PATHS TO INNOVATION
HOW RESEARCH CAN BE GOOD FOR BUSINESS

SEED FUNDING
UNLV’s Faculty Opportunity Awards help great ideas move forward

RESEARCH AS REMEDY
Faculty in Nursing and Allied Health advance patient outcomes
Research and the Path to Tier One

It is a time of transition at UNLV as we welcome our incoming president, Dr. Len Jessup, to our campus. Formerly the dean of the Eller College of Management at the University of Arizona, Dr. Jessup will join us in early January as UNLV’s 10th president. He is an innovative, entrepreneurial leader in higher education and an excellent choice to lead our university as it continues its progression toward greater distinction. I know he shares my view that we cannot have a great community without a great university. UNLV has already built strong and lasting connections throughout the state, and we continue to play a vital role in our region’s economy and to serve as an important resource for our citizens.

One of the university’s most significant contributions is the research that it performs. The research of faculty members and their teams is designed to broaden our understanding of the world and to solve important and complicated problems. Much of the collective progress of civilization has depended on the advances of leading scholars. For this reason, research activity is considered the key measure of prestige at universities around the world.

Because research is so integral to our own reputation and future, it is also central to our pursuit of what we have termed a “Tier One” ranking, and it is central to our plan to be a Carnegie Research/Very High University. Identified by the Carnegie Foundation for the Advancement of Teaching, this ranking places tremendous emphasis on several factors that focus on research. The Carnegie Foundation currently places UNLV outside the range of Tier One, but still in the top 4.5 percent of universities across the country. To achieve top-tier status, however, UNLV must join the ranks of the 108 institutions that have earned Carnegie’s highest distinction.

To achieve this level of excellence, UNLV is developing a long-term plan that will expand and enhance its research endeavor by focusing on the quality and impact of our scholarly works, increasing grant funding, and dedicating resources and infrastructure to research. The plan also includes an increased focus on partnering with our community and state to enhance our capacity for performing more sophisticated research and a greater emphasis on the development of research teams. Part of our Path to Tier One is designed to bring greater national attention to the valuable work being done here, both to communicate that work to our stakeholders and to attract and retain the very best faculty, staff, and students.

All of these are lofty goals, but we are building a path toward them with our current strategic planning effort. It is my hope that you will embrace our Tier One initiative. As the quality of our university continues to rise, remarkable benefits emerge: We advance the reputation of our city and state, improve our economy, better educate our children, and enhance our quality of life. We can also take pride in yet another important institution in our community. I doubt there is another investment that has such sweeping or wonderful effects.

Donald D. Snyder  
UNLV President

Welcome to UNLV Innovation!

We are pleased to offer another new issue of UNLV Innovation, the university’s annual research magazine. In this publication, we share stories that demonstrate the type of research that yields discovery, expands existing knowledge, contributes to the economic development of our community and state, and demonstrates the connection between research and community wellbeing. We seek to promote the value of research both through examples of research and the context in which it is performed.

As you will see in this issue, UNLV research covers wide-ranging subjects, from the invention of energy-saving materials and promising cancer therapies to thought-provoking historical scholarship on the civil rights movement. The diversity of topics is matched only by the insightful perspectives shared by our faculty and students.

Please enjoy this issue, and visit our website to learn more about UNLV research: http://research.unlv.edu/.

Thomas Piechota  
Vice President for Research and Economic Development
Features

8 | ARRAY OF ACCOMPLISHMENT  Shahram Latifi, a professor of electrical and computer engineering whose work explores a dizzying array of his discipline’s most complex areas, is the 2014 Harry Reid Silver State Research Award winner.

12 | PATHS TO INNOVATION  As uncertainties cloud the future of funding support for higher education, UNLV’s ability to market its intellectual property becomes ever more crucial. Three projects provide textbook cases for how it’s done.

20 | CULTIVATING RESEARCH  Faculty Opportunity Awards help innovative ideas blossom into fully formed scientific and scholarly investigations.

26 | RESEARCH AS REMEDY  By expanding research and encouraging collaboration, UNLV’s nursing and allied health faculty are advancing patient outcomes.

Departments

2 | RESEARCH BRIEFS  Supercomputing on campus; cosmic radiation and a mission to Mars; a grant to help at-risk kids; Bluetooth boosts blood-flow sensing; high marks for grad programs; a plentiful mineral from space; hard-to-find soft fossils; climate challenges; the public weighs in on drones; and preserving Nevada’s old newspapers.

33 | PERSPECTIVE  What impact will a medical school have on the university and its research endeavor?

34 | BOOKS  George Rhee examines the dawn of the cosmos; Satish Sharma discusses his final volume on Gandhi’s intellectual influences; Todd Robinson sheds light on the underappreciated civil rights struggle in Grand Rapids, Mich.; and Richard Wiley explores redemption in his latest novel.

42 | RESEARCH REPORT  Data on sponsored programs expenditures, awards, and proposals, as well as technology transfer activity, doctoral conferrals, and more.
ONE OF THE WORLD’S MOST POWERFUL computers is coming to Las Vegas, a development that promises to significantly power up UNLV research and discovery.

Las Vegas-based Switch SUPERNAP and tech giant Intel recently announced that UNLV has been awarded the use of the Intel “Cherry Creek” supercomputer, which ranks among the world’s fastest supercomputers for its combination of speed, power, and energy efficiency.

The supercomputer will be housed in Switch’s Las Vegas SUPERNAP data center and will be made available to UNLV researchers through the data center’s unique connectivity network. It will give the university and its research partners access to world-class computing power and will act as a catalyst for scientific discovery, the modernization of applications, and regional economic development efforts.

Complicated analyses that once took years can now be completed in days, advancing fields such as genomics and bioinformatics, medical and climate research, molecular modeling, and data analytics. Thanks to its placement at Switch SUPERNAP, Cherry Creek will allow UNLV researchers to share data with collaborators across the globe.

“Supercomputers have become an indispensable part of almost every industry. For university researchers, they’ve increased the speed of analysis and discovery exponentially,” says UNLV President Donald D. Snyder. “Working together with Intel and Switch, UNLV has a tremendous opportunity not only to keep pace with but to play a leading role in big data research and economic development partnerships that require high-performance computing.”

The companies will also encourage public-private interactions to accelerate innovation and advance regional economic development. Private companies need access to the high-level computing power of supercomputers and the expertise of the UNLV team that uses them, so a portion of the computer’s space will be reserved for private-sector investment in university research through partnerships.

“Cherry Creek was the first ‘Top-500-Class’ supercomputer featured at a supercomputing event, showcasing the efforts by Intel and our partners in driving unprecedented efficiency gains and accessibility that were not previously possible,” says Hugo Saleh, director of Marketing and Industry Development, Intel Technical Computing Group.

In addition to research and private collaborations, Intel experts will provide guest lectures and academic programming for UNLV students in IT-related fields — activities that will help UNLV graduates compete for jobs in the evolving tech industry.

“The SUPERNAP executive team is pleased to be donating the services to UNLV for this effort. We understand how important this scientific research will be for economic development in the region,” says Rob Roy, CEO and founder of Switch SUPERNAP. “The SUPERNAP ecosystem will accelerate the development of new technology and provide the necessary industry relationships to advance UNLV’s efforts.”

UNLV officials say the Cherry Creek computer will be a welcome addition to the strong computing arsenal of UNLV’s National Supercomputing Center for Energy and
the Environment (NSCEE), a facility founded in 1991 that supports researchers on campus and across the nation. UNLV staff will maintain and optimize Cherry Creek, will schedule time and use for UNLV and its research partners, and will work closely with technical experts from Intel and Switch SUPERNAP to update the supercomputer as new technology becomes available.

“Having access to this technology will enhance and expand UNLV’s current research programs and will act as a catalyst for new emerging research interests such as big data analytics,” says Joseph Lombardo, executive director of NSCEE. “Additionally, having this special resource will enhance the educational experience for a diverse set of top-quality graduate and undergraduate students while playing an important role in faculty recruitment.”

HOW LONG IS IT SAFE TO STAY IN SPACE?

HERE ON PLANET EARTH, ALL LIVING things are protected from cosmic radiation by a thick layer of “shielding” — a barrier of nitrogen, oxygen and water vapor — provided by the atmosphere. Radiation does get through to the surface of the planet, but at significantly lower levels than on planets lacking our atmospheric buffer.

For those who spend time in space, however, cosmic radiation can be a serious problem. One estimate is that a single day in space exposes astronauts to the equivalent of a year’s worth of natural radiation on Earth. And the effect is cumulative; it doesn’t dissipate when they return home.

Frank Cucinotta, a professor of health physics and diagnostic sciences at UNLV, studies the biological risks of such exposures, evaluating for NASA and other agencies just how long it is safe to stay in space.

“To provide the level of protection we all receive from Earth’s atmosphere would require surrounding astronauts in hundreds of centimeters of material, which is impractical,” Cucinotta says. “Ships and suits typically have 10 to 20 centimeters of protection. To better protect these men and women, we have to accurately determine the risks of radiation exposure when they are in space. This will lead to methods for identifying individuals who have lower risks and to the discovery of approaches that can protect them.”

To calculate the exposure risks, or the chance that a person will be diagnosed with cancer, Cucinotta and others studying cosmic radiation examine and develop theoretical models. Tests are then conducted on human cells and mice to validate their hypotheses.

Cosmic radiation increases the risks for cancers and seems to produce more lethal tumors than other types of radiation. It also seems to increase the risks for heart disease and cognitive conditions, such as loss of memory and dementia. The current acceptable risk for fatal cancer among astronauts on the space station is no more than a 3 percent probability of death. The maximum duration of space missions to stay within this limit is about 18 months. However, the trend toward longer missions, coupled with greater exposure, could reduce the length and number of missions in which an astronaut can participate.

And then there’s Mars. While conducting research at NASA, Cucinotta and his team explored the potential for a manned mission to Mars. The cosmic radiation exposure during a voyage to the Red Planet is much higher than that on the space station. The estimated fatal risks for cancer and other diseases during that mission could be as high as 20 percent.

“A trip to Mars will take approximately 1,000 days using current technology,” Cucinotta says. “Based on theoretical models, the cosmic radiation during that mission could also impact the crew’s cognitive abilities or cause them not to remember the journey after they safely return to Earth. And once back on Earth, the types of cancers, according to studies conducted on mice, will be more aggressive and likely to occur at much younger ages, compared to the cancers found on our planet.”

As Cucinotta continues to uncover the actual risks of cosmic radiation and the means for protecting astronauts, his work also determines safe limits for manmade radiation, especially from medical equipment like computed tomography (CT) scans.

“Most people don’t understand radiation,” he says. “My colleagues and I are working to teach them about it and protect them from it.”
"EXQUISITELY PRESERVED" FOSSIL FIND SHEDS LIGHT ON A DISTANT ERA

ROCKS DATING FROM THE PRECAMBRIAN typically don’t contain fossils, as the sediments that formed them were deposited thousands of years before multicellular organisms were abundant.

Among the animals that did thrive during the period, few had the type of hard shells that aids in preservation. So when UNLV paleontologists working in a remote region of Nevada announced last year that they had discovered an assemblage of exquisitely preserved Precambrian fossils, the world took notice.

In a paper appearing in the March 2014 issue of the *Journal of Paleontology*, UNLV paleontologist Steve Rowland and recent graduate Margarita Rodriguez describe a new species of alga, the first from these newly discovered fossils to be formally described and named. The fossil is just a millimeter wide — the thickness of a dime — with segmented branches that are each about the diameter of a human hair.

The 560 million-year-old fossils occur in strata of the Ediacaran Period near the town of Gold Point, in Esmeralda County. The Ediacaran interval of geologic time immediately predates the Cambrian Period — the time of the so-called Cambrian explosion of multicellular life.

“This discovery of soft-tissue preservation in Ediacaran fossils is a big deal because there are no such sites of this age anywhere else in North America and very few anywhere in the world,” Rowland says.

Because the Ediacaran is a poorly understood, yet critical time in the history of life, paleontologists are intensely interested in finds from the period.

Evidence of soft tissues open a window into the biology of the organism, Rowland says, but is rarely preserved in the fossil record. In Rowland and Rodriguez’s find, however, the cellular structure of the alga is visible in the fossils. The researchers say they don’t yet understand what set of circumstances permitted their preservation.

Rowland added that researchers typically find only the “hard parts” of animals and plants preserved — teeth and bones, for example — but these Ediacaran organisms did not have any hard parts.

Rowland and Rodriguez named their fossil alga *Elainabella deepspringensis.* “Elainabella” honors Elaine Hatch Sawyer of Fredonia, Ariz., whom Rodriguez identifies as an important person in her life. “Deepspringensis” indicates the fossils were unearthed in the Deep Spring Formation rock layer.

The type specimen, or scientific name-bearing representative of the new fossil species, will be permanently housed in the research collection of the Nevada State Museum in Las Vegas, where it will be accessible for study by other researchers.

GRADUATE PROGRAMS EARN HIGH MARKS FROM U.S. NEWS

ELEVEN UNLV GRADUATE OR GRADUATE specialty programs ranked among the nation’s top 100 in 2014.

Each year *U.S. News and World Report* evaluates more than 1,300 of the nation’s graduate and specialty programs by discipline or specialty. Each is scored on the standardized test results of newly enrolled students, opinions from experts on each program’s quality, acceptance rates, and other criteria.

Of the 11 ranked programs, those in two UNLV schools scored particularly well: Boyd Law School and the School of Nursing.

Boyd Law School’s Lawyering Process Program ranked third for its legal writing programs. The dispute resolution program at Boyd’s Saltman Center for Conflict Resolution, which includes advanced study of the nature of conflict and the methods to resolve it, ranked ninth. Among part-time law programs, Boyd ranked 20 out of 83 accredited law schools.

The School of Nursing online graduate program ranked 10th in a report originally released online in January and included in the 2015 guidebook. The school offers two master’s tracks — family nurse practitioner and nurse educator — to prepare advanced
SOUTHWEST FOUND TO BE AMONG THE MOST “CLIMATE-CHALLENGED” REGIONS IN THE NATION

The Southwest faces a multitude of ill effects associated with climate change, including rising annual temperature averages, a decline in water reserves, diminished agricultural yields, and an increase in wildfires, according to Thomas Piechota, the lead author of the Southwest Section of the 2014 National Climate Assessment.

The 2014 National Climate Assessment explores what each of the eight regions in the U.S. faces in the coming decades as a result of climate change.

Piechota, who is a sustainability expert as well as UNLV’s vice president for Research and Economic Development, noted that overwhelming heat and lack of rainfall are among the top reasons the Southwest is one of the most “climate-challenged” regions in the United States.

“Snowpack and stream flow amounts are projected to decline in the region, decreasing water supplies for cities and affecting agriculture and ecosystems,” Piechota says. “The Southwest produces more than half the nation’s high-value specialty crops, which are irrigation-dependent and particularly vulnerable to extremes of moisture, cold, and heat. We can expect reduced yields from increased temperatures and increasing competition for scarce water supplies that will displace jobs in some rural communities.”

PUBLIC AMBIVALENCE CONCERNING THE USE OF UNMANNED AERIAL SYSTEMS

PUBLIC AMBIVALENCE CONCERNING THE USE OF UNMANNED AERIAL SYSTEMS

Public ambivalence concerning the domestic use of unmanned aerial systems, commonly known as “drones,” remains strong, according to two national web surveys conducted by UNLV’s Center for Crime and Justice Policy. The surveys are part of a series designed to measure public attitudes on emerging technology.

Tabulated last summer with responses from hundreds of U.S. adults, results showed that attitudes toward these “eyes in the sky” are highly dependent on how and where they are used, and who is using them.

Unmanned aerial systems, or UAS, usage continues to climb in Nevada and across the country. In January, the Federal Aviation Administration designated Nevada as one of six locations for UAS testing and development.

“UAS use will be widespread in the near future, so it is critical to develop well-conceived policy and laws to govern the use of this technology,” says Joel Lieberman, professor and chair of the UNLV criminal justice department and co-author on the reports. “We are conducting this work to provide a strong foundation grounded in social science research to create relevant laws and policy decisions that will lead to a more effective implementation of UAS into society.”

According to the surveys, there is general support for UAS use in search and rescue operations, military operations, and climate/geological mapping, but strong opposition to UAS for monitoring citizens, especially around their homes and at their workplaces.

“The use and proposed applications of aerial drone technology in a variety of public and private settings is at the center of ongoing public policy debates about the issues of public safety, personal privacy, and the acceptable balance between them,” the report’s authors say. “Based on the findings from this national survey of Internet users, public acceptance of aerial drone usage is highly contextual, depending upon the specific area of its application.”

UNLV criminal justice professors Terance Miethe, Joel Lieberman, and Emily Troshynski, along with graduate students Mari Sakiyama and Milia Heen, conducted the surveys. They expect to release a Nevada-specific survey on UAS use later this year.
HISTORICAL NEVADA NEWSPAPERS TO BE DIGITIZED THROUGH NEH GRANT

THE UNLV UNIVERSITY LIBRARIES HAVE been awarded a large, multi-year grant from the National Endowment for the Humanities.

The two-year $311,000 grant was awarded for the National Digital Newspaper Program, a partnership between the National Endowment for the Humanities and the Library of Congress.

The grant will allow the University Libraries to digitize and make public selected historical Nevada newspapers. The digitized content will be hosted and freely available on the Library of Congress’ Chronicling America Website (http://chroniclingamerica.loc.gov/).

This grant represents a statewide collaboration. The UNLV University Libraries will serve as the lead institution and will partner with the Nevada State Library and Archives and the University of Nevada, Reno Knowledge Center. A diverse panel of experts and scholars from around the state will serve on a Newspaper Selection Advisory Board, providing guidance for newspaper titles to be digitized.

“Newspapers represent a priceless trove of information, documenting the people, places, and events that have collectively woven the rich tapestry of Nevada history,” says Patricia Iannuzzi, dean of University Libraries. “Historical newspapers are very popular with both the research community as well as lifelong learners curious about the state’s history. Nevada’s history, as told through its newspapers, deserves to be preserved, but doing so requires leadership and commitment from many partners across the state. The coordination required to complete this project is a testament to the passion we share for Nevada history.”

She adds that the digital collections experts at the UNLV Libraries will lead the project, which involves digitizing and publishing tens of thousands of pages of historical Nevada newspapers. More information on the University Libraries is available at https://www.library.unlv.edu/.

EARTH’S MOST PLENTIFUL MINERAL FINALLY MAKES AN APPEARANCE

SINCE 1979, SCIENTISTS HAVE BEEN searching for a piece of the Earth’s most abundant mineral. Because the mineral is located more than 400 miles deep in our planet’s lower mantle, the quest to discover a specimen has seemed, at best, a long shot.

No longer. After five years of work, Oliver Tschauner, a mineral physicist in UNLV’s department of geoscience, and Chi Ma, a mineralogist from the California Institute of Technology, have located their elusive quarry.

Not surprisingly, the prize didn’t emerge from deep digging. It instead had been hiding in plain sight, part of a 4.5-billion-year-old meteorite that landed near the Tenham station in Australia more than a century ago.

The pair named the mineral “bridgmanite” in honor of Percy Bridgman, a physicist who won the 1946 Nobel Prize for pioneering research on solids under high pressure. For decades, scientists have simply known the mineral by its chemical components and crystal structure — silicate perovskite.

Officially identifying and naming a mineral involves knowing its chemical composition and crystal structure. Synthetic examples had been studied, but until Tschauner and Ma’s discovery, no naturally occurring samples of the mineral had ever been found.

The mineral in the meteorite was created through a “shock event” that occurred approximately 470 million years ago.

“Before its fall, the Tenham meteorite was part of a larger asteroid that collided with another asteroid and broke into many pieces,” Tschauner says. “It exhibits signs of strong shock-induced transformations, meaning it endured high temperatures and pressures as the result of this collision. These high-pressure conditions, similar to what we see in the Earth’s mantle, are why bridgmanite could form in this meteorite, and why we don’t see it at the surface of Earth.”

According to Tschauner, people had previously suspected bridgmanite was located in so-called shocked meteorites. Grains of shock-generated high-pressure minerals are known to be tiny (micrometer scale), so scientists used electron diffraction — using a blast of electrons to reveal a solid’s crystalline structure — to search for bridgmanite. However, the electron beam destroys this mineral, transforming it into glass.

Tschauner and Ma instead used a micro-focused high energy X-ray beam to collect diffraction signals from the Tenham meteorite. The project required development of new analytical methods and was dependent
on a new generation of ultra-fast X-ray detectors, which only became available two years ago. These new detectors permitted a fine-grid mapping for fishing out the tiny grains of bridgmanite, Tschauner says.

“Bridgmanite makes up approximately 70 percent of the volume of the lower mantle and approximately 38 percent volume of solid Earth in total,” says Tschauner. “Its physical, chemical, and rheological properties are key in understanding the lower mantle.

“Because the mineral didn’t have an official name, there was a problematic terminological vagueness in the literature about the lower mantle, ‘MgSi-perovskite,’ ‘silicate perovskite,’ or plainly wrong ‘perovskite.’ This vagueness is now removed,” he says.

**$1.4 MILLION GRANT TO EXPAND CLINICAL SOCIAL WORK EDUCATION & RESEARCH**

UNLV SCHOOL OF SOCIAL WORK PROFESSORS Ramona Denby-Brinson and Joanne Thompson and their team of collaborators have been awarded a $1.4 million Behavioral Health Workforce Education and Training for Professionals grant.

The award is from the U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA).

The purpose of the three-year project is to work with local and state public and behavioral health partners to develop and expand clinical social work education with the goal of producing more than 100 highly competent practitioners who can intervene on behalf of children, adolescents, and transitional-age youths who are at risk of or who have developed behavioral health disorders.

The project has a strong research component and will utilize multiple innovative methods, including geodemographic recruitment, youth- and family-informed teaching models, mentoring groups, field site environmental scans, and clinical, cultural, and linguistic self-assessments/self-efficacy measures.

“We truly consider this to be good news for all of the children, youth, and families in our community that struggle daily with mental health challenges,” says Denby-Brinson. “We are excited to be able to prepare additional, advanced-level social workers who will have the skills and specialized training necessary to intervene on behalf of this vulnerable group.”

**RESEARCHERS EMPLOY BLUETOOTH TECHNOLOGY IN BLOOD-FLOW SENSOR**

STROKE, ALONG WITH HEART DISEASE, is one of the two leading causes of death in America. Strokes afflict nearly 800,000 Americans each year, resulting in some 145,000 fatalities and an estimated $40.9 billion in patient-care costs. Despite this tremendous human and financial toll, researchers have yet to develop a definitive therapy for their prevention and treatment.

Impaired blood flow is a factor in the majority of strokes, explains School of Life Sciences professor Frank van Breukelen, adding that the limitations of current blood flow sensors have hampered therapeutic developments. Van Breukelen is collaborating with electrical engineering professor Biswajit “BJ” Das on a better blood-flow sensor — one that employs inexpensive Bluetooth technology to detect stroke and heart disease risks.

Part of the problem, the scientists say, is that current blood flow sensors rely on power-consuming systems, thus hindering wireless telemeter use. Das and van Breukelen’s Bluetooth sensor would measure blood flow rates without such limitations.

This sensor will be readily adaptable to wireless telemetric solutions. It also will allow long-term measurement of blood flow when testing with social animals, such as rats. Previous measurement methods suffered because they required that lab animals be physically restrained, given anesthesia, or in some other way having their mobility limited.

The researchers are using the College of Sciences’ Research Fund for Innovation and Development (RFID) money to develop a prototype Bluetooth-enabled blood flow sensor. No similar digital telemeters are yet on the market. The RFID funds helped pay for undergraduate researchers to build and test the system.
For more than two decades, Shahram Latifi has worked to bring electrical and computer engineering at UNLV to national prominence.
In an era of specialization, **SHAHRAM LATIFI** has pursued a diversity of interests.

**Array of Accomplishment**

Back in 2004, the Swiss-born philosopher and critic Alain de Botton penned a memorable phrase that rings especially true for engineers: “We delight in complexity,” de Botton wrote, “to which genius has lent an appearance of simplicity.”

Thus it is in the world of Shahram Latifi, a professor of electrical and computer engineering at UNLV, whose work explores how a dizzying array of his discipline’s most complex areas — digital networks and data compression, parallel processing and distributed computing, advanced image processing and remote sensing — can be used to craft elegant solutions to problems fraught with complication.

As Bijan Salimi, a prominent Nevada engineer recently put it, “the depth and breadth of his knowledge in his field are truly remarkable.” It’s an assessment shared by many, including the committee of scholars that earlier this year conferred upon Latifi the 2014 Harry Reid Silver State Research Award. The award, UNLV’s most prestigious research honor, singles out faculty members whose work achieves a rare trifecta of attainments: It significantly advances the recipient’s academic field, addresses real-world needs and concerns, and contributes to Nevada’s economic growth and development.
LATIFI, WHO GREW UP IN IRAN, DISCOVERED EARLY ON THAT MATH AND ENGINEERING WOULD BE HIS CALLING. AS A CHILD HE POSSESSED A RARE ABILITY FOR NUMBERS AND PROBLEM SOLVING. HIS PARENTS — ESPECIALLY LATIFI’S DAUGHTER, REZA — WERE THRILLED AND URGED HIM TO MAKE THE MOST OF HIS GIFT.

HE DID. BY THE TIME HE REACHED HIGH SCHOOL, LATIFI WAS YEARS AHEAD OF HIS MATH CLASSMATES. HE WAS STILL A SOPHOMORE WHEN HE WOULD CHOOSE TO JOIN A DELEGATION OF STUDENTS REPRESENTING IRAN IN THE INTERNATIONAL MATH OLYMPIAD COMPETITION, THE ANNUAL “WORLD CHAMPIONSHIP” OF NUMBERS.

LATIFI WAS INTRODUCED TO ENGINEERING DURING HIS SENIOR YEAR. IT IMMEDIATELY STRUCK A CHORD. SINCE HIS PRE-TEEN DAYS, THE B UDDING SCHOLAR HAD LONG SEARCHED FOR AN INSTRUMENT TO MAKE MATH’S ABSTRACTIONS MORE TANGIBLE. “IT WAS THE APPLICATION OF MATH THAT I WAS INTERESTED IN,” HE SAYS. “I WANTED TO USE MATH AS A MEANS, NOT AN END.” ENGINEERING FIT THE BILL.

AFTER GRADUATION, LATIFI ENROLLED AT TEHRAN UNIVERSITY, THEN, AS NOW, ONE OF IRAN’S TOP DESTINATIONS FOR MATH AND ENGINEERING. NOT LONG AFTER HE MATRICULATED, HOWEVER, THE CAMPUS WAS ROILED BY STUDENT STRIKES AND PROTESTS, A YEARS-LONG OUTPOURING OF TIMES-VIOLENT DISCONTENT THAT PRECEDED THE FALL OF THE SHAH.

LATIFI SAYS HE STEERED CLEAR OF POLITICS, FOCUSING INSTEAD ON HIS COURSEWORK. THIS WASN’T EASY. THE PROTESTS AND RELATED SHUTDOWN SOMETIMES MADE IT IMPOSSIBLE TO COMPLETE CLASSES. FINALLY, AFTER TWO YEARS OF DELAYS, LATIFI GRADUATED WITH A MASTER’S DEGREE IN ELECTRICAL ENGINEERING IN 1980.

BECAUSE IRAN LACKED INSTITUTIONS OFFERING FURTHER ADVANCEMENT, THE YOUTHFUL ENGINEER KNEW THAT PROGRESSING IN HIS CAREER MEANT MOVING ON. IN BOTH PHYSICAL AND CULTURAL TERMS, THE LOCATE HE CHOSE WOULD TURN OUT TO BE FAR AFIELD INDEED.

THAT PLACE WAS LOUISIANA STATE UNIVERSITY IN BATON ROUGE, LA., THE HUMID HOME OF CRAWFISH BOIL, ÉTOUFFÉE, AND AN EXCELLENT ENGINEERING PROGRAM. LATIFI HAD NEVER SEEN FISHERS ON THE CAMPUS BEFORE HE ARRIVED ON AN AFTERNOON IN M ID-APRIL. “IT WAS VERY, VERY HOT,” HE SAYS, DRAWING IN A DEEP BREATH AS IF RELIVING THE SENSATION.

DESPITE THE SEVERELY STRAINED RELATIONS BETWEEN THE U.S AND IRAN, LATIFI ENCOUNTERED NO ILL WILL. “I IMMEDIATELY INTERACTED WITH PEOPLE; THEY WANTED TO KNOW MY BACKGROUND, WHERE I CAME FROM,” HE SAYS. “EVERYONE WAS VERY FRIENDLY, VERY HELPFUL.”

AT LEAST, HE ADDS, IN SO FAR AS HE COULD TELL.

THE ACCENT — THE SOUTHERN ACCENT — WAS SOMETHING THAT WAS DIFFICULT FOR ME TO FOLLOW,” SAYS LATIFI. “I HAD BRITISH TEACHERS IN IRAN, AND OF COURSE THEIR ACCENTS WERE TOTALLY DIFFERENT.”

WHEN CURIOUS LSU STUDENTS ASKED ABOUT HIS HOME COUNTRY, FOR EXAMPLE, THEY ALMOST ALWAYS PRONOUNCED IT, “EYE-RAN.” LATIFI SAYS HE HAD NO IDEA WHAT THEY WERE TALKING ABOUT, BUT SUSPECTED IT HAD SOMETHING TO DO WITH THE ARMY. “I WOULD TELL THEM, NO, I HAVE NEVER BEEN IN THE ARMY,” HE RECALLS WITH A LAUGH. “OF COURSE, NOW WHEN SOMEONE PRONOUNCES IRAN AS ‘EYE-RAN,’ I UNDERSTAND.”

IF MASTERING THE NUANCES OF SOUTH-SPEAK TOOK TIME, THE ENGINEERING CURRICULUM WAS MORE YIELDING. SOON, LATIFI WAS MAKING IMPORTANT CONTRIBUTIONS TO LSU’S HIGHLY REGARDED COMPUTER ENGINEERING PROGRAM. AFTER COMPLETING A MASTER’S DEGREE, HE MOVED ON TO THE DOCTORAL PROGRAM. HIS DISSERTATION INVOLVED THE DESIGN OF COMPUTER NETWORKS COMPOSED OF MILLIONS OF PROCESSING ELEMENTS.

“I STARTED WITH COMPUTER NETWORKS FOR WHAT WE CALL MASSIVELY PARALLEL SYSTEMS,” LATIFI SAYS. “AT THAT TIME WE WERE LOOKING FOR WAYS TO HELP MACHINES WITH TENS OF THOUSANDS OF PROCESSING NODES ACT IN HARMONY ON VERY COMPLEX, COMPUTATIONALLY INTENSIVE PROBLEMS.”

LATIFI EXAMINED INTERCONNECTIONS AMONG THESE NODES, DISCOVERING WAYS TO MAKE THEM EXECUTE THESE PROBLEMS MORE EFFICIENTLY. HE FOUND IT ENTHRALLING WORK, EVEN THOUGH IT MEANT MASTERING A NEW SET OF SKILLS.

“IN IRAN, MY BACKGROUND WAS IN POWER: HIGH VOLTAGE ELECTRICAL ENGINEERING. I WAS INVOLVED IN DESIGNING THINGS FROM TRANSFORMERS TO ELECTRICAL MACHINES — SYNCHRONOUS, ASYNCHRONOUS. I DID A LOT OF PROJECTS IN POWER GENERATION, TRANSMISSION AND DISTRIBUTION. WHEN I CAME TO THE UNITED STATES I GOT INTERESTED IN COMPUTER ENGINEERING. IT WAS A TOTALLY DIFFERENT DISCIPLINE.”

LEARNING NEW SETS OF SKILLS HAS BECOME A HALLMARK OF LATIFI’S CAREER. HE ARRIVED AT UNLV IN 1989, CONVINCED THAT THE SMALL BUT Ambitious ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT AT THE HOWARD R. HUGHES COLLEGE OF ENGINEERING WOULD BE A GOOD PLACE FOR HIM TO PURSUE A VARIETY OF PROJECTS.

“It was a very young department. There were few faculty, but a lot of potential for growth,” Latifi says. “That was one of the primary factors that led to my decision to come to UNLV.”

LIKE THE MOVE TO LSU, THIS ONE INVOLVED ADAPTING TO A NEW CULTURAL MILIEU. IT ALSO MEANT HE HAD SOME EXPLAINING TO DO, ESPECIALLY AMONG PROFESSIONAL COLLEAGUES WHO, LIKE MANY AMERICANS, OFTEN HELD AN UNAPoloGETICALLY MYOPIC VIEW OF LATIFI’S NEW HOME.

“In the first few years I would get defensive any time I attended conferences — there was this stereotype about living in Las Vegas, that Las Vegas was all about hotels and casinos, nothing else,” he says. “This was a motivating factor for me. However little it might be, I wanted to make a contribution to alter that perception — to show that, yes, we can have big projects coming out of UNLV, we can have very good quality students graduating from UNLV, and we can have professors who are internationally known working at UNLV.”

ONE OF LATIFI’S FIRST SUCCESSES AROSE FROM THAT “MASSIVELY PARALLEL” COMPUTING WORK HE HAD PURSUED AS A DOCTORAL STUDENT. IT REMAINS AMONG HIS MOST IMPORTANT CONTRIBUTIONS.

EARLY COMPUTERS RELIED ON WHAT’S CALLED “SERIAL COMPUTATION” TO GET THEIR WORK DONE, STEP-BY-STEP SEQUENCES OF INSTRUCTIONS THAT COULD BE COMPLETED BY A SINGLE PROCESSOR. IN PARALLEL COMPUTING, AN ARRAY OF PROCESSORS WORK TOGETHER ON DISCRETE ASPECTS OF PROBLEMS FAR TOO COMPLEX FOR SEQUENTIALLY PROGRAMMED MACHINES.

“LARGE” PARALLEL SYSTEMS ARE OFTEN MADE UP OF GROUPS OF SEPARATE COMPUTERS WORKING IN TANDEM. “MASSIVELY” PARALLEL SYSTEMS, ON THE OTHER HAND, ARE TYPICALLY SINGLE SUPERCOMPUTERS WITH THOUSANDS OF INDIVIDUAL PROCESSING “NODES,” EACH WORKING IN “PARALLEL” AND AT BLINDING SPEED. UNLV’S NEW INTEL SUPERCOMPUTER IS AN EXAMPLE OF SUCH A MASSIVELY PARALLEL SUPERCOMPUTER; A SCIENTIST WITH A HANDHELD CALCULATOR WOULD NEED 159,000 YEARS OF NON-STOP CALCULATING TO MATCH A SINGLE SECOND OF THIS SUPERCOMPUTER’S ACTIVITY.

IN DISCIPLINES INVOLVING SUPERCOMPUTING — BIOINFORMATICS, WEATHER FORECASTING, ROBOTICS, AND ARTIFICIAL INTELLIGENCE, JUST TO NAME A FEW — MASSIVELY PARALLEL SYSTEMS HAVE REVOLUTIONIZED THE WAY RESEARCH IS CONDUCTED. LATIFI’S WORK IN THE EARLY 1990S HELPED MAKE THIS POSSIBLE.
“Soon after I came to Las Vegas I was able, for the first time, to propose a network with much better performance metrics than the existing ones, both in terms of solving highly parallel problems and computationally extensive problems,” Latifi says.

The 1991 paper resulting from that work has been described as a “milestone” that “opened up a new avenue of research.” It has since been cited by scholars across the world.

Theorizing about ways to improve supercomputing did not limit Latifi’s interest in more practical concerns. While still relatively new to UNLV, he served as a computer networking consultant for a local branch of the Lockheed Corporation and assisted a Las Vegas law firm investigating the circumstances surrounding the death of a man who may have been electrocuted.

Other consulting work followed, and Latifi has since continued to build bridges to the private sector, especially in developing technologies aimed at improving public health, safety, and security. His projects have included advancements in “partial iris recognition,” systems that allow security screeners to identify malefactors who attempt to conceal their faces; next-generation unmanned aerial vehicles, a.k.a., drones, that will one day assist emergency-services personnel; and advanced image-processing algorithms, computer code that can make intelligible otherwise unreadable remotely sensed objects.

Latifi has also worked on a major data collection project aimed at assessing the pace of climate change, and has teamed up with NASA to think about ways of keeping deep-space astronauts in good trim. Not surprisingly, this latter project also involves a form of remote sensing.

When it’s not possible to include a physician on a spacecraft, how, Latifi wanted to know, “can we efficiently monitor the astronauts?” The answer, he says, will likely involve creating better “cognitive systems,” technologies that allow machines and people to interact more naturally. Such systems, he adds, will almost certainly produce benefits here on this planet.

“I’m working with my team to leverage this technology to deal with a very important problem right here,” Latifi says. “The population of elderly living in Nevada is high. How might we remotely monitor the health of these elderly in their homes? I’ve been striving with my team to come up with a lighter, more powerful, more patient-friendly [monitoring] system that is also more reliable — something that would immediately register a fall, a sudden drop in blood sugar, fluctuations in blood pressure, or any abnormality.”

This “something,” he explains, will involve a series of sensors forming what engineers call a “body-area network” — a form-fitted, information-gathering grid that would use wireless, ultra-wideband technology, or UWB, to transmit vital signs and other data to health-care professionals in near real time.

“Our ultimate goal is to save lives, to prolong lives,” he says.

WHEN THESE AND OTHER RESEARCH interests are coupled with Latifi’s long experience organizing information-technology conferences — events that for more than two decades have brought hundreds of prominent international scholars to Las Vegas and the UNLV campus — a picture emerges of a high-energy scholar whose interests and expertise defy the notion that today’s academe is all about specialization.

Asked whether there might be a common thread binding together his extraordinarily diverse oeuvre, Latifi pauses for a moment. “That’s a very good question,” he says, then briefly describes how mathematics — his first love — has been a crucial component throughout his career.

“Apart from that, I was fortunate to have been exposed to different aspects of electrical engineering, from the traditional, high-voltage electrical work to the more modern computer engineering,” he says. “This enabled me to tackle a variety of assignments that at the time seem to have nothing in common.”

It’s a breadth of knowledge that has made him both a popular instructor of undergraduates and an advisor and mentor to more advanced students. Awards like the Silver State Research prize are wonderful honors, Latifi acknowledges, but he says that his work with these engineers of the future will define his legacy.

“For years I’ve been recruiting quality students into our Ph.D. program, helping them do projects and write grant proposals with me. They’ve been very successful,” he says. Latifi, a fellow of the prestigious Institute of Electrical and Electronics Engineers, has been a principal or co-principal investigator on 26 grants totaling over $38 million.

This is not to suggest, of course, that there’s not also something to be gained by engaging more youthful minds. “I always bring to the undergraduates’ classroom some of my project problems,” Latifi says with a laugh. “This has two distinct benefits: At the same time the students get experience, I get my problems solved.”

The Harry Reid Silver State Research Award is funded by the UNLV Foundation

EMERGING ENGINEERS Latifi consults with master’s student Steven Wilson (right) and undergraduate student Jeevake Attapattu (center).
Paths to Innovation

For more than 30 years, U.S. universities have had the right to commercialize discoveries made through faculty research funded by the federal government. For a time, few universities made much of the opportunity. But today, as funding support for higher education is increasingly imperiled, marketing great ideas has never been more popular — or more crucial. Three UNLV projects show how research benefits the university, the business community, and you.
Engineering professor Kwang Kim’s new water-repelling coating for condenser tubes could make the nation’s power plants both more efficient and more profitable.
KWANG KIM  Energy Booster

After nearly 25 years of digging deep into surface modification — the branch of materials science that explores the outer parts of all things solid — UNLV’s Kwang Kim has emerged as a thought leader in developing and deploying a technology that helps condensers at steam-power plants function more efficiently.

The technology, called “dropwise condensation,” could one day save power companies millions and lead to decreased electricity costs for consumers around the globe.

Condensation is a familiar part of daily life: Think of water vapor, for example, forming droplets on a cold bottle of soda. At power plants, a similar process occurs at heat-exchanging units called condensers. Here, exhaust steam from electricity-producing turbines condenses into water that is recirculated to a boiler. The boiler heats it and produces steam that’s pumped back into the turbines.

But the process isn’t perfect. When water molecules adhere to the surface of the condenser’s collection tubes they create a thin film of moisture. This “film condensation” tends to make heat transfer less robust than it might be.

Working in collaboration with the Daejeon-based Korea Institute of Energy Research, Kim and his team found that by coating condenser tubes with a water repelling, or hydrophobic, substance they can manipulate the water to form droplets instead of film.

“The film is the killer for heat transfer,” says Kim, who serves as the Southwest Gas Professor of Energy and Matter in the Howard R. Hughes College of Engineering. “In what we have done, if you look at the surface of the tube, the condensate drops off instead of creating a film. This creates a cost savings for the power plant. You can maintain the size of these drops and transfer more heat. Intrinsically, you will have better power plant efficiency. It all interconnects and makes things quite interesting.”

The dropwise condensation method can improve heat transfer by more than 200 percent in some steam-producing environments, says Kim, who is also a fellow with the American Society of Mechanical Engineers. Its wider application, he adds, could even revolutionize the way steam plants are constructed.

In a typical power plant using steam, condensers take up a very large footprint of a building. With Kim’s coating, their footprint could shrink to a much smaller size.

NBD technologies, a Boston-based venture company, took note of Kim’s research nearly two years ago.

“They looked at the entire playground of research and noticed that this guy is always popping up. They said, ‘Why don’t we visit him?’” Kim recalls. “They knew we had one invention that is quite unique. The industry was ignoring this particular application, and we just happened to put things together in the right context.”

One patent application had been filed on the technology, and in January 2014 UNLV finalized the licensing deal. Also, NBD hired Bong June Zhang, a postdoctoral scholar and Kim’s former doctoral student who had worked closely on the project. As NBD finalizes the product for commercial use, Zhang will be an important part of the testing process.

“This is a great example of a technology developed at a university finding a great commercial partner to create a product to benefit the public,” says Zachary Miles, UNLV’s executive director of technology transfer and economic development. “We are excited about this partnership and look forward to working with NBD in the future.”

The coating may have other important applications as well. It could be used one day to turn fog into water in countries and regions that lack water resources, could boost the performance of everyday condenser-dependent appliances like refrigerators, or speed the “de-icing” of frost-bound passenger planes.

The dropwise method is just one of many discoveries Kim has made during his career. His research interests also encompass a wide spectrum of energy systems and active materials and sensors, blending expertise and concepts from mechanical engineering, physics, biology and more. In his Active Materials and Smart Living (AMSL) Laboratory at UNLV, Kim provides an environment that promotes the acquisition of the skills and attitudes students need to become great innovators.

Among Kim’s ongoing projects is an investigation aimed at developing a battery system that uses a unique composite material as part of an electrochemical cell for energy conversion. The device could offer several advantages over conventional batteries: lower maintenance, a longer cycle life, and unlimited scalability of energy capacity. It could be particularly attractive for electric vehicles, for example, since the batteries could be easily and almost instantly recharged.

Finally, Kim is currently at work on a next-generation “robotic catheter,” one using an ionic polymer-metal composite artificial muscle, for use in medical therapy and diagnosis. The National Science Foundation is supporting the project.

Kim has authored and co-authored more than 325 publications, including 148 refereed journal papers and three monographs. His research has been funded by NASA, the U.S. Office of Naval Research, the U.S. Department of Energy, the Army Research Office, the National Science Foundation, private companies, and other organizations.

— Megan Downs
Mark Yoseloff is wagering on the creativity of UNLV students, and it’s paying off for all involved.

Yoseloff is the former chairman and CEO of SHFL Entertainment, Inc., a top global gaming supplier. He recently partnered with the university to establish the Center for Gaming Innovation at UNLV, whose primary goal is to support student designers seeking to develop next-generation gaming technologies.

It’s a move calculated to keep America’s gaming mecca ahead of the competition, with a safe side bet that a mutually beneficial relationship between UNLV faculty and gaming industry leaders will produce valuable payouts.

Priority one, Yoseloff says, is ensuring that Las Vegas doesn’t lose its innovation edge.

“Although there has been a dramatic proliferation of gaming throughout the world, Nevada has, for many years, been the center of new product creation,” says Yoseloff, who holds a doctorate in mathematics from Princeton. “This is extremely important to the Nevada economy. Although gambling may take place in many jurisdictions, creating and manufacturing gaming products in Nevada represents important revenue and jobs for our state.”

Yoseloff is helping ensure the industry maintains its edge, and he has even put up his own earnings to help make this happen.

“During Governor Sandoval’s 2013 State of the State Address, he talked about the need for Nevada to remain the intellectual property capital of the world for gaming,” says Yoseloff. “Having worked in this field for many years, and knowing that many of the new ideas in gaming have come from young creative minds, I began to formulate a plan to...
harness that creativity. This ultimately became the Center for Gaming Innovation at UNLV. As far as I know, there is no other such program in the gaming field.”

The center, which is located in UNLV’s International Gaming Institute in the William F. Harrah College of Hotel Administration, was launched last year with a course in gaming commercialization. Yoseloff taught the course through the college’s gaming management concentration, though the class itself is open to students from all disciplines. Local game creators and industry and legal experts also participated as guest speakers.

Seventeen students, both undergraduate and graduate, signed on for the program’s first semester. Among them was doctoral student Dan Sahl.

Sahl, whose dissertation research explores video game-like elements in slot machines, says the class was the most distinctive one he’s ever taken.

“One of the things I took away was a better appreciation of the value of creative and innovative ideas,” he says. “Any good university course will make you think, but this was the only class I’ve ever taken where equal time and consideration were spent learning and navigating the process of protecting and commercializing my intellectual property.

“We spent a lot of time discussing our ideas and trying out different game configurations in the gaming lab. The opportunity to receive both criticism and advice from Dr. Yoseloff and other industry experts was a key part of the development process.”

Sahl credits his advisor, the International Gaming Institute’s Executive Director Bo Bernhard, with recommending he enroll. For his part, Bernhard says steering students toward Yoseloff’s program was an easy call.

“I’ve now been in university classrooms for nearly 25 years, and I’ve never sensed a positive, collaborative energy like I felt when I had the privilege of observing Mark teach that class,” says Bernhard. “These students are creating and innovating in a manner that all of us, as teachers, can learn from. I know that I’ve taken lessons learned from that class into my own teaching, as I now actively seek ways to get students to work in teams on challenging, real-world problems like those associated with intellectual property in new games.”

“Being a mentor and teacher in this program has been extremely rewarding,” says Yoseloff. “I don’t believe that it is possible to teach someone to be creative. What I do believe is that it is possible to teach creative people to harness and direct their creativity. This has been my approach in the program, and I am very happy with the results.”

Those results speak for themselves. “My hope is that my students become important contributors in this regard; thus far, I am both surprised and very pleased. My first class produced 12 patentable ideas. In addition, one new company has already been started as the result of the sale of one of these patents.”

Yoseloff says the most important point for new inventors to know is that they must closely guard their intellectual property. “Discussing their ideas without the proper legal safeguards can damage their later ability to patent and protect what is theirs,” he says. “Early in our program there is a discussion of copyrights, trademarks, and patents, just for this purpose.”

The program is focused on real-world outcomes, in this case bringing game ideas from the classroom to a casino floor or online gaming platform. Yoseloff, who spent a career designing technically advanced casino games for resorts and the web, is an ideal mentor. He is also well-connected and isn’t shy about using his contacts.

Yoseloff has enlisted a roster of gaming-industry superstars to guide program participants in areas such as the commercialization of ideas, the patent process, and effective business methods. “Las Vegas has a creative edge in that most of the world’s gaming experts are right here,” he says.

He notes that gaming companies are looking for employees who understand the intersection of their industry with math, psychology, business, and sociology. These are the employees who will bring new ideas to the market. Starting with students learning the patent process for casino games seems to be a logical first step.

The Center for Gaming Innovation is supported by the state’s Knowledge Fund, which promotes research in sectors Nevada has targeted for economic growth. The objective of the grant is to maintain Las Vegas’ role as the global “intellectual capital” of gaming.

Based on the success of the first course, UNLV is continuing the program. The revamped class will include dedicated sections on innovation in the areas of entertainment, security, and productivity.

Yoseloff knows that even the students who do not have their proprietary games purchased will benefit. In fact, as his former student Sahl explains, failure is often the first step towards success.

“You could go home, consider what the professor and fellow students liked and didn’t like about your idea, and then return the next week to present a better product,” Sahl says.

Exactly right, says Yoseloff, adding that those who are equipped to make these “better products” are sure bets to do well after they graduate.

“Technology is driving the gaming industry like never before, and the program is designed to give students the tools they need to perform and succeed in a competitive business.”

— Robyn Campbell-Ouchida
Unique platinum-containing chemotherapy compounds, created by Bryan Spangelo and his UNLV research team, offer hope for improvement in cancer treatment.
More than just a number, 8,703,756 represents years of hard work, patience, and collaboration.

It’s the number of the UNLV patent that names chemistry professor Bryan Spangelo and his team as co-inventors on a discovery involving promising new chemotherapy compounds.

The research team has spent the past five years developing the compounds in the laboratory, and have observed that they have greater effect and less toxicity than some existing cisplatin therapies used in the treatment of cancer.

Spangelo is joined on the project by UNLV chemistry professor Pradip Bhowmik, assistant professor-in-residence Haesook Han, doctoral student Ontida Tanthmanatham, and recent doctoral graduate Van Vo.

Their discovery involves cisplatin derivatives that use platinum, a heavy metal already used to disrupt the replication of cancer cells’ DNA, to anchor a novel tumor-combating compound.

Their new compounds, Spangelo says, are unique, thanks to the way in which the UNLV researchers were able to modify two rings of carbon and nitrogen atoms — a change that promises to boost platinum drugs’ cancer-fighting abilities while reducing their negative side effects.

Cisplatin is the most common of the FDA-approved chemotherapy compounds containing platinum. While effective in fighting a number of difficult-to-treat cancers, cisplatin can cause serious problems for patients: It can harm the kidneys, can kill the neurons in the periphery of the body, and can cause hearing loss.

Development of the new, less toxic drug began after Vo synthesized a series of new platinum-containing compounds. Subsequent testing on human cancer cells in test tubes indicated that three of these new compounds were, in some cases, much more effective than cisplatin.

“I was floored at the extent of the differences between existing platinum-containing drugs and our compounds,” says Spangelo.

“In science, we call it ‘orders of magnitude,’ and these new compounds are hundreds and perhaps thousands of times more effective in terms of concentration.”

The research team also discovered that the most potent of these new platinum-containing compounds wasn’t toxic in mice. This opens the possibility that these new compounds might be much easier on patients.

The key to enhancing effectiveness while reducing side effects, the researchers say, is using less platinum. Platinum works by causing apoptosis, or programmed cell death, by disrupting the DNA of cancer cells. But these are not precision weapons; when deployed, scores of healthy cells inevitably become collateral damage.

In a clinical setting, Spangelo says, the hope is that use of the new drugs will mean noncancerous cells will be exposed to less platinum. Fewer unintended cell causalities will mean fewer damaging side effects.

He is quick to acknowledge, however, that gaining federal approval and making such treatments available to patients is no simple matter. The researchers’ first steps were to formally disclose the nature of the research and then apply for a patent on the discovery. This process involves close coordination with UNLV’s intellectual property experts, including Zachary Miles, the executive director of technology transfer and economic development.

Miles says his office supports research faculty and staff in assessing, protecting, managing, and potentially commercializing promising findings — the “intellectual property” of the researchers and UNLV.

“Through the assessment process we can identify the commercial path the intellectual property may take,” Miles says. “After an assessment of the discovery, we then determine if it can be protected and marketed successfully. If it can be, the university will expend resources to file for patent protection. We clearly felt this was the case with the cisplatin derivatives developed by Dr. Spangelo and his team.”

Miles says he is excited about the possibilities of their discovery, and he and his staff are currently seeking partners to commercialize drugs covered by the patent, as well as potential research partners to help refine the research.

Spangelo, who came to UNLV in 1994 from the Medical University of South Carolina, says he hadn’t thought much about the patent process until recently.

“As a scientist, I was interested in publishing my work and sharing it with the scientific community. But we want to be a Tier One university, and this kind of work has to be promoted,” he says.

Patent in hand, Spangelo and his team continue conducting research on their novel compounds. Their next step is to better understand the genetic mechanisms behind their drugs’ apparent effectiveness. This was the subject of Vo’s dissertation.

“It is a very exciting time here at UNLV, and I am thankful that the administration understands the importance of supporting this kind of work because it is essential for both a medical school environment and the Tier One initiative,” says Spangelo. “This is exactly the kind of project that thrives in an environment that supports research.”

— Shane Bevell
Call it watering the green spots. UNLV’s Faculty Opportunity Awards program provides seed funding for faculty researchers with promising ideas and a desire to pursue additional funding from government agencies, foundations, or private industry. The program has supported a wide variety of campus research projects involving multidisciplinary teams, single investigators, and other faculty working to develop intellectual property.

By Charles E. Reineke
SEED MONEY UNLV’s Faculty Opportunity Awards provide funding for researchers looking to advance ideas that will attract larger grant dollars to university programs.
ELISABETH HAUSRATH

GEOSCIENCE

ELISABETH (LIBBY) HAUSRATH GREW UP in the desert, a circumstance that made it easy for her to appreciate how water, our planet’s most important chemical compound, profoundly affects even the most moisture-challenged of locales.

For Hausrath, now an assistant professor of geoscience at UNLV, that appreciation eventually led to a doctorate focused on aqueous geochemistry from Penn State. Because her studies there happened to coincide with the Mars Rover landing — an event that proved the now desertous Red Planet may have once been wet — she quite naturally began to think about slipping the surly bonds of Earth (figuratively) to conduct her research.

Today, due in part to her UNLV Faculty Opportunity Award, Hausrath is working to interpret data from NASA’s Mars Exploration Program to investigate how soil and water might have once interacted on the surface of our solar system’s most-Earthlike neighbor.

"My research program aims to better understand chemical weathering and soil formation on Earth and on Mars,” she says. “The Mars Exploration Program results in increasing amounts of fascinating data from Mars. Our goal is to help interpret and understand these data and their implications for Mars as a potentially habitable planet.”

Funding from the Faculty Opportunity Award, Hausrath says, was key to laying the scientific groundwork necessary for attracting the extramural support that such time-intensive research demands.

"In order to get larger, multi-year grants, it is really helpful to have preliminary data — at least a few results showing that an idea is promising — and that the proposed research approach is appropriate,” she says. She currently has two multi-year proposals pending with NASA resulting from the FOA award and is very hopeful that they will be funded.

The internal award has also allowed her to publish more widely in her field and to more fully support students working in her laboratory.

One particularly fruitful area for Hausrath and her team involves analyses of clay minerals. Because these minerals — also known as hydrous aluminium phyllosilicates — form in the presence of water, they are of intense interest to scientists studying habitability.

“Our research on transitions in clay-mineral chemistry, particularly the work of Ph.D. student Seth Gainey and master’s student Michael Steiner, is yielding fascinating results that may help us better interpret the potential habitability of clay-mineral-containing Martian environments,” Hausrath says. “This project is providing new insights that could lead to further studies conducted at UNLV or other institutions.”

Her work has implications closer to home as well, she adds, ticking off a list of investigations that have also generated enthusiasm among the funding agencies supporting her work.
“I am part of a group that recently received funding from NASA EPSCoR to look at snow dynamics,” says Hausrath. “My part of this will be to examine interactions between microorganisms and minerals in the nutrient-poor environment present on glaciers, which may also be an analog to Mars. I am interested in impacts of minerals, particularly phosphate minerals, on prebiotic chemistry.”

She and her former doctoral student Chris Adcock recently published a paper in *Nature Geoscience* examining phosphate release from minerals important on Mars, which has implications for the possible origin and persistence of life on Mars.

“My current Ph.D. student Courtney Bartlett and I will be continuing work on these projects, and I’m excited to be expanding both of these parts of my research program.”

REBECCA GILL

POLITICAL SCIENCE

**JUVENAL’S FAMOUS QUERY** — “SED QUIS custodiet ipsos custodes?” (“But who will guard the guards themselves?”) — has for centuries been used to highlight the difficulties of ensuring the accountability of decision makers.

But for Rebecca Gill, the question is slightly recast: How will we judge the judges?

The assistant professor of political science is leading a project that seeks to shed light on the issue, assessing how judges are selected and retained and how gender or racial bias may influence their performance evaluations.

Thanks in part to a UNLV Faculty Opportunity Award, she has the support she needs to help promote the “fairness and validity” of the processes that determine who ends up presiding in the nation’s courtrooms.

Gill says she has used the award to expand upon her earlier work on formal judicial performance evaluations and their effectiveness. That work, conducted in collaboration with UNLV law professor Sylvia Lazos, raised serious questions about the problem of implicit gender and race bias in judicial performance evaluation. Gill expanded the project and recently garnered a $171,000 grant from the National Science Foundation (NSF) for it.
"Prior to the Faculty Opportunity Award, Sylvia and I had already conducted a small-scale pilot study of judicial performance evaluations in Clark County," Gill says. "However, we ran into quite a bit of pushback because of the unique situation of performance evaluations here in Nevada. That study found that rankings for female judges are significantly lower than similarly situated male judges. I really needed a broader pilot study demonstrating the generalizability of our preliminary findings to performance evaluations in other states."

Gill says the FOA allowed her to conduct a broader pilot study and to hire a research assistant to help with the labor-intensive process of collecting the expanded pilot data to support a grant proposal. In the summer of 2013, she submitted her proposal to the NSF’s Law and Social Science Program, which seeks to advance scientific theory and understanding of the connections between law or legal processes and human behavior.

"Without help from UNLV," she says, "I would not have been able to conduct the broader pilot study, which was essential. Information collected in the pilot was used to establish the feasibility of this project, as well as its theoretical and practical importance to the NSF’s Law and Social Science Program’s mission. The expanded pilot study was also the source of the data used in two scholarly publications, one of which she co-authored with her FOA research assistant, Kenneth Retzl.

NSF funding in place, Gill says that she is now working with two full-time research assistants to collect data for the American Judicial Performance Evaluation Database, which will contain information for all the states that use judicial performance evaluations to judge the judges’ qualifications and effectiveness. Such a catalog of evaluations, Gill’s research indicates, will help shed light on persistent disparities — such as those noted in her pilot study — in the way judges and prospective judges are scored.

As part of her NSF grant, she will also write a best practices handbook for designing and implementing selection and evaluation programs.

Beyond her current study, she is interested in expanding her research to study the selection, evaluation, and retention of other public officials, including local and state politicians as well as public prosecutors, police chiefs, and the like.

She acknowledges that for those invested in the evaluation status quo, her plans might not be an easy sell. But there are signs of progress.

"Those who are strongly supportive of the current system of judicial performance evaluation have revisited some previously unexamined assumptions of the fairness and validity of the instruments currently in use," Gill says. Fiat justitia.

**JANET DUFEK**

**KINESIOLOGY AND NUTRITION SCIENCES**

**INJURY FROM FALLING IS A REAL CONCERN**

For hospital patients, particularly older adults. But pediatric patients are at risk, too, an unfortunate reality UNLV’s Janet Dufek is working to better understand.

Dufek, a professor in the department of kinesiology and nutrition sciences, has teamed up with Nancy Ryan-Wenger, director of nursing research at Nationwide Children’s Hospital in Columbus, Ohio, to examine incident reports detailing falls among children in pediatric-care facilities. Their goal is to examine both why falls occur and how best to quickly and accurately evaluate the damage done.

“Dr. Ryan-Wenger and I became mutually interested in combining our academic strengths and interests,” Dufek says. “Hers is in pediatrics and standards of care, mine in applying mechanics to the problem of determining magnitude of injury following a fall in a hospital or clinic. I became interested in testing new approaches to identify and reduce pediatric patient falls and how to develop a risk model to evaluate the likelihood of serious injury following a fall.”

With the assistance of a UNLV Faculty Opportunity Award, Dufek says she and Ryan-Wenger were able to amass the preliminary data they needed to convince outside funding agencies that their investigation was worthy of support.

“The primary purpose of this pilot study was to obtain data in support of an external grant application being prepared and submitted,” she says, noting that the research team has already received a $10,000 grant from the American Nurses Foundation and is preparing a grant proposal for an Academic Research Enhancement Award from the National Institutes of Health. “Obtaining outside funding would likely have been impossible without the faculty award support used to generate the pilot data.”

She adds that the FOA was crucial to her collaboration with Ryan-Wenger. Dufek, a fellow with UNLV’s Collaborative Research and Education (CoRE) program, is an advocate for hospital patients, particularly older adults. But pediatric patients are at risk, too, an unfortunate reality UNLV’s Janet Dufek is working to better understand.

But pediatric patients are at risk, too, an unfortunate reality UNLV’s Janet Dufek is working to better understand.

**HURTFUL FALLS**

Janet Dufek is examining why pediatric patients fall and how to better evaluate the damage done.
of interdisciplinary projects, but notes that each participant oftentimes must acquire new knowledge to conduct collaborative research.

“The Faculty Opportunity Award provided me the opportunity to work with Dr. Ryan-Wenger in an accelerated fashion to learn the new language of nursing and clinical care,” says Dufek. “Our unique backgrounds have combined to generate ideas that neither of us would have independently developed.”

Among these are recommendations intended to help pediatric healthcare providers do a better job in their initial assessments of injury severity. This is important, the researchers say, because no matter how careful physicians and staff may be, a small but significant number of kids will be hurt in falls each year.

“Ultimately,” Dufek says, “we would like to reduce or eliminate the occurrence of pediatric patient falls in health care facilities. But that is likely an unrealistic goal. A more reasonable outcome is to develop an objective protocol to determine injury severity following a fall, one that would be used to inform standards of follow-up care.”

Such a protocol is critical given the potential for further harming young patients with sometimes overly aggressive post-fall diagnostic evaluations.

“One of the undercurrents in our research is concern about exposing infants and young children to levels of radiation used in some diagnostic imaging techniques,” says Dufek. “If we could more accurately determine fall severity using some form of quantitative evaluation, it is possible that children could be spared from exposure to unnecessary diagnostic radiation. We hope the long-term impact of this research has the potential to affect change in administrative policy and procedures in healthcare delivery and to reduce waste by eliminating unnecessary tests.”

YING TIAN
CIVIL AND ENVIRONMENTAL ENGINEERING AND CONSTRUCTION

FOR STRUCTURAL ENGINEERS SUCH AS UNLV professor Ying Tian, the problem might be best described as an architectural tug-of-war between form and function.

To create high-rise buildings with light-filled, wide-open floor plans, architects and structural engineers often use large reinforced concrete slabs — called “flat plates” — supported directly on columns.

The spaciousness of these designs can come at a price, however: Buildings using flat plates are vulnerable to catastrophic collapse caused by “punching shear failure,” which occurs when the flat plates break free, appearing to “punch” their way through the supporting columns. Earthquakes can cause punching failure, as can terror bombings and ensuing fires.

Tian, who began conducting research on this subject in 2007, is seeking to better understand how fires contribute to this phenomenon with the goal of saving lives.

“I was inspired to conduct research on the effects of fire damage on flat plate building structures because of the collapse of a flat plate underground parking garage in Switzerland in 2004 due to a 90-minute fire,” Tian says. “The collapse, causing the death of seven firefighters, was triggered by a punching failure of a slab at one column that immediately propagated throughout the structure.”

Tian says receiving a Faculty Opportunity Award helped him to obtain data necessary to seek additional funding. “Without the Faculty Opportunity Award, it would have been difficult for me to generate convincing preliminary data to request competitive grants from extramural agencies,” Tian says.

The award also helped him establish fruitful collaborations with other campus experts, such as colleague Aly Said; working together, they designed a project that used UNLV’s Structural Engineering Laboratory, a facility capable of large-scale testing, to learn more about how uncontrolled fires set off punching failures.

The results will help address a significant void in the study of this area; early findings were recently published in the International Journal of Concrete Structures and Materials.

“We need experimental data, analytical tools, and education to design resilient structures that can survive fire events such as those that precipitated the collapse of the World Trade Center towers,” says Tian. “Our results so far have clearly indicated the high risk of progressive collapse in flat plate buildings experiencing uncontrolled fires.”

Building safer buildings, in other words, demands designing slabs and connections with columns that can survive brief periods of intense heat without cutting loose and “pancaking” the floors below. A related improvement would involve boosting the slabs’ “shear capacity” — their ability to resist the stresses inflicted by what engineers call “extreme loading events.” These improvements can’t be developed, Tian says, until engineers have better data.

“I hope our tests will address whether elevated temperatures really cause decreased shear strength as predicted from some computer simulations,” he says. “To date, knowledge regarding the resilience of flat plates to elevated temperature is extremely limited. Hopefully, more researchers will conduct studies like ours, since flat plate designs constitute a major class of structures widely used in the U.S. and other countries.”

Ariana Goertz and Scott Lien contributed to the reporting on this article.
During the past decade, UNLV’s Schools of Allied Health Sciences and Nursing have expanded their research programs and boosted collaboration among faculty investigators in support of the university’s vision of becoming a major research institution.

In Allied Health Sciences, these projects include a range of potentially patient-benefitting areas, among them investigations in health physics and diagnostic sciences, physical therapy, nutrition, and kinesiology. Nursing researchers are also working to improve human health and wellness, most prominently via projects aimed at advancing understanding of issues related to chronic conditions such as diabetes, obesity, and stress. Both schools will benefit from a recent $20 million grant from NIH to support clinical and bench-to-bedside research and to lead a health research group, the Clinical Translational Research Infrastructure Network, or CTR-IN, comprising 13 universities across the Mountain West region.

The following profiles demonstrate the diversity and depth of the two schools’ research projects.
Yu Kuang: Dangerous Tumors, Expedited Assessments

Yu Kuang, an assistant professor in the School of Allied Health Sciences, is focused on the early detection of cancer and image-guided cancer treatment. His recent work explores whether testing for genetic markers associated with tumors, coupled with new approaches to quantitative magnetic resource imaging (MRI) analysis, might lead to more effective treatments for sarcomas, malignant tumors that form in bone, cartilage, fat, muscle, or vascular tissue.

Patients diagnosed with sarcoma usually undergo what health care providers call “neoadjuvant” therapy—typically chemotherapy—to shrink their tumors before surgery. Reducing tumor size prior to operating, oncologists have found, not only makes surgery more effective but also enhances patients’ long-term survival rates.

A drawback of this approach is that determining whether neoadjuvant therapy has done its job can only happen via tumor-tissue analysis following surgery. This means that patients don’t learn if they’ve benefited until after leaving the operating room, an unfortunate reality that ensures some patients will endure the toxic effects of chemotherapy without any therapeutic advantage. For these patients, the harm in superfluous chemo is not just in the unnecessary discomfort it inflicts. Precious time has been wasted—time that could have been spent on potentially lifesaving treatment alternatives.

Kuang has teamed up with the Children’s Specialty Center of Nevada and Nevada Imaging Centers to develop an earlier, non-invasive method for predicting success or failure of neoadjuvant chemotherapy. His method involves combining an analysis of tumor markers in mitochondrial DNA from blood draws and diffusion MRI data. The goal, Kuang says, is to identify the early changes of genetic biomarker levels in the blood and the imaging features in the MRI scan that can help clinicians more effectively ascertain how well sarcomas have responded to pre-operative chemotherapy.

By determining patients’ response to the treatment early in the course of chemotherapy, Kuang’s team expects this research will ultimately enable oncologists to optimize treatment protocols for individual patients, improving quality of life and enhancing disease-free survival for patients with sarcoma.

If successful, Kuang’s next step will likely involve multi-institutional clinical trials. These will seek to determine how this combined biological- and imaging-biomarker method might be used to guide future chemotherapy treatments.

Kuang is also actively involved in multi-institutional collaborative work related to prostate cancer. Earlier this year, he teamed up with Sandi A. Kwee, a physician and associate professor at the John A. Burns School of Medicine at the University of Hawaii, to develop a positron emission tomography (PET) image guided prostate cancer radiation therapy method. PET scan is an imaging test that helps reveal how patients’ tissues and organs are functioning via a radioactive drug (radiotracer). In this collaboration, the radiotracer Kuang and Kwee are using is a new U.S. Food and Drug Administration-approved investigational drug that could allow for better targeting of radiation treatments used against intermediate- and high-risk prostate cancer.

The collaborative relationship is expected to lead to a multicenter clinical trial initiative between UNLV and University of Hawaii, a trial that could bring this potentially game-changing approach to prostate cancer patients in Southern Nevada.
OSTEOARTHRITIS OF THE KNEE, an increasingly common health problem among active adults, is a painful condition involving loss of cartilage and deformity of the joint. It is also a major factor in diminished mobility, especially among older people.

Multiple studies have identified stress injuries to the leg bones as a primary contributor to arthritic knee pain and deformity. Little is known, however, about the causes and progression of bone-stress injuries among middle-aged, active adults.

Kai-Yu Ho, an assistant professor in the School of Allied Health Sciences, is directing a study that could remedy this deficiency, while at the same time providing a method for evaluating the probability that osteoarthritis is present. She also hopes to help doctors detect the sort of bone damage that produces osteoarthritis, even before a person experiences pain.

Ho’s study involves an examination of how “locomotion-induced shock loading” — the results of such everyday, bone-jarring movement like walking, running, and stair climbing — affects the physiology of knees. Her work also examines the alignment of bones in legs that have stress injuries, and how injury-related alignment issues might relate to arthritis development.

A normal femur, or upper leg bone, is not perfectly vertical. The bone extends from the hip at a slight angle toward the midline of the body. Normal physical activity can cause micro-damage to the femur and tibia where they meet at the knee. The body repairs the damage by growing new bone, a process called bone remodeling.

Continual shock-loading damage can cause too much bone remodeling, however, with new bone forcing the femur away from the midline of the body into a “varus angle” (a phrase adapted from the Latin word for “crooked”). When the varus angle is pronounced a person appears bowlegged — the knees do not touch when one stands with his or her feet together.

Ho hypothesizes that increased shock loading among middle-aged persons will lead to greater bone stress, which can increase the onset of osteoarthritis in the joint. She put her hypothesis to the test in a study involving 20 adults ranging in age from 50 to 65. None of her subjects had been diagnosed with arthritis in the knee.

Participants were asked to complete a locomotion-induced, shock-loading activity. When finished, they receive a magnetic resonance imaging (MRI) scan to verify bone stress injuries. Participants next allowed the researchers to measure the angle between the long axis of their femurs and tibias.

Ho says she and her team are now analyzing the data they’ve collected to determine whether there is an association between lower extremity alignment and MRI-detected bone stress injury. If there is, she says, the finding could provide health-care providers with an early detection method of bone abnormalities. This, in turn, will enable them to recommend physical therapy intervention to ward off future bone-stress injuries to patients’ knees.

Research related to this study has been published in the European Journal of Sports Science and Magnetic Resonance Imaging.
EARTHQUAKES, EXPLOSIONS, INDUSTRIAL accidents, car crashes — each are forms of mayhem that leave crushing trauma in their wake. Barbara St. Pierre Schneider, an associate professor in the School of Nursing, is working to better understand the biological processes characterizing such “skeletal and muscle-crush injuries,” and how they might best be treated. She is especially concerned with U.S. service personnel who have been injured on the battlefield.

Whether these injuries occur in military combat, during a terrorist attack, or in a natural disaster, crush-related injuries involve significant compression, a traumatic event that interrupts blood flow and damages the cell membrane of muscle fibers. Although the injury itself may not be immediately life threatening, damaged muscle can increase the risk for death down the road: In many cases ruptured muscles spill cellular contents, such as the muscle protein myoglobin, into the bloodstream. Myoglobin, for example, can cause kidney damage and failure.

Soldiers who experience skeletal muscle-crush injuries during combat face additional challenges. Often, the wounded must endure long flights to treatment centers. While unavoidable, these evacuations by air expose the wounded to hypobaria, a situation in which tissues may be deprived of sufficient oxygen, which can become a factor when the air pressure is equivalent to an altitude of 8,000 feet, or that of a typical plane’s cabin pressure.

St. Pierre Schneider and her team are studying how hypobaric hypoxia affects the healing of injuries and are searching for potential treatments that counteract its effects. A previous St. Pierre Schneider study, for example, simulated the effects of air transport and examined the effect of hypobaric hypoxia on genes within skeletal muscle. One major finding was that the simulated flights affected the genes affiliated with skin integrity, but had no apparent effect on inflammatory genes in skeletal muscle.

To further her hyperbaric hypoxia crush-muscle research, St. Pierre Schneider is expanding the capabilities of her lab. She recently received grant funding to purchase a combined cell sorter/flow cytometer, an instrument that allows scientists to measure and analyze the inner workings of cells. Having the instrument, says St. Pierre Schneider, will enhance UNLV’s research capacity and the university’s science, technology, engineering, and mathematics (STEM) program.

St. Pierre Schneider’s studies in muscle injury recovery are guiding techniques in aeromedical evacuation, and her work has been featured in multiple publications, including *Aviation, Space and Environmental Medicine* and *Innate Immunity*.
WHEN IT COMES TO PAINFUL CONDITIONS affecting the mobility of millions of Americans, bum knees take a back seat to bad backs. Chronic low-back pain is the most common health complaint in the United States, affecting nearly 30 percent of people older than 18. In addition to the physical discomfort it causes, chronic low-back pain sufferers also incur high health care costs.

In recent years, more physicians and specialists have recommended self-management strategies to help reduce pain, improve quality of life, and lower associated treatment costs. Jennifer Kawi, a chronic pain specialist and assistant professor in the School of Nursing, is among those who have noted its effectiveness, and she is currently working to identify those chronic low-back pain sufferers who might benefit.

In general, self-management strategies not only encourage patients to actively direct and improve their health, but they also inspire and reinforce patient confidence. Such positive feelings, Kawi says, help patients set realistic goals and action plans, and make lifestyle changes that often include increased exercise and activity levels, better eating habits, and greater use of non-pharmacological pain remedies such as heating wraps and relaxation techniques.

While self-management has improved outcomes and lowered health care costs for a host of conditions, its effectiveness with chronic low-back pain sufferers has not been fully explored. Kawi’s project aimed to remedy this using a two-pronged approach.

She first sought to identify variables, such as perceived support from health care providers, pain intensity, and functional ability, that might predict which low-back pain sufferers would respond best to self-management strategies. Her second goal involved evaluating differences in those variables among patients seeking help in specialty pain centers and primary care clinics. Understanding these variables, she reasoned, could help maximize self-management effectiveness in clinical settings, while enabling health care providers to tailor self-management strategies to fit the needs of individual patients.

Kawi and her team analyzed data from 230 people with chronic low-back pain — 110 from specialty pain centers and 120 from primary care clinics. Her research revealed five variables to be predictors of self-management for patients in both settings: age, self-management support, education levels, overall health, and the helpfulness of pain management.

She also discovered differences among key variables in patients who sought care from a specialty pain center versus those who sought care in a primary care clinic. For example, participants in specialty pain centers were more apt to self-manage if they were active in their religious or spiritual beliefs or if they received support from their significant others. On the other hand, low-back pain patients in primary care clinics who had higher incomes tended to self-manage more than those with lower incomes. These important preliminary findings have been tabbed for future research.

Kawi’s research has already provided essential intervention data that health care providers can use to bolster the odds that chronic low-back pain patients will be able to successfully self-manage their conditions. The results also identified a need to formulate additional strategies for patients who may not be the best candidates for self-management programs.

The study, which was funded by an external grant from the Nurse Practitioner Healthcare Foundation, appeared in the journal Applied Nursing Research.
PEOPLE OFTEN FACE MULTIPLE CHRONIC ailments during their senior years, clusters of conditions that demand a collaborative approach to treatment. But today there are few, if any, training opportunities aimed at preparing the next generation of practitioners and specialists for the challenges of providing the collaborative, interprofessional elder care that is so desperately needed.

Susan VanBeuge is changing that. VanBeuge is an assistant professor in the School of Nursing who is co-principal investigator with Georgia Dounis, an associate professor of clinical sciences in UNLV’s School of Dental Medicine, and Sue Schuerman, an assistant professor in the School of Allied Health Sciences. The UNLV team is a sub-awardee of the Nevada Geriatric Education Consortium, a state-wide initiative aimed at improving the health care delivered to older adults.

The UNLV objectives include developing a Type 2 diabetes management training program for interprofessional faculty with emphasis on communication, prevention of co-morbidities, and cultural sensitivity.

At its core, VanBeuge’s program aims to develop a series of provider training for senior health issues to include Type 2 diabetes and Alzheimer’s disease. The UNLV team, for example, has developed a one-day training program focused on Type 2 diabetes and offered it statewide to health care providers and faculty who work with professional students. The program includes video-recorded encounters with “standardized” patients — individuals trained to simulate the needs of real patients — and hands-on training with high-fidelity manikins.

The program focused on Type 2 diabetes because of its multiple symptoms, prevalence among older adults, and the need for multiple health care professionals to involve themselves in treatment and management of the condition.

During the training, each participant received a chart detailing a standardized patient’s medical and social history, physical attributes, clinical findings, and chief complaint. Teams had 15 minutes to complete the examination. During the encounter, each group assessed their patient’s physical status, formulated treatment goals and intervention options, noted potential outcomes, and identified opportunities for coordination of care. They also developed a plan for how responsibility for that care would transpire.

The teams next participated in a debriefing session with the project’s instructors (who were observing the interactions in real time on video monitors). Finally, instructors led a group discussion and encouraged self-assessments from participants.

Thus far, the five-year grant, now in its fourth year, has seen close to 100 participants complete the course. Early findings were published after the study’s second year. Participants at that time told the researchers that they had gained a better understanding of inter-professional team building, a stronger ability to communicate effectively with team members, and greater confidence in recognizing that meeting the needs of geriatric patients often requires an interprofessional response.

The project has been featured in the Journal of Interdisciplinary Healthcare and has been presented during multiple national clinical conferences. The team recently received additional funding to include Alzheimer’s disease and dementia to the course training for the coming year.
Steen Madsen: A Nano-Sized Weapon Against Glioblastoma

SCHOOL OF ALLIED HEALTH SCIENCES’ Steen Madsen is exploring new treatment methods for primary brain tumors — tumors that originate in the brain — using nanoparticles and lasers.

Madsen, professor and chair for the department of health physics and diagnostic sciences, is collaborating with Henry Hirschberg, a researcher at the University of California-Irvine’s Beckman Laser Institute and Medical Clinic, on a particularly promising approach. It involves using a type of white blood cell that ingests foreign material as a therapeutic-drug delivery vehicle.

There are approximately 34,000 new cases of primary brain tumors diagnosed each year in the U.S. and Europe. Close to 40 percent of these tumors are of the most aggressively malignant variety, glioblastoma multiforme (GBM). Less than 5 percent of patients diagnosed with GBM will live more than five years.

Glioblastoma tumors are notoriously aggressive and difficult to treat. When removed during surgery, they almost always reappear. Madsen, Hirschberg, and their research team are exploring a small solution to this big problem: employing macrophages, the aforementioned, material-ingesting white blood cells, to transport nano-sized particles of therapeutic gold to surgical resection sites. If successful, it’s a system that could greatly enhance the effectiveness of photothermal therapy, a process that destroys tumor cells using laser light.

Why gold? The precious metal offers two particular advantages. First, it has already been used safely in humans for a variety of medical applications. Second, and more to the point, gold has the ability to convert infrared laser energy to thermal energy. When exposed to photothermal therapy, gold nanoparticles act as heat generators and burn the tumor cells.

In preliminary studies, Madsen and Hirschberg demonstrated the feasibility of using macrophages as delivery vehicles for gold-based nanoparticles. This was a particularly welcome finding given that, being part of the body’s natural defenses, macrophages can be easily extracted from a patient, loaded with the desired therapeutic agents and re-injected into the body.

During the study’s next phase, Madsen and Hirschberg’s team showed that using gold-loaded macrophages in concert with photothermal therapy was effective in treating tumor cells in the brains of laboratory animals. Animals that received the macrophages and photothermal therapy, in fact, showed zero tumor cells when the treatments concluded. These findings and others have been published in the Annals of Biomedical Engineering and Lasers in Surgery and Medicine.

Hurdles remain, however. Part of Madsen and Hirschberg’s current research involves searching for a means to allow nanoparticle-loaded macrophages to pass through the body’s “blood-brain barrier,” the biological mechanism preventing most external cells and other matter from passing through to the brain. Thus far, the answer has eluded them.

Madsen and Hirschberg say they are confident that this obstacle, too, can be overcome, and that, once bypassed, they will be that much closer to improving the dismal five-year survival rate of GBM patients.
AS UNLV SEEKS SUPPORT FOR A MEDICAL school, much of our advocacy has focused on community impact, and rightly so. Las Vegas is the largest urban area in the United States without a public allopathic medical school. Our lack of such a facility makes it more difficult to deliver the level of high-quality healthcare that Southern Nevada needs and deserves.

But what impact will the medical school have on the university and its research endeavor?

Simply put, medical schools that perform research are at the front lines of scientific innovation and discovery. They conduct sophisticated studies on diseases, drugs, and procedures that advance the practice of medicine, and they train their students to think outside the box about established courses of treatment. They also attract highly motivated faculty and students — the type of pioneering scientists and scholars who produce breakthroughs with real-world applications and commercialization potential.

Additionally, medical schools typically seek and receive high levels of federal funding to conduct research: The average research funding for U.S. medical schools is $85 million annually. An infusion of this kind of funding would, in and of itself, drive UNLV’s overall success to new heights, placing the university in the top tier of research universities across the country.

This is not to suggest that UNLV faculty members are not already conducting significant research in a whole host of areas within the health care field. Just a quick review of the stories in the preceding article in this publication will give you a glimpse of the kind of creative, applied health care research that is currently underway. But a medical school offers the potential of greatly enhancing these efforts by creating opportunities for new investigations and collaborations among UNLV faculty and others in the community.

For instance, a school of medicine could build upon UNLV’s relationship with the Cleveland Clinic Lou Ruvo Center for Brain Health, a world-class facility in Las Vegas that cares for patients with Parkinson’s, Alzheimer’s, and multiple sclerosis. The medical school plans to work with the center to expand our current research programs involving genomics in Alzheimer’s patients and to develop new clinical trials of drugs that target patients’ genetic makeup.

This is just one example of the types of partnerships that will grow out of medical research at UNLV. The potential for additional research — and the improved health care that results from it — is limited only by the number of faculty and the ideas they can generate.

With its promise for bolstering our science and scholarship, enhancing our academic reputation, and making our funding comparable to the world’s best research institutions, a medical school is truly a prescription for success, not only for our community, but for UNLV research as well.

Want to learn more about the UNLV medical school? Visit www.unlv.edu/medicalschool
In Print

Faculty authors explore our place in the universe, Gandhi and his mentors, a small city’s civil rights struggle, and more.

By Todd Peterson
Cosmic Dawn: The Search for the First Stars and Galaxies
George Rhee
Springer, 2013

If George Rhee wasn’t already a scientist, he could play one on TV.
With a shock of red-brown hair and no-nonsense glasses, Rhee certainly looks the part. He also speaks in the sort of deliberate, thoughtful tones one would expect from someone who thinks big thoughts about big subjects. In his case, it’s the biggest subject of them all: the whole of the cosmos.

From his office in UNLV’s Bigelow Physics Building, the astronomy and physics professor recently sat down to discuss his new book, Cosmic Dawn, a volume that serves as both a brief history of cosmology (the study of the universe) and a primer on what he sees as coming advances in astronomy.

Cosmic Dawn, he says, has been a decade-long endeavor. The project, which he joined at a writing partner’s behest, became a solo endeavor when his colleague abandoned the book. Rhee worked on the manuscript for a time, but ultimately set it aside. Ten years later, a chance meeting with a publishing professional convinced him that it was worth reviving.

As one might expect, Rhee found that cosmology had changed over the intervening years. Aside from some of the basic information he’d written, he found himself starting from square one. “I wouldn’t even say it was a revision,” Rhee says. “It was a whole new book.”

The difficult job of reworking the manu-
script was further complicated by Rhee’s lofty goal for the project: He wanted his work to be accessible to general readers; “to convey,” he says, “a sense of wonder.”

To that end, Cosmic Dawn begins with a longer chapter, “Cosmology Through Its Past,” in which Rhee details science’s high points through the ages, from the ancient Greeks’ first probing questions, all the way to the contemporary thinking about the universe’s origins. In this chapter and elsewhere, Rhee says he has done his best to help general-interest readers navigate what he admits is complex subject matter. Still, he says, “it takes a determined reader to get through it.”

But the payoff is worth the effort. From mankind’s study of cosmology, Rhee moves on to reward readers with fascinating, approachable distillations of daunting topics, including the core elements of the Big Bang Theory, scientists’ observations of the lifecycle of stars, and the formation of galaxies — a subject with particular relevance to Rhee’s career.

Upon completing his doctorate in astronomy at Leiden University in 1989, Rhee spent three years teaching at New Mexico State University. There, he worked to broaden understanding of the true nature and scope of the cosmos. It’s work he continues at UNLV.

When he began his academic career, he says, astronomers had identified only one solar system — our own. Now, astronomers have identified a few thousand. “We think there are billions of solar systems in our galaxy alone,” Rhee says. “By studying the others, we can understand something about other planet formation.”

Knowledge about how planets, galaxies, and stars form is crucial to understanding life — and our future — on Earth.

“The more we study the universe, the more things seem interwoven and related. The elements in this room were formed inside stars,” Rhee says, sweeping his hands outward to show the space of his office and all its contents. “That’s a pretty visceral connection.”

In Cosmic Dawn’s final chapters, Rhee delves into one of his favorite subjects: science’s exponential growth through technology. “I think we double the amount of known data every two years in astronomy,” Rhee says. “It’s staggering.”

In the book, he walks readers through projects such as the Large Synoptic Survey Telescope, currently under construction in Chile. When complete, it will provide, in a single night, data equal to every word in the Library of Congress.

Rhee devotes an entire chapter to the James Webb Space Telescope (JWST), the successor to the Hubble Telescope, which is scheduled for launch in 2018. The JWST will eventually operate one million miles from Earth (about four times as far away as the moon), and will be much too distant for astronauts to reach.

The JWST’s goals, Rhee explains, are mapping the evolution of galaxies, searching for planets that might support life, studying the formation of stars and planets, and searching for the formation of the first stars and galaxies.

This last endeavor, discovering the origin of the first stars and galaxies, particularly intrigues Rhee. It’s a subject he revisits throughout Cosmic Dawn. Identifying these formations will provide astronomers with a roadmap of the universe’s development following the Big Bang, he says.

“It’s a unique story. We get to discover the history of the universe once,” Rhee explains, “You don’t get to rediscover DNA. You get to do it once, and I think we are on the brink of that level of discovery in astronomy.”

Rhee acknowledges his unabashed zeal for all things cosmological and hopes his readers share his sense of joy and wonder about the subject.

“I think it’s an exciting story,” he says. “We live in a world that is completely dominated by science and technology. With these advances, we can look back in time. We can see light that set out on its journey before the Earth existed. This is real. It’s not some Hollywood thing made up for entertainment. It’s such a fantastic age of discovery.”
“Ultimately, the world is to be guided not by political leaders, but by visionaries. Ideas are much stronger than policies and planning. Ideas make the world go around. And only if they are peaceful ideas are they going to work.”

Satish Sharma says some of his earliest memories are related to the idea of nonviolence.

“I have always favored pacifist tendencies and orientations, and practiced them,” says Sharma, a UNLV social work professor.

With this orientation, it was only a matter of time before he became interested in the life of Mohandas Gandhi, the father of Indian independence and a worldwide model for pacifism and nonviolent civil disobedience.

Sharma recently completed Gandhi’s Teachers: Henry David Thoreau, the last of a four-volume series on thinkers who influenced Gandhi.

In his collected writings and speeches, Gandhi noted several modern thinkers who had influenced his ideas. They include Rajchandra Ravjibhai Mehta, an Indian philosopher; Russian novelist Leo Tolstoy; English intellectual John Ruskin; and American transcendentalist Henry David Thoreau.

By drawing a straight line from Gandhi to these other men and showing how the Indian leader’s philosophy developed, Sharma hopes to get people thinking about Gandhian principles.
“You have to pay attention to peace and pacifism,” Sharma says. “You have to believe that without peace and pacifism your lives are going to be miserable, and nations’ lives are going to be miserable, too.”

We can see this on a daily basis, he says, as more people and nations take combative routes to end their differences.

“That may solve the problems partially in the short term,” Sharma says. “But in the long run, those problems keep on emerging again and again.” Real change comes through discussion, not through aggression, he says.

The Gandhi’s Teachers series will add to this discussion. Although much has already been written about Gandhi and the other men individually, Sharma says there wasn’t significant work connecting Gandhi’s thinking to those who influenced him.

After obtaining degrees at Panjab University and later at the University of Iowa and Ohio State, Sharma continued studying Eastern and Western pacifists, which eventually led to this series.

He began the series in 1999. Of the four men, Sharma says, Mehta was the one most mentioned by Gandhi. Despite that fact, Sharma explains, he was the least known, both in India and among international scholars. That prompted Sharma to explore Mehta’s influence in the first volume of the series.

After obtaining degrees at Panjab University and later at the University of Iowa and Ohio State, Sharma continued studying Eastern and Western pacifists, which eventually led to this series.

He began the series in 1999. Of the four men, Sharma says, Mehta was the one most mentioned by Gandhi. Despite that fact, Sharma explains, he was the least known, both in India and among international scholars. That prompted Sharma to explore Mehta’s influence in the first volume of the series.

After obtaining degrees at Panjab University and later at the University of Iowa and Ohio State, Sharma continued studying Eastern and Western pacifists, which eventually led to this series.

He began the series in 1999. Of the four men, Sharma says, Mehta was the one most mentioned by Gandhi. Despite that fact, Sharma explains, he was the least known, both in India and among international scholars. That prompted Sharma to explore Mehta’s influence in the first volume of the series.

After completing the Mehta volume, Sharma moved on to Tolstoy, then Ruskin and Thoreau. It has kept him busy for a decade and a half.

“You devote 15 years of your life only if you are totally committed to something,” he says.

While his research on Thoreau didn’t reveal any particular surprises, there were challenges reconciling Thoreau’s embrace of direct action to end slavery with Gandhi’s nonviolence, Sharma says. Thoreau, for example, was willing to accept violence in certain situations, specifically John Brown’s bungled attempt to incite a slave insurgency in Virginia.

Sharma devotes an entire chapter to Thoreau’s writing and statements about Brown, the abolitionist militant whose 1859 attack on a federal arsenal at Harpers Ferry dramatically heightened tensions in a nation already deeply divided by slavery. Thoreau wrote several essays defending Brown and his use of violence.

Gandhi found this troubling, as does Sharma. “[Thoreau’s] subscription to violence under certain circumstances did disappoint me,” Sharma says.

Still, he adds, Thoreau’s admirable traits are legion. Sharma was “deeply impressed” by Thoreau’s simplicity, humility, frugality, will power, and forbearance, all virtues that mirror Gandhi’s fundamental values.

Elsewhere in Thoreau, Sharma details prominent aspects of the American writer’s contributions, perhaps chief among them, Thoreau’s 1849 essay “Resistance to Civil Government” (or “Civil Disobedience”). Gandhi encountered the essay in 1907, after launching the Satyagraha, “soul force,” movement in South Africa on behalf of that country’s Indian immigrants.

Sharma says exploring the ideas of Gandhi’s spiritual and intellectual influences was not an obvious choice for scholarly attention. But exploring the antecedents of Gandhi’s thinking is critical to fully appreciate the lasting influence of his ideas.

“Ultimately, the world is to be guided not by political leaders, but by visionaries. Ideas are much stronger than policies and planning,” says Sharma. “Ideas make the world go around. And only if they are peaceful ideas are they going to work.”

Pacifism is personal for Sharma. Even while excitedly discussing his latest project — Sharma is currently at work on a book-length study of Quakerism and its effects on Gandhian thought — he radiates calm and peacefulness. A similar peaceful capacity is available to all of us, he says. We simply need to learn how to use it.

Teachers such as Gandhi and Thoreau can help.

“People know how to obtain peace on a daily basis. They can do the same thing for the nation,” Sharma says. “This series is more like awakening the conscience of the people. That is what I’m trying to do.”

---

**A City Within a City: The Black Freedom Struggle in Grand Rapids, Michigan**

Todd E. Robinson  
Temple University Press, 2013

Ferreting out history’s “truths” often requires looking beyond standard, accepted narratives and focusing instead on telling details that more fully represent the whole. Such is the case with Todd E. Robinson’s *A City Within a City: The Black Freedom Struggle in Grand Rapids, Michigan*.

Robinson, an associate professor of history at UNLV, says he learned early on that few scholars were interested in how the civil-rights struggle played out in “second-tier” cities like Grand Rapids. “I observed that most of the narratives of the black freedom struggle focused on the experiences of blacks living in primary cities such as Chicago, Detroit, New York, and Los Angeles,” he says. Robinson worked to change that while a doctoral student at the University of Michigan, where his dissertation work eventually led to *A City Within a City*.

He says he decided on Grand Rapids for a couple reasons. First, there was the aforementioned dearth of information on midsized cities. Second, he says, the size and scope of Grand Rapids was similar to his hometown of Springfield, Mass. “I felt strongly that there was a rich narrative worthy of national attention which could add to the larger understanding,” he says.

*City Within a City* begins by describing the influx of African-American migrant workers to Grand Rapids in the early 1900s up until World War II, a fascinating story of pride and perseverance among women and men determined to claim their share of the American dream. It then transitions into the main thrust of Robinson’s work: How, after the war, black citizens’ increasing demands for equality ran headlong into a white establishment determined to maintain a discriminatory status quo.

He identifies “managerial racism,” as a
key component in impeding racial progress, a means by which Grand Rapids’ white city fathers, chiefly through business associations, succeeded in starving predominantly black neighborhoods of crucial economic development opportunities.

Robinson next describes how the black community organized to overcome this and other barriers. He details the formation of organizations such as the Grand Rapids National Association for the Advancement of Colored People (GRNAACP) and the Grand Rapids Urban League (GRUL); the struggle for employment and housing; and the hardships faced by black students. He enlivens these stories with first-person reporting and secondary sources which, when taken together, provide a picture of the black freedom movement more nuanced — and complicated — than the popular narrative suggests.

“The traditional view of the civil rights movement that circulates through American memory is hotly contested in academia,” Robinson says. “What most might consider the traditional civil rights movement — framed in the South between the years of 1954 to 1968, and presented from an organizational approach centered on the actions of men to win political rights — offers only a parochial understanding of the civil rights movement.”

While the familiar story of Martin Luther King Jr. may be readily accessible, he adds, “It conceals as much as it reveals,” he says. “Analyzing the past of secondary cities will provide invaluable lessons for understanding the tragedy and triumphs of the black experience during that time period and even today.”

Robinson adds that he would like to see his study blossom into research on other, similar cities that would provide comparative insights, examine the place of managerial racism in other communities, and analyze...
the complex intersection between schooling, housing, jobs, and race in these smaller locales,” he says.

This interest led him, in part, to Las Vegas. Part of our city’s attraction to him, Robinson says, is a scholarly interest in its African American community.

“The Las Vegas African American community remains virtually hidden in scholarly literature and certainly so within a comparative light,” he adds. “We do not know if the struggle for equality in Las Vegas resembles that of Los Angeles, Grand Rapids, or if it presents an entirely new set of issues.”

To that end, he’s working on several new works, including contributions to the “Nuclear Test Site Oral History Project” and “Documenting the African American Experience in Las Vegas Project,” the final manuscript of which will “use the narratives of black test-site workers to examine the intersection of the Cold War and civil rights history in Las Vegas.” He was also recently named director of the African American Studies Program at UNLV.

He hopes readers come away from reading a City Within a City with the understanding that the fight for civil rights and black equality did not take place within a vacuum, nor is it anywhere close to finished.

“Somewhere along the way it seems the history of racism was distilled from American memory,” Robinson says. “In fact, I woke up one morning and found out that apparently America was past racism — America had entered its post-racial era.”

But for anyone willing to examine and admit our history in late 2014, nothing could be further from the truth.

“The incidents in Benton Harbor, Mich., Sanford, Fla., Staten Island, N.Y., and Ferguson, Mo., not only provide us with individual examples of why race matters, but [show us] a system and a philosophy that continues to cause these situations to arise,” Robinson says. “To ignore the fact that racism is deeply engrained in the fabric and infrastructure of American society is dangerous, and it ensures that racial inequality will persist to divide America.”

The Book of Important Moments
Richard Wiley
Dzanc Books, 2013

Richard Wiley says a voice spoke to him as he composed his most recent novel, The Book of Important Moments.

Set in Nigeria beginning in the late 1990s, Important Moments is Wiley’s seventh novel. The narrative covers a period of nearly 35 years, though the author’s use of time shifts and flashbacks illuminate episodes in ways that considerably broaden its time span.

The novel is part mystery, part drama, part explosive action: Much of it is told through the voice in Wiley’s head, that of Babatunde Okorodudu, an albino Nigerian businessman.

Wiley describes Babatunde’s speech as “electric and frantic and frenetic,” an insistent voice that came to him quickly. It was so real, Wiley says, that the first draft of the novel was written entirely as Babatunde might have narrated it. That version, Wiley says, “was intense, to say the least.”

Wiley understands intense writing. His 1986 debut novel, Soldiers in Hiding, a wrenching account of the emotional devastation produced by war, won the esteemed 1987 PEN/Faulkner Award. Wiley joined the UNLV faculty two years later, helping to launch the school’s creative writing program.

In the 25 years since, he has written five more novels. He has also cofounded UNLV’s nationally respected creative writing MFA program and played a key role in founding the Black Mountain Institute, a “literary think tank,” in Wiley’s words, where writers and scholars meet to listen to speakers and discuss contemporary issues.

These accomplishments notwithstanding, Wiley still cites “writing well” as one of his primary motivations. For him, this means taking a hard look at even his own work. After reviewing the first draft of Important Moments, for example, Wiley knew he was trying to do too much. Reading it, he says, was like forcing readers to eat “a gallon of ice cream at one time.”

Given the forceful impact of the published version, it’s hard to imagine how much
Important Moments opens with the equivalent of electroshock therapy: a graphic scene in which Babatunde sexually assaults an 18-year-old girl named Ruth.

It was a difficult scene to write, Wiley says, one that required numerous adjustments. He needed something that would shock readers, but not so much that they’d put down the book. It was all part of a larger goal, he adds. “If I had to say what the book was about, I’d say it’s about redemption. And in order to have something to redeem, it can’t just be something trite. It has to be the real deal.” In short, he says of Babatunde, “I wanted to make readers hate him.”

Simply creating a despicable character, of course, wouldn’t make for much of an interesting story. Instead, says Wiley, he wanted to build reader hatred and then tear it down. “I wanted Babatunde to do something that was unforgivable, something really bad. And then I wanted readers to, despite themselves, lose the hate for him for a minute — and if not like him, at least be crazy about finding out what’s going to happen to him, to be interested in him.”

In that regard, Wiley succeeds and then some. Babatunde never quite becomes sympathetic, but his gripping story and personal traumas blunt his harder edges, making it a challenge not to feel at least the stirrings of empathy. Other characters are equally well drawn, with Wiley deftly deploying dark humor to complicate readers’ preconceptions about the nature of heartbreak and calamity. The book’s narrative structure is inventive and propulsive. Readers who think they have latched on to the novel’s direction may find themselves consistently surprised.

Like a play, Wiley’s novel is divided into three acts, each building on the preceding action. But unlike traditional drama, the story’s details unfold piecemeal, as readers uncover the stories within the story, along with characters’ unique relationships to one another. In the first act, for example, Wiley moves from the harrowing opening scene to a few years in the future and then to the distant past. From that point, the story hopscotches across place and time, with multiple perspectives giving readers glimpses of how these characters — Babatunde, in particular — came to be the people they are.

When developing supporting members of Important Moments’ cast, Wiley borrowed from one of his favorite sources: his own work. Lars Larsson — a man whose mother has just been murdered in a gas station parking lot — has, along with his father and his grandfather, previously appeared in a short stories Wiley has authored. “I like sticking around characters and seeing who they are and what they do,” he says. Wiley adds that he’s been carrying the seed of this story in his head for quite a while. During what he terms “the middle years of adulthood,” he spent five years in Africa. Among other places, he spent time in Nigeria, where he developed a fascination with the role of albinos in Nigerian society.

“I’d always had it in my head that I would deal with [that relationship] fictionally, so this is how it came out,” he says.

And what does he consider the most important moment in Important Moments? Wiley won’t be pinned down.

“We always like to read the most important part of a book,” he says. “So I thought, ‘Why not make every part important?’”
The UNLV Division of Research and Economic Development reports annual data characterizing institutional research activity in order to evaluate campus research productivity and to facilitate benchmarking to promote future growth.

Various performance measures indicate that FY2014 was a productive year for UNLV researchers.

Research expenditures — funding spent by UNLV researchers during the last fiscal year — increased 12 percent to just over $31 million. (Research expenditures are the gold standard for measurement of research productivity.) Total sponsored program expenditures, a broader measure reflecting the full scope of UNLV’s grants and contracts activity, were up 8 percent to $48 million.

Total sponsored program awards — funds available for use by researchers but not yet expended — increased by 38 percent to nearly $60 million, the largest amount of award funding since 2010. Sponsored program proposals, meanwhile, increased by 41 percent for a total of $286 million. Health Sciences, Engineering, and Sciences all posted substantial gains in funding. Both the colleges of Education and Hotel Administration also showed awards increases.

“This is a testament to the dedication of our faculty, staff, and students, who are committed to research that advances their fields, impacts the community, and supports economic development,” said Tom Piechota, Vice President for Research and Economic Development.

Other metrics for research and economic development activity also showed gains in FY2014. Research disclosures and patent filings, both important measures of economic development activity, each increased over the previous fiscal year thanks, in part, to the gaming innovation program that generated numerous patents.

Another measure of university research activity is the number of doctoral degrees conferred, as doctoral programs require a strong research component culminating in the doctoral dissertation. A decrease in doctoral degrees conferred in 2013-14 reflects closure of several graduate programs during the recession. However, increases in doctoral conferrals are anticipated in coming years given that doctoral headcount has begun to rebound.

Additionally, Institutional Review Board (IRB) approvals were up by 23 percent, an increase produced in large part by growth in the number of biomedical IRB approvals. The IRB is a committee designated to approve, monitor, and review biomedical and social/behavioral research involving human subjects in order to protect the rights and welfare of the research subjects.
**SPONSORED PROGRAM ACTIVITY**

### Expenditures

<table>
<thead>
<tr>
<th>Year</th>
<th>Sponsored Programs*</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY08</td>
<td>$74,568,354</td>
<td>$46,765,293</td>
</tr>
<tr>
<td>FY09</td>
<td>$59,359,059</td>
<td>$36,756,589</td>
</tr>
<tr>
<td>FY10</td>
<td>$62,414,679</td>
<td>$35,916,552</td>
</tr>
<tr>
<td>FY11</td>
<td>$50,201,861</td>
<td>$32,581,529</td>
</tr>
<tr>
<td>FY12</td>
<td>$42,924,520</td>
<td>$27,072,642</td>
</tr>
<tr>
<td>FY13</td>
<td>$44,593,471</td>
<td>$27,649,953</td>
</tr>
<tr>
<td>FY14</td>
<td>$48,144,405</td>
<td>$31,027,377</td>
</tr>
</tbody>
</table>

*Sponsored programs include research, instruction and training, and other sponsored activity (i.e., public service, student services, etc.). Financial aid funding, which was previously reported in sponsored program data, is no longer included here. It has been removed beginning in FY2008.

### Awards

<table>
<thead>
<tr>
<th>Year</th>
<th>Sponsored Programs*</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY08</td>
<td>$611,997,758</td>
<td>$398,447,200</td>
</tr>
<tr>
<td>FY09</td>
<td>$59,874,418</td>
<td>$40,097,479</td>
</tr>
<tr>
<td>FY10</td>
<td>$65,222,872</td>
<td>$38,381,001</td>
</tr>
<tr>
<td>FY11</td>
<td>$56,090,962</td>
<td>$40,398,054</td>
</tr>
<tr>
<td>FY12</td>
<td>$40,772,216</td>
<td>$22,565,629</td>
</tr>
<tr>
<td>FY13</td>
<td>$43,204,579</td>
<td>$26,585,099</td>
</tr>
<tr>
<td>FY14</td>
<td>$59,636,192</td>
<td>$41,477,222</td>
</tr>
</tbody>
</table>

*Sponsored programs include research, instruction and training, and other sponsored activity (i.e., public service, student services, etc.). Financial aid funding, which was previously reported in sponsored program data, is no longer included here. It has been removed beginning in FY2008.

### Proposals

<table>
<thead>
<tr>
<th>Year</th>
<th>Proposals</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY08</td>
<td>$228,366,587</td>
</tr>
<tr>
<td>FY09</td>
<td>$26,594,089</td>
</tr>
<tr>
<td>FY10</td>
<td>$223,527,076</td>
</tr>
<tr>
<td>FY11</td>
<td>$210,857,602</td>
</tr>
<tr>
<td>FY12</td>
<td>$281,270,704</td>
</tr>
<tr>
<td>FY13</td>
<td>$203,337,011</td>
</tr>
<tr>
<td>FY14</td>
<td>$286,087,223</td>
</tr>
</tbody>
</table>

*FY08-FY14, in millions*
### UNLV Award Data, FY14

<table>
<thead>
<tr>
<th>Funding by College/Unit</th>
<th>Awards</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Div Health Sciences</td>
<td>67</td>
<td>15,269,848</td>
</tr>
<tr>
<td>Engineering</td>
<td>122</td>
<td>13,836,444</td>
</tr>
<tr>
<td>Student Life*</td>
<td>27</td>
<td>12,352,815</td>
</tr>
<tr>
<td>Sciences</td>
<td>74</td>
<td>10,390,364</td>
</tr>
<tr>
<td>VPRED</td>
<td>8</td>
<td>2,959,494</td>
</tr>
<tr>
<td>Education</td>
<td>24</td>
<td>1,482,536</td>
</tr>
<tr>
<td>Liberal Arts</td>
<td>11</td>
<td>848,129</td>
</tr>
<tr>
<td>Hotel Administration</td>
<td>6</td>
<td>747,208</td>
</tr>
<tr>
<td>Harry Reid Center</td>
<td>7</td>
<td>534,661</td>
</tr>
<tr>
<td>Provost</td>
<td>5</td>
<td>442,737</td>
</tr>
<tr>
<td>Business</td>
<td>5</td>
<td>226,540</td>
</tr>
<tr>
<td>Urban Affairs</td>
<td>9</td>
<td>203,544</td>
</tr>
<tr>
<td>President’s Office</td>
<td>1</td>
<td>155,080</td>
</tr>
<tr>
<td>Library</td>
<td>1</td>
<td>100,000</td>
</tr>
<tr>
<td>VP Finance</td>
<td>3</td>
<td>46,910</td>
</tr>
<tr>
<td>Fine Arts</td>
<td>6</td>
<td>34,357</td>
</tr>
<tr>
<td>VPEO</td>
<td>1</td>
<td>5,485</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>377</strong></td>
<td><strong>$59,636,152</strong></td>
</tr>
</tbody>
</table>

*Financial aid funds (e.g., Pell grants and Millennium Scholarships) are no longer included in these amounts.

### Sponsored Program Funding by Source, FY14

<table>
<thead>
<tr>
<th>Sources of Funding</th>
<th>Awards</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal</td>
<td>108</td>
<td>32,058,182</td>
</tr>
<tr>
<td>Federal Pass Through</td>
<td>164</td>
<td>17,295,145</td>
</tr>
<tr>
<td>State</td>
<td>41</td>
<td>8,098,629</td>
</tr>
<tr>
<td>Industry/Foundations</td>
<td>51</td>
<td>1,524,526</td>
</tr>
<tr>
<td>Local</td>
<td>13</td>
<td>659,670</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>377</strong></td>
<td><strong>$59,636,152</strong></td>
</tr>
</tbody>
</table>

### Doctoral Degrees Conferred, AY08/09–13/14

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>Number Conferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008–09</td>
<td>134</td>
</tr>
<tr>
<td>2009–10</td>
<td>140</td>
</tr>
<tr>
<td>2010–11</td>
<td>150</td>
</tr>
<tr>
<td>2011–12</td>
<td>153</td>
</tr>
<tr>
<td>2012–13</td>
<td>156</td>
</tr>
<tr>
<td>2013–14</td>
<td>124</td>
</tr>
</tbody>
</table>

Using a special dye, life science professor Allen Gibbs and his team explore the breakdown and transport of nutrients to the various tissues of the fruit fly body. Here, the small spots are droplets of fat that change from green to yellow to red as they are processed by the fruit fly’s gut. The image is magnified 20x with a confocal microscope.
### Research Disclosures/Patents Filed, FY08–14

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Disclosures Submitted</th>
<th>Patents Filed</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2008</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>FY2009</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>FY2010</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>FY2011</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>FY2012</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>FY2013</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>FY2014</td>
<td>37</td>
<td>28</td>
</tr>
</tbody>
</table>

### Agreements and Licensing Revenue, FY08–14

- **MTA** — Material Transfer Agreement
- **IIA** — Inter-Institutional Agreement
- **MOU** — Memorandum of Understanding

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Nondisclosure Agreements</th>
<th>Options &amp; License Agreements</th>
<th>MTAs, IIA, MOUs, &amp; Other Agreements</th>
<th>Total Licensing Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2008</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>FY2009</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>FY2010</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>FY2011</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>FY2012</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>FY2013</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td>16 $32,281</td>
</tr>
<tr>
<td>FY2014</td>
<td>33</td>
<td>9</td>
<td>8</td>
<td>50 $81,155</td>
</tr>
</tbody>
</table>

### Institutional Review Board Approvals, FY08–14

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Biomedical</th>
<th>Social/Behavioral</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY08</td>
<td>61</td>
<td>235</td>
<td>296</td>
</tr>
<tr>
<td>FY09</td>
<td>75</td>
<td>254</td>
<td>329</td>
</tr>
<tr>
<td>FY10</td>
<td>91</td>
<td>228</td>
<td>319</td>
</tr>
<tr>
<td>FY11</td>
<td>93</td>
<td>230</td>
<td>323</td>
</tr>
<tr>
<td>FY12</td>
<td>75</td>
<td>214</td>
<td>289</td>
</tr>
<tr>
<td>FY13</td>
<td>77</td>
<td>184</td>
<td>261</td>
</tr>
<tr>
<td>FY14</td>
<td>122</td>
<td>200</td>
<td>322</td>
</tr>
</tbody>
</table>
“It means a lot to me that you were willing to invest in my future.”

JESSICA ZAROGIANOS ’16
SCHOLARSHIP RECIPIENT
PRE-PROFESSIONAL BIOLOGY AND PRE-DENTISTRY MAJOR

Private gifts to UNLV fund hundreds of scholarships and graduate research fellowships each year. We invite you to invest in brighter futures.

UNLV FOUNDATION
unlv.edu/foundation