THE BIOLOGY OF

UCI BioSci

DEAN'S REPORT 2023

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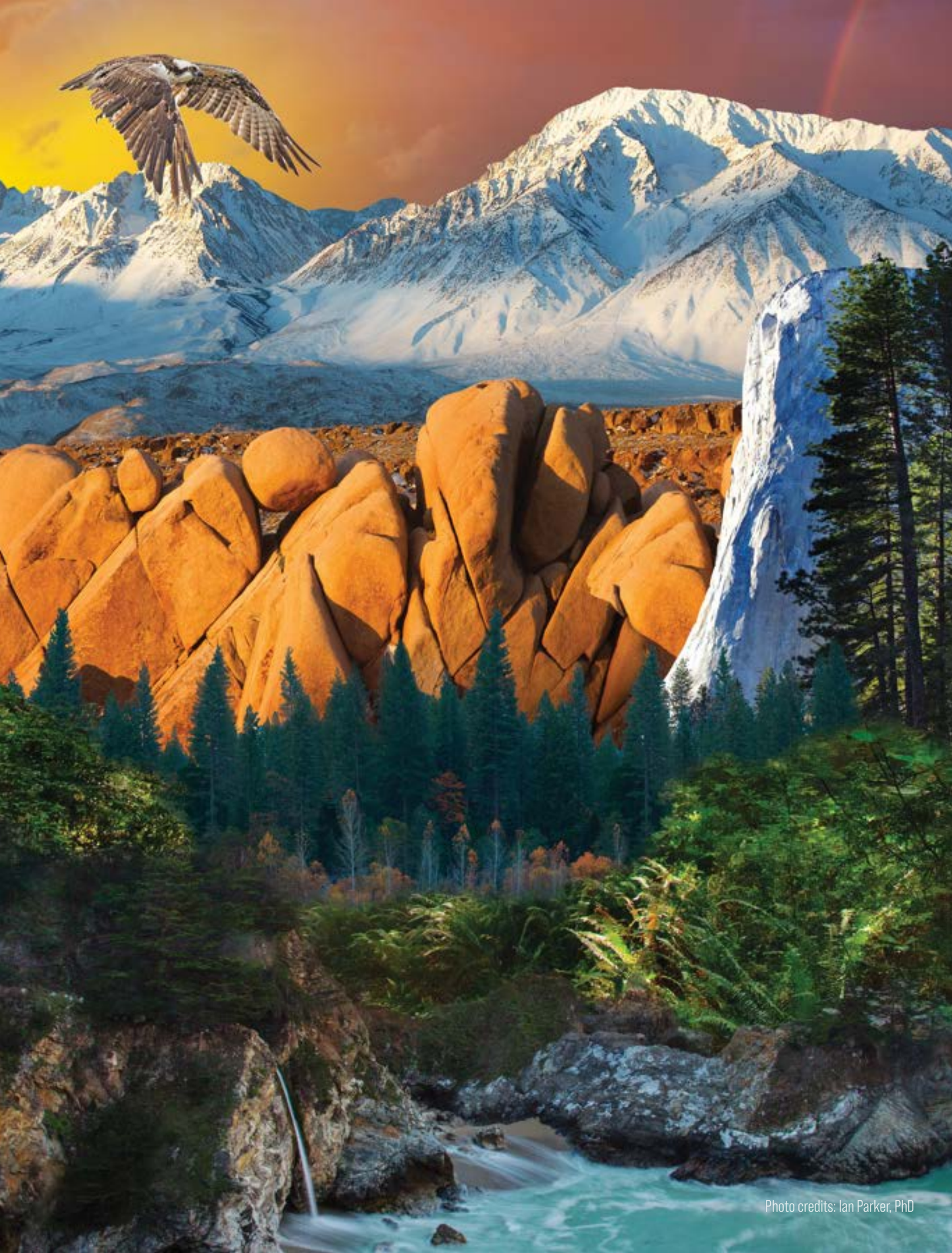

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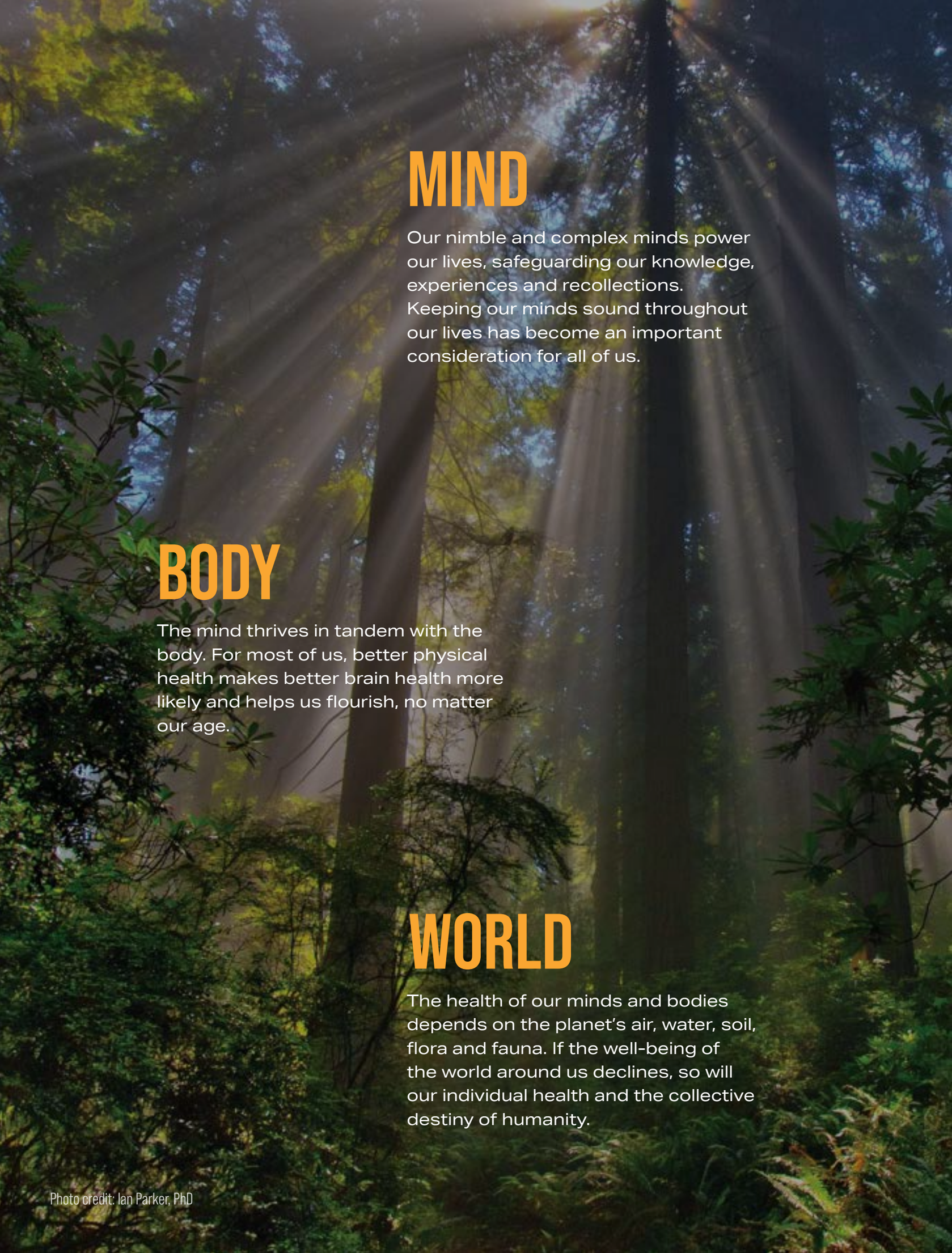


MIND

Our nimble and complex minds power our lives, safeguarding our knowledge, experiences and recollections. Keeping our minds sound throughout our lives has become an important consideration for all of us.

BODY

The mind thrives in tandem with the body. For most of us, better physical health makes better brain health more likely and helps us flourish, no matter our age.

WORLD

The health of our minds and bodies depends on the planet's air, water, soil, flora and fauna. If the well-being of the world around us declines, so will our individual health and the collective destiny of humanity.

Photo credit: Ian Parker, PhD

MESSAGE

FROM THE DEAN

Dear Colleagues and Friends,

This year's Dean's Report is focused on our home state of California. We hope to call attention to some of the work being done by faculty at the School of Biological Sciences that has a direct impact on the state's residents and ecosystems, from climate change to diabetes research and much more.

California, as many of us know, is disproportionately susceptible to the effects of climate change due to a combination of factors such as its Mediterranean-like climate, which makes it vulnerable to drought and wildfires. Climate change is likely to exacerbate these existing risks and create new ones. However, our faculty are doing their part to mitigate the effects of climate change through research into its causes and effects and finding solutions to this global problem. The health and well-being of California and Californians is a complex issue that requires interdisciplinary approaches, and the school's faculty is working towards solving these problems, from studying the impact on the environment to uncovering new approaches to tackling various diseases.

Among the many notable issues being addressed by our faculty is depression, a serious mental health disorder that directly and indirectly affects millions of people, including many in California. The upcoming Noel Drury M.D. Depression Research Center — established with a $55 million bequest from the late philanthropist Audrey Steele Burnand — will focus on the causes and treatment of depression, drawing from and building upon existing research efforts that encompass

Photo credit: Ian Parker, PhD

"The health and well-being of California and Californians is a complex issue that requires interdisciplinary approaches, and the school's faculty is working towards solving the many problems..."

many fields of study, such as biology, health sciences, engineering and social sciences. The center's research will help to improve the lives of millions of people affected by depression by developing new treatments, increasing access to mental health care and reducing the stigma associated with depression.

To put it simply, there is a vast amount of important work being conducted by our faculty and researchers. These dedicated individuals are highly productive in making new discoveries, obtaining grants and publishing papers, and their research impacts many areas of society, from understanding the fundamental mechanisms of life, to developing new therapies and strategies for managing diseases, to conserving biodiversity and protecting the environment.

The excellence of our faculty has resulted in a banner year of extramural funding for the school. This funding allows the school to conduct research, pay for facilities and equipment, and support the work of faculty and students. Extramural and philanthropic funding are essential for the school's research enterprise, as it allows us to increase the number of research projects, attract and retain top faculty and students, and enhance the reputation of the university and the school.

Our faculty, researchers, students and staff continue to make significant contributions to understanding and addressing some of the most pressing issues facing society — in California and beyond — through its research, instruction and community engagement. We at BioSci are proud of their achievements and look forward to their ongoing and future successes.

Regards,

Frank LaFerla

Frank LaFerla, PhD
Dean and Distinguished Professor

RESILIENCE IN THE FACE OF ADVERSITY:

A LOOK AT PROFESSOR THOMAS POULOS' JOURNEY

Professor Thomas Poulos, a Distinguished Professor of Molecular Biology & Biochemistry, Pharmaceutical Sciences and Chemistry at the University of California, Irvine, has had an illustrious career in both the private sector and academia. However, in January 2022, his life took a dramatic turn when he was involved in a skiing accident that left him with a spinal cord injury. Despite the challenges he has faced, Professor Poulos has remained resilient, continuing to push forward in his recovery.

On January 5th, 2022, Professor Poulos was skiing at Snow Summit, an activity he had been doing since the 1970s. Toward the end of his session, however, he collided with another skier and suffered a serious spinal injury, specifically a C4-C5 incomplete spinal cord injury. He was airlifted to Loma Linda University Medical Center where he underwent a 7-hour surgical operation during which pressure on the spinal cord was relieved and vertebrae were fused together.

Fortunately, Tom's physical fitness and cardiovascular health likely aided in his body's ability to handle the surgery and readied him for the recovery road that was ahead.

Following a week in the intensive care unit, he was later moved to the orthopedic wing of the hospital, where he received further care and treatment. Friends and colleagues at the UCI Medical Center suggested he attend Craig Hospital in Colorado, a world-renowned hospital that exclusively specializes in neurorehabilitation for individuals with spinal cord injuries. Wife Andrea Tenner, Distinguished Professor of Molecular Biology and Biochemistry, as well as a Professor of Pathology and of Neurobiology and Behavior, secured Professor Poulos his spot at Craig Hospital, where he spent three months undergoing intense physical and occupational therapy to help him regain as much function as possible.

"When I say intense, I mean intense," said Professor Poulos. "There's no mercy. As soon as you get there, they plop you into a wheelchair and tell you to figure out how to make it work."

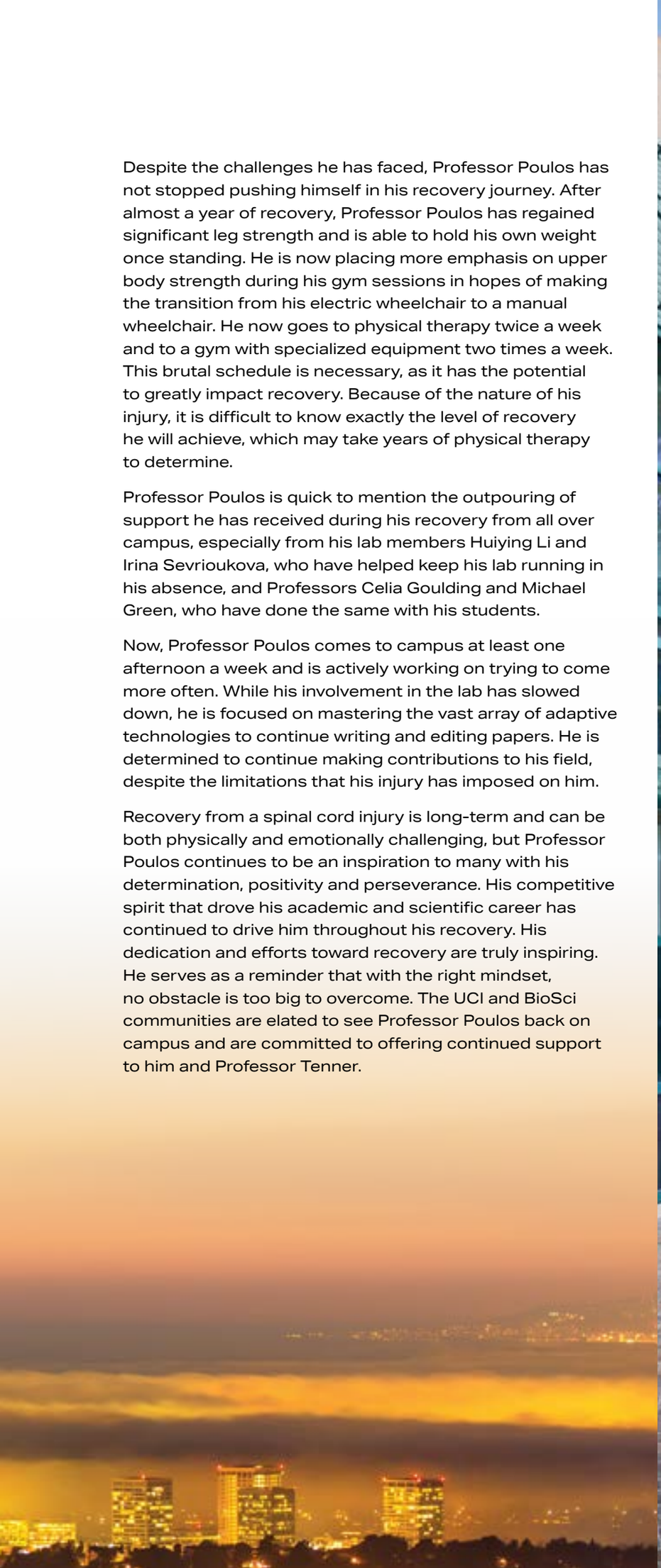
After that, he continued his recovery process in an outpatient program for 30 days, where he and Professor Tenner stayed in an apartment near the hospital to practice the transition back to everyday life. Professor Tenner and their three children were tremendous in their support of not only Professor Poulos, but also each other, as they navigated this new challenge. They have been a constant source of encouragement and motivation for him and have been by his side through every step of his recovery.

Despite the challenges he has faced, Professor Poulos has not stopped pushing himself in his recovery journey. After almost a year of recovery, Professor Poulos has regained significant leg strength and is able to hold his own weight once standing. He is now placing more emphasis on upper body strength during his gym sessions in hopes of making the transition from his electric wheelchair to a manual wheelchair. He now goes to physical therapy twice a week and to a gym with specialized equipment two times a week. This brutal schedule is necessary, as it has the potential to greatly impact recovery. Because of the nature of his injury, it is difficult to know exactly the level of recovery he will achieve, which may take years of physical therapy to determine.

Professor Poulos is quick to mention the outpouring of support he has received during his recovery from all over campus, especially from his lab members Huiying Li and Irina Sevrioukova, who have helped keep his lab running in his absence, and Professors Celia Goulding and Michael Green, who have done the same with his students.

Now, Professor Poulos comes to campus at least one afternoon a week and is actively working on trying to come more often. While his involvement in the lab has slowed down, he is focused on mastering the vast array of adaptive technologies to continue writing and editing papers. He is determined to continue making contributions to his field, despite the limitations that his injury has imposed on him.

Recovery from a spinal cord injury is long-term and can be both physically and emotionally challenging, but Professor Poulos continues to be an inspiration to many with his determination, positivity and perseverance. His competitive spirit that drove his academic and scientific career has continued to drive him throughout his recovery. His dedication and efforts toward recovery are truly inspiring. He serves as a reminder that with the right mindset, no obstacle is too big to overcome. The UCI and BioSci communities are elated to see Professor Poulos back on campus and are committed to offering continued support to him and Professor Tenner.



MODEL-AD:

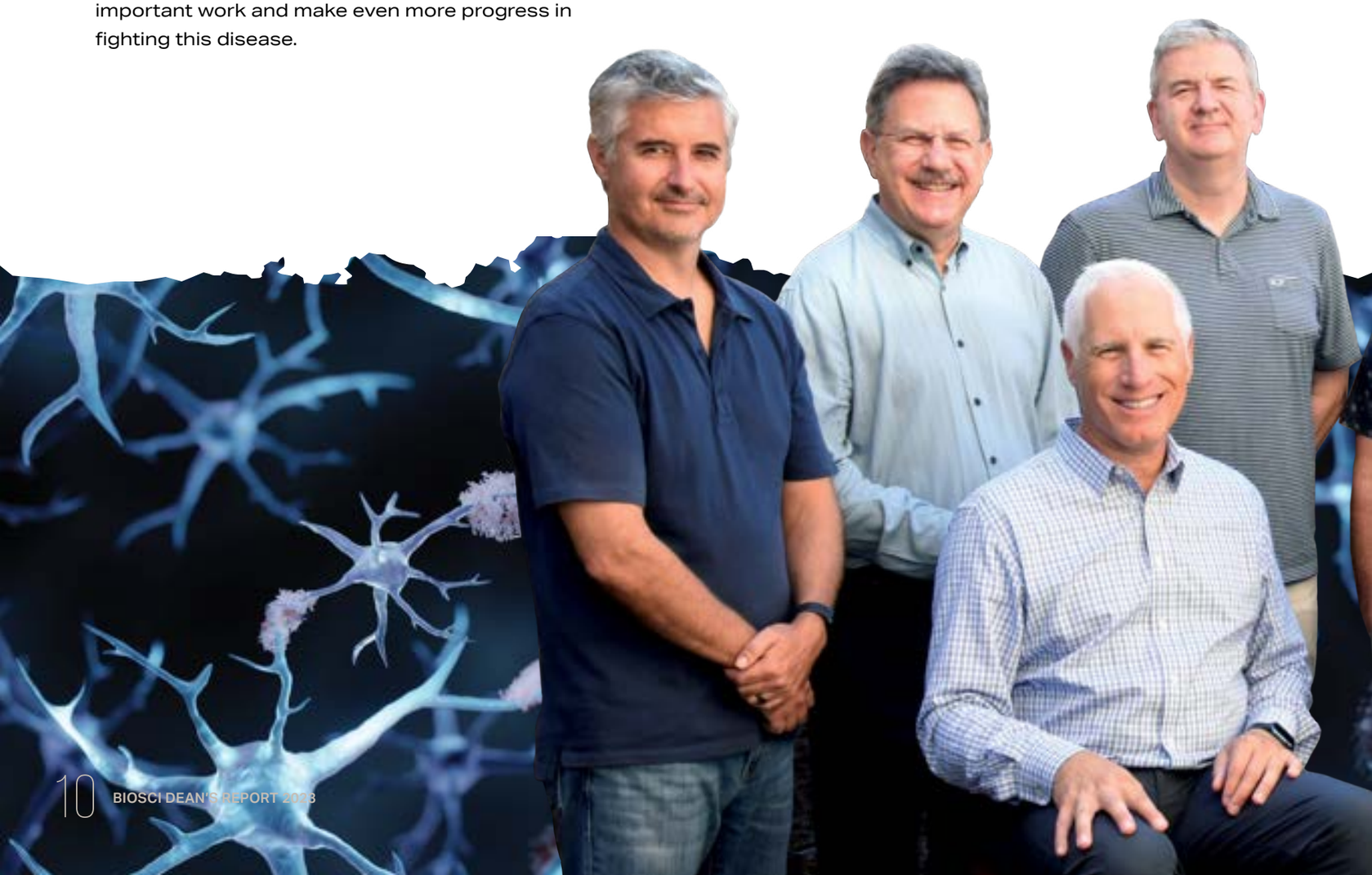
UNLOCKING THE SECRETS OF LATE-ONSET ALZHEIMER'S

UCI is at the forefront of the fight against Alzheimer's disease, and the recent $47 million grant from the National Institute on Aging (NIA) is set to further boost their efforts.

The UCI team, which is part of the National Institutes of Health-funded Model Organism Development & Evaluation for Late-Onset Alzheimer's Disease (MODEL-AD) consortium, is made up of experts from a range of disciplines, including molecular biology, biochemistry, pathology and neurobiology, and is working on developing the next generation of mouse models for studying late-onset Alzheimer's. These models are crucial for understanding the biology behind the development of Alzheimer's, and for testing potential new drugs. With the help of the recent NIA grant, they will be able to continue their important work and make even more progress in fighting this disease.

In addition to developing mouse models, the team is also involved in a range of other activities related to Alzheimer's research, including observational patient-oriented research and clinical trials of promising treatments.

The UCI team, co-directed by Frank LaFerla, dean of the School of Biological Sciences, has a long history of using genetically modified mice to study neurodegenerative diseases. In 2003, LaFerla and his team created the first mouse model to accumulate beta-amyloid plaques and tau tangles, which are hallmarks of Alzheimer's. And in 2010, they developed the first mouse model for the Lewy body variant of Alzheimer's.



One of the unique aspects of the work being done at UCI is that the mouse models are based on the most common form of Alzheimer's, known as "sporadic AD" or "late-onset AD."

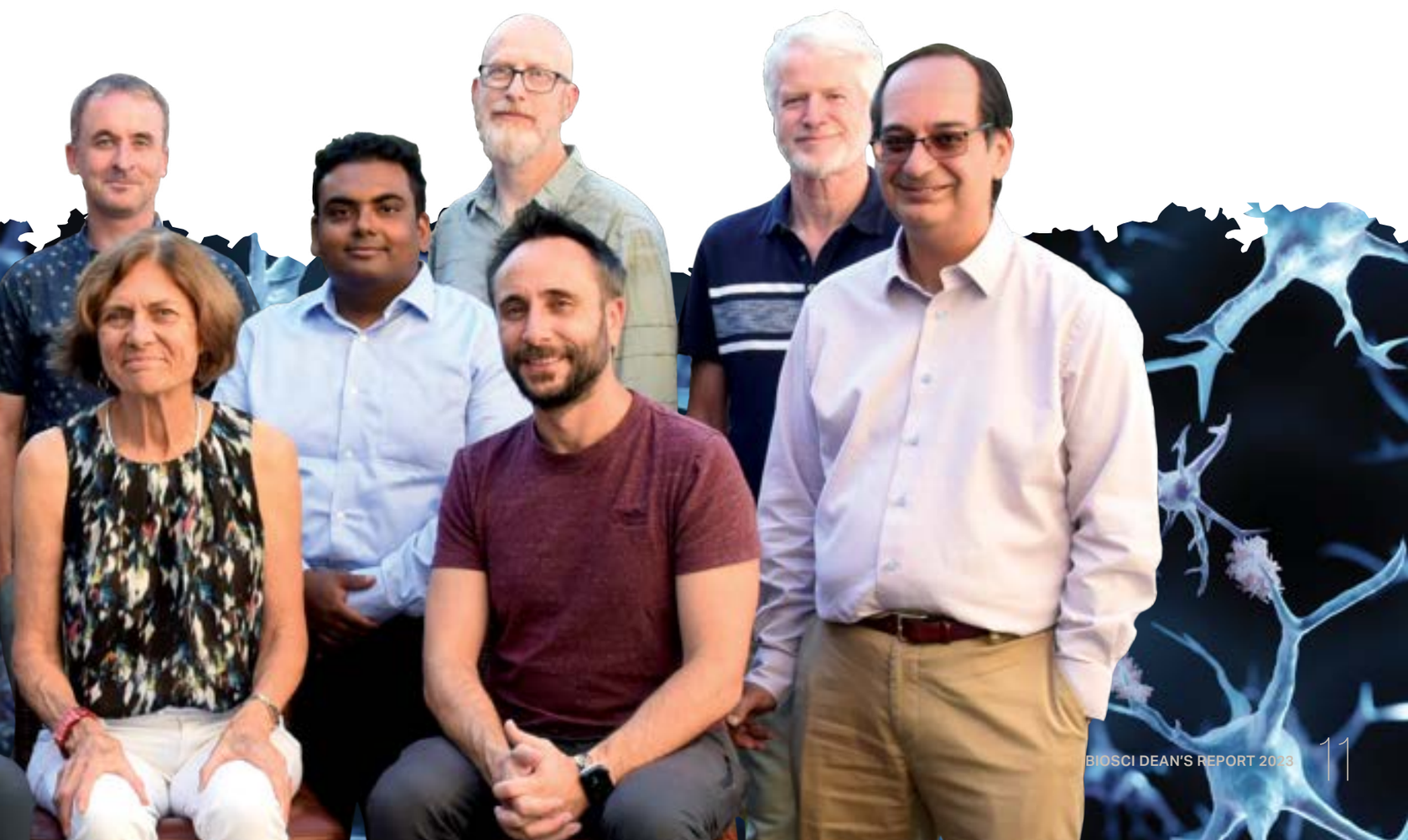
Previous mouse models have focused on the "familial AD" form of the disease, which accounts for less than 5% of cases. By using models that better reflect the majority of Alzheimer's cases, the team at UCI is better positioned to make progress in understanding and treating the disease.

The $47 million grant has allowed the team to continue and expand their work into its next phase, which is co-directed by Dean LaFerla; Andrea Tenner, a Distinguished Professor of molecular biology and biochemistry, as well as a professor of pathology and of neurobiology and behavior; and Kim Green, a professor of neurobiology and behavior.

The team also includes Professors Arthur Lander, Grant MacGregor, Ali Mortazavi, Ian Smith, Craig Stark, Vivek Swarup, Katrine Whiteson and Marcelo Wood from the School of Biological Sciences; and Professors Mark Mapstone, Andre Obenaus and Xiangmin Xu from the School of Medicine. They are supported by an administrative team that includes Project Manager Dr. Angela Gomez-Arboledas and Program Administrator Andrea Wasserman.

The efforts of the team at UCI are particularly important given the increasing prevalence of Alzheimer's. Unless there are major medical breakthroughs, the number of Americans aged 65 and older with Alzheimer's is expected to rise from 5.8 million in 2020 to 13.8 million by 2050, according to the NIA.

The work being done at UCI as part of the MODEL-AD team is crucial for advancing our understanding of Alzheimer's disease and finding new treatments. The recent grant from the NIA will provide a major boost to these efforts and help to ensure that the team at UCI can continue to make progress in the fight against this devastating disease.



THE DIABETES EPIDEMIC:

ONE PROFESSOR'S PERSONAL JOURNEY TO FIND A SOLUTION

As a child, Molecular Biology and Biochemistry Assistant Professor Dequina Nicholas didn't understand why her mother jabbed herself with needles and worried about her diet. Now she is researching a new way to combat diabetes, her mother's longtime disease and one that poses a hazard to Professor Nicholas herself. Her award-winning work takes place as California contends with a diabetes rate exceeding the national average.

"It was only when I became high-school age that I realized my mother was diabetic and even then, I didn't really understand what diabetes was," said Professor Nicholas. While she majored in chemistry in college, she decided to pursue graduate biology studies with a mission to learn more about the disease.

With her grandmother also diabetic, Professor Nicholas is at high risk. Even though she exercises regularly and eats appropriately, "no matter how active I am, my blood sugar is never in the normal range," said Professor Nicholas.

It has been thought that dietary lipids trigger the immune response producing diabetes' characteristic inflammation. In rodent models, eliminating this inflammation eradicates the disease. Due to differences between rodents and humans, the process doesn't work in people. However, the concept has propelled Professor Nicholas in an innovative direction.

"We think several other lipid species could actually be triggering the immune response," she said. "Perhaps we should be managing lipids instead of blood glucose. It might be possible to produce an antibody therapy that gets rid of those lipids and prevents or eliminates the diabetes."

The findings could also help women with polycystic ovary syndrome, or PCOS, an endocrine disorder affecting those of childbearing age. The inflammation associated with PCOS resembles that of diabetes. In recognition of her groundbreaking work, Professor Nicholas has won the National Institutes of Health Director's New Innovator Award from the National Institute of Allergy and Infectious Diseases.

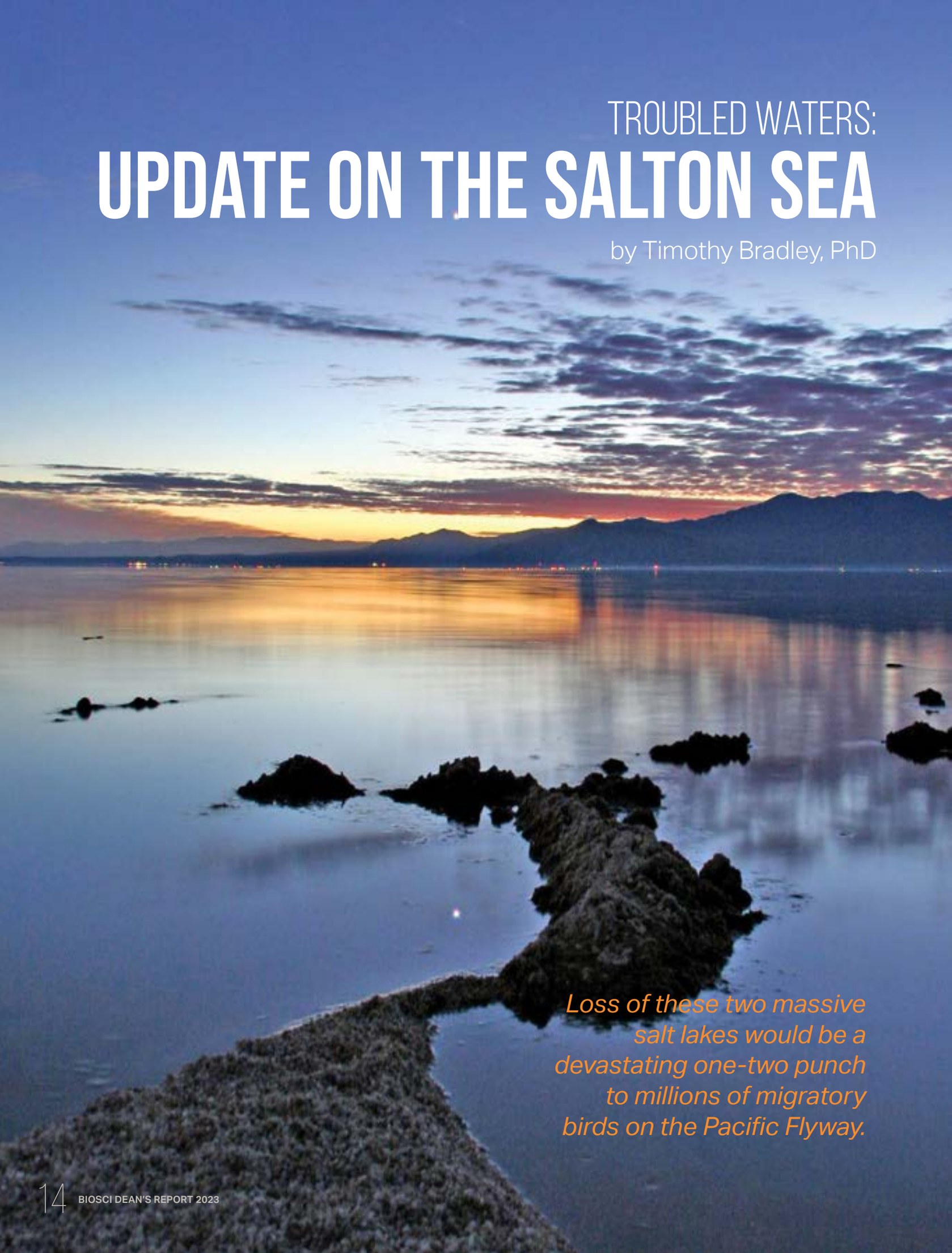
As passionate as Professor Nicholas is about her research, she is equally dedicated to diversity and mentorship.

"You can't answer a complex problem without the insights of many people with different backgrounds," she said. As to mentoring, "I discovered the value of it firsthand when I began graduate biology studies after majoring in chemistry. My mentors helped me tremendously. Now, I learn from my mentees, who challenge me and keep me from approaching things in a set way."

Over 13 percent of California's adult population is living with diabetes, a rate that is four percentage points higher than the nation's average. More than a third of Californians are pre-diabetic, according to the American Diabetes Association.

TROUBLED WATERS: UPDATE ON THE SALTON SEA

by Timothy Bradley, PhD



Loss of these two massive salt lakes would be a devastating one-two punch to millions of migratory birds on the Pacific Flyway.

The health of California residents, migratory birds and the Salton Sea ecosystem continue to be pushed to the brink as a result of the fallout from the Quantitative Settlement Agreement (QSA). The QSA, which mandated the transfer of water from the agricultural Imperial Valley to urban regions, has devastated the Salton Sea and precipitated California's worst environmental and public health catastrophe of this century.

The disastrous effects of the water transfer were never in doubt. The Salton Sea receives water in the form of irrigation runoff from fields in the Imperial Valley. When the QSA was proposed in 2003, it was recognized that transfer of water would cause the Sea to shrink and increase in salinity, leading to the collapse of the ecosystem and loss of one of the most important feeding sites for birds on the Pacific Flyway — a major north-south route used by migratory birds that stretches from Alaska to southernmost tip of South America. What's more, the shrinking Sea creates dried beaches that are a source of toxic dust, affecting the health of the hundreds of thousands of people who live in the Imperial and Coachella Valleys.

Reports produced by the Little Hoover Commission, Pacific Institute, and numerous faculty within the University of California system, including those associated with the UC Irvine Salton Sea Initiative, emphasized the damage that would occur to the environment, to the economy of the region, and to the public health of hundreds of thousands of Californians.

The negative effects of the mandate were so clear that the State of California agreed to delay the water transfers for 15 years to seek mitigative measures. Although none were initiated, the water transfers were nonetheless approved by the State Water Resources Control Board in 2018.

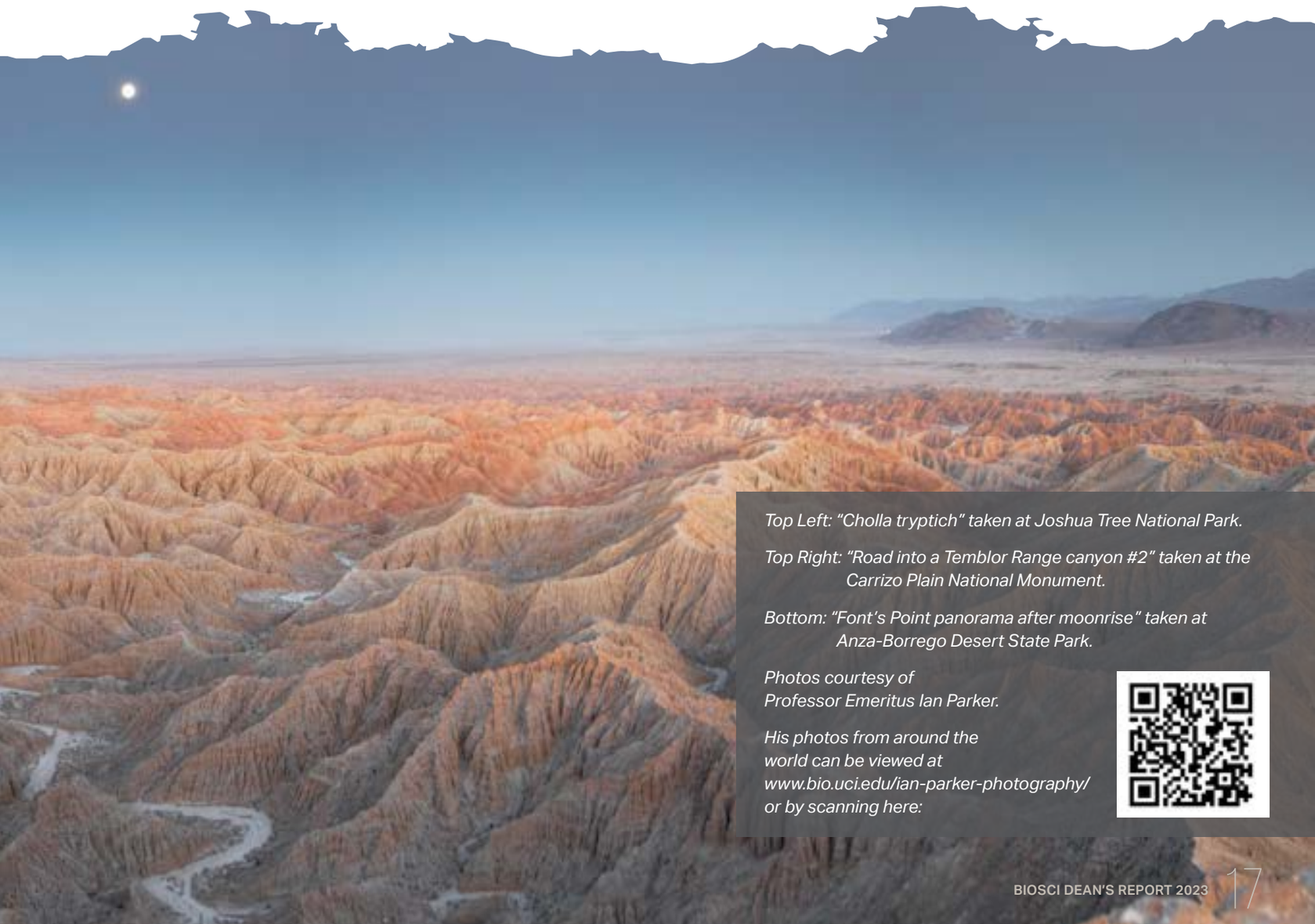
The environmental, economic and public health impacts of the loss of the Salton Sea are complicated by three concurrent and interrelated events:

- Over-allocation of the water in the Colorado River complicates negotiations about water allocations within California.
- Global warming is simultaneously reducing water flow in the river.
- And in Utah, similar threats exist for the Great Salt Lake.

Loss of these two massive salt lakes would be a devastating one-two punch to millions of migratory birds on the Pacific Flyway.

In an attempt to mitigate the negative effects, the State of California is spending hundreds of millions of dollars to create artificial marshes along the shore of the Sea. Unfortunately, the rate of dust production vastly outpaces the state's efforts and the marshes produced are threatened by toxic selenium in the available water sources. These short-term solutions proposed by the state are inadequate and late in implementation. If the Salton Sea ecosystem is to be saved, along with the health and wellbeing of Californians and migratory birds, the state must implement longer term solutions.

Nature photo credits: Ian Parker, PhD



Top Left: "Cholla tryptich" taken at Joshua Tree National Park.

Top Right: "Road into a Temblor Range canyon #2" taken at the Carrizo Plain National Monument.

Bottom: "Font's Point panorama after moonrise" taken at Anza-Borrego Desert State Park.

Photos courtesy of Professor Emeritus Ian Parker.

His photos from around the world can be viewed at www.bio.uci.edu/ian-parker-photography/ or by scanning here:

BREAK A SWEAT

FOR BETTER MEMORY

There is plenty of research that demonstrates the health benefits of regular exercise, but a team of researchers, led by Neurobiology and Behavior Professor and Chair Marcelo Wood and Postdoctoral Fellow Ashley Keiser, has made a groundbreaking discovery that shows exercise is also good for the mind. Their findings reveal that exercise creates a molecular memory for physical activity that enhances subsequent learning.

This discovery builds upon years of research by Carl Cotman, professor of neurology and neurobiology and behavior, who has studied the role of exercise in cognitive function and brain health.

Professor Wood was inspired by a study he read that showed yeast exhibit molecular memory. He and Keiser decided to investigate the same phenomenon in mammals by exposing mice to different exercise programs and determining the impact it had on gene expression — or the process by which the instructions in DNA are used to produce the proteins and other molecules that carry out functions in the body. One group had their gene expression measured after exercising for two weeks and again after a week of no exercise. The other group had measurements taken after exercising for two weeks and again after a week of no exercise but followed by an additional two days of exercise.

Subsequent tests found that when the receptor was activated in mice, those mice performed better in memory tests, and mice that had the receptor inhibited did not perform as well.

The results showed that the gene known as Acvr1c, which is a receptor, was turned on in mice after two weeks of exercise, then turned off after a week of no exercise, then turned back on after two days of exercise. Two days of exercise is not sufficient to turn on the receptor by itself. This means that the initial two weeks of exercise primed the receptor to be turned on later by two days of exercise, suggesting that a molecular memory is generated by two weeks of exercise. Subsequent tests found that when the receptor was activated in mice, those mice performed better in memory tests, and mice that had the receptor inhibited did not perform as well.

The team then utilized data from UCI's MODEL-AD group, which is developing models of late-onset Alzheimer's disease, to gather gene expression measurements. The team found that the receptor's gene expression declines in the aging mouse and human brain, correlating with age-related cognitive impairment. To determine the effect of restoring the receptor's function, the team turned on the receptor in aging mice, which improved the brain's ability to adapt and change and increased long-term memory function. Impressively, the same approach performed in a mouse model that replicates a severe form of Alzheimer's also led to increased ability in memory tests compared to mice without receptor activation.

Because the gene encodes a receptor, there is potential to target it with therapeutics to improve memory in patients, especially in those with Alzheimer's and other forms of dementia. The team has received two grants from the National Institutes of Health to continue their research and is in the early stages of uncovering the full potential of that gene. What's more, this research has led to Professors Wood and Cotman receiving a Multiple PI grant of over $3.5 million and Ashley Keiser receiving a K99/R00 grant to support both the last year of her postdoctoral fellowship and the first three years of her own independent laboratory.

This discovery showcases the incredible potential of scientific research to improve our understanding of the human body and improve the lives of individuals. It highlights the value of using models to study complex biological systems and the benefits it brings to society.

TOXOPLASMA GONDII:

THE THREAT TO WILDLIFE AND HUMANS

California is home to a wide variety of wild and domestic animals, and some of them — including endangered sea otters — are at a risk of becoming infected with and dying from the parasite *Toxoplasma gondii*. This dangerous single-celled organism can infect nearly all warm-blooded animals and is spread through contact with contaminated soil and water, or from eating contaminated undercooked meat or shellfish.

Toxoplasmosis, the disease caused by the parasite, can result in serious long-term health consequences in animals, as well as in humans. In fact, it is estimated that *Toxoplasma* infects about one-third of the human population worldwide and between 11% and 15% of Americans. Few people know more about the impact of *Toxoplasma* than Professor Melissa Lodoen from the Department of Molecular Biology and Biochemistry, whose research focuses on *Toxoplasma* infection of the brain and the human immune system's response to the parasite.

"Most pathogens can't pass the blood-brain barrier and infect the brain, but not only can *Toxoplasma* cross it, it can also cross the blood-retinal barrier — and cause an ocular disease — and the maternal-fetal interface, which can cause serious medical issues for the unborn fetus," said Professor Lodoen.

What's even more troubling about *Toxoplasma* is that most people infected do not know they are infected because their immune systems are currently keeping the parasite in check. If these individuals become immune compromised, either from HIV, chemotherapy, or because they must take immunosuppressants, the unchecked *Toxoplasma* can cause encephalitis — or inflammation of the brain — as well as seizures, blurred vision and damage to other organs.

"Even when there are no overt clinical effects from *Toxoplasma gondii* infection in people or animals, it's important to understand what consequences may occur in the long term and in the event of a compromised immunity later in life," said Professor Lodoen.

To study *Toxoplasma*, Professor Lodoen's lab uses a combination of microfluidic systems with human cells, as well as intravital imaging in the mouse brain, to try and understand how the parasite crosses these profound biological barriers and how the immune system responds.

Highlighting the importance of understanding this parasite is a surprising discovery; when mouse models used to study Alzheimer's disease are infected with *Toxoplasma*, the mice exhibit reduced levels of the amyloid plaques associated with Alzheimer's disease and improved cognition. Understanding how the parasite reduces plaques in the brain is an active area of research in the Lodoen lab. Further investigation is required to uncover the vast potential — both positive and negative — of this unique parasite.

Toxoplasma gondii is a health issue among at-risk human and animal populations. Understanding the pathogenesis of toxoplasmosis requires further study on the part of Professor Lodoen and her team and may lead to better detection methods and treatments for this debilitating disease. Such research promises to bring about significant advancements for both people and animals living in California and around the globe.

ADDRESSING RACIAL AND ETHNIC DISPARITIES IN ALZHEIMER'S DISEASE IN THE STATE OF CALIFORNIA

by Michael Yassa, PhD

More than 650,000 people aged 65 and older are living with Alzheimer's disease in California. This number is projected to more than double by the year 2040. Hispanic/Latine and Black communities will see a disproportionate tripling in prevalence[1]. Genetic factors do not account for these large differences in prevalence. Instead, the major contributors appear to be modifiable health risk factors (*e.g.,* rates of diabetes and vascular disease), socioeconomic factors, racism and discrimination, as well as reduced access to, and use of health services.

In 2020, the Centers for Disease Control and Prevention called for the removal of systemic and structural barriers within policies, systems and community conditions that have contributed to inequitable health outcomes in minoritized populations. This is a significant ongoing challenge with respect to clinical research in Alzheimer's disease. Disparities in clinical research and clinical trial enrollment for Alzheimer's disease have meant that many drugs and interventions approved by the FDA in humans may not work in the populations they would most benefit. Moreover, even when participation barriers are addressed, cultural barriers in assessment methods and inadequate translation of testing tools can influence the identification and diagnosis of dementia in culturally diverse populations. Not only does this limit our scientific understanding of the disease in minoritized groups, but it also directly impacts the individuals living with dementia, since early diagnosis is key to effective intervention.

There is an urgent need for current and future research to proactively and meaningfully partner with minoritized communities to increase their access to and participation in clinical research. This requires a genuine commitment to understanding the impact of systemic and structural discrimination and bias, cultural barriers to participation, as well as community needs and priorities. We must focus not only on research participation but on advocacy, awareness and increasing access to equitable healthcare resources. Additionally, a comprehensive understanding of social and structural determinants of health in Alzheimer's disease observational studies is key. This includes the use of culturally tailored tools that have been validated appropriately[2]. These tools have recently become incorporated in our research and hold promise for an improved understanding of Alzheimer's risks in minoritized populations.

While there is no one-size-fits-all approach to address health disparities, I would like to share with the reader some strategies that we have begun to use in our laboratory to build sustainable community partnerships that center the experiences of the communities in Orange County and surrounding areas to foster awareness and increase participation of Hispanic/Latine individuals. We were recently awarded a $13 million grant from the National Institute on Aging that will support research aiming to understand the role of vascular mechanisms in Alzheimer's disease. Our focus is explicitly on minoritized communities where vascular risk factors are higher in prevalence. Interestingly, vascular pathologies have been underappreciated in research compared with the more commonly studied pathologies of Alzheimer's disease such as amyloid plaques and tau tangles. We hope to bridge this gap in knowledge using advanced brain imaging techniques and innovative sensitive memory tests that we have developed.

Our community-engaged work began by translating all of our recruitment and assessment tools into Spanish, including a Spanish-language version of our website. We hired several Spanish-speaking clinical research staff, who have been instrumental in building true partnerships with individuals and organizations in the community. We partnered with local nonprofits that support the Hispanic/Latine community to build relationships and enhance trust between researchers and individuals who are historically excluded from research studies. We directly engage with families and offer information about Alzheimer's disease and about our clinical research both in English and Spanish. We also expanded our reach by participating in senior health fairs and disseminating information about Alzheimer's disease risks and prevention as well as clinical research opportunities.

Engagement with local government, community leaders and media figures is also crucial. We connected with former mayor of Santa Ana, Vicente Sarmiento, whose office shared information about our studies on their social media platform. A lab member joined a Facebook live podcast with Dr. Ana Nogales, President of the Association for Latino Mental Health Awareness (ALMHA) in Los Angeles & Orange County, where they discussed Alzheimer's disease in the Latine community and increased awareness both of the disease as well as research resources. These are just some of the activities that we have been engaged in as part of this community-engaged research. We are now planning wellness panels in the community and building more partnerships with local advocacy groups. Our goals over the coming year include hiring Spanish-speaking community leaders part-time to advise on our strategies and build a referral network for research participants, as well as investing in the community to improve patient advocacy and access to healthcare resources.

A key to this commitment is ensuring that our relationship with the community is mutual and bidirectional. We are now building a community advisory board to center the voices of minoritized stakeholders and learn from community members about their lived experiences and their individual and collective concerns and priorities, particularly with respect to unique challenges that different communities face. While there is still a very long road ahead, we are beginning to see positive results. We know that this work requires a significant investment of time, effort and resources, as well as a genuine commitment to making a difference in the communities this research should serve. I am especially indebted to our recruitment and engagement team who bring a diversity of knowledge and experiences to this work and who enable this research direction in the lab. This team includes Novelle Meza, Yuritza Escalante and Alyssa Harris, all of whom are proud University of California graduates.

For more information about our Alzheimer's disease research, please visit us online at http://beacon.bio.uci.edu.

The Alzheimer's Disease Research Center (ADRC) at UCI MIND is a federally funded center that aims to improve diagnosis, treatment and care for people with Mild Cognitive Impairment (MCI), Alzheimer's disease and related disorders. The center also seeks to prevent and cure these conditions by investigating ways to identify, diagnose and treat them, understanding cognitive aging in special populations, engaging older adults in memory and aging studies, and serving as a source of information for Orange County seniors, healthcare professionals and the community.

For additional information about the Alzheimer's Disease Research Center, visit **mind.uci.edu/adrc/about**.

[1]Ross, L, Beld, M, and Yeh, J. (2021). Alzheimer's Disease and Related Dementias Facts and Figures in California: Current Status and Future Projections. Report prepared for the California Department of Public Health, Sacramento, CA at the Institute for Health and Aging, University of California, San Francisco, CA.

[2]Stites, S. D., Midgett, S., …,Wolk, D. A. (2022). Establishing a Framework for Gathering Structural and Social Determinants of Health in Alzheimer's Disease Research Centers. *The Gerontologist,* 62(5), 694–703.

CELINE CROOKS:

A STUDENT LEADER ON THE PATH TO PEDIATRICS

Meet Celine Crooks, a fourth-year student at the UCI School of Biological Sciences, who is pursuing her passion for medicine. Long before she was in her final year as an undergraduate, however, Crooks admits she did not know about UCI until she began looking at schools during her senior year of high school. But after learning about UCI's programs and being wowed by the campus's natural beauty and welcoming community, she was hooked.

Crooks chose to pursue the Human Biology major, which combined her appreciation for the natural world and her interest in pediatrics. Her father, who grew up on a farm in Jamaica, instilled in her a love of nature, and her desire to enter the medical field comes from witnessing firsthand the deficiencies in care that her foster brothers received. As a pediatrician, Crooks wants to play a role in delivering outstanding care to all, especially those from historically marginalized groups and regardless of socioeconomic standing.

"The Human Biology program was really cool because we had the opportunity to collaborate with classmates to solve real-world medical scenarios and diagnose patients in simulated situations," said Crooks.

In between classes and studying, Crooks found ways to support other students on campus. As a Peer Tutor and Peer Academic Advisor for the School of Biological Sciences and a Resident Advisor at the Mesa Court student housing community, Crooks has been able to share her knowledge and help fellow students navigate the challenges of college life.

"I love the feeling of giving advice to students and helping them out," said Crooks. "It's especially rewarding when your advice visibly reduces the stress and anxiety they had."

After graduating this summer, Crooks plans to take some time for herself to learn kickboxing and spend time traveling, especially to Italy, Greece and Jamaica. She will then take the Medical College Admission Test in the fall and apply to medical schools the following summer in hopes of becoming a pediatrician and medical professor.

Crooks' experiences have left a lasting impression on her, and she is proud to be a part the many communities she has joined while at UCI. Crooks has fond memories of her time on campus, most notably at the California Alliance for Minority Participation (CAMP) office, which has offered a supportive and comfortable atmosphere and was where she formed many friendships. Crooks will miss the CAMP community and the opportunities it provided her, but she is confident that her experiences at UCI will prepare her for a bright and impactful future.

Crooks is deeply committed to her education and her future as a medical professional, and her experiences at UCI have only reinforced that passion. Her journey at UCI has been an enriching one filled with growth, friendships and opportunities, and there's no doubt she will continue to impact countless lives as she joins the ranks of UCI alumni in June.

THE HUMAN BIOLOGY MAJOR:

A PRESCRIPTION FOR SUCCESS

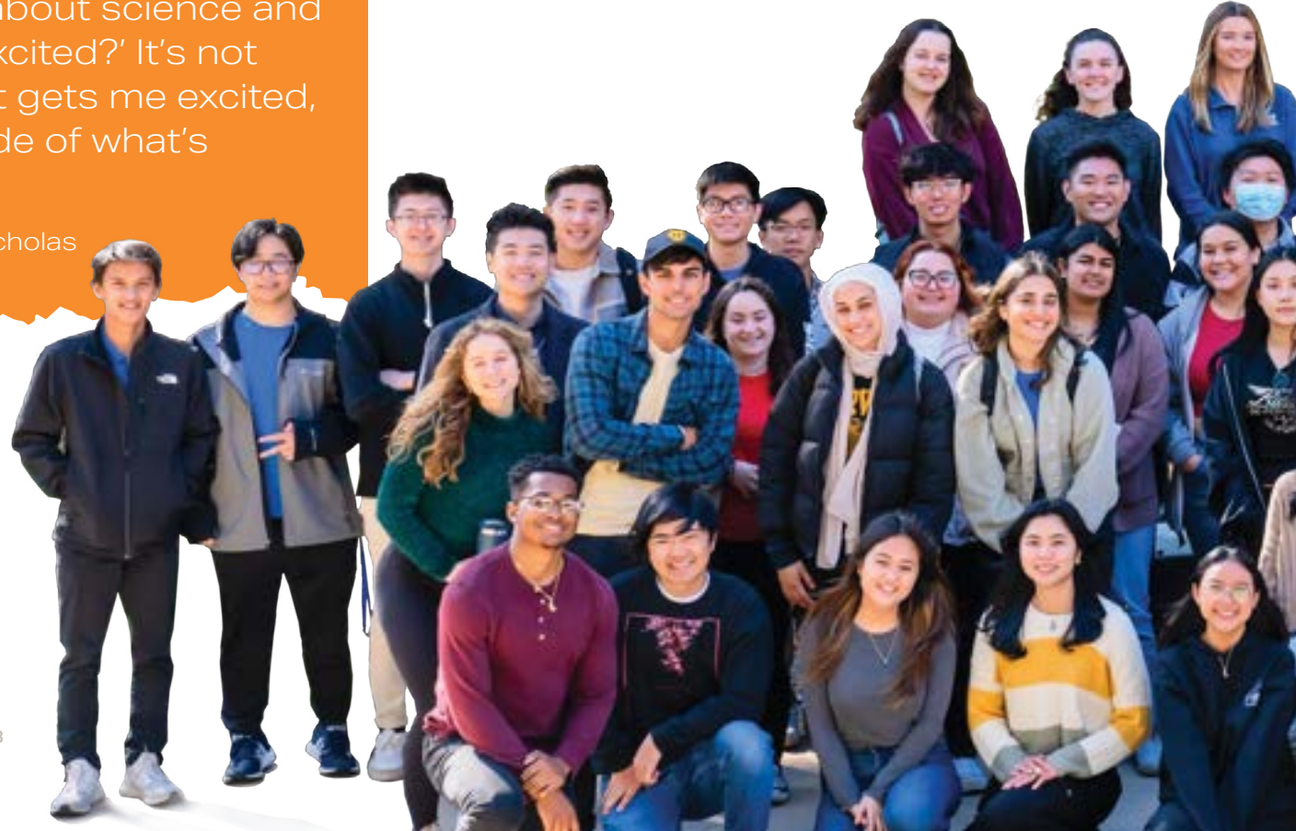
UC Irvine is a popular choice for undergraduates hoping to pursue careers in the medical field. As such, countless students have looked to the School of Biological Sciences to prepare them for medical school.

However, around 2013, then-Associate Dean for Undergraduate Education Professor Michael Leon asked Andrea Nicholas, associate professor of teaching in the Department of Neurobiology and Behavior, to develop a specific pre-med major to cater to budding healthcare professionals.

Professor Nicholas conducted research to find out exactly what pre-med students wanted and needed from a dedicated pre-med program. The result was a blend of coursework in humanities, biology, chemistry, physiology and epidemiology, providing students with a well-rounded understanding of the fundamental concepts that are relevant to the study of medicine. One of the standout features of the Human Biology major is its focus on active learning and real-world medical case applications of the science they learn in other classes. This, combined with an introduction to the main topics that are covered in the Medical College Admission Test, has made it wildly successful and popular among students. Since its creation, enrollment has grown from 15 to 140 students per year, making it the second largest undergraduate major in the school.

"I thought about my passion; 'What do I love about science and what gets me excited?' It's not what I know that gets me excited, it's the magnitude of what's not known."

- Professor Andrea Nicholas



"It was a very intentional, carefully put together program," said Professor Nicholas. "I'm super proud — I think it's my life's work. I think I've helped shape some incredible premedical candidates."

The students enrolled also benefit from Professor Nicholas herself, a Chicago native and rock musician with a history in behavioral neuroscience and bench research at the University of Chicago, Stanford and UC Berkeley. Her unique perspective and passion for teaching have made her classes highly engaging and sought-after by undergraduate students.

"I thought about my passion; 'What do I love about science and what gets me excited?' It's not what I know that gets me excited, it's the magnitude of what's not known," said Professor Nicholas.

The Human Biology major offers several key benefits to undergraduate students and provides them with a comprehensive and well-rounded education in human biology, preparing them for success in their future careers in medicine and related fields.

Students in the major are so devoted to human health that they often go beyond campus to volunteer at student-run free health clinics for uninsured Californians, conduct outreach at minority middle schools in Los Angeles, and even take trips to parts of Mexico to assist clinicians providing free healthcare.

Professor Nicholas serves as the faculty advisor for these and other opportunities, which are available to students in the major. Graduates of the Human Biology major are just as enthusiastic; in fact, it's not uncommon for a former student, who is now in medical school, to return to provide support and guidance for undergraduates, including on how to better their chances at getting into medical school.

Thanks in part to the Human Biology major, the next generation of healthcare professionals will be equipped with the knowledge and skills to make a positive impact on the lives of countless individuals.

Left: "Red iceplant" taken at Garrapata Beach.

Right: "Surf and rock patterns" taken at Point Lobos State Natural Reserve.

Photos courtesy of Professor Emeritus Ian Parker.

His photos from around the world can be viewed at www.bio.uci.edu/ian-parker-photography/ or by scanning here:

Q&A WITH EQUITY ADVISOR MONICA DALEY, PHD

ECOLOGY & EVOLUTIONARY BIOLOGY PROFESSOR

Q What motivated you to seek out this opportunity to serve as the Equity Advisor for the School of Biological Sciences?

I sought to become Equity Advisor to help foster an equitable and supportive scientific community where everyone thrives and reaches their best potential. I believe in the value of service to the community and that the University of California should serve and reflect the diversity of perspectives and experiences of our population. Diversity and equitable practices benefit everyone by fostering excellence and innovation, and by enabling all individuals to thrive and excel.

Q Can you elaborate on your duties as the Equity Advisor?

The Equity Advisor acts as a personal resource and advocate for individuals within the school to listen to their concerns, help them understand the resources and support available to them and help them navigate challenging situations to find positive solutions and improve their experience at UCI.

I also support diversity, equity and inclusion in faculty recruiting by providing training for faculty search committees in inclusive and equitable recruitment practices and I oversee the search strategy to encourage committees to advertise and recruit from a diverse pool of qualified candidates. I also work with the Dean's office and with Professor Michael Yassa, Associate Dean of Diversity Equity and Inclusion, in the BioSci DEI office to promote an inclusive and equitable work environment in our community, by:

- Raising awareness of best practices for equity and inclusion
- Helping to coordinate faculty development programs including training and mentoring
- Addressing specific concerns raised by individuals in our community about equity and inclusion
- Working with the Dean's office to improve our policies and practices to better support our community

I also work closely with the campuswide Office of Inclusive Excellence and help raise awareness of education and training resources, support programs and funding opportunities through this office.

Q Equity and diversity are vital in society. Can you share specifics on the direct benefits of equity and diversity within academia?

It is well established that diverse teams and communities produce more innovation and higher quality outcomes in their work. Therefore, fostering a diverse scientific community is critical for our continued scientific excellence. Students also feel more supported and thrive when they have access to role models with whom they can relate and identify. Equitable and Inclusive practices also benefit everyone by supporting healthy work-life balance, and a sense of belonging and support, which allows individuals to avoid burnout and continue to feel a sense of joy and purpose in their work, long term.

Q Are there long-term consequences to ignoring equity and diversity, especially in academia?

Research has shown that individuals from historically marginalized groups produce innovation and novelty at rates at least as high as majority groups, yet their contributions are not credited and valued equally. When we lose talented individuals from a profession because they feel undervalued, this is a huge loss to our community and long-term ability to produce excellent science. Loss of talent also contributes to the lack of diversity in senior and leadership positions, which then perpetuates the status quo, and compromises the well-being of our students who are more likely to feel supported and empowered by role models with whom they can identify.

I believe that equity and inclusion is an issue of social justice; however, there is also ample evidence to show that it is also critical for our continued thriving as a community of academic excellence.

Q What advice do you have for those who want to be equity and diversity advocates and aren't sure how to start?

Supporting equity and diversity is, first and foremost, a process of constant listening to diverse perspectives, being open to change, and acting locally to advocate for others when you see them facing obstacles or bias. A good place to start is to educate yourself about implicit bias and learn about your own unconscious associations about race, gender and sexual orientation that may influence how you perceive individuals. I would also encourage everyone to take bystander intervention training to learn strategies for standing up for others when they face bias or discrimination. Additionally, we should all learn about microaggressions and how some of the off-hand comments we make in our daily social interactions can have damaging consequences. Learning about these things can help you increase your awareness, improve your language to foster more inclusive communities and become a better advocate for others.

For Office of Diversity, Equity & Inclusion resources and training, visit inclusion.bio.uci.edu.

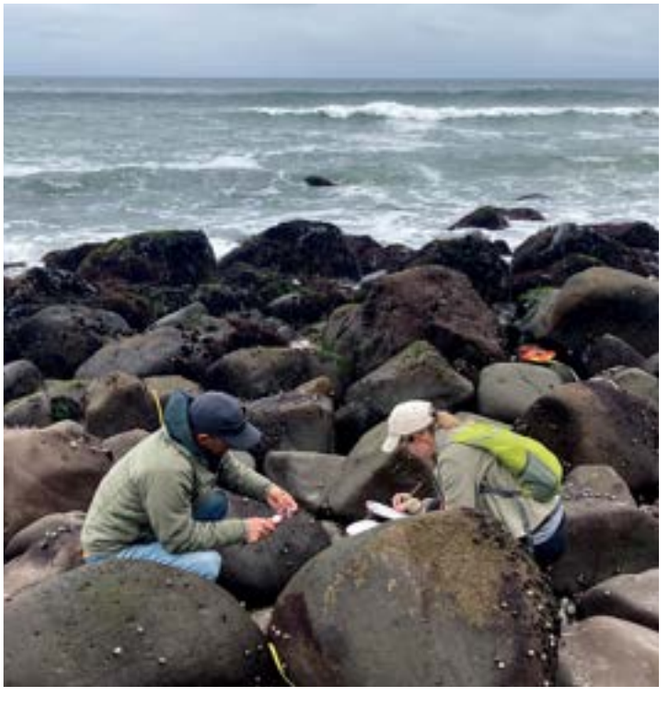
ADAPTING TO CLIMATE CHANGE:

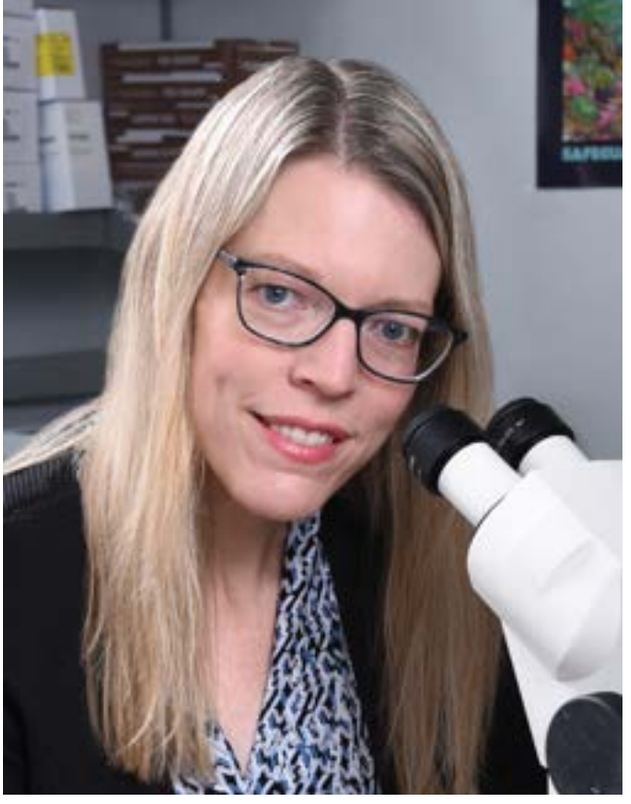
INVESTIGATING THE IMPACT OF RANGE-SHIFTING SPECIES

Climate change is not only causing more frequent extreme weather events, but the rise in temperatures is also causing many species to shift their ranges closer to the poles where the temperatures are cooler. And while adaptations are preferred over extinction, the range-shifting species may act as invasive species, negatively impacting the ecosystems to which they move.

Professor Cascade Sorte and her team work to understand the effects of global change, including climate change and species invasions. Their goal is to predict responses to global change, test our understanding of fundamental ecological processes, and mitigate harm to ecosystems.

One of their current ongoing field studies involves tracking two native species of predatory sea snails — known as the Dark Unicorn and the Angled Unicorn — whose ranges are shifting north. As they move into new areas on California's coast, they have the potential to become invasive species that negatively alter ecosystems. The study, which is funded by the National Science Foundation, aims to understand how these range-shifting snails are affecting the native shellfish populations and if they are outcompeting native species for resources in their new environments. In collaboration with researchers in Ensenada, Mexico, and at Cal Poly Humboldt, the team is surveying rocky shores from Baja California to Northern California.





The study is particularly important because if range-shifting species have the same negative impact as invasive species, there may be a need to control range-shifters in addition to the already costly management of invasive species. Thus, understanding how range-shifting species affect new environments is crucial to anticipate ecological needs before it is too late.

The research conducted by Professor Sorte and her team is a critical contribution to the growing body of knowledge on the effect of climate change on our planet's biodiversity. The rate and extent of species range shifts is increasing with accelerating climate change, but to date there is no framework for predicting impacts on ecosystems. Researchers in the Sorte Lab aim to develop a framework for understanding the significance of species range shifts and anticipating outcomes before the arrival of a shifting species.

By studying the impact of range-shifting species, like the Dark Unicorn and Angled Unicorn sea snails, and integrating this new knowledge in a risk assessment framework, the Sorte Lab aims to help policymakers worldwide act preemptively to address ecological needs. Understanding the effects of climate change on biodiversity is vital to the continued health and well-being of our planet, and the work being done by Professor Sorte and her team is essential in predicting and mitigating the harm caused by global change.

SATISFYING MELANOMA CELLS' CRAVINGS

COULD STOP THEIR SPREAD

A cancer cell is like a "hungry animal" and rather than starving it, sating its appetite could represent a powerful treatment strategy. This concept underlies research by Molecular Biology and Biochemistry Professor Mei Kong, who is exploring whether providing tumors the nutrition they crave can make them less likely to metastasize. She and her team are focusing their investigations on the melanoma type of skin cancer and the early results are promising.

Chomping through nutrients at a fast pace, melanoma and other kinds of cancer cells proliferate rapidly. This can often lead to a depletion of nutrients in the tumor and can drive the hungry cancer to a more invasive form. Among the nutrients cancer cells prefer is glutamine, the body's most abundant amino acid. Professor Kong and her team are examining whether it can be used to fight melanoma's spread.

Nearly 11,000 people in California will be diagnosed with melanoma this year.

Melanoma is the fourth most-frequent cancer for men in California and the sixth most common for women.

The incidence of new melanoma cases among men in California is higher than the national average.

(Source: American Cancer Society)

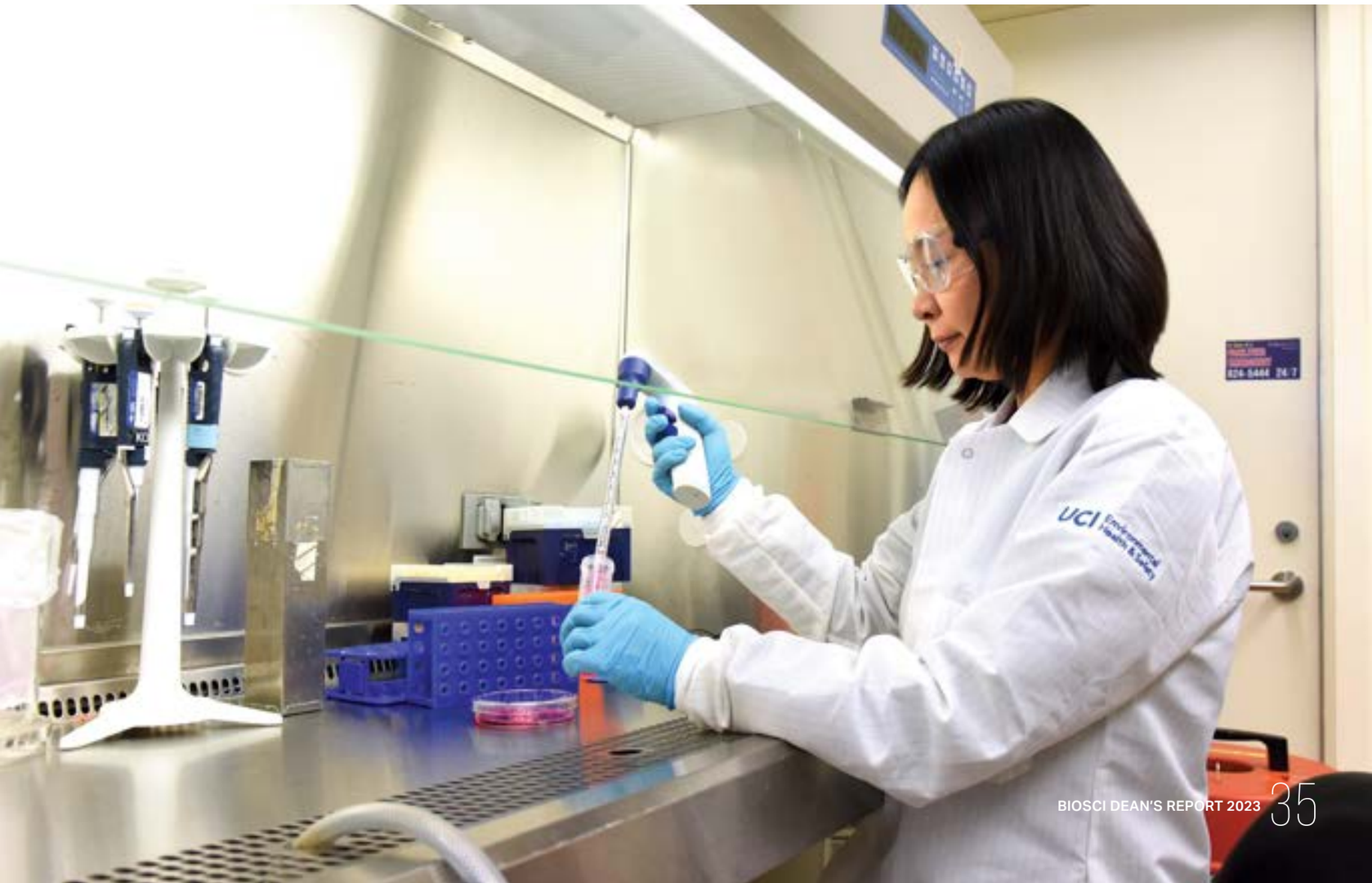
"The glutamine level in a solid tumor is very low and we have studied how melanoma cells can survive with so little," she said. "We found they adapt by altering their metabolism. This process involves changes in many genes, even affecting those related to drug resistance." It makes the melanoma more likely to metastasize and harder to treat.

Professor Kong believes feeding the cancer cells glutamine rather than starving them could be effective. "A tumor is like a hungry animal," she said. "Their hunger makes them more aggressive, but if you give them the minimum glutamine they need, they are less aggressive."

She and her colleagues found that a diet containing 20-percent glutamine suppresses various tumor-related gene activities and melanoma growth in mouse models. They next plan to investigate whether dietary glutamine supplementation can increase the impact of immunotherapy and other melanoma treatments.

Using glutamine successfully will require more than just consuming a greater amount. "We need to figure out the processes behind this so we have a scientific approach to utilizing nutrition as you would use a drug," she said.

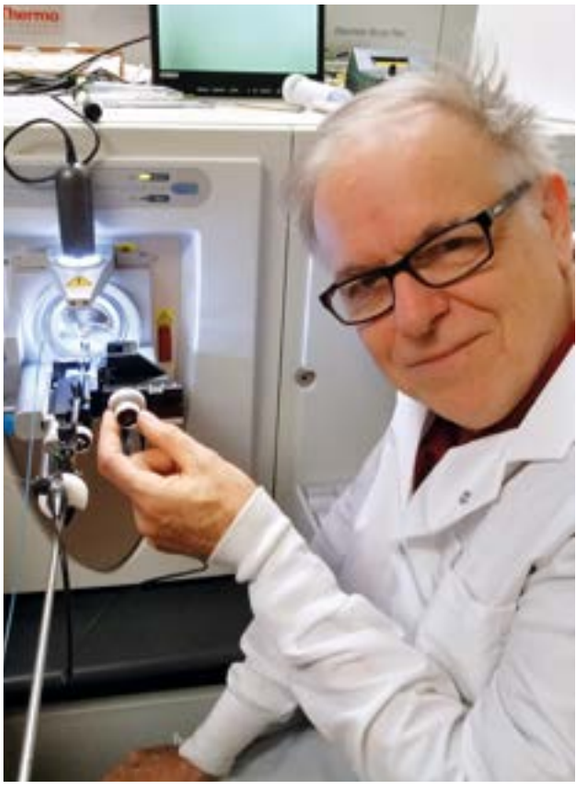
As Professor Kong pursues this research into melanoma, she urges everyone to lower their risk. Preventive measures include wearing sunscreen and protective clothing year-round, staying out of mid-day sun, and steering clear of tanning lamps and beds. "Many melanomas can be avoided, and it is important to take these daily steps," she said.



THE RISE OF MONKEYPOX:

UNDERSTANDING THE EMERGING ZOONOTIC DISEASE

by Paul Gershon, PhD



Infectious diseases that pass from non-humans to humans — or zoonotic diseases — have garnered increased attention in recent years. Well known zoonotic diseases include Ebola virus, rabies and Lyme disease. The most recent zoonotic disease to garner global attention has been human monkeypox (hMPX), an emerging zoonotic disease of humans known since 1970, found primarily in Africa and whose primary hosts include non-human primates and rodents.

The causative agent of hMPX, Monkeypoxvirus, belongs to the same virus family as the now-eradicated smallpox albeit hMPX is much less severe. As a disease, hMPX is asymptomatic for an initial period of 4 to 21 days followed by symptomatic pre-eruptive and eruptive stages. The pre-eruptive stage, which lasts 0 to 5 days, is characterized by swelling of the lymph nodes, back pain, muscle pain, fever, intense headache, physical weakness and general discomfort. The eruptive stage, during which the virus is contagious, typically involves a rash on the face that can spread throughout the body, affecting in particular the palms of the hands and soles of the feet, oral mucous membranes, genitalia and eyes. Over time, the rash evolves in appearance then crusts over and falls off.

Human monkeypox outbreaks in Africa in have increased steadily since the cessation of smallpox vaccination in the late 1970s and early 1980s, with case fatality rates of 3–5%. Animal-to-human transmission likely arises from the handling of live or recently killed infected animals. Until 2022, human-to-human transmission was uncommon, resulting only from close contact with infected individuals via respiratory droplets or skin lesions. May through November 2022, however, saw a comparatively massive outbreak of over 83,000 cases that spread over 116 countries with roughly 60% of cases reported in the U.S., Brazil, and four European countries. Within the U.S., the state of California took the lead, with 5,640 cases.

The 2022 outbreak was characterized by relatively high transmissibility, low mortality and more localized lesions, for which genomic sequencing and other studies have not yet provided a clear explanation.

Fortunately, hMPX is considered less serious than human smallpox, as infection is typically self-limiting. However, death can occur in severe cases, primarily in children and immunocompromised individuals. Additionally, the FDA-approved human smallpox vaccine, JYNNEOS, is 85% cross-protective against hMPX and has been cleared for use in at-risk adults and immunocompromised individuals. For those already infected with hMPX, treatments include Tecovirimat, an anti-smallpox drug approved by the FDA in 2018.

One of the longest-standing problems in modern biology has been the atomic and molecular structure of the poxviruses, which comprise about 600 million individual atoms. Since 1961, when the first electron microscopic images of the smallpox vaccine appeared, there has been little progress in understanding the structures of poxviruses at the molecular level. Work in the lab of Professor Paul Gershon from the Department of Molecular Biology and Biochemistry is currently resolving this problem.


MONKEYPOX
SMALLPOX & MPXV
VACCINE
For Intramuscular Use Only


NATURAL SCIENCES II

EXERCISE AS MEDICINE:

THE POWER OF PHYSICAL ACTIVITY FOR PROMOTING HEALTH AND INCREASING LONGEVITY

by James Hicks, PhD

The idea that regular exercise is essential for health and integral to medicine can trace its roots to ancient China, India and Greece. In fact, around 400 B.C., the Greek physician, Hippocrates, wrote "... eating alone will not keep a man well; he must also take exercise. For food and exercise, while possessing opposite qualities, yet work together to produce health." For western medicine, this notion that physical activity was important for health and prevention of disease persisted for almost two millennia.

With the 20th century came advances in the life sciences; the development of new drugs and the invention of medical technologies shifted the focus of Western medicine away from preserving health. Medicine used new and effective tools to cure sickness and disease, and life spans increased. The successes of medicine resulted in forgetting the importance of daily exercise in health and disease prevention, and the topic of exercise was relegated to sports and physical education.

As the 21st century approached, new medical challenges were evolving; obesity was rising, and chronic illnesses such as hypertension, type 2 diabetes, and various cancers rapidly increased. In 2022, the Centers for Disease Control estimated that 90% of the nation's $4.1 trillion in annual healthcare expenditures are for people with chronic illnesses.

Although the 20th century witnessed an increase in life span, health span — defined as "the period of life spent in good health, free from the chronic diseases and disabilities of aging" — was on the decline. Health span and life span can be positively affected by five lifestyle changes, including regular exercise, proper nutrition, reduction in stress, good quality sleep, and exogenous compounds, which include pharmaceuticals for medical conditions. Of these five changes, regular exercise has the biggest effect on risk reduction. Hundreds of studies and millions of subjects reveal the benefits of regular physical activity in increasing longevity, preserving health, reducing the risk of chronic illnesses and improving disease trajectories. These facts have once again raised the importance of incorporating the prescription of regular exercise into medicine. Today, medicine must accept the overwhelming evidence for the essential role of daily exercise in extending life span and health span and incorporate that knowledge into daily patient care.

Unfortunately, the concept of "exercise as medicine" is not routinely incorporated into medical school training, but that is beginning to change. At UC Irvine, in 2016, Ecology and Evolutionary Biology Professor James Hicks developed a small seminar series for undergraduate students entitled "Exercise as Medicine." The course explores the mechanistic basis for how regular physical activity promotes overall cardiovascular, metabolic and mental health and how regular exercise dramatically improves outcomes with various chronic illnesses, including type 2 diabetes, many cancers, cardiovascular disease and neurodegenerative disorders.

In 2021, Professor Hicks expanded this unique course to 85 biology majors. But with almost 200 students on the waiting list, it was clear that students were hungry for such information. The course continues to expand in 2023 to provide our next generation of healthcare providers with the foundations of "exercise as medicine."

Top Left: "Lembert Dome from Tuolumne Meadows" taken at Yosemite National Park.

Bottom Left: "Sequoia grove" taken at Sequoia National Park.

This Page: "Mossy branches" taken at Redwoods State Park.

Photos courtesy of Professor Emeritus Ian Parker. His photos from around the world can be viewed at www.bio.uci.edu/ian-parker-photography/ or by scanning here:

RECOGNIZING SUCCESS:

THREE BRILLIANT PROFESSORS WIN NEW INNOVATOR AWARDS

In 2022, three BioSci faculty members — Professors Evgeny Kvon, Dequina Nicholas and Xiaoyu Shi — were awarded the National Institutes of Health (NIH) Director's New Innovator Award. This prestigious award acknowledges early career investigators for their innovative research, and supports them in their endeavor to make new, impactful scientific discoveries.

Professors Kvon and Shi from the Department of Developmental and Cell Biology received their awards through the National Institute of General Medical Sciences (NIGMS). Professor Nicholas from the Department of Molecular Biology and Biochemistry received her award from the National Institute of Allergy and Infectious Diseases (NIAID).

Professor Kvon explores how transcription is regulated during animal development. He focuses on enhancers, non-coding DNA elements that regulate gene expression, to understand their function in the 3D genome and cell fate specification. For this purpose, the Kvon lab uses the mouse as an animal model system and employs novel genome editing and genomics tools. His research also investigates how human risk variants located in enhancers lead to congenital disease. Additionally, his lab develops methods for studying the molecular basis of vertebrate evolution.

Professor Nicholas investigates the relationship between the nutrient environment, immune system and metabolic diseases. The Nicholas lab uses multiple tactics — including molecular and cellular biology, transgenic mouse models, cytokine profiling and flow cytometry — to explore polycystic ovary syndrome, inflammation in type 2 diabetes and immune regulation of gonadotropins. Her lab also uses these tactics to understand cellular metabolism in the hypothalamic-pituitary-gonadal axis, lipid antigen presentation and immunometabolism.

Professor Shi uses a variety of optical and chemical techniques to develop advanced microscopy methods. These methods enable her and her lab to explore the molecular and cellular mechanisms behind aging and cancer. For example, they focus on how the nuclear lamina drives gene expression by studying organelle-organelle interactions in breast cancer cells at the molecular scale. A new direction in Shi's research program is spatial single-cell analysis. Shi lab is developing a cutting-edge technology called GO3D multiomics, which simultaneously profiles proteins, RNAs and DNAs of whole tissues with subcellular resolution. Applications of the GO3D spatial multiomics technology will transform our understanding of critical biomedical processes, such as Alzheimer's disease progression, neuron interactions, the tumor microenvironment, and the microbiome-host relationship.

These three faculty are paramount examples of UCI's world-class research initiatives. The school takes great pride in their accomplishments and celebrates their success as they continue to make invaluable contributions to the field of science. The NIH Director's New Innovator Award serves as an inspiring reminder of the incredible work being done at the School of Biological Sciences.

2022 GRADUATE HONORS

CONVOCATION BANQUET

On June 8, 2022, the School of Biological Sciences hosted its inaugural Graduate Honors Convocation Banquet, a formal event that recognized outstanding graduate students through the presentation of awards and scholarships. This elevated event more closely represented the distinguished nature of the awards compared to similar graduate honor events of previous years.

Graduate education and research play a critical role in shaping the future and improving the world we live in.

The formal event enabled the School of Biological Sciences to celebrate the achievements of its graduate students as well as the tireless work of BioSci faculty and the generosity of its donors. The event was attended by students, their families and friends, and faculty, staff and donors, and was an occasion to reflect on past successes and look ahead to the future.

Dean Frank LaFerla opened the event with a warm welcome to the attendees. In his remarks, he acknowledged the significance of graduate education to the university's mission and the importance of research to the world. He also spoke about the challenges posed by the COVID-19 pandemic and climate change, and the role of graduate students in solving these problems. Dean LaFerla praised the work of the students and encouraged them to continue their efforts, inspiring hope for the future of the planet. Professor Gillian Hayes, Vice Provost for Graduate Education and Dean of the Graduate Division at UC Irvine, was also in attendance as a special guest speaker, where she thanked the graduate students for their dedication to scientific research.

During the banquet, Professor Michael Mulligan was recognized for his 23-year-long service as Associate Dean of Graduate Education.

He was thanked for his contributions to the program and his efforts to establish BioSci's Graduate Education as a world-class program. Additionally, Professor Kim Green was honored with the Golden Apple Award for Excellence in Teaching, which acknowledges the outstanding contributions of educators who inspire students and create innovative teaching programs.

Professor Craig Walsh, Associate Dean of Graduate Education, announced the awardees and presented them with certificates. Afterward, students had the opportunity to take photos with their peers, families and donors, who's generosity in supporting the sciences is greatly appreciated. The School of Biological Sciences extends a special thank you to each donor, including Brian Atwood; Susan Bryant, PhD; David Gardiner, PhD; Steven Granger, PhD; Doug Granger, PhD; Barbara Granger; Zubin Mowlavi; John Schneiderman; Ann Stephens; Nita Tewari, PhD; Dr. Devansu Tewari; Paris Mowlavi Torkamani, JD; and Judith Wagner.

BioSci is proud of the scientific excellence of its graduate students and looks forward to recognizing more students at future Graduate Honors Convocation Banquet events.

Graduate education and research play a critical role in shaping the future and improving the world we live in.

The discoveries made by graduate students have the potential to solve some of the biggest challenges facing society and contribute to the betterment of humanity. Through the efforts of dedicated educators, students and supporters, graduate education continues to drive progress and innovation in all fields of study.


UCI BioSci

BIOSCI UNVEILS

DEDICATED GRADUATE SPACE

The school recently celebrated the grand opening of its new Graduate Active Learning Space. The dedicated space, located in Natural Sciences I, is designed to provide graduate students with an environment to collaborate and learn together.

The ribbon-cutting ceremony was attended by BioSci graduate students, faculty and staff, who gathered to mark the occasion and explore the state-of-the-art facilities. The space is equipped with interactive whiteboards and Zoom capabilities, allowing for remote collaboration and group discussions.

Dean Frank LaFerla delivered remarks at the small ceremony, expressing his excitement for the new space and its potential to enhance learning and foster collaboration among graduate students. He highlighted the critical role that graduate students play in advancing scientific research and shaping the future of the field, and emphasized the school's commitment to providing them with the resources they need to succeed.

The Graduate Active Learning Space is available exclusively for graduate students and can be booked through BioSci Facilities. It is expected to become a hub for innovative ideas and lively discussions among the BioSci graduate student community, contributing to the important work they are doing in advancing the field of biological sciences.

The project was made possible through the tireless efforts of the BioSci Facilities and Computing teams, as well as feedback and ideas from the graduate student community. The grand opening ceremony was a testament to the school's commitment to supporting its graduate students and investing in their success.

2022-2023

NEW FACULTY

Eitan Schechtman, PhD

Assistant Professor
Neurobiology and Behavior

Professor Schechtman uses neuroimaging, behavioral manipulations, and computational methods to explore memory reactivation during sleep in humans. His lab combines novel techniques to selectively bias memory reactivation; machine-learning algorithms to decipher memory-related content from neural data; and neuroscientific methods for monitoring brain connectivity and rhythms in different regions and timescales. Using this state-of-the-art methodological framework, the lab hopes to reveal the neural infrastructure through which sleep transforms memories, and how these dynamics may be harnessed for improving well-being in healthy and clinical populations.

Nir Drayman, PhD

Assistant Professor
Molecular Biology and Biochemistry

Professor Drayman specializes in studying the interactions between disease causing viruses and the human cells they infect, at the single-cell level. While our cells are genetically identical to one another, they show remarkable variability in their traits and their resistance to viruses. Using state-of-the-art techniques in cell biology, imaging and machine learning the Drayman lab hopes to understand the molecular components of cells that make them resistant to viral infections, thereby unlocking novel ways to develop antiviral therapies.

Benjamin Morehouse, PhD

Assistant Professor
Molecular Biology and Biochemistry

Professor Morehouse studies the evolution and diversification of antiviral immunity. Many of the innate immune defenses employed by plants and animals are surprisingly conserved in bacteria and archaea. Identifying and characterizing the immune processes that are shared among diverse organisms may be useful in developing new therapeutic strategies to protect us from pathogenic microbes. The Morehouse lab is particularly focused on the enzymes, chemical signals, and receptors that mediate antiviral responses across the tree of life and aims to use protein structural analysis and biochemical approaches to improve our molecular understanding of these ancient immune signaling pathways.

2022-2023

FACULTY RETIREMENT

Ian Parker, PhD

Distinguished Professor
Neurobiology and Behavior

Distinguished Professor Ian Parker is a renowned neurobiologist and professor, recognized for his pioneering work in understanding how cells in the nervous system communicate. He has developed advanced methods to measure and capture the movement of calcium ions within cells, using techniques like "caged" signaling compounds and high-resolution fluorescence microscopy.

His contributions to the field of neuroscience were acknowledged with an election to the prestigious Royal Society. Alongside his scientific pursuits, Professor Parker also has a passion for endurance running and photography, having completed the Badwater Ultramarathon multiple times and having his photographs featured in scientific publications. Professor Parker's photography is featured extensively throughout this report.

Backround photo credit: Ian Parker, PhD

2022 BIOSCI

AWARDS AND HONORS

2022 Elected Fellow
American Academy of Arts & Sciences
Adriana Briscoe, PhD

2022 Elected Fellow
American Academy of Microbiology
Anthony James, PhD

2022 Elected Fellow
American Association for the Advancement of Science
Aimee Edinger, PhD
Georg Striedter, PhD

2022 Highly Cited Researcher
Web of Science Group
Steven Allison, PhD
Kathleen Treseder, PhD

Innovator of the Year Award
UCI Innovator Awards
Maksim Plikus, PhD

Early Career Innovator/Emerging Innovation of the Year Award
UCI Innovator Awards
Mathew Blurton-Jones, PhD

APS Rising Star
Association for Psychological Science
Eitan Schechtman, PhD

2022 Fellow
UCI Faculty Academy for Teaching Excellence
Celia Faiola, PhD
Catherine Loudon, PhD
Pavan Kadandale, PhD
Brian Sato, PhD
Adrienne Williams, PhD

2022 Fellow
The Hellman Fellows Program
Xiaoyu Shi, PhD
Katherine Thompson-Peer, PhD

Grace Evelyn Pickford Medal in Comparative Endocrinology
International Federation of Comparative Endocrinological Societies
Deborah Lutterschmidt, PhD

Marsh Award for Climate Change Research
British Ecological Society
Kathleen Treseder, PhD

Society for Leukocyte Biology Legacy Keynote Lecture Award
Society of Leukocyte Biology
Andrea Tenner, PhD

Best of CASE District VII Award
Council for Advancement and Support of Education
Pavan Kadandale, PhD

National Institutes of Health Director's New Innovator Award
National Institute of General Medical Sciences
Evgeny Kvon, PhD
Xiaoyu Shi, PhD

National Institute of Allergy and Infectious Diseases
Dequina Nicholas, PhD

2022 Impact Award for Outstanding Contributions to Diversity and Inclusion
Botanical Society of America
Ann Sakai, PhD

Gilliam Fellowship
Howard Hughes Medical Institute (HHMI) Gilliam Fellowships for Advanced Study
Carlene Chinn
Marcelo Wood, PhD

Academic Senate Better World Award
University of California, Irvine
Christopher C.W. Hughes, PhD

Samueli Scholar
Samueli Scholars Award Program
Katrine Whiteson, PhD

Lauds & Laurels

Angeline Dukes, PhD
Diana Hendel, PharmD
Benedicte Shipley

Staff Service Award — 3 Years

School of Biological Sciences

- Joy Beardwood
- Joanna Bradshaw
- Regina Castleman
- Monique Henriquez
- Ethan Perez
- Naveen Sami

Staff Service Award — 5 Years

School of Biological Sciences

- Karl Cannon
- Rebecca Crowe
- Shannon Ingram
- Aris Lindo
- Reham Riad
- Claire Wen
- Bing Yang

Staff Service Award — 10 Years

School of Biological Sciences

- Jennifer Maitland
- Morgan Oldham

Staff Service Award — 15 Years

School of Biological Sciences

- Bella Almourzaeva
- Carmen Bastos
- Sarah McCarthy
- Ling Sardi

Staff Service Award — 20 Years

School of Biological Sciences

Darla Becker

IN MEMORIAM

Stuart M. Krassner, ScD, PsyD

1935-2022

Professor Emeritus Stuart Krassner's name is synonymous with the history of UCI and the Department of Developmental and Cell Biology. As one of the founding faculty members, he was present when UCI first opened for classes on October 4, 1965.

During his four-decade career at UCI, Professor Krassner studied disease-causing hemoflagellates and sought to understand the mechanisms by which primitive parasitic protozoa transform within each host. One such organism, *Trypanosoma cruzi,* was of particular interest, as it causes Chagas disease, which is the primary cause of heart disease in Central and South America. His global work in infectious diseases led him to India, Brazil and Switzerland, where he lived to study and conduct research. As an expert in parasitology, he taught courses on the subject at the School of Biological Sciences. He also held a joint appointment in the School of Medicine, where he taught Medical Parasitology to medical students and served on the Medical School Admissions Committee.

In addition to his research and teaching, Professor Krassner was instrumental in developing the original FDA and NIH compliance procedures for UCI-sponsored human clinical trials, organized UCI's first Institutional Review Board, and was the campus officer responsible for all UCI-related contract and grant activities from 1985 to 1990. Following his retirement in 2005, Professor Krassner remained active with the UCI Emeriti Association.

Outside of the university, Professor Krassner's scientific and regulatory expertise was highly sought after, and he conducted work as a consultant for numerous public and private organizations until 2019.

Professor Krassner is survived by his wife, Liza, and three sons, David, Mark and Joseph. He will be greatly missed.

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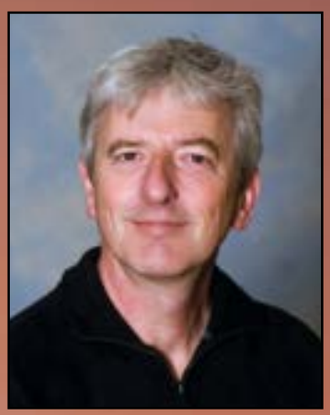

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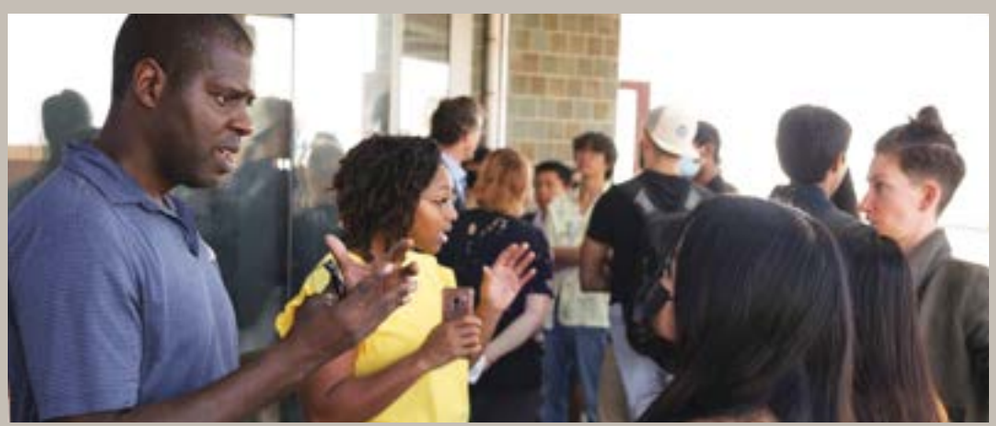
Catherine Loudon, PhD
Vice-Chair

Marissa Reyes
Department Administrator

YEAR IN REVIEW

Through innovative programming and outreach initiatives, BioSci is able to build bridges between science and society and inspire the next generation of biologists and thought leaders.


Dean's Distinguished Lecture Series:
Looking to a Future Without Alzheimer's
November 15, 2022 | 4:00 p.m.
The Beckman Center
UCI School of Biological Sciences
BECKMAN CENTER




UCI BioSci


Uci
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SCHOOL

FACTS AND STATS

3,911
Undergraduate Students

- 43% — First-generation students
- 66% — Female
- 27% — From Underrepresented Backgrounds

389
Graduate Students

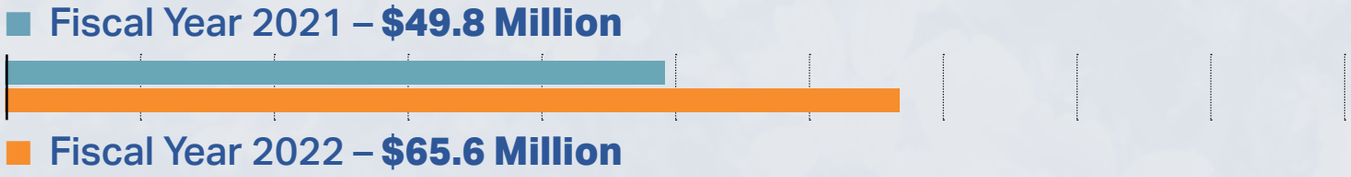
- 59% — Female
- 23% — From Underrepresented Backgrounds

FALL 2022 ENROLLMENTS BY THE NUMBERS

#1 Doing the Most for the American Dream

UCI is No. 1 on The *New York Times'* College Access Index, which ranks colleges based on their commitment to economic diversity by measuring the number of lower- and middle-income students enrolled and the cost of tuition.

BioSci's Extramural Funding



Degrees Conferred Academic Year 2021-2022

935
Bachelor's Degrees

104
Graduate Degrees

60
Masters

44
Doctorates

BioSci's Tenure-Track Faculty Diversity

- **47%** – Female
- **33%** – From Underrepresented Backrounds

#9

UCI ranked No. 9 in the nation among public universities on *Forbes'* 2022 America's Top Colleges List.

#32

BioSci ranks No. 32 on *U.S. News & World Report's Rankings for Biological Sciences Graduate Programs*

SCIENTIST'S CURIOSITY
INSPIRES HER CHILDREN'S GIFT

It is one thing to cherish the memories of loved ones. It is another thing to keep their spirit alive by sharing their character and values with others so they can continue to impact more lives.

That is exactly what daughter Paris Mowlavi Torkamani and son Zubin Mowlavi did to honor their late mother, Simin Amindari, through the establishment of the Simin Amindari Endowed Graduate Fellowship. The fellowship honors Simin's love of science and teaching by providing need- and merit-based awards to graduate students who display research excellence and come from non-traditional educational backgrounds or have overcome challenges in pursuing their studies.

"Our mother believed you should always learn and grow," said Torkamani, a 2005 UCI political science graduate and San Diego attorney. Mowlavi said: "That was her core aspiration for herself and for us." Mowlavi majored in computer engineering at UCI and graduated in 2004. He is a technology entrepreneur and musician in Corona del Mar.

Simin grew up in Urmia, Iran, amid a rural setting that sparked her interest in plants and animal science. While a University of Tehran undergraduate, she studied for a year at the University of Illinois, Champaign. After obtaining a master's in Iran, marrying and having her children, she returned to Illinois on a fellowship and stayed there with her family. Following a divorce in her 40s that turned her into a single parent, she earned a PhD in plant physiology.

For her, learning was about more than the classroom. She believed in curiosity, open-mindedness and inclusivity.

- Paris Mowlavi Torkamani

"Obtaining that degree is not an easy feat," Mowlavi said. "She did it without ever failing to drop us off at school, pick us up and be involved in our lives, all on a limited salary. Doing something like this requires a myopic focus on your family, without forgoing your personal growth. She made it seem simple."

When Simin decided to move to Southern California with her children, she landed a post as a postdoctoral Alzheimer's researcher in the laboratory of Professor John Weiss with the Department of Neurology and Department of Anatomy and Neurobiology at the School of Medicine.

On November 4, 2003, Simin lost her life in a traffic accident at 54 years old. "It was devastating to our family and the laboratory team," Torkamani said. "The people she worked with left her desk untouched for nearly a year and a bench was commissioned in her name. It was a beautiful show of love and solidarity from her colleagues."

Torkamani and Mowlavi chose to support BioSci because of their mother's interest in plants, animals and neurosciences. In addition to supporting students' formal education, they hope to encourage their inquisitiveness. "For her, learning was about more than the classroom," Torkamani said. "She believed in curiosity, open-mindedness and inclusivity."

"Had she lived and retired, philanthropy would have given her the satisfaction that she was helping other people grow in their understanding of the world," said Mowlavi.

The Simin Amindari Endowed Graduate Fellowship supports the school's extraordinary students' dreams and potential. BioSci is honored by this gift and expresses the deepest thanks to Paris Mowlavi Torkamani and Zubin Mowlavi for their generosity.

Ensuring grad students have the funding they need to complete their education is vital for the school's mission of transforming the world's future for the better. The UCI Graduate Division will match new funds issued to students through graduate fellowship endowments for the next 10 years. This means your donation will go farther than ever. For more information on how to support our graduate students, please contact Denise Khaw at dkhaw@uci.edu or 949-824-2734.

2022

DONOR HONOR ROLL

UCI School of Biological Sciences is grateful to all our donors. Your gifts truly make a difference in the pursuit of our mission. The honor roll below is reflective of gifts and pledges made between January 1, 2022, and December 31, 2022. Thank you!

We make every effort to list all donors accurately. If, however, you find an error, please contact us at **bio-development@uci.edu**. To view our longtime donor alumni and friends list, please visit **bio.uci.edu/giving**

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Image top: "Mono Lake tufas and Sierra Nevada by moonlight" taken at Mono Lake.

Image Bottom: "Lupine and ocotillo" taken at Anza-Borrego Desert State Park.

Images by Professor Emeritus Ian Parker

UCI School of Biological Sciences

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