sensitive to anti-tumor agents.

By identifying mechanisms that can prevent tumor regrowth, Dr. House's work could result in the inhibition of cancer progression and disease relapse.

The National Cancer Institute and the National Institute on Minority Health and Health Disparities support this research.



- 1 Ph.D. students Jenny Waters (L) and Ryne Holmberg (R) discuss techniques for analyzing secreted proteins from the ovarian tumor microenvironment.
- 2 Ovarian cancer spheroids, 3-D clusters of tumor cells that mimic those found in cancer patients, are used to study mechanisms of tumor growth and drug resistance.
- 3 Undergraduate researchers, Savanna Cashell (L) and Julia Florenzano (R), joined the House Lab to study cancer biology.

All photos by Carrie House

Fruit Flies as a Window into Human Genetic Disease

RICHARD CRIPPS

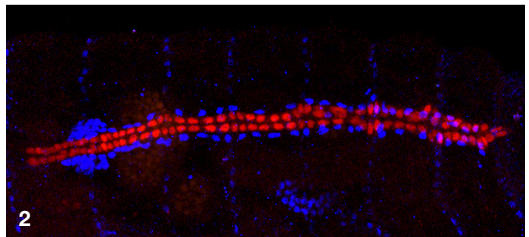
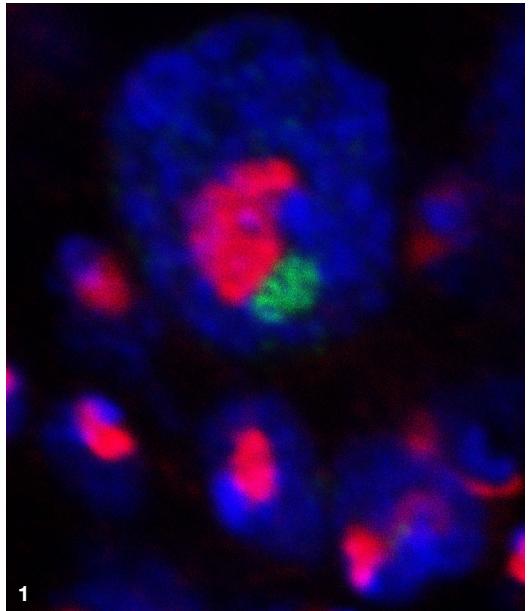
Biology/

*Fred Henry Professor
of Life Sciences*

The simplicity of the fruit fly, and its similar genetic makeup to humans, offers a mechanism to uncover important biology relevant to human development and disease.

Geneticist Richard Cripps uses the fruit fly (*Drosophila melanogaster*) as a model to understand muscle development. The fruit fly has a variety of muscle types which allows Dr. Cripps to better understand why and how certain muscles develop. He and his team study the *Drosophila* heart to help determine how different cardiac cell types form, and the *Drosophila* flight and jump muscles to help identify how different vertebrate skeletal muscle fiber types arise.

Funded by the National Institutes of Health, this research will uncover molecular mechanisms that take place when muscle forms, providing insight into how human muscles develop and how their development is affected in genetic muscle diseases.



- 1 Dr. Cripps's team discovered a new nuclear compartment in muscle precursor cells, that they termed the B-body. Photo by Sandy Oas and Anton Bryantsev
- 2 A tiny heart (red) pumps blood around the body of a larva. Photo by Dani Ryan
- 3 Dr. Cripps's research team at SDSU. Photo by Gina Spidel

Addressing California's Shortage of Bilingual Educators

SAÚL I. MALDONADO

Dual Language and English Learner Education

Forty percent of California's 6.2 million students in K-12 schools have knowledge and experience in at least two languages. The California Department of Education has called on local education agencies to collaborate in developing and sustaining students' bilingualism by doubling the number of bilingual teachers by 2030.

As the number of bilingual programs in K-12 schools increases, more credentialed teachers with bilingual authorization preparation are required to strengthen and meet the needs of California's linguistically diverse students. Supported by the U.S. Department of Education, Dr. Saúl I. Maldonado and SDSU colleagues are working with partners from Southwestern College, San Diego City College and San Diego Mesa College (Hispanic-serving Institutions) to facilitate the community college to university transfer pathway for Latinx/Chicanx/Hispanic students pursuing a teaching credential with bilingual authorization. Dr. Maldonado and colleagues are establishing inter-institutional systems and coordinated professional development activities for California's future bilingual teachers.

- 1 "Developing Effective Bilingual Educators with Resources" leadership team. From left, Michael Wickert (Southwestern College), Sera Hernandez (SDSU), Laurie Lorence (SD Mesa), Gabriel Adona (SD Mesa), Cristina Alfaro (SDSU), and S.I. Maldonado (SDSU).
- 2 Cristina Alfaro discussing coordinated professional development activities across institutions.
- 3 Gabriel Adona and S. I. Maldonado discussing how to establish inter-institutional systems for recruiting and preparing bilingual teachers.

All photos by Hai Duong



Flash Sintering of Ceramic Powders in a Matter of Seconds

WENWU XU

Mechanical Engineering

Traditional densification or sintering of ceramics powders into a functional component usually takes at least several hours. In 2010, a group of scientists discovered that nearly instantaneous full densification can occur (within five seconds) for certain ceramics when a high-level voltage or current passes through a compact of these ceramic powders. This rapid densification technique was named flash sintering.

Flash sintering has become one of the most promising techniques for ceramics processing. However, the mechanisms for this rapid sintering process are unclear. Dr. Wenwu Xu and his team are working with SDSU colleague Dr. Eugene Olevsky to reveal the underlying reasons.

The experimental work in this research is complemented by computational modeling, enabling a more comprehensive understanding of the rapid densification mechanisms of flash sintering of ceramic powders. This new knowledge will help extend the flash sintering technique into a wider range of ceramic materials.

The National Science Foundation supports Dr. Xu's work.



- 1 Dr. Xu sets up a sample to be flash sintered.
- 2 Dr. Xu transports a sample for heat treatment using a furnace.

Photos by Donald Olumor

Understanding Word Retrieval Dynamics After Stroke

STEPHANIE RIES

Speech, Language & Hearing Sciences

Lexical retrieval is the process we use to fit an appropriate word to ongoing speech. Disruption of lexical retrieval is observed to some extent in all patients surviving a stroke to the left side of the brain, causing immense personal and societal cost.

Lexical retrieval abilities are not equally compromised in these patients. Patients with lesions to the left lateral prefrontal cortex can often recognize the word they are trying to say when presented with competing stimuli; this may be more difficult for patients with lesions in the left posterior temporal cortex.

Dr. Stephanie Ries studies outcomes in patients with chronic left-hemisphere stroke-induced lesions by examining the spatio-temporal brain dynamics supporting lexical retrieval in patients with left prefrontal versus left posterior temporal lesions. She examines these processes in both native English speakers and Spanish-English bilinguals, who face the additional challenge of overcoming interference from their second language when retrieving words.

This work will help inform how word retrieval occurs in patients with brain damage to areas that control language, and help design therapy approaches to improve word retrieval after stroke.

The National Institute on Deafness and Other Communication Disorders and the American Speech-Language-Hearing Foundation support Dr. Ries's research.

- 1 Research participant with electroencephalography (EEG) cap in the Laboratory for the Brain Dynamics of Language (LBDL). Photo by Dr. Ries
- 2 Undergraduate Senior student Alyssa Zidek and Dr. Ries in front of their poster at the Student Research Symposium Showcase. Photo by Dr. Nip



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Friendly Trails

SHERRY RYAN

Public Affairs

Parks and trails are an important part of a community, providing recreation, health and transportation benefits. According to the Centers for Disease Control, in a well-designed community, homes, parks, stores, and schools are connected by safe walking and biking routes.

Northwest Arkansas, for example, has more than 200 miles of hard and soft-surface trails, and is a leader in bike and pedestrian friendliness and environmental initiatives. Dr. Sherry Ryan is monitoring trail use in Benton and Washington counties to determine the relationship between infrastructure and bike and pedestrian activity levels. She incorporates state of the art technology to monitor and evaluate usage with a goal to promote healthy lifestyles and increase safety and connectivity.

Dr. Ryan's work is supported by The Walton Family Foundation.



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1 Bike trail. Photo courtesy of The Walton Family Foundation

2 Dr. Sherry Ryan.

3 Measuring bike activity levels. Photo by Garver Associates



Improving Child Language Treatment Outcomes

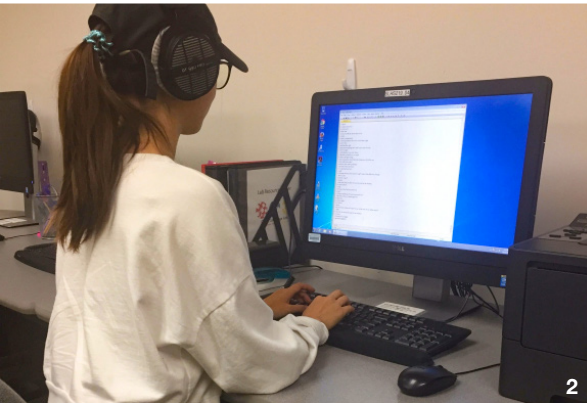
**JESSICA BARLOW
SONJA PRUITT-LORD**

Speech, Language and Hearing Sciences

Approximately 11% of children aged three to six years have a communication disorder and roughly 34% of those children have multiple disorders. The goal of speech/language intervention for preschool and school-aged children is to help them prepare for or achieve grade-level skills as quickly as possible. Co-occurring impairments can hinder their progress.

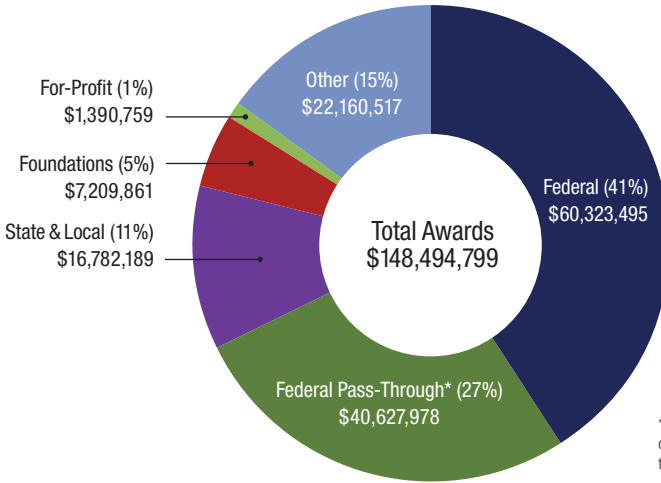
Dr. Jessica Barlow and Dr. Sonja Pruitt-Lord are examining the interaction between two critical areas of child language acquisition – phonology and morphology – to identify ideal treatment plans. Their work will impact the efficacy and timeliness of treatment interventions in this vulnerable population of children.

This research is supported by the National Institute on Deafness and other Communication Disorders.



- 1** A researcher works with a child to elicit different types of linguistic constructions. Photo by Melinda Lara
- 2** SDSU student Ju Heun Ki transcribing children's speech and language. Photo courtesy of ChiLD³ Language Lab
- 3** Drs. Barlow and Pruitt-Lord (left) consult with postdoctoral researcher Dr. Irina Potapova and doctoral student Philip Combiths on the progress of their treatment study. Photo by Melanie Patton

Awards by Sponsor Type Fiscal Year 2018-2019



SDSU Doctoral Programs

SDSU is proud to offer these joint and independent doctoral programs:

MAJOR/CONCENTRATION	PARTNER UNIVERSITY
Audiology (Au.D.)	UC San Diego
Biology	UC San Diego
Chemistry	UC San Diego
Clinical Psychology	UC San Diego
Computational Science	UC Irvine
Ecology	UC Davis
Education	Claremont Graduate University
Education Leadership: Pre K-12 School Leadership	Independent
Education Leadership: Community College/Post-Secondary Leadership	Independent
Engineering Sciences: Bioengineering	UC San Diego
Engineering Sciences: Electrical & Computer Engineering	UC San Diego
Engineering Sciences: Mechanical & Aerospace Engineering	UC San Diego
Engineering Sciences: Structural Engineering	UC San Diego
Evolutionary Biology	UC Riverside
Geography	UC Santa Barbara
Geophysics	Scripps Institution of Oceanography/UCSD
Interdisciplinary Research on Substance Use	UC San Diego
Language & Communicative Disorders	UC San Diego
Math & Science Education	UC San Diego
Physical Therapy (DPT)	Independent
Public Health: Epidemiology	UC San Diego
Public Health: Global Health	UC San Diego
Public Health: Health Behavioral Sciences	UC San Diego

Other Distinctions

- SDSU faculty and staff received \$148.5 million to support their research programs.
- The National Institutes of Health awarded \$28.8 million to SDSU researchers, a 12 percent increase over the previous year.
- The National Science Foundation awarded \$9.3 million to SDSU researchers, a 17 percent increase over the previous year.
- Approximately 500 undergraduate, graduate and doctoral students across 50 disciplines showcased their faculty-mentored research in last year's Student Research Symposium.
- SDSU ranks No. 68 among public universities and No. 147 among national universities overall according to U.S. News & World Report.
- SDSU was named a top college for LGBTQ students by BestColleges, placing No. 12 among the top 25 on the list with a 5-star rating.
- San Diego State University ranked No. 5 nationally and No. 1 in California for the number of students studying abroad in the latest Institute for International Education's Open Doors report.
- SDSU began offering a joint doctoral degree in computational science with the University of California, Irvine - its 23rd joint doctoral program.
- SDSU was recognized as one of the nation's most environmentally responsible universities by The Princeton Review.
- SDSU was again named one of the top institutions in the nation by The Princeton Review and was listed in its Best 385 Colleges list. The Princeton Review also named SDSU in its 2019 Edition of Best Value Colleges.
- SDSU Imperial Valley celebrated its 60th anniversary serving students and the community of Imperial County.
- SDSU graduate programs continued to climb in national rankings. In the 2020 U.S. News and World Report ranking, SDSU's graduate program in public health ranked No. 23; the College of Education ranked No. 53 nationally and No. 40 among public universities; the School of Social Work ranked No. 51 in the nation. The graduate program in Rehabilitation Counseling ranked No. 4 out of 96 programs.
- Psychology professor Georg Matt leads the Thirdhand Smoke Resource Center, the nation's first public resource center on thirdhand smoke.
- Speech, language and hearing sciences professor Karen Emmorey was elected a Fellow of the Linguistic Society of America.
- Y. Barry Chung, dean of SDSU's College of Education, has been named recipient of the 2019 Eminent Career Award from the National Career Development Association (NCDA).
- Anthropologist Ramona Pérez was selected to serve as president-elect/vice president of the American Anthropological Association.
- A team of researchers led by SDSU astronomers William Welsh and Jerome Orosz discovered a third planet in the Kepler-47 system.
- Guadalupe X. "Suchi" Ayala received CSU's 2019 Wang Family Excellence Award for Outstanding Faculty Scholarship in recognition of her scholarly and community-based work to improve health disparities.
- Dr. Rob Edwards discovered a common gut virus with a country-specific biomarker that changes rapidly depending on location, mapping human travels.
- USS Midway Foundation made a \$3 million, five-year pledge to create and fund an endowed chair in modern U.S. military history at SDSU.



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