

UNLV INNOVATION

The Research Magazine of the University of Nevada, Las Vegas



Research That Helps the Most Vulnerable

Ramona Denby-Brinson
Studies Ways to Help
Kids in Need and
Their Families

From Breakthrough to Business

Faculty Discoveries
with Commercial
Potential

The Fellowship Factor

How Fellowships
Support Doctoral
Research



Dr. Neal J. Smatresk
UNLV President

A Top-Tier University, A Thriving State

It shouldn’t surprise you to learn that all major metropolitan areas across the United States are home to top-tier research universities. Each of these universities contributes in myriad ways to the success of their cities: They help create a thriving economy, a sophisticated and productive work force, and a vibrant quality of life. These universities generate the kind of capital, both human and monetary, that helps their communities flourish. So it is a bit mystifying to most people why Las Vegas and the state of Nevada lack a research university of this strength and caliber.

Here in Nevada, we are missing the crucial investment in infrastructure and faculty necessary to enhance the standing of our research universities, and we must change this situation for the betterment of our state, communities, and citizens. The Carnegie Foundation for the Advancement of Teaching, which provides the most objective system for classifying universities, designates UNLV and UNR in the “RU/H” category – Research University/High research activity, placing us in the second tier of U.S. universities. This designation is quite impressive in that we are among the top 4.5 percent of universities across the country.

The top-tier universities, however, are classified as “RU/VH,” or Research Universities/Very High research activity. Only 108 U.S. institutions hold this distinction, and naturally, they are considered the very best universities in the U.S. in terms of the key performance metrics indicating quality: faculty size and excellence, student demographics and success, degree productivity, endowments, and, of course, research activity, infrastructure, and funding.

In my recent State of the University Address, I drew some comparisons between UNLV and several peer institutions using these performance metrics. It became clear quickly that there are significant gaps in the resources necessary to bring our institution to tier-one status. I asserted that these gaps, while daunting, could be closed within the next 10 to 15 years with appropriate investment by the state and the community, and a concomitant increase in our productivity. With this target in mind, we are now outlining a data-driven framework for achieving Carnegie Tier-One (CT1) status, including benchmarks that will hold us accountable for making progress toward our goals. This framework is also guiding planning at each level of the university so that all units are contributing and unified in the pursuit of CT1 status.

In addition to raising funds to help us achieve our dream, we will need to ask the state to invest in our future by funding us to meet our rapidly growing enrollment and to support our research growth. It will be an investment with an incredibly high rate of return for our students’ future, our economy, and our quality of life. So we ask you – the members of our community, our alumni, our donors, and our friends, as well as our faculty, staff, and students – to support this endeavor. We ask that you enthusiastically endorse our goal to build a Carnegie Tier-One research university and, with it, a more prosperous Nevada.

Dr. Neal J. Smatresk
UNLV President



Dr. Thomas Piechota
Interim
Vice President
for Research
and Economic
Development

Welcome to *UNLV Innovation*!

We are pleased to offer once again a new issue of *UNLV Innovation*, the university’s annual research magazine. In this publication, we seek to tell the stories of those who are passionate about their research – the scientists, engineers, and scholars who are dedicated to discovering new knowledge in their respective fields and to changing the way we understand the world.

These stories are designed to describe not only the work of our outstanding faculty and students, but also to promote our university’s philosophical commitment to research. Thus, we hope you come away from this issue with a greater appreciation of the value of research in general, as well as a better understanding of the innovative projects developed on our campus.

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

Dr. Thomas Piechota
Interim Vice President for Research and
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UNLV is taking a leading role in a multi-institution research project funded by the National Science Foundation to advance understanding of the connections among solar energy, water, and the environment in Nevada.

UNLV Leads \$20 Million Project on Solar Energy-Water Nexus

Research to Explore Solar Energy, Water, and Environmental Issues Related to Large-Scale Solar Installations on Arid Desert Lands

UNLV is taking a leading role in a \$20 million research project that will enhance solar energy technology and advance understanding of the connection between solar energy, water, and the environment in Nevada. Over the course of the five-year grant, UNLV will receive \$7.4 million to lead the solar energy and water components of the research project. The rest of the funding will go to the University of Nevada, Reno, and the Desert Research Institute. The project was funded by the National Science Foundation’s Experimental Program

to Stimulate Competitive Research (EPSCoR) program, whose mission is to assist the NSF in strengthening research and education in science, technology, engineering, and mathematics throughout the United States. The “Solar Energy-Water-Environment Nexus” project will enhance understanding of the balance among water conservation, the environment, and solar energy by addressing a variety of issues related to large-scale solar installations in arid desert lands. The project will combine research on solar energy generation with the understanding of eco-hydrological impacts of solar installations to advance

the economic and eco-friendly viability of solar electricity generation. “UNLV is pleased to be a part of this project,” says UNLV President Neal Sma-tresk. “We believe Nevada is an ideal location for advancing solar energy, and we are delighted to help develop clean energy technology that will address a variety of environmental concerns. UNLV is at the forefront of interdisciplinary research that can contribute to the economic development of our community and state. This grant demonstrates how competitive we have become in research and how committed we are to

educating our workforce, improving the economy of the state, and enhancing the quality of life for all Nevadans.” As a part of the project, the Nevada Environment, Water, and Solar Testing and Research Facility (NEW-STAR) will be established at a site outside Boulder City surrounded by large, commercial solar energy plants in the Eldorado Valley. The new facility will develop engineering/technological solutions to repel arid dust and minimize water usage while examining the desert ecosystem responses. It will then develop mitigation tactics to preserve the environment. Additional experiments will be conducted at other sites in Southern Nevada. “Our students and faculty will benefit tremendously from this grant,” says Thomas Piechota, interim vice president for research and economic development. “A grant of this size brings attention to the quality and competitiveness of our university, but, most importantly, it enables the campus to build its infrastructure and provide resources for research. It’s a wonderful opportunity.” The award will increase the ability of Nevada’s higher education institutions to conduct research on solar energy generation, its environmental impacts and associated water issues, and to develop new capabilities in cyberinfrastructure that will accelerate the high-speed connectivity within institutions for scientific capabilities. A primary goal will be to initiate collaboration with stakeholders and industry leaders to facilitate more research and development capabilities, technological enhancements, and promote innovation. It will also promote workforce development. The Nevada EPSCoR office operated through the Nevada System of Higher Education is facilitating this award. UNLV distinguished professor of mechanical engineering Robert Boehm, a veteran of solar energy research and co-principal investigator on the grant, will lead the portion of the project on improving solar energy technology. “This grant will enable us to build some

very important infrastructure that will make us even more competitive in the acquisition of research funding,” Boehm says. “The project draws on many strengths already established in Southern Nevada and at UNLV, so we will be in an even better position for future research.” UNLV civil and environmental engineering professor Jacimaria Batista, Boehm’s co-PI on the grant and an expert in water research, will lead the portion of the project that focuses on how to conserve water used in solar energy generation. “With this grant, Nevada has the potential to advance our understanding of the balance among water conservation, the environment, and solar energy,” Batista says. “We call this the solar energy-water-environment nexus. This grant will also generate a qualified workforce for future solar energy development in Nevada, as it includes 18 Ph.D-level assistantships, as well as research opportunities for undergraduate students in engineering and science.” UNLV faculty from three UNLV colleges will be involved, and the researchers hope to attract several industry collaborators to the project. **UNLV to Receive \$20.3 Million NIH Grant to Support Clinical and Bench-to-Bedside Research** UNLV has received a five-year, \$20.3 million grant from the National Institutes of Health (NIH) to lead a health research network of 13 universities across the Mountain West. The Clinical Translational Research Infrastructure Network (CTR-IN) will expand the capacity of partner institutions across seven states to put clinical research into practice to address regional health concerns such as access to care, cancer, obesity, diabetes, and cardiovascular and infectious diseases. The University of Nevada School of Medicine will partner on the grant. “This grant will be a game-changer for Nevada and the entire region,” says program director Robert Langer, a physician and epidemiologist with more than 25 years of



Program director Robert Langer: “This grant will be a game-changer for Nevada and the entire region.”

related research experience. Langer holds faculty appointments at UNLV’s School of Allied Health Sciences and the University of Nevada School of Medicine. “We will now have the means to address the unique health needs of people in the Mountain West, which covers one third of the U.S. and faces tremendous healthcare delivery challenges,” Langer says. “While we’ve been successful in building basic science research, until now we’ve had a tough time building traction for research that can help everyday people. This grant will help us change that.” Partner institutions will share resources and expertise to centralize services for researchers. This will improve research capacity at the institutional level and increase the likelihood for future independent NIH-funded research studies. Services/resources will include:

- Pilot grants of one-to-two years per award for clinical and translational research.
- A virtual clinical translational science center hosted at UNLV and tailored to the needs of the 13 partner institutions.
- Mini-sabbaticals and visiting scholar awards to promote greater collaboration.
- Biostatistical support, mentorship, educational opportunities, and editorial and administrative support.
- Annual meetings focused on themes drawn from the health issues of the region.

Though most CTR-IN universities have successful programs in basic science, they lack capacity in clinical, or bench-to-bed-



Fossilized Remains of Extinct Wolf Species Discovered In Nevada

A UNLV research team recently unearthed fossil remains from an extinct wolf species in a wash northwest of Las Vegas, revealing the first evidence that the Ice Age mammal once lived in Nevada.

The metapodial, or foot bone, was uncovered late last year by UNLV geologist Josh Bonde during a survey of the Upper Las Vegas Wash. They have now confirmed that the bone comes from a dire wolf.

The discovery site is near the proposed Tule Springs Fossil Beds National Monument, a fossil-rich area known for its diversity and abundance of Ice Age animal remains. Scientists estimate the fossil to be 10,000 to 15,000 years old during the Late Pleistocene period.

“Dire wolves are known to have lived in almost all of North America south of Canada, but their historical presence in Nevada has been absent until now,” says Bonde, a visiting assistant professor of geoscience. He was a Ph.D. student at the university when he discovered the bone.

“The Tule Springs area has turned up many species, but it’s exciting to fill in another part of the map for this animal and reveal a bit more about the Ice Age ecosystem in Southern Nevada,” he says.

The dire wolf, a larger relative of the gray wolf, was present in much of North and South America for more than a million years. Scientists theorize that competition from other wolf species and a possible food scarcity led to its extinction roughly 10,000 years ago.

Foot bones of the extinct dire wolf are difficult to distinguish from those of the gray wolf. Researchers concluded the bone is likely from a dire wolf because of the abundance of dire wolf fossils – and scarcity of gray wolf fossils in similar-aged excavation sites throughout the Southwest.

Fossil remains of dire wolves are abundant in the La Brea tar pits and have been found in other Southwestern states. Many of the same species of Ice Age animals found at La Brea have also been recovered in the Las Vegas Val-

ley, including Columbian mammoths, camels, horses, bison, and ground sloths.

“This discovery helps flesh out Southern Nevada’s Pleistocene ecosystem and shows that there are still important discoveries to be made in the Upper Las Vegas Wash,” says UNLV geoscience professor Steve Rowland, a collaborator with Bonde on the study of local Ice Age fossils. “To understand why certain species became extinct and others did not, we need to learn as much as possible about predatory habits and which species were especially sensitive to changes in the environment.”

The announcement comes on the heels of a recent discovery in the same wash of a saber-tooth cat by researchers from the San Bernardino County Museum. Like dire wolves, saber-tooth cats were Pleistocene predators that had been conspicuously absent from the Southern Nevada fossil record.

According to Rowland, Tule Springs was a spring-fed, swampy area during periods of the Late Pleistocene, an ideal spot for plant-eating animals and their carnivorous predators.

The recent discoveries come exactly 50 years after scientists conducted a “big dig” at Tule Springs, revealing the site to be rich with Ice Age fossils. The center of the original big dig is on the same parcel of land where Bonde discovered the wolf fossil.

“Tule Springs likely had the highest density of large animals in the area during the Late Pleistocene, and the marshy environment was very good for preserving at least some of the bones and teeth of animals that died there,” Rowland says.

“In the 50 years since the ‘big dig,’ the scientists have confirmed that humans interacted with Ice Age animals. We now have a new list of questions about life and death in the Pleistocene, and a new tool kit of research techniques to help us get the answers.”

The identity of the find was confirmed by Xiaoming Wang of the Los Angeles County Museum of Natural History, an expert on extinct species of the dog family.

Bonde has been surveying the Tule Springs area since 2007, and he and a group

of UNLV undergraduate students are prospecting for more fossils.

The dire wolf bone, in addition to other bones collected by UNLV researchers, are cataloged, studied, and stored at UNLV.

Physicist Seeks to Build a Safer, More Efficient Lithium-ion Battery

All of Boeing’s new Dreamliner airplanes were temporarily grounded earlier this year after the aircrafts experienced problems with on-board fires related to lithium-ion batteries. Though Boeing revised the battery design and the Dreamliner returned to the air, the news caught the attention of UNLV physicist Yusheng Zhao.

Zhao, executive director of UNLV’s High Pressure Science and Engineering Center, has been tasked by the U.S Advanced Research Projects Agency-Energy (ARPA-E) with developing a new, fire-resistant solid electrolyte battery. The three-year, \$3.1 million grant could lead to an alternative to the corrosive liquid used in today’s lithium-ion

batteries that can catch fire from impact, overheating, and overcharging.

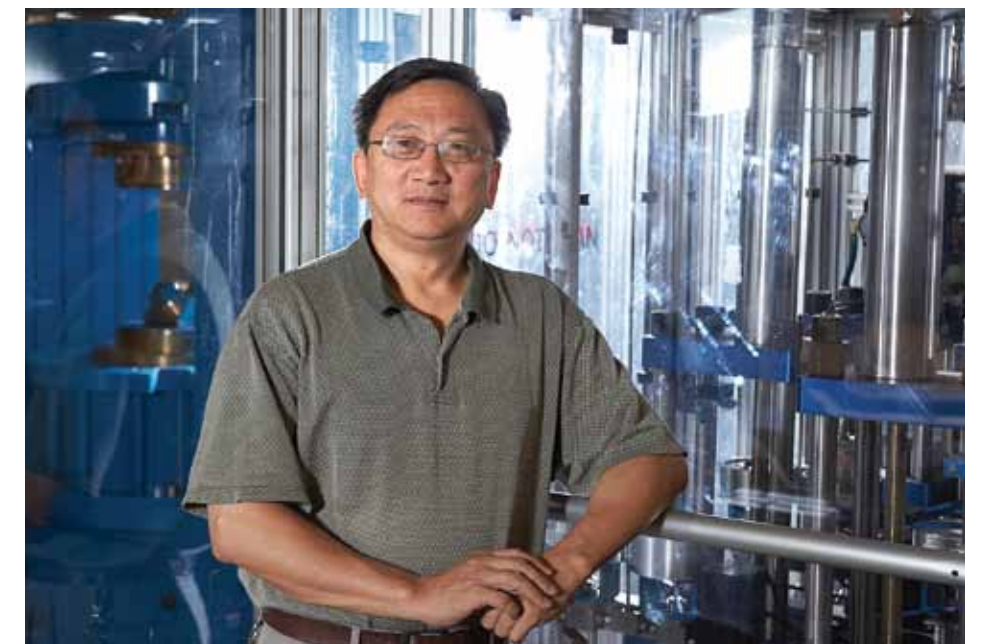
Most lithium-ion batteries rely on a liquid electrolyte material to shuttle the lithium ions back and forth across the battery; however, liquid electrolytes run into safety problems due to their flammability. Zhao’s team is hoping to make the batteries safer by replacing a liquid electrolyte with a solid, fire-resistant version using lithium-rich antiperovskite (LiRAP).

“This new electrolyte material would help make vehicle batteries safer in an accident while also increasing battery performance by extending vehicle range and acceleration,” says Zhao, who came to UNLV in 2010 after 18 years at Los Alamos National Laboratory.

Lithium-ion batteries power most of today’s electric vehicles, cell phones, and laptop computers.

“The battery is so important in renewable energy,” he says. Despite their promise, Zhao says current lithium-ion batteries not only have safety issues but also lack energy density and power capacity.

“Energy density determines how long



Physics professor Yusheng Zhao is developing a new, fire-resistant solid electrolyte battery, which could be an alternative to today’s lithium-ion batteries that can catch fire from impact, overheating, and overcharging.

side, research – what the NIH refers to as translational research – and have limited resources to support faculty conducting this type of work. Only three partner institutions have medical schools, and the two outside of Nevada – the Universities of New Mexico and Hawaii – have NIH-funded research centers to provide additional support to CTR-IN partners. With this grant, Nevada achieves similar leadership capability.

For UNLV, the grant is part of an expected major build-out in health sciences over the next five years and supports the university’s goal to attain status as a tier one research institution.

“Our region must improve the quality of healthcare available to all Nevadans, and we have an incredible opportunity through this grant to build clinical and related research capacity in Southern Nevada and across the Mountain West,” says UNLV President Neal Smatresk. “This program will allow UNLV and our partners to more readily support the rapid growth of medical advancements by teaming up to solve the unique health

Visiting assistant professor of geoscience Josh Bonde was part of a UNLV research team that unearthed a fossilized metapodial, or foot bone, of an extinct dire wolf.

issues affecting our region.”

Grant funding comes from the NIH Institutional Development Award (IDeA) Program. IDeA grants are intended to enhance the caliber of scientific faculty at research institutions in historically underfunded IDeA-eligible states, thereby attracting more promising faculty and students. The CTR-IN will further this goal among the 13 partnering universities, which include UNR (through the University of Nevada School of Medicine); University of Alaska, Anchorage; University of Alaska, Fairbanks; University of Hawaii at Manoa; Boise State University; Idaho State University; University of Idaho; Montana State University; University of Montana; University of New Mexico; New Mexico State University; and the University of Wyoming.

UNLV will coordinate the grant through its School of Allied Health Sciences.

R. MARSH STARKS



the vehicle can drive; power capacity governs how fast you can accelerate, and safety is important because liquid electrolyte is corrosive, flammable, and toxic,” Zhao says. “Because of this, it is difficult to use liquid electrolyte batteries in many high-performance commercial applications.”

If successful, Zhao says the new fire-resistant solid electrolyte LiRAP would greatly increase the lithium-ion transporting rate and enhance the energy density and power capacity of today’s best lithium-ion solid-state batteries.

“The ability to make higher-performance batteries at a lower cost will give U.S. battery manufacturers a significant and enduring advantage over their foreign competitors,” says Zhao, noting that increasing use of electric vehicles would also decrease U.S. dependence on foreign oil.

The project supports the U.S. Department of Energy’s approach to solve the nation’s most pressing energy challenges by funding technologies that show technical promise but are too early in their development for private-sector investment.

Zhao’s project has attracted considerable support from the private sector. Pathion Inc., an energy storage innovation company, and UNLV have signed a cooperative research and development agreement to work together. Additionally, Western Lithium Co., a lithium mining company that has projects based in Nevada, has donated a significant cache of instruments and chemicals to UNLV

UNLV researchers Jennifer Berger Ritchie and Shawn Gerstenberger (not pictured) have discovered higher-than-acceptable levels of lead in several Mexican hot sauces.

for battery research.

Partnering with Zhao on the grant are UNLV physicists Liping Wang and Ravhi Kumar, and Yahia Baghzouz from the Howard R. Hughes College of Engineering. Researchers from Los Alamos National Laboratory and the University of Texas, Austin, are also partners on the project. Private-sector collaborators include Pathion Inc. and K2 Energy Solutions, a Henderson-based company that produces lithium-ion batteries.

Study: Elevated Levels of Lead Found in Mexican Hot Sauces

In the first known study of its kind, UNLV researchers have discovered excessive levels of lead in hot sauces imported from Mexico.

UNLV researcher Shawn Gerstenberger has directed previous studies that have found high lead levels in other products, including artificial turf, tuna, candy, and cookware. Recently, Gerstenberger and colleague Jennifer Berger Ritchie turned their attention to Mexican hot sauces and identified four brands with high levels of lead.

Their results were published in a recent edition of the *Journal of Environmental Science and Health, Part B*.

In the last decade, the U.S. Food and Drug Administration (FDA) has issued several warnings about and recalls on imported

food products that exceed federal standards for lead. Ingredients such as chili peppers and salt are thought to be partly responsible, largely due to contamination from their packaging; these ingredients naturally led the researchers to examine hot sauces.

There is no known safe level for lead exposure, as lead poisoning can affect almost every organ in the body and is absorbed faster by children than adults. In young children, lead poisoning has been known to cause learning disabilities, behavioral problems, seizures, and comas and death in extreme cases.

In Gerstenberger and Ritchie’s study, 25 bottles of imported hot sauces from Mexico and South America were purchased from local ethnic markets, grocery stores, and a swap meet. Products varied in terms of manufacturer and type; the samples were from Mexico because of previous findings of lead contamination of Mexican food products.

Bottles were shaken for 60 seconds and analyzed for lead concentrations and pH levels. The lead content of the packaging was evaluated as well. (Lead content in packaging has been known to leach into and contaminate other food products.)

Four brands of hot sauces, or 16 percent of the samples, exceeded 0.1 parts per million (ppm) lead, the current FDA standard for unsafe levels of lead in food products. All four of these brands were imported from Mexico, but were from four different manufacturers.

The hot sauces that exceeded the 0.1 ppm lead standard include:

- Salsa Picante de Chile Habanero, manufactured by El Yucateco
- El Pato Salsa Picante, manufactured by Walker Foods
- Salsa Habanera, manufactured by Salsas Castillo
- Bufalo Salsa Clasica, manufactured by Herdez

“The results indicate the need for more rigorous screening protocols for products imported from Mexico, including an applicable standard for hot sauce,” says Gersten-

berger, who is interim dean of the School of Community Health Sciences and director of the university’s environmental and occupational health laboratory. “Without enforceable standards for hot sauces and condiments, manufacturers will not be encouraged to improve quality control measures designed to reduce the amounts of lead and other toxic elements before exporting.”

The study also suggests that the U.S. Department of Agriculture and the FDA receive support to create and establish additional standards to protect consumers from chemical hazards, such as lead in hot sauces, and enforce or clarify existing standards.

Gerstenberger recommends the adoption of a standard of 0.1 parts per million of lead as an unsafe level for hot sauces until further conclusive evidence supports a different action. He recommends that states adopt policies to reject all imported hot sauces and other food products found to contain detectable concentrations of lead.

Gerstenberger and Ritchie are particularly concerned about children ingesting lead. Although hot sauce would not typically be considered a food product likely to be consumed by children, the researchers suggest that ethnic and cultural practices must be considered.

If hot sauce is a regular part of a child’s diet, it could contribute to unsafe levels of lead exposure, especially when combined with exposure to lead in the soil, cookware, and candies, or paint manufactured before 1978.

Extreme Climate Change Linked to Early Animal Evolution

An international team of scientists has uncovered new evidence linking early animal evolution to extreme climate change.

A dramatic rise in atmospheric oxygen levels has long been speculated as the trigger for early animal evolution, but direct evidence has proven elusive to scientists. In a recent issue of the journal *Nature*, a UNLV-led research team for the first time offers evidence of a causal link between trends in early biological diversity and

shifts in Earth system processes.

The fossil record shows a marked increase in animal and algae fossils from roughly 635 million years ago. An analysis of organic-rich rocks from South China points to a sudden spike in oceanic oxygen levels at this time – in the wake of severe glaciation – allowing animal life to flourish. The new evidence pre-dates previous estimates of a life-sustaining oxygenation event by more than 50 million years.

“For more than three quarters of the Earth’s history, the oxygen level in the atmosphere and ocean was insufficient to support animal life,” said Swapan Sahoo, lead author and Ph.D. student in UNLV’s geoscience department. “Our findings support a link between glaciation, oxygenation of surface environments, and the diversification of animals. Knowing the environment where the first animals lived is critical for understanding the evolutionary stress of ecosystems.”



Geosciences professor Ganqing Jiang was part of an international team of scientists who recently uncovered new evidence linking early animal evolution to extreme climate change. Their findings are discussed in a recent issue of the journal *Nature*.

An analysis of iron and trace metal concentrations in shale collected from the Doushantuo Formation in South China revealed spikes in concentrations of metals that denote higher oxygen levels in seawater. These elevated levels of molybdenum, vanadium, and uranium slightly predated the earliest oxygen-demanding animal fossils, supporting the link between ocean oxygenation and animal evolution.

High element concentrations found in the South China rocks are comparable to modern ocean sediments and point to a substantial oxygen increase in the ocean-atmosphere system. Researchers say the oxygen rise is likely due to increased organic carbon burial, a result of more nutrient availability following Earth’s extreme cold climate.

“Photosynthesis is the most efficient process to generate oxygen,” said Ganqing Jiang, UNLV associate professor of geoscience and principle investigator on the project. “Fast burial of a large quantity of photosynthetic organic carbon in sediments would leave free oxygen in the ocean-atmosphere system, leading to significant oxygen rise.”

The large variability of iron content and trace metal concentrations in the South China rocks may cause scientists to rethink existing geological interpretations about ancient oceans and could lead to accompanying investigations of similar-aged rocks on other continents.

The joint research was supported by grants from the National Science Foundation, the NASA Exobiology Program, and the National Natural Science Foundation of China. The research team includes Swapan K. Sahoo and Ganqing Jiang of the UNLV geoscience department; Noah J. Planavsky and Timothy W. Lyons of the University of California, Riverside; Brian Kendall and Ariel D. Anbar of Arizona State University; Xinqiang Wang and Xiaoying Shi of the China University of Geosciences (Beijing); and Clint Scott of McGill University, Canada.

The study, “Ocean oxygenation in the wake of the Marinoan glaciation,” appears in the Sept. 27 edition of the journal *Nature*.

R. MARSH STARKS



A Place in the Sun

Talent and hard work helped Team UNLV earn their top-in-the-nation ranking in the Solar Decathlon 2013. But research is the next priority for several team members after the award-winning home is relocated to the Las Vegas Springs Preserve.

UNLV was the top-ranked team in the nation and won second place overall for its “DesertSol” home in the U.S. Department of Energy Solar Decathlon 2013 competition, which requires student team members to design, build, and maintain a sustainable solar-powered house.

Sixty students from multiple disciplines, including architecture, engineering, and business, designed and built DesertSol, which will be on display soon as the newest public exhibit at the Las Vegas Springs Preserve.

While the design and construction of the home were impressive feats in and of themselves, some equally impressive research on the house and its features has been conducted behind the scenes.

For the competition scoring, data were collected on the house’s comfort zone temperature and humidity, appliance temperature, and

net energy production. Several team members are using this data, and collecting and analyzing more of it, for various research projects.

According to UNLV graduate student Jinger Zeng, the Solar Decathlon 2013 project engineer, several graduate students are writing their master’s theses on aspects of the project. One wrote her thesis on the solar thermal system, which provides domestic hot water for the home and heats the house itself using a hydronic radiant system. The home also features an advanced automation and control scheme, which will be examined in further engineering research on residential energy use reduction. Zeng herself is writing her thesis on the overall design and operation strategies of a net-zero energy home built for the Mojave Desert environment.

Plans are in place for students to make a scholarly presentation at the American Council for Energy Efficiency Economy 2014 Summer



PANORAMIC VIEW: JASON FLAKES (NOMINO) U.S. DEPARTMENT OF ENERGY SOLAR DECATHLON

INSET IMAGES: AARON MAYES



Study on Energy Efficiency in Buildings. Students also plan to write scholarly articles with their faculty mentors on the project.

Lead faculty adviser and architecture professor Eric Weber is pleased that students on the team are taking an active role in research, and he himself is pursuing several scholarly projects with them. He has had a paper accepted for presentation at the Eighth International Conference on Design Principles and Practices and is working on two posters for the Associated Collegiate Schools of Architecture Spring Conference. Also, he is submitting a research findings paper to the Building Technology Educator’s Society and hopes to present a paper to the Fifth North American Materials Education Symposium. He also plans to submit more articles to respected academic journals in the future.

Meanwhile, manufacturers of materials and systems used in the



Above: Manufacturers of fixtures, materials, and systems used in the DesertSol home have contacted the team to gather input on the performance of their products. **Far left:** An artistic pattern of holes creates the image of a mesquite tree on this metal screen, considered a passive energy-saving feature. **Left center:** During the competition, DesertSol actually produced more energy than it consumed. **Left:** Team UNLV tied for first place in the hot water generation category of the competition.

home have contacted the team to gather input and data on the performance of their products and to better understand challenges they encountered in building the house.

During the competition, which included 20 international teams, DesertSol’s blend of aesthetic appeal, optimal energy production, and maximum efficiency gained the judges attention. Team Austria, representing the Vienna University of Technology, won first place in the overall competition, which was held in Irvine, Calif. in October. But the UNLV team finished first among U.S. universities participating and in two individual categories – market appeal and hot water generation. UNLV also ranked in the top five in several other individual categories.

More information about the Solar Decathlon 2013 and DesertSol is available online at <http://solardecathlon.unlv.edu/>.

What Do Families and Teams Have in Common?

They both have built-in support groups, and they're both subjects of interest to Brad Donohue. The UNLV psychology professor takes the principles of Family Behavior Therapy and applies them in a variety of contexts, including athletic performance.

Story by Scott Lien
Photography by R. Marsh Starks

In 2001 the university established its most prestigious research honor, the Harry Reid Silver State Research Award, in recognition of the achievements of UNLV scholars in a wide variety of disciplines. Named for the U.S. senator who has been a longtime supporter of UNLV, the award recognizes faculty researchers who exemplify a commitment to advancing understanding of an array of issues that address the changing needs of our community, state, and nation. In 2013, the university awarded its most prestigious research award to UNLV psychology professor Brad Donohue for his work in developing family-supported interventions to assist in goal achievement.

As a graduate student in the late 1980s, psychology professor Brad Donohue was part of a research team that developed a clinical protocol known as Family Behavior Therapy, now commonly referred to as FBT.

The team was led by the late renowned psychologist Nathan Azrin, one of the first students in B.F. Skinner's laboratory at Harvard to apply principles of reinforcement to enhance mental health in humans.

"He was considered one of the pioneers of behavioral analysis," Donohue says, adding that he considers himself fortunate to have worked with Azrin.

Their research resulted in the development of FBT, which uses community-based reinforcement to help people enhance their relationships and personal conduct, avoid substance misuse, and improve employment and school performance.

"FBT involves a holistic 'family,' or team approach, to goal achievement," says Donohue, who has applied FBT in a variety of contexts, conducting research on its effectiveness and helping clients along the way.

"We teach individuals how to set and reach goals using rewards as a catalyst for



UNLV psychology professor Brad Donohue received a four-year, \$2 million grant from the National Institutes of Health to study the efficacy of Family Behavior Therapy among college athletes.



At the Family Research and Services facility, Donohue guides the work of two post-doctoral fellows, six clinical doctoral students, and more than 15 undergraduates.

achievement,” he says. “These are goal-oriented therapies.”

As its name suggests, family involvement is key to the program; each member of an individual’s family helps him or her move toward desired outcomes. This approach has been reviewed positively by dozens of independent scientists in peer-reviewed journal articles.

Donohue’s research has primarily focused on analyzing the efficacy of FBT in clinical environments. He and his team have seen FBT reduce alcohol and drug use; improve mood, conduct, and family functioning; and augment school and workplace success.

His findings are well documented, and his approach is widely practiced. FBT is a standard treatment protocol being used by clinicians across the country today. He himself has applied the practice to a wide variety of settings, and his success has not gone unnoticed.

“Within our field he is a luminary,” says Mark Ashcraft, the chair of the UNLV psy-

chology department. “He significantly influenced treatment of substance abuse with the development of Family Behavior Therapy.”

Donohue has authored more than 120 peer-reviewed journal articles and numerous academic textbook chapters. He is also the co-author of two textbooks, *Treating Adolescent Substance Abuse Using Family Behavior Therapy* and *Treating Adult Substance Abuse Using Family Behavior Therapy*.

Donohue’s work has also earned the attention of the National Institutes of Health (NIH) and other major federal agencies; he has been awarded more than \$4 million in research funding since he joined the university in 1998.

Additionally, he now joins the elite group of recipients of the Harry Reid Silver State Research Award, an honor well suited to a researcher who focuses on the needs of Nevadans.

“Much of my research has focused on pressing social needs in the state while at the same time advancing mental health and

economic prosperity among disadvantaged populations,” he says.

Through his research, Donohue is also training clinical psychology students both on FBT and on how to work with clients; he has mentored literally hundreds of graduate and undergraduate students throughout his career. He currently works with his team on-campus at a facility called Family Research and Services.

One of his recent major research projects involved collaboration with Clark County’s Department of Family Services. Donohue led a study that involved mothers who had been reported for child neglect and drug use. The study was funded by a \$1.2 million grant from the National Institute for Drug Abuse, which provided money to help Clark County social caseworkers learn and use FBT over the course of nearly five years.

During this time, Donohue and his team of students worked together with the casework-

ers to examine the efficacy of a home-based FBT. Compared with the usual forms of treatment, FBT showed very promising outcomes, resulting in an increase in employment and a reduction of child maltreatment potential, as well as a diminished hard drug use. However, Donohue believes additional research in this area should be conducted to determine which mothers respond best to FBT.

Donohue led another project working with Clark County, this time with the Business Development Division, as well as the City of Las Vegas, to facilitate higher-order employment with predominately low-income and/or ethnic minority youth.

Called the Summer Business Institute, the program provided extensive training and mentoring to participants. With a team of UNLV students and county officials and staff, Donohue helped young people deal with real-world employment experiences and gave them financial management training. His study on the effectiveness of this program was the first to evaluate such programs using controlled methodology in an ethnic minority youth population.

“The outcomes were again very positive, with many of the participants improving their knowledge of financial management and employment-related efforts,” Donohue says.

Today, Donohue is taking his passion for FBT to a new group – college athletes. In 2012 he received a four-year, \$2 million grant from the National Institutes of Health to study the efficacy of a performance-based FBT among collegiate athletes.

“This is the first grant award of its kind by the National Institute of Health, and UNLV was chosen as the trial site,” Donohue says. He adds that NIH is interested in understanding how traditional, individual-based campus counseling (which is offered through UNLV’s Counseling and Psychological Services) and family-based performance programming (using FBT) influence goal achievement in student athletes.

Donohue identifies five primary aims in his current study: management of or abstinence from substance use; avoidance of unsafe sexual practices; improved quality of relationships; mental health/strength; and sports performance.

In addition to supporting student athletes, this program provides training opportunities for those interested in this research specialty, including two post-doctoral fel-

lows, six clinical doctoral candidates, and more than 15 undergraduate students per semester. Additionally, the program provides a federally funded referral source for UNLV Athletics, UNLV Wellness, and UNLV intramural sports programs.

Donohue has named the family-based experimental program “TOPPS,” which stands for “The Optimum Performance Program in Sports,” and he is very clear about its goals.

“This is a coaching program to help student athletes achieve optimum performance,” he says. “It is designed to train elite athletes and coaches in optimum sport and life performance through applied research, with an emphasis on sports and academic performance.”

In addition to conducting performance research with athletes, Donohue and his team have developed several non-study performance curriculums at TOPPS to assist athletes in achieving their goals. They address impulse control, financial management, social communication skills, emotional management, and career planning.

While TOPPS is open to all student athletes to assist in any performance-related issue, Donohue is especially interested in working with athletes who have identified drugs or alcohol as a factor in negative performance.

He noted that college athletes face unique stressors that put them at increased risk of using or misusing substances. According to Donohue, nationwide data suggests greater than 50 percent of students in college, including student athletes, participate in dangerous alcohol and drug use patterns, such as binge drinking.

Donohue cites increased social anxieties in

providing an athlete-friendly environment. He displays photos of UNLV athletes, UNLV sport insignia, and UNLV team schedules on the walls of the Family Research and Services offices, where he and his team work. Interactions with student athletes are referred to as team meetings, and the program meets athletes on their terms, whether it’s in the office, at the practice field, or in the locker room. All interactions are confidential.

It also helps to have several members of the TOPPS team who have a background in athletics. Two post-doctoral students on the project, Miesha Marzell and Graig Chow, were college athletes, and TOPPS team coordinator Yulia Gavrilova was a competitive swimmer in Russia. Donohue himself was a national amateur boxing champion in 1986, and he has served on several athletic commissions and as a consultant to various teams at UNLV.

Donohue is very committed to the research component of this program.

“These trials shift our focus to a population for which no evidence-based interventions have been developed,” Donohue says. “In athletics, the norm is to involve a support team. Utilizing this model, performance programming at TOPPS incorporates coaches, teammates, and any significant others who are considered part of the ‘family’ unit.”

Donohue is optimistic about the future use of the TOPPS approach in the context of sports. If his research demonstrates the effectiveness of performance programming in student athletes, it could be used as the model to improve performance among sports teams across the country.

Once his current study has been com-

“We teach individuals how to set and reach goals using rewards as a catalyst for achievement. These are goal-oriented therapies.” – Brad Donohue

adjusting to a new environment, new people, and the demands of academic success as factors contributing to substance use and misuse among college students. He notes that student athletes have the added burden of performance-related demands, travel, and intensive practice and competitions, in addition to academic responsibilities, that must be met.

In the TOPPS program, Donohue works to encourage participation in his program by

pleted, Donohue hopes to explore whether TOPPS is effective with high school and/or professional athletes.

“There are tremendous opportunities for advancing knowledge in this area,” says Donohue, “and very positive potential outcomes for student athletes.”

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

From Breakthrough To Business

UNLV faculty discoveries have commercial applications with value to the university, the private sector, and, ultimately, you. Learn about three different faculty members who are working to move their innovative thinking out of the laboratory and into the boardroom.

Commercialization of faculty discoveries is on the rise at UNLV, facilitated by a new emphasis on economic development associated with research, according to Thomas Piechota, interim vice president for the recently renamed Division of Research and Economic Development.

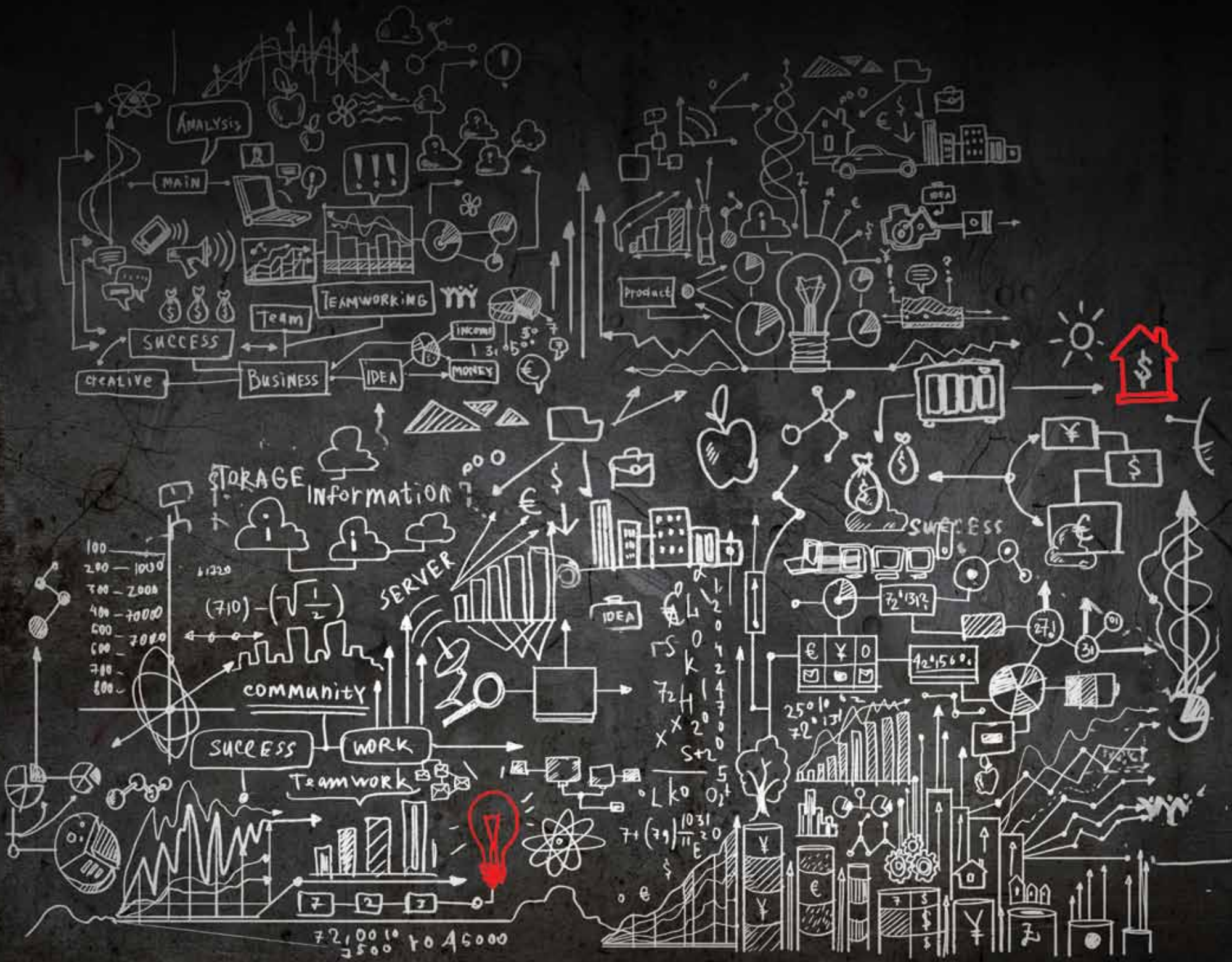
"We want to bring greater attention to the important role the university plays in bringing economic vitality and diversity to our community and state," Piechota says, adding that the university's workforce development, business startup advising, and private-sector partnerships all support this effort.

"But one of the principal ways we contribute to economic development is by supporting commercialization of faculty discoveries through technology transfer," he adds.

Technology transfer is the process through which the university's discoveries, or intellectual property, are transferred to another organization – typically in private industry – for the purpose of development and commercialization. This activity has become increasingly important to research universities across the country as they seek to contribute to economic development in their communities and states while generating a valuable revenue stream. Some notable results of the technology transfer process are Google and Gatorade, both products originally invented in a university setting.

Technology transfer activity at UNLV has increased dramatically in recent years. The university has filed 31 patent applications in the last four years; it has more than 140 research disclosures on file and 14 issued patents listing UNLV inventors. Twenty-seven research disclosures have been submitted in the last twelve months alone.

UNLV faculty have produced a wide variety of intellectual property with great commercialization potential. Here are just a few of the most promising projects.



Genome Surgery and xReader

Martin Schiller, Life Sciences Professor

Each week a group of students gather in life sciences professor Martin Schiller's bioinformatics lab to discuss what they have been reading in scientific journals.

It was here, in a nondescript room with brown leather couches, where the idea for a new approach to genome surgery was first discussed. From this exchange, Schiller and his team developed a novel idea combining two technologies with bioinformatics tools to remove disease-causing DNA from cells.

The discovery could lead to a new way to treat HIV/AIDS.

UNLV recently submitted a patent application for this idea to the U.S. Patent Office, a development of huge impact to Schiller.

"Unless someone else submitted an application for the exact thing before we did, we may own a big advancement in medicine at UNLV," says Schiller, explaining his discovery with a short lesson on the way some viruses interact with DNA.

"When a person is infected with some pathogenic viruses, such as HIV, the virus inserts its DNA and becomes part of the DNA of the infected cells," he says, explaining that patients receiving drug therapy may get well temporarily, but the DNA of the virus remains behind. Later, it can become reactivated, and the patient relapses.

"Latency is when you have the virus in your genome, but it isn't actively producing infective virus," says Schiller, who came to UNLV in 2009 from the University of Connecticut School of Medicine. "This is the reason you can't cure someone of AIDS. You can lower the viral levels for a functional cure as long as the person stays on a cocktail of drugs the rest of their lives. But as soon as you take them off the drugs, the virus explodes and mutates. At that point, the drugs no longer work."

Schiller notes that a technology exists allowing researchers to specifically target and cut out a region of DNA – which, he reasoned, could be employed to fight latent

HIV infection. But there is another pertinent technology that emanates from HIV itself – it is a protein that can actually travel across cellular membranes; scientists have learned how to harness the protein to deliver a change to the interior of a cell.

"What we did is combine these two technologies," says Schiller, "while taking advantage of our bioinformatics expertise."

By "bioinformatics," he is referring to his laboratory's tremendous amount of biological information on the human genome with its 23,000 genes and resulting proteins. His lab is known for its comprehensive database on short contiguous peptide sequences that are known to have a function in at least one protein. Schiller credits an undergraduate student in his lab, Horacio Guerra, with using this vast database and the Los Alamos HIV sequence database to help identify the right region to target in the HIV cells.

Schiller's team analyzed thousands of different HIV sequences and determined parts in the HIV genome where a mutational change is very rare, indicating that these are critical genomic elements of HIV (and good sites to target for intervention). Then, in the laboratory, they designed a protein to enter the cells of a person with a latent HIV infec-

tion, and snip out those parts of the genome, effectively killing it.

In humans, blood stream injection would be used to deliver this discovery. Because it has a portion of a protein from HIV itself, it would move across cell membranes.

Still, Schiller acknowledges that much additional work is needed before this technology will be approved for use in humans. He notes that there are four stages of development to bring this product to market: The first stage is to show that the protein works in a test tube, which has been successfully accomplished in his lab.

The second stage is to grow active HIV cultures in the lab, and when this protein is added, it should cure the infection in a dish of cells. Schiller notes that Christy Strong, a postdoctoral fellow in the lab, is currently helping to shape this portion of the research. The third and fourth steps are animal and human trials, respectively.

Although confident of the viability of this discovery, Schiller is aware of the difficulty in bringing a new drug or technology to market.

"Only 1 in 500 of these types of applications ever lead to a drug," he says. "This one could fail along the way. Right now, it's a promising strategy, and we have some sound



Life sciences professor Martin Schiller and his team have designed a protein to enter the cells of a person with a latent HIV infection and snip out critical parts of the HIV genome.

indication that it has a chance of working.

"We have the hope that if this is successful with the HIV virus, with adaptations to the system, it could work on almost anything – cancer, immunological diseases, and more. There's no reason that this strategy can't become a commonplace treatment for any disease."

But if advancing a strategy that might cure disease were not enough, Schiller has also managed to develop another completely different form of intellectual property with great commercialization potential.

He has invented a new type of reading accelerator, called xReader, for which the university has filed another patent application.

The purpose of the tool is to make it easier to read complicated documents, including scien-

tific or legal journal articles that contain jargon.

"These types of documents often contain words that are difficult to understand. With this program, as you're reading, and you don't know a word, you point to it and a definition pops up along with relevant images."

This would be useful for myriad circumstances, but particularly valuable for someone who has been recently diagnosed with a disease and wants to learn more about it from actual medical or research journals, Schiller says.

"The xReader will enable you to better understand the jargon in order to make more informed medical decisions."

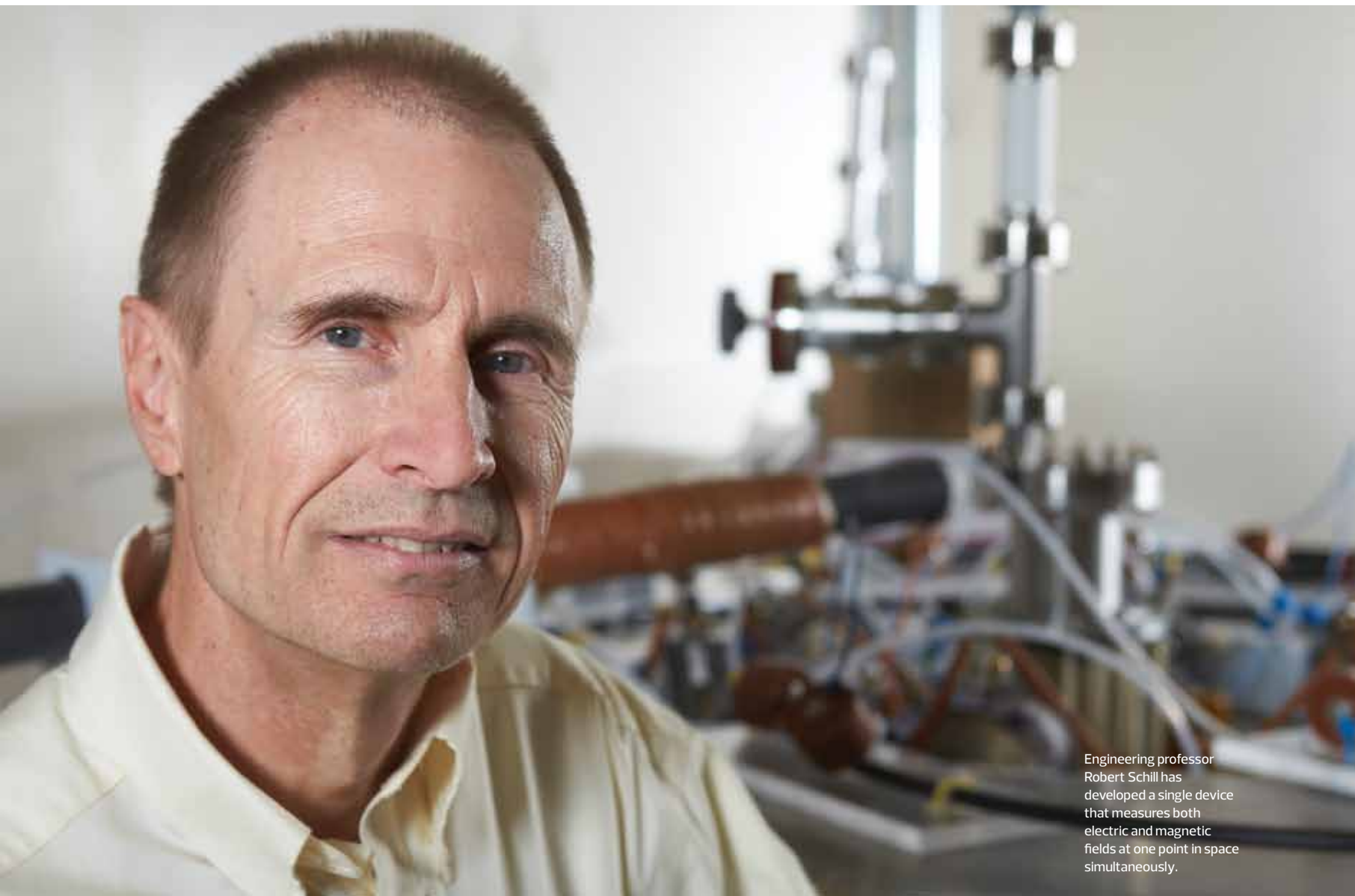
Schiller thought of the invention when he was working with the huge amount of

bioinformatics data he and his team had collected for their research on genome surgery.

"I was thinking about ways in which we could use the large data warehouse that we built," he says.

This invention is further along in the commercialization process than the genome surgery discovery, Schiller notes. Earlier this year, the Schiller lab launched Taecan LLC, a new startup company to advance the xReader in the marketplace. It will commercialize the xReader technology, which is in the final stages of review by the U.S. Patent and Trademark Office. Soon, the company will be releasing several new mobile apps and browser plug-ins for personal computers.

– SHANE BEVELL



Engineering professor Robert Schill has developed a single device that measures both electric and magnetic fields at one point in space simultaneously.

EM Dot™

Robert Schill, Engineering Professor

At first glance, it wouldn't appear that the Post-it note, the Kevlar vest, and the Electro Magnetic (EM) Dot™ would have much in common.

But dig a little deeper and you'd find that they are all revolutionary inventions originally intended for some other purpose.

For instance, the glue on Post-it notes, which was once deemed capable of sticking nothing together reliably, was viewed as ideal for attaching bookmarks in church hymns. Before Kevlar became synonymous with body armor, it was a material designed

for racing tires.

And now comes the EM Dot, a novel electric and magnetic sensor that will soon have some innovative – and undoubtedly unexpected – applications.

The EM Dot was developed by UNLV electrical and computer engineering professor Bob Schill and his research associate, Marc Popek, in 2005 to aid in their experiments with pulsed power in the Energy Materials Interaction Technology Initiative of Nevada (EMITION) Center, located in the Science and Engineering Building at UNLV.

Schill had previously acquired the Ne-

vada Shocker Pulse Power Machine, a one million-volt, 100,000-to-200,000-ampere device that helped the researchers study the interaction of pulsed power and materials. But the team was stymied by a lack of the right kind of field diagnostics for the machine. What existed at the time were two separate field sensors: one was the B dot, used to measure magnetic fields, and the other was the D dot, which is used to measure electric fields.

"When you transition from the measurement of radio waves, which have very long wavelengths, to micro waves, which are

much shorter, the dots' construction, calibration, and relative location must be carefully considered for accurate and valid measurement," Schill says. "The existing sensors were too large and expensive for the work we were doing. So, we came up with the idea for the EM Dot out of pure necessity."

Their breakthrough in electric and magnetic field sensor technology combines the B and D dots into one sensor, creating a device resembling a wishbone that's slightly smaller than a regular paperclip.

"This single device measures both the electric and magnetic fields at one point in space simultaneously," Schill says.

It was patented in 2009, and in 2013 the technology was licensed to Kyma Technologies, Inc., a leading supplier of advanced semiconductors, sensor technologies, and other materials solutions that promote safety and energy efficiency.

Though Kyma has kept their plans for the EM Dot mostly under wraps to maintain their competitive business edge, Schill sees various potential applications for the device.

One possible application he has researched focuses on leak detection in underground pipes. He used PVC piping to mimic water transportation systems in order to find out how the EM Dot could be used by water districts to pinpoint compro-

mised integrity of underground pipes. By using an antenna inside the pipe at a fixed position to send a pulse through the pipe, Schill is able to receive readings with the EM Dot at a fixed location external to the pipe to detect and locate leaks.

This method – as opposed to using a remote, submersible device propelled in the pipe system that detects leaks based on sound waves – has its benefits. It allows for continuous monitoring over fixed locations based on radio wave signals without acoustic noise signatures that are generated when a shower is turned on or toilet is flushed.

While he has so far tested the technology on PVC piping only, Schill predicts that this system would provide similar results in metal and concrete pipes, particularly those used in areas with hard water, such as Nevada. There is also potential to detect pipe degradation with continuous monitoring, especially in metal pipes, which would allow for preventive maintenance.

Since developing the EM Dot, Schill has used it to conduct experiments for other ongoing projects, including one started in 2010 that will have military and/or law enforcement applications. He calls it "the detonator defeat system," and it has the potential to disarm detonators of explosive devices without actual physical contact. The

system uses a coil that, when placed near an improvised detonator, heats it up to the point of controlling or confounding the mechanism that detonates the blast. The university filed a patent application on the technology this year.

The device could be invaluable in locating and "defeating" improvised explosive devices (IEDs) that caused so many horrendous injuries and fatalities among military personnel in Iraq and other countries.

What makes Schill's system unique is its non-specificity to devices and its ability to impact various materials.

"The difficult thing with improvised detonators," Schill says, "is that you essentially have a black box, and you don't know what's in it. You don't know what has been used to build the detonator, and each possibility – tungsten, platinum, copper, etc. – has its own fingerprint. Moreover, one does not know *a priori* the connecting circuitry to activate the detonator. We've conducted numerous experiments with different materials and connecting circuit loading effects, and we found similarities in results, pointing to the device's ability to perform in all scenarios."

In its current state, the coil is relatively small, and it requires an individual or a robot to place it so close to a detonator that its exact location must be known. As he continues work on the system, Schill hopes to extend its size to cover wider areas, eliminating the need to know a detonator's location, and to implement a detection system that would allow for potential disarmament of underground mines on the battlefield.

In addition to inventing several technologies, Schill has also founded and directed the EMITION Center and performed countless hours of research. Since 2005, his center has been home to ground-breaking work on initiatives that he hopes will one day enable UNLV to become more competitive in conducting research in novel areas that are beneficial and pertinent to the state and the nation.

– SHANNON SPOLLEN



R. MARSH STARKS

C. diff Prevention

Ernesto Abel-Santos, Chemistry Professor

Imagine the following scenario: You go to the hospital for bronchitis or another ailment. You are prescribed an antibiotic and start feeling better, but you suddenly get severe abdominal pain and uncontrollable diarrhea. You go back to the doctor and learn that you now have a different, secondary infection. The doctor takes you off the bronchitis medication and gives you a new antibiotic that targets the secondary infection. You start feeling relief from the diarrhea, but the bronchitis returns. Now the doctor stops the second medication to start treating the bronchitis again.

This vicious cycle continues and can eventually become very serious, even deadly.

The secondary infection in the above scenario is from the bacterium *Clostridium difficile* (C. diff). In the United States alone, there are approximately 500,000 cases and 20,000 deaths each year as a result of it. Illness from C. diff typically occurs after use of antibiotics and often affects patients who have suppressed immune systems, many of whom have been in a hospital, nursing home, surgery center, or similar facility where C. diff is present.

However, all hope isn't lost for those who are exposed to this infection. UNLV biochemistry professor Ernesto Abel-Santos and his team of students believe they have found a potential solution.

The university shares their belief in the value of the treatment and has pursued a patent for his discovery through the U.S. Patent and Trademark Office. He also has co-founded Abel Therapeutics LLC to develop a new drug for preventing C. diff. Additionally, he has worked with College of Business entrepreneurship students, who developed a business plan for his company. The team won second place at the Southern Nevada Business Plan Competition.

"There are really only two drugs that treat the *Clostridium difficile* infection," says Abel-Santos, who came to UNLV in 2006 from the Albert Einstein College of Medicine in New York City. "So after the second relapse, you

are basically out of pharmacological options. Other options are not pleasant and include a colectomy, which involves cutting out the infected intestine, or fecal transplantation, which replenishes the good bacteria in your intestinal tract."

The problem is that while antibiotics kill the bacteria that are causing bronchitis or other infections, they also kill the good bacteria in your body, and that is when C. diff introduces itself.

What Abel-Santos discovered is a compound that basically functions the same way the good intestinal bacteria does: It keeps the C. diff spores from germinating, acting as a surrogate for gut bacteria and thereby preventing infection.

Abel-Santos' path to this discovery emanated from his research in the area of bacterial spores, anthrax being the most famous. He became interested in bacterial spores after the Sept. 11 terror attacks when letters containing anthrax spores were mailed to several news media offices and two U.S. Senators, killing five people and infecting 17 others.

Clostridium difficile is another bacteria that forms spores. "The problem with these types of bacteria is that when you try to kill

them, instead of dying, they form a very resistant structure," he says.

The resistant spores stay in the environment or body for a long time and, under the right conditions, can germinate, producing toxins and infecting those who are vulnerable.

Abel-Santos studies that germination process. "We want to understand how a dormant spore can detect its environment. It has to be able to figure out when it is sitting on a desk contaminating a surface and differentiate that from when it is inside your body."

He explains that bacterial spores use signals from the environment to germinate – typically substances found inside the body, such as amino acids and sugars. So Abel-Santos and his team made molecules to mimic the signals that the bacteria use to trigger germination. Once they were able to make compounds that mimic these types of biomolecules, they were then able to make compounds that inhibit them. These inhibitors are then able to block the spore from germinating. If the spore germination is blocked, then the spore passes through the body without producing toxins.

So far, the compound has proven successful in animal models, though his studies continue. Eventually, the team will plan for testing of the compound's effect on humans, though much work is necessary before that phase of the research is pursued.

Someday, Abel-Santos says, his discovery could be prescribed as a prophylactic measure for those likely to be troubled by C. diff, as the drug is designed to prevent infection rather than treat it.

"The idea is that patients will be given the anti-germinant at the same time as other antibiotics, so that even if they are infected with the spore, this compound will keep the spore from germinating," he says. "If they don't germinate, they don't produce toxins. And once you finish the antibiotic treatment, your gut bacteria are going to come back, which will allow you to stop the anti-germinant treatment."

– SHANE BEVELL



R. MARSH STARKS

Chemistry professor Ernesto Abel-Santos has discovered a compound that keeps C. diff spores from germinating.





“What’s excited me about this kind of research is that you can begin to see the impact right away.”
– Ramona Denby-Brinson

Helping the Most Vulnerable

Social work professor and Lincy Institute Scholar Ramona Denby-Brinson uses research as a tool to help children who have entered the child welfare, mental health, and juvenile justice systems.

Story by Jean Reid Norman
Photography by R. Marsh Starks

Ramona Denby-Brinson remembers the day she decided to pursue a career in academia.

A medical social worker at the time, she walked into the emergency room at University Medical Center to see the familiar face of a young boy; she had worked to find services for him three times already that year.

She regretted that she would need to call the child protective services hotline about him – a decision she always dreaded, given the impact of child removal on both the child and the family.

“I said, ‘Whatever we are doing is not working. In a few months, he’ll be back,’” she recalls, realizing then that life for children like this young patient and many others like him was not changing. She knew she had to take a different approach.

Her time as a frontline social worker often made her wonder what more she and her colleagues could and should do and how to impact larger systemic issues so that children and families do not re-enter the social service system.

“A lot of the problems that people face are larger than the individual,” she says. “How do we get at the root cause and to a solution? The question is, what interventions really work?”

As much as she loved working directly with clients, she knew she wouldn’t find the necessary policy and program answers as a frontline social worker – only more questions. It was at that point she decided then to pursue a doctorate and later a career as a researcher and professor.

That decision eventually led her to UNLV, where she now serves as a senior resident scholar at The Lincy Institute and as a professor in the School of Social Work.

In this role, she conducts research on how social services are provided to the most vulnerable children and their families: those who have entered the child welfare, mental health, and juvenile justice systems.

She has been awarded \$10.5 million in nationally competitive research grants since 1996 from such agencies as the National Institutes of Health, the U.S. Department of Health and Human Services, and the Lois and Samuel Silberman Foundation. She has published multiple peer-reviewed articles, books, book chapters, policy briefs, and technical reports; her work has also been disseminated and diffused nationally and internationally via numerous conferences, at which she has served both as an invited speaker and peer-reviewed presenter.

While her scholarly success is certainly note-

worthy, Denby-Brinson also counts her accomplishments in terms of the number of people her research has helped. She would be the first to say that she conducts research as a method of advocacy and to drive necessary change.

In one of her empirical studies, she and her research team collaborated with a host of child welfare providers to increase child well-being by supporting the relative caregivers who assume responsibility for them. The findings of this study revealed that Clark County more than doubled the percentage of foster children placed with relatives, as well as the percentage of relatives adopting those children. The intervention used to support the relative caregivers (referred to as the “peer-to-peer approach”) reduced the percentage of alleged re-abuse cases among foster children placed with relatives from 13 percent to 4 percent in three years.

“What excited me about this kind of research is that you can begin to see the impact right away,” Denby-Brinson says. She considers herself a huge proponent of pure research but recognizes that her passion is for helping people to change their lives.

In a way, it is what she always intended to do. Growing up as one of 10 children in a middle-class family in historic West Las Vegas, Denby-Brinson saw the poverty around her and wanted to do something about it. Of course, she adds, there was more than just poverty in her neighborhood – it also had strength and a sense of community that she wishes everyone could experience during their youth. But she always knew she would come back to her hometown as a social worker and seek the change she wanted to see.

After earning a master’s in social work from UNLV in 1990, Denby-Brinson worked several years in Southern Nevada, including a stint as a medical social worker at University Medical Center. It was during these years that she began to see the multifaceted nature of social work and that, as a researcher, she could still do her part to effect change. It was then she decided to head to Ohio State for her Ph.D. Her doctoral research centered on foster



“The solution to a problem is not one agency, not one therapist. Solutions require many people bringing their strengths, braiding their funding and their approaches.”
– Ramona Denby-Brinson

families and the mental health of African-American families. Her nine conference presentations during three years of doctoral study included such titles as, “Why foster parents leave” and “Grief reactions in African-American families: Is there a cultural difference?”

After receiving her degree, Denby-Brinson accepted an assistant professor position at the University of Tennessee, Knoxville. She knew she wanted to return home to Las Vegas, but no positions were available at the time.

Her early research produced several peer-reviewed journal articles (two of them in top-tier publications) on parents’ experience in foster care; they continue to be cited today. Also, with one of her research mentors, Denby-Brinson created a statistical model that is still used for predicting which foster parents are most likely to cease continuing care.

“The whole point with us is to use research as advocacy, data as advocacy,” Denby-Brinson says. “If we can show that we have good outcomes that help kids and families and that it’s a better way to invest our social services money, then lawmakers tend to be more responsive.”

This philosophy has led her to seek large grants from the National Institutes of Health to conduct some longitudinal studies.

“Unfortunately, funding for social service research is scarce,” she says, “and at times it results in researchers focusing on the ‘hottest trends’ for the year or focusing on what problems those in the field think donors and foundations want to fund. But this is a misguided

approach. It takes time to determine whether an intervention works. Many social problems are deeply engrained into the fabric of our very socio-economic structure.

“In order to see sustainable changes in the types of situations and conditions faced by so many, it takes an investment, not the least of which is research,” she says. “We hope that with the contributions that we make through longitudinal research, we can help inform the field about probable solutions to tough social problems.”

Previously, she would use her skills as a social worker to tap the resources of many agencies to help a client. Now, the client is “the system” instead of a person.

“The solution to a problem is not one agency, not one therapist,” she says. “Solutions require many people bringing their strengths, braiding their funding and their approaches.”

It was in Knoxville, under the mentorship of senior faculty member Charles Glisson, that she received her first NIH grant funding. Two years later, a job opened at UNLV, and she brought her research to the School of Social Work.

“I had to come back to Las Vegas,” she says. “It’s my community. This has always been my town and my university.”

She received tenure in 2002 at UNLV and continues to bring in large federal grants, as well as state grants from the Division of Child and Family Services and university awards.

Her research has tackled some of the toughest cases in the social service arena.

One study analyzed a “wraparound” model for case management of youths for whom intensive mental health services were needed. The wraparound model takes a holistic approach to youth and their families, giving priority to the preferences of the family and the youth, team-based decision making, individualized plans of care, and services and support for caregivers, family members, and siblings.

“You can’t talk about what might work for a youth without involving that youth and his or her parents in the discussion,” she says. “You can’t help kids to get better without helping the parents to get better.”

She and her colleague Eric Bruns of the

University of Washington School of Medicine researched the wraparound model using a randomized experimental approach, which examined the effectiveness of the model when compared to a traditional, intensive case management service approach.

This type of research provides data that justifies the need for sustainable services to families and youth. Legislatively supported funding was provided to extend wraparound services during the time of research efforts.

Another grant-funded study had a similar result. In partnership with Clark County, Denby-Brinson secured U. S. Department of Health and Human Services and state funding to create the Caring Communities partnership for foster families that had taken in the children of relatives.

These kinship families—grandparents taking in their grandchildren, aunts or uncles taking in nieces and nephews, or even older siblings taking in younger ones – had not been given many resources, and local outcomes were not keeping pace with kinship outcomes seen nationally.

“Clark County was not using relative placements at the same rate as many comparable counties and other national jurisdictions,” she says. “People in the field disagree about how safe relative placements are. I had a person tell me once, ‘The apple doesn’t fall far from the tree.’ My experience in the field says this isn’t the case.”

Denby-Brinson and child welfare leaders in Clark County followed their gut instinct on this, developing a five-year study focusing on children who were in foster care – or were headed that way – and their families.

She and the leaders at the Clark County Department of Family Services created a peer-to-peer kinship care model, using grant dollars to hire mentors to work with relatives going through the process of getting licensed for foster care to take in these children.

At first, the program proved to be challenging to implement. But eventually there was a nice complement of services and support given to caregivers by the Department of Family Services professional case workers and

the paraprofessional kinship liaisons who had real-world experience in caring for their relatives’ children but no formal training.

The mentors gave the caregivers someone safe to talk to when they were feeling overwhelmed, Denby-Brinson says. Before long, the professionals were referring cases to peer mentors.

Ultimately, the data from the study confirmed Denby-Brinson’s gut instinct. The program initially established through the federal grant was sustained by fiscal action taken by the Clark County Board of Commissioners.

The Lincy Institute conducts and supports research that focuses on improving Nevada’s health, education, and social services. This research is used to build capacity for service providers and enhance efforts to draw state and federal money to the greater Las Vegas area. The Lincy Institute highlights key issues that affect public policy and quality-of-life decisions on behalf of children, seniors, and families in Nevada.

The institute was established through a gift from The Lincy Foundation in 2009.

According to the institute’s website, the goals of The Lincy Institute include:

- ▶ Support the viability of the economic future of Nevada and the quality of life for its residents, especially in Southern Nevada.
- ▶ Create a new model for bringing together state, regional, and for-profit and non-profit agencies to address the large-scale challenges in Southern Nevada.
- ▶ Identify and attract federal, state, and private funding opportunities.
- ▶ Provide baseline and follow-up assessments of agency activities that can, in turn, highlight applications for these funds.
- ▶ Design and maintain a data repository to support research, grant acquisition and application.

Learn more about The Lincy Institute at www.unlv.edu/lincyinstitute

“Children report a sense of belonging when placed with a relative caregiver,” she says. “They have fewer problems with attachment. The outcomes experienced by the children in our research were positive and more favorable than their counterparts.”

Denby-Brinson’s current research is a five-year study examining why the teen pregnancy rate among foster children remains stubbornly high while comparable rates among other teens have been steadily falling.

The problem, Denby-Brinson says, is that prevention programs focus on accidental pregnancy. Girls in foster care, she is finding, are getting pregnant on purpose. It gets back to the issues of abandonment and lack of attachment.

“We have found through some qualitative work that many of the foster youth see a baby as a way to heal themselves psychologically,” she says. “The baby is theirs. The baby is a way of re-establishing the family that they lost.”

Denby-Brinson bases her work with these young women on a model developed by her colleague Darla Henry, formerly with Temple University.

“Her premise is that kids in the foster care system are dealing with profound grief and loss, and until we get to the core of that, nothing else is going to matter,” Denby-Brinson says. “The traditional pregnancy-prevention model is not going to work.”

Now that she understands the problem better, her next step is testing interventions to find the right ones.

Denby-Brinson’s study of foster care dovetails well with the mission of The Lincy Institute, which supports and conducts research that focuses on improving Nevada’s health, education, and social services. It’s a practical approach meant to solve real-world problems and build capacity and collaboration in the nonprofit sector. It’s a job description Denby-Brinson might have written for herself.

“It’s a perfect alignment of everything we do as social service researchers,” she says. “We conceptualize a problem, figure out an integrated solution, and go back and implement that approach to see what kind of outcome we get.

“It’s been a great opportunity here,” she says.

The Story of Four Fellowships

Meet four recipients of UNLV's most prestigious graduate fellowships and learn about their research and their gratitude for the funding that made it possible.

Profiles by Jean Reid Norman

As UNLV continues its upward trajectory toward becoming a top-tier research institution, one of its key goals will be supporting doctoral students.

"Doctoral students are an absolutely critical part of the research endeavor," says Thomas Piechota, interim vice president for Research and Economic Development. "Research is very often conducted in teams, and doctoral students are vital members of these teams. They work with faculty in mutually beneficial collaborations that advance research."

This occurs at all major research institutions across the world, he says.

"So if we are to build UNLV's reputation for research, doctoral students must be supported," Piechota says.

One of the best ways to support doctoral students is by offering doctoral fel-

lowships, according to Kate Korgan, interim dean of the Graduate College.

"Fellowships provide doctoral students with the financial support they need to complete their research and write their dissertations in their final year," Korgan says. "This kind of financial assistance is essential and impactful because it supports doctoral students so that they can focus on completing their degrees."

Both Piechota and Korgan agree that significantly increasing doctoral fellowship support is pivotal to establishing UNLV as a tier-one research institution. As evidence of the importance of fellowships, they point to four of this year's recipients to illustrate the kind of sophisticated research being conducted and the value of the fellowships to the students. All of their fellowships are provided with private funding from the UNLV Foundation.

ISRAEL ALVARADO LIFE SCIENCES

When Israel Alvarado says he's been as busy as a bee, he knows what he's talking about. But he might be just as inclined to say he's as sick as a bee.

Alvarado's research takes him deep into an illness that affects 4 percent of honeybee hives inspected in a U.S. Department of Agriculture survey. American Foulbrood Disease occurs when honey bee larvae eat food contaminated by the spores of a seed-like bacterium, and it can kill a colony. Alvarado is trying to figure out how the disease establishes itself in hives and what substances have the potential to halt it.

"AFB disease can impact the health of the honey bee colonies we use to pollinate our crops," he says. "So this can have a significant impact."

His doctoral research takes Alvarado into multiple scientific disciplines, including physiology, microbiology, and biochemistry. He works with life sciences professor Michelle Elekonich and chemistry professor Ernesto Abel-Santos, both of whom have been critical to his success.

"Without their support, I could not have accomplished what I have so far," he says, noting that he has received a grant from the U.S. Department of Agriculture to support his research.

This year, he also received the Hermesen Fellowship, which is specifically designated for doctoral students in life sciences.

After graduation, Alvarado hopes to land a postdoctoral fellowship and then establish a career in academia. He would also like to turn his research into an entrepreneurial venture that can help agriculture.

"The dream of any researcher is to contribute to research fields and to society," he says.

He already contributes in other ways; he volunteers for the American Society for Microbiology, helping to make presentations on honeybees and related scientific concepts in schools.

"The more we expose children to science, the more likely they will one day



Life sciences doctoral student Israel Alvarado conducts research on the cause American Foulbrood Disease, an illness that affects approximately 4 percent of honeybee hives and diminishes bees' ability to pollinate crops.

want to become scientists," he says. "I feel a responsibility to UNLV and Nevadans to share what I have learned over the years."

He also is giving back through his mentoring of UNLV undergraduates in the laboratory.

"It is rewarding to support their enthusiasm for research," he says. "I try to encourage undergraduates to think of graduate school as a viable option."

He says he encourages his students to continue their education because graduate studies have been so important to him.

"I believe that everyone has the potential to be an expert in a specific field that they enjoy," Alvarado says. "Graduate education provides you with the license to carry out your dreams."

SARAH EVANS, GEOSCIENCES

Sarah Evans can imagine tens of millions of years ago when Nevada was a high-standing plateau and a large portion of California was swimming with the fishes.

The geosciences doctoral student explains that about that time, dramatic changes occurred in the Earth's crust, forming the expansive valleys and jagged mountains that are now characteristic of Nevada topography.

To the west of these mountains, she says, was the Pacific Ocean.

"Eastern California and Nevada used to look similar to what the west coast of South America looks like today," she says.



Geosciences doctoral student Sarah Evans studies extensional tectonics, the widening and stretching of the Earth's crust. Her work could help geologists locate natural gas, oil, and mineral deposits more efficiently.

Evans is conducting her doctoral research on the processes that led to these incredible geological changes. Geologists call this process “extensional tectonics,” or the widening and stretching of the Earth's crust.

Evans feels fortunate to study this subject in Nevada, which she says is a natural laboratory for geologists.

“There’s so much extension here that it exposes lower levels of the crust we wouldn’t see otherwise,” Evans says, adding that rock features that are more than 10 miles underground in other places sit above ground here.

Evans is trying to reconstruct a timeline of when this important period of extension occurred in Nevada. She’s using relatively new technology called thermochronology that determines the temperature of a rock in a certain time frame.

Her research is important for understanding how the Earth’s crust evolved in similar places around the globe. It could also help locate natural gas, oil, and mineral deposits more efficiently, as such deposits often occur in extensional regions, she says.

Her work began with geological mapping, which she conducted over the summer in the Southern Snake Range of Great Basin National Park.

The field work has helped her produce a map that will be published through the Nevada Bureau of Mines and Geology. She will also have two journal articles published as result of the research.

She is currently applying her expertise in the private sector as an intern for Exxon Mobil in Houston, Texas. She hopes the ExxonMobil internship will help her under-

stand private industry better so that she can help her future students obtain jobs.

Eventually, she hopes to become a professor at a community college or an undergraduate institution. Her previous experience as a community college student inspired this career choice. She says the instructors gave her the confidence to pursue her education further, and she plans to return the favor to future students through teaching and creating research projects in which undergrads can participate.

Evans says she has been well supported since she began her studies in fall 2011. When she entered the program, she received the Fay and Jack Ross Fellowship through the geosciences department. In addition, she

has received grants and fellowships from the Geological Society of America, the Nevada Petroleum and Geothermal Society, Exxon-Mobil, and the geosciences department.

This year, she is also the recipient of the UNLV Foundation’s President’s Fellowship.

She is grateful for her fellowship and the experiences she has had throughout her education, including her doctoral studies at UNLV.

“I’ve had incredible support my entire graduate career while studying world-class geology around Nevada,” she said. “I’ve had some fantastic experiences.”

NICK PELLEGRINO HISTORY

When Nick Pellegrino started his doctoral studies at UNLV four years ago, he became a rebel in more than one way.

Of course, he became a UNLV Rebel, wearing his scarlet and gray proudly. But his research into the history of church-state separation also has a rebellious streak to it.

“I have taken issue with many of the accepted narratives that we read in school,” he says. “Part of what I’d like to do as an historian is to broaden our understanding of America’s past by challenging these narratives, especially those about religion.”

More specifically, his doctoral dissertation

seeks to show that Catholics, as a persecuted minority in England and Ireland, helped transform American thought on the church-state relationship.

Because religious liberty and church-state issues are so central to the current culture wars, Pellegrino realizes his research has the potential to make some waves.

“My work is part of a larger movement that calls on policy-makers to get their history right before making suggestions about church-state relationships in the 21st century, independent of what those policies may be,” he says.

While he studies issues that divided people in the past, he says he feels lucky to be surrounded today by people who are united in creating a supportive environment for him and his research.

“I’ve heard many stories of rather cut-throat atmospheres among graduate students in departments across the country,” he says. “But I’ve found a wonderful academic climate at UNLV where everyone is genuinely interested in helping in any way they can.”

He extends that appreciation to his students; as a former graduate assistant, he taught undergraduate history classes.

“There is nothing more satisfying than seeing a student struggle the first few weeks before making a commitment to their academic life and rising to the top of the class by the final exam,” he says.

While he enjoys the classroom, he will use his UNLV Foundation Board of Trustees Fellowship this year to focus on his dissertation research. In addition to his fellowship, his work also has been supported by the Maryland, Massachusetts, and Virginia Historical Societies and a Summer Session Scholarship, which helped him travel to archives for his research.

Pellegrino plans to pursue an academic career after graduation and believes his doctoral work is preparing him for that. But, he notes, graduate school is also giving him the opportunity to be the kind of student he wasn’t earlier in life.

“I never paid much attention or did much homework when I was a child, so graduate school has helped me get back those lost years,” he says. “It offers a wonderful opportunity for people to learn about things that secondary and undergraduate schools simply do not teach.”



Psychology doctoral student Jessica Urgelles researches intervention strategies used with families that have been reported to the county for child neglect and maternal drug abuse.

JESSICA URGELLES, PSYCHOLOGY

When Jessica Urgelles arrived in Las Vegas from New York to begin her doctoral work in clinical psychology, she found a city in need.

Las Vegas does not have enough psychologists to provide sufficient appointments, she discovered, and many people in need could not afford to get help if they could get an appointment.

This created an opportunity that Urgelles says she may not have had elsewhere.

“The city is growing faster than the infrastructure can handle,” she says. “A graduate psychology student can do a lot of hands-on work in the community; they may not have that opportunity in other cities.”

Urgelles has been able to make the most of the opportunity, working through a practicum with victims of domestic, physical, and sexual abuse, particularly teenage girls who have fallen victim to human trafficking. She also managed the Family Research and Services lab, led by psychology professor Brad Donohue, and has done research on child neglect and mothers’ drug abuse.

The work on child neglect and mothers’ drug addictions has special interest for Urgelles; she will build on the lab’s research for her dissertation.

“In cases of child neglect from substance abuse, you’d think moms would want to do anything for their children,” Urgelles says. “But I’ve seen it with my own eyes. If they’re

really dependent on a substance, their decisions are completely skewed by the drugs they’re using.”

The lab developed an intervention for families that had been reported to the county for child neglect where the mother was abusing drugs. Workers would go to the homes and work with the mother and children trying to help the mother stop using drugs and give priority to the family.

The program required that a significant other – husband, boyfriend, parent, or even just a friend – participate and provide support. Urgelles is focusing on the role of the significant other.

“Unfortunately, many of our clients had trouble keeping the significant other engaged,” Urgelles says. Sometimes the significant other didn’t finish the treatment or never showed up. “Some people with drug abuse problems have trouble making appropriate friends.”

When relatives volunteered as the support person, sometimes it was helpful, sometimes it wasn’t, she says.

“For instance, if the parent is putting them down or causing shame or guilt, it might work against them or hurt them,” she says.

A recipient of the Barrick Fellowship and the Patricia Sastaunik Scholarship, Urgelles hopes to figure out a way to help long-term users with children kick the habit and become responsible parents.

“We have to find something to help these families,” she says. “Even if we can discover just a small piece of the puzzle, we can do more research to learn more.”



In his doctoral dissertation, fellowship recipient Nick Pellegrino seeks to show that Catholics, as a persecuted minority in England and Ireland, helped transform American thought on the church-state relationship.

EVANS: ERIK CAYNE; PELLEGRINO: DAVID S. APPELL

URGELLES: R. MARSH STARKS



History professor Michelle Tusan began unraveling Britain's role in creating the Balkan States and the Middle East using maps drawn in the second half of the 19th century.

In Print

Faculty authors explore mass media and weddings, race as a false consciousness, the birth of the Middle East, and more.

By Jean Reid Norman

R. MARSH STARKS

Smyrna's Ashes: Humanitarianism, Genocide, and the Birth of the Middle East

By Michelle Tusan
University of California Press

In her 2012 book *Smyrna's Ashes: Humanitarianism, Genocide, and the Birth of the Middle East*, UNLV history professor Michelle Tusan traces historical developments that seem a world away: post-World War I conflicts in the Balkan states, humanitarian concerns for minority Christian populations in the Ottoman Empire, and British foreign policy.

Tusan suggests, however, that these seemingly distant historical developments have striking pertinence to Americans today, as they led to the rise of the modern-day Middle East.

"I was trained as a British historian at Berkeley, and I didn't think I was going to write about the Middle East at all," Tusan says. "But I kept being led to these stories of maps and people in the Middle East, and I realized this is an important history that hasn't been told before. It occurred to me that Americans really need to know more about the Middle East as a place and what the West's involvement there has been."

Tusan started unraveling Britain's role in creating the Balkans and the Middle East through maps drawn in the second half of the 19th century. The maps reveal that the British defined the geography of the region on the basis of religious orientation: Europe and the Near East (as the Balkans were then known), was identified as Christian; areas east of that location, now known as the Middle East, were identified as Muslim. Those boundaries were constantly shifting on the map, as Britain had a strong interest in keeping territories on the route between Europe and India – its biggest colony – within its control.

That entire area, of course, was ruled

by the Ottoman Empire during that time, however, and the treatment of the minority Christians by the Ottoman rulers was constantly at issue as a humanitarian concern for both Britain and other European nations.

This is where humanitarian concern and geopolitics began to collide in history, Tusan says, and the world is still living with the results today.

"That Muslim-Christian divide is really solidified during World War I," she says. "It goes back to the 19th century, in part, because of this map-making."

She explains that as World War I ended, world leaders drew the map of Eastern Europe and the Middle East along sectarian religious lines in response to both geopolitical and humanitarian concerns. The massacre of minority Christian populations in the Ottoman Empire during the war sparked a massive humanitarian response to what is today called the Armenian Genocide.

The book details one scene from the aftermath of that genocide – the burning of the ancient city of Smyrna, occupied by Greece at the time and now located in the Republic of Turkey. Tusan explains that the term "crimes against humanity" was coined by the international community to describe the genocide.

Unfortunately, Britain and its allies left the prosecution of the war criminals to the Ottomans, and little was done. Tusan believes this prosecutorial inaction later emboldened Hitler.

"Hitler famously says, 'Who remembers the Armenians?'" she notes. "He clearly remembered them. He was saying essentially, 'No one's going to care what we do to the Jews.'"

Tusan points out, however, a difference in context between the aftermaths of the first and second World Wars. After World War I, the West

was still trying to figure out how to deal with such atrocities, she says; by the end of World War II, they got it right with the Nuremberg trials.

But the tension between humanitarian concerns and geopolitics has continued in recent decades, she says, citing Rwanda, Bosnia, and now Syria. Today, instead of Britain, the United States has taken over the mantle of world leadership, however, and seems to be in charge of monitoring humanitarian causes, Tusan says.

"There's a way in which we think about foreign policy as having a conscience, that what we do in the world matters," she says, "not just because we're advancing our interests, but because we are good stewards in our role as a global leader. It's part of Americans' DNA, inherited from the British."

There is always talk of protecting minorities, Tusan says.

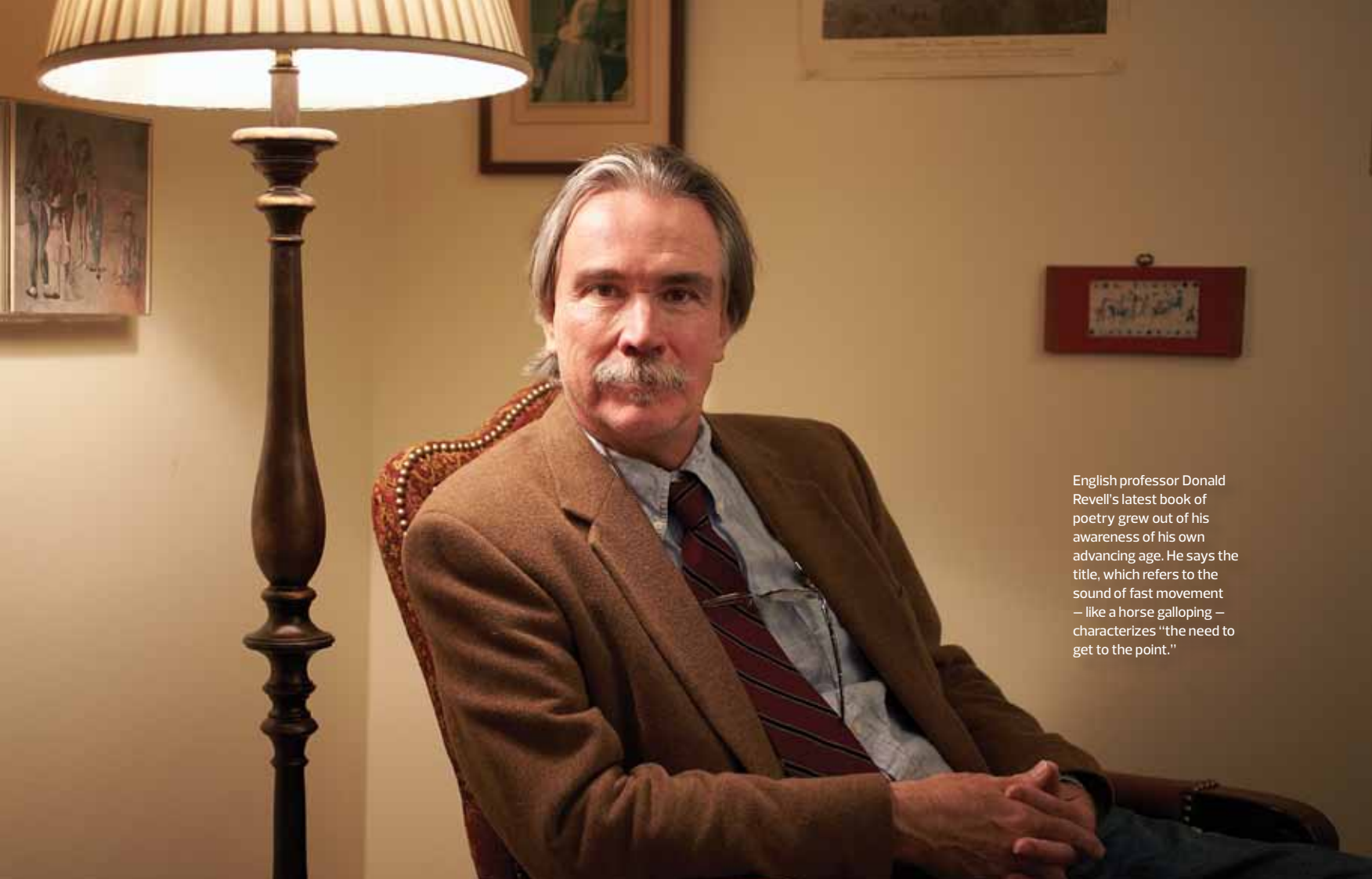
"But the problem is when you talk about protecting minorities as a foreign policy, how far are you willing to go to protect those minorities? There are a hundred ways you can think about how you protect, and most of these involve some sort of cost, including war."

Historically determined divisions make it hard to know when and how to intervene, she adds. For example, sectarian conflict in the modern Middle East that often pits Christian, Muslim, and Jewish communities against one another resulted in part from the divide-and-rule strategy employed after World War I by the British and the French. Some

of the violence seen in Syria today comes out of the destabilizing effects of a policy that used the doctrine of minority protection to further geopolitical ends.

"People don't wear black and white hats in this story, right?" she says. "The tensions that were caused





English professor Donald Revell's latest book of poetry grew out of his awareness of his own advancing age. He says the title, which refers to the sound of fast movement — like a horse galloping — characterizes “the need to get to the point.”

by creating these nations in moments of conflict after World War I exacerbated conditions under which those hatreds thrived.”

Tusan herself knows firsthand the effect of those deep hatreds. Her grandmother and great-grandmother survived the Armenian Genocide.

Her great-grandfather, an Armenian barber, was warned and had enough time to immigrate to the United States and establish himself in Portland, Maine. But by the time he sent for his wife and child, the massacres had begun, and the pair had to find a way through France and across the sea to Ellis Island.

“That was a story that was always there, but we never talked about it very much,” Tusan says.

Writing about the genocide that her family survived will be her next project, one that she knows will be hard to write.

“But I’m a historian. I tell stories about the past,” she says. “It’s a compelling story, both professionally and personally.”

Tantivy

By Donald Revell
Alice James Books

Donald Revell’s family knows when he’s working on a new book of poetry.

They hear giggling through the study door at home.

“I’m always happy when I’m writing,” says the English professor and poet. “My children on more than one occasion have had to explain why their father is behind a closed door giggling. But that’s just how it comes to me.”

In his latest book of poetry, *Tantivy*, Revell says he is more direct than in past volumes. His more straightforward approach grew out of his own awareness of his advancing age, he says. The title, which is the sound of fast movement, like a horse galloping or a flock of birds taking flight, characterizes the need to move along, to get to the point.

“I think everyone has so much to say, and then they’re done,” he says. “And for me, personally, I feel the end is in sight, in terms of what I’ve been given to write, what I can do. I have a sense it’s time to hurry up, cut to the chase.

“I tried for this book to be simpler. The lines are almost sentences. I felt, ‘Say what you have to say; don’t worry about finding metaphors. Use the things that your life actually handed you.’” For instance, one poem — “Birds small enough...” — offers an accessible metaphor:

*Birds small enough to nest in our young cypress
Are physicians to us*

*They burst from the tree exactly
Where the mind ends and the eye sees*

Revell describes his writing process as something of a search.

“It’s a rummaging around inside of the language, looking for different ways to make sounds that make sense,” Revell says.

“One of the fundamental things that draws folks to poetry is that the words not only make sense, they also make sounds. There’s a sort of physical relationship with the language in a poem that you may not have when you’re reading a page of prose, a page of fiction, or history. There’s immediately a sense of play.”

Despite his perception that this collection is a bit more direct than past ones, Revell notes that reviewers found the poems in *Tantivy* a bit inaccessible. That doesn’t trouble him.

“I don’t think that’s anything you can worry about,” he says. “My audience is the poem. It says, ‘OK, Don, whatcha gonna do now?’ I feel that I’m talking to the poem, and that once the poem is acceptable to me and the poem, we’re good.”

Revell says the public reaction to his poems can vary widely.

Other poets may find that in a volume of 30 or 35 poems, a few rise to the top as widely acclaimed. Not Revell.

“The poor little poems, my heart goes out to them,” he says. “Some people will love a poem, and there are other people who will detest that exact same poem. So really, I would go crazy if I paid any attention at all.”

Either way, he doesn’t take the comments personally. The poems are not an extension of him. They have their own life.

“I think of them like baby chicks at Easter. ‘Hello poems! How are you today? How do you want to arrange yourselves?’” he says.

His poems, like the books on his shelves, are “dear companions,” a relationship that extends into his classroom. When he teaches, he feels like he’s introducing old friends to a new crowd.

“Hey, you room full of young strangers. I’d like you to meet my friend, and I love this person, and I’m going to tell you why. And if you don’t love them, I’m sorry, but I do,” he says. “It’s more testimony than argument. I’m a character witness for the poems.”

He might never have made it to the front of a classroom if he had followed

his mother’s wishes. She was devastated when she learned her teenage son wanted to be a poet. In fact, she chewed out Revell’s English teacher for ruining his life. She hoped he would become a lawyer and then run for mayor of New York City, where he grew up.

So Revell made her a promise to become a full professor by the age of 40. He made it at 39.

“I barely made it under the wire, and my mother grudgingly accepted my life choice,” he says.

Revell was the first in his family to complete a college degree. His mother was a high school graduate, and his father, a brilliant mechanic, never learned to read. Both of them planned from his birth that Revell would go to college, to the point that they would not allow him to learn practical skills, such as ironing.

His experience as a first-generation college student gives him an affinity for his UNLV students.

“I feel like I’m talking to kin,” he says.

A good portion of that talking is about poetry, which has been his passion since the age of 14. Once he fell for poetry, there was no looking back, he says.

His wooing and wedding to his English department colleague professor Claudia Keelan was the same. They met 23 years ago when she invited him to speak at Murray State University in Kentucky. They went to dinner.

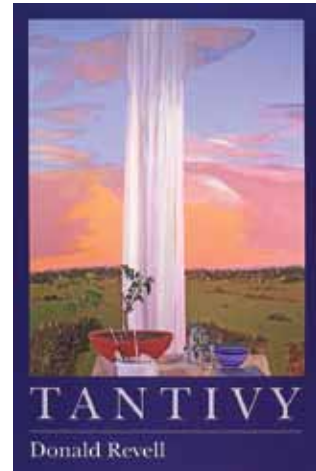
“This is the very, very first time we had met and seen each other, and by the time dinner was over, I had asked her to marry me,” he says. “And she said yes. So by the time we actually got to my poetry reading, we could announce our engagement.”

They were married two weeks later.

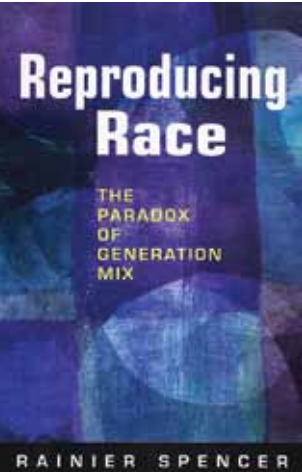
“And it’s worked out,” he says.

All of his life has been that way, he adds.

“In my case, it’s just one lucky circumstance after another,” he says. “And maybe that’s why writing that book was just trust. I’ve never found my trust to be misplaced, and that’s what I’m trying to say in the poems.”



**“One of the fundamental things that draws folks to poetry is that the words not only make sense, they also make sounds. There’s a sort of physical relationship with the language in a poem that you may not have when you’re reading a page of prose, a page of fiction, or history. There’s immediately a sense of play.”
—Donald Revell**



“I think there needs to be either a national ‘Ah-ha’ moment, or there needs to be millions of ‘Ah-ha’ moments over time. I don’t know what it will take. Clearly, it will not happen in my lifetime, but I hope this contributes to the eroding of that false consciousness.”
—Rainier Spencer

Reproducing Race: The Paradox of Generation Mix

By Rainier Spencer
Lynne Rienner Publishers

With his father an African-American soldier in post-World War II Germany and his mother a white German national, Rainier Spencer grew up in New York City thinking of himself as black.

That changed for him when, as an adult, he studied philosophy during pursuit of his master’s degree at Columbia University, where he began examining the nature of race and reconsidering his perceptions of his own family.

His brother, he recalls, had the same mother but a different father, also a black U.S. soldier.

“I had always considered my brother white, and that’s because of his socialization, his interests, and the way he existed as a person in my childhood,” Spencer says.

However, his studies at Columbia shook that assumption.

“When I came to the notion of critical consciousness, it didn’t make sense. How can my brother be white, and I am black?” he says. This realization led him to question perceptions of race and to conclude that race is a myth, a false consciousness.

He later developed this realization into a dissertation at Emory University, and three books on the subject have followed, helping to establish Spencer as a founder of critical mixed-race theory. His most recent book, *Reproducing Race: The Paradox of Generation Mix*, was released in 2011.

Spencer describes himself as a “race skeptic.” He is described in a study being conducted by doctoral student Carlos Hoyt of Simmons College in Boston as a “race transcender,” a term Spencer easily adopts.

“I live it,” says Spencer, founder of UNLV’s Afro-American Studies Program and associate vice provost for academic affairs at UNLV. “Biological race doesn’t exist. You can’t divide people into three, five,

seven, or 17 or even 50 categories of biology that make sense because people won’t fit.”

In *Reproducing Race*, Spencer proposes a thought experiment involving three cousins. One appears black but has a white ancestor. One appears white but has a black ancestor. The third appears biracial and has ancestors of both races. None of them has “pure” lineage, so how does one determine which race to classify each cousin?

It’s not logically possible, Spencer says.

“These categories only make sense if they have been endogenous through infinity,” he says. “It’s impossible to take any one African-American and go backwards through time and find only unmixed African ancestry.”

Even if it could be done, Spencer says, the notion that West African slaves were unmixed is another serious problem.

Race does not exist, he says. However, belief in race? That’s the real issue, he maintains.

He likens race to witchcraft and flat-earth theory. All are false, but they also carry real consequences.

When populations believed in witchcraft, women accused of it were often killed. When explorers believed the earth was flat, they were careful not to go too far.

When people believe in race, discrimination – and much worse – happens. The solution, Spencer says, is “that everyone realizes at some point, ‘This is wrong; this is silly.’”

The answer is not, he argues, getting rid of the check boxes on various government forms asking for racial identity. Nor is the answer creating a new category, “multiracial.”

These are solutions that were offered in the 1990s, during debates before the 2000 census on how the Office of Management and Budget should gather racial data. These are solutions still advocated by some mixed-race scholars who trumpet the potential of “Generation Mix,” the current generation of biracial children, to end race as an issue.

“The push-back from the civil rights movement and black people was, ‘No, those of you who are part black are just black, so

Rainier Spencer, Afro-American studies professor and associate vice provost for academic affairs, questions perceptions of race and concludes that race is a myth, a false consciousness.



get over it,” Spencer says.

Spencer disagrees with both arguments. If the government wanted racial categories that made sense, it would need 316 million, one for each resident of the nation. Creating a new category, “multiracial,” just reaffirms the existing categories.

But he agrees the government should continue to ask the question.

“It’s important to put people into the categories that racists think they are discriminating against,” he says. “That’s important because we need to knock out that discrimination.”

In the end the OMB decided to allow people to mark as many boxes as they wanted. On the back end, the statisticians clas-

sify people into their non-white groups.

It’s a compromise that satisfied no one, but it seems to be working, Spencer says.

In his current book, Spencer opposes the argument that race is socially or culturally based. This reasoning makes no more sense than biological race does, he says.

“There are far more differences amongst blacks than there are between blacks and whites,” he says. For instance, he has more in common with white professors than he does with a black man his age from the inner city.

Spencer also takes on those who argue that mixed race people have a special role in society.

Because we are all mixed race to some degree, the notion is silly, he says. Those

making the argument contradict themselves; they say they want their own category and that their movement will bring a post-racial society. How can they end racial categories when they are asking for one, he asks.

“They say they are challenging the paradigm but what they really want is to fit into it,” he says.

At this point, the debate over his perspective seems to be at a lull, he says, as no substantive counterargument in the scholarly world has emerged.

“I think my arguments are right, and people don’t want to deal with them,” he says, noting the exception of Hoyt, the previously mentioned scholar from Simmons College and a few others. For now, Spencer



Communication studies professor Erika Engstrom finds that media that cover the wedding industry tend to support traditional gender roles cloaked in a feminist “you-can-have-it-all message.”

is willing to allow that lull to continue, as he has other responsibilities to address in his current administrative post.

Though it may have to wait a few years, Spencer maintains he has more to say – and write – on the subject of race as a false consciousness.

“I think there needs to be either a national ‘Ah-ha’ moment, or there needs to be millions of ‘Ah-ha’ moments over time,” he says. “I don’t know what it will take. Clearly, it will not happen in my lifetime, but I hope this contributes to the eroding of that false consciousness.... I think we want to live in a world where exterior physical differences have no impact on how we see or treat each other.”

The Bride Factory: Mass Media Portrayals of Women and Weddings

By Erika Engstrom
Peter Lang Publishing

Communication studies professor Erika Engstrom and her husband spent \$300 to get married, so it’s hard for her to fathom why anyone would spend \$30,000, the average cost of a wedding, on what boils down to a fancy party.

“That’s a significant portion of a college education. That’s a car, or a down payment on a house,” she says. “You could buy half a house for that today.”

Her disbelief at the extravagant price

some are willing to pay for weddings led her to dissect the role the media play in supporting the bridal industry in her book, *The Bride Factory: Mass Media Portrayals of Women and Weddings*.

In it, she examines a wide range of wedding components – from announcements to gown selection to cakes – depicted in various media, including reality shows and bridal magazines.

She finds that the media, for the most part, support traditional gender roles cloaked in a feminist “you can have it all” message. According to Engstrom, they set unfair and unrealistic expectations for women.

Engstrom describes herself as a reality TV fan, and her interest in the bridal media

began in 1998 with one, “A Wedding Story,” on the Learning Channel.

She noted a common phenomenon: While the women were doing all of the planning, the men were unengaged in the process, usually participating in some completely unrelated outside activity, like playing touch football. On the big day, while the women were primping, tending to their hair and nails, and putting on make-up, the men seemed unconcerned about their looks and were still, oddly enough, playing touch football. Such obvious reinforcement of stereotypes struck her as worth further exploration.

About the same time, she was engaged and looked casually at some bridal magazines.

She said to herself, “This is not for me. I can’t afford to buy a dress like this.”

Instead of spending money on a wedding, she built a research agenda around the trappings of the bridal industry and the role of the media in perpetuating it. She wrote papers first on a few reality shows, then moved on to bridal magazines and websites, media coverage of royal and celebrity weddings, and newspaper wedding announcements.

Then one day over lunch, she and her mentor, Martha Watson, sketched out the book’s outline on a placemat.

Between teaching, serving as associate dean, and completing her other work, Engstrom began the lengthy process of writing the book.

Her analysis of wedding media found the same patterns, whether it was a royal wedding, a low-budget affair, a gay wedding, or a televised one. They all portray the roles: the bride putting in enormous amounts of time on preparation – both on the event and on herself – and the groom is in the shadows, buying a diamond, maybe helping a little, but ultimately playing football right before the ceremony.

She says gay weddings may differ from straight weddings in terms of division of labor, but they still include many of the same elements – fancy clothing, the

cake, the reception.

“It still goes back to, ‘We want a wedding,’ which assumes certain values,” she says. “It’s perpetuating the wedding as a show.”

Her research indicates that the big wedding is a relatively new phenomenon. In the early 20th century and before in the United States, a wedding was generally a low-key affair at home, with a few days of planning and the bride wearing the nicest dress in her closet.

This stands in contrast to the current media message, which is that a woman can be a feminist and still want the big wedding, a message that Engstrom says creates undue pressure and diverts attention from where it should be.

“People put a lot of emphasis on the objects instead of the relationships,” she says. “If the bridal magazines actually had a checklist for what is real love or compatibility, people might say, ‘No, I don’t think we’re compatible’ ... which would put them out of business.”

She hopes that when people read her book, they don’t come away thinking, “She hates weddings, she hates love, she hates men, she hates ... the world,” she says, adding that she’s not anti-marriage, or even anti-wedding.

“I’m married. I believe in marriage,” she says. “It’s just that you don’t have to have the big wedding if you don’t want to.”

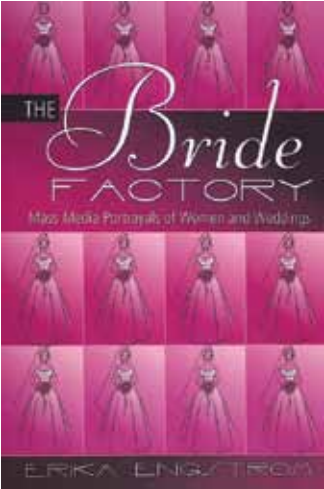
She hopes people think carefully about what they observe in the wedding media.

“Basically, I suggest they question what they’re seeing,” she says.

If anything should be celebrated, Engstrom says, it should be anniversaries: proof that the relationship was right from the start. But don’t expect an invitation to Engstrom’s anniversary party.

“It’s not that I’m not fun. I just don’t have the time,” she laughs.

She is busy continuing her research, turning her attention to other subjects. She has written two other books with co-authors, one on the CW network show “The Supernatural” and its depiction of religion, and the other on the portrayal of women on the AMC show “Mad Men.” Both are due out next year.



“People put a lot of emphasis on the objects instead of the relationships.”
–Erika Engstrom



Division of Research and Economic Development

ANNUAL REPORT ON UNLV RESEARCH ACTIVITY

The UNLV Division of Research and Economic Development reports data characterizing institutional research activity in order to measure and evaluate campus research productivity and to facilitate benchmarking to promote future growth. The following report contains compilations of standard institutional research metrics, as well as pertinent graduate education data.

Sponsored programs activity is a dominant component, including dollars sought through grant proposals, funding received through awards, and research expenditure data depicting funding used for the conduct of research. (The latter is the national gold standard for measuring research funding activity.)

Also contained in this report are data on technology transfer outputs, which include intellectual property activity in the form of IP disclosures, patent applications, and patents. Data on the number of doctoral graduates are also included. Not included in this document is a depiction of faculty scholarly outputs in the form of publications, presentations, books, and creative activities. Data collection and analysis are underway in this area but are not available at this time.

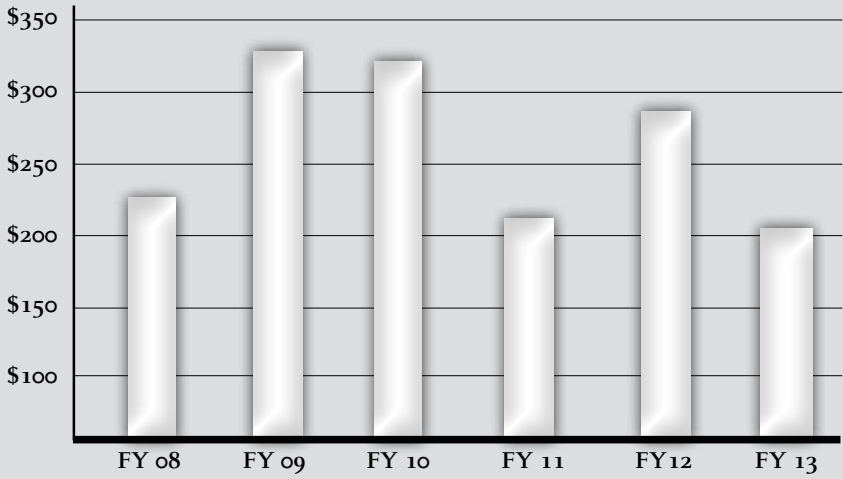
SPONSORED PROGRAM ACTIVITY

Proposals

UNLV faculty and staff have submitted an average of approximately \$262 million in proposals each year since 2008. The annual proposal totals have decreased in recent years as budget cuts have led to three factors: a reduced number of research-productive faculty, increased teaching workloads, and increased administrative burden on researchers due to cuts in research support staff.

Proposals	
FY08	\$228,366,587
FY09	\$326,594,089
FY10	\$323,327,776
FY11	\$210,857,602
FY12	\$281,270,704
FY13	\$203,337,011
AVG	\$262,292,295

Proposals FY08-FY13, in millions



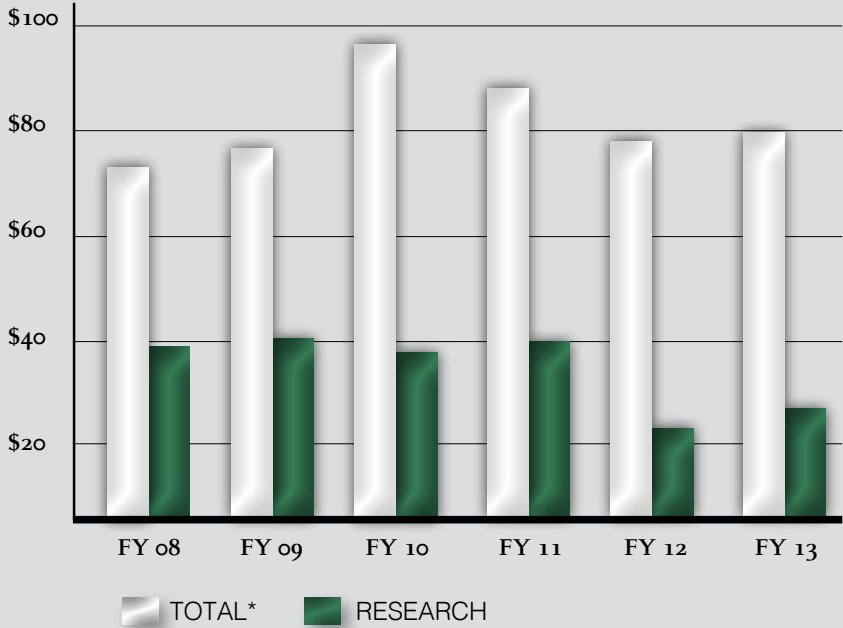
Awards

Total award funding and research award funding are down overall in recent years, though a slight increase was observed in FY13. It should be noted, however, that a large portion of this decline is attributable to the national moratorium on federal appropriations funding, which previously comprised a large portion of award funding at UNLV. As federal appropriations funding has declined, competitive funding has proportionately increased.

AWARDS		
	Total*	Research
FY08	\$73,712,021	\$39,844,720
FY09	\$76,458,869	\$40,097,479
FY10	\$96,040,576	\$38,381,001
FY11	\$87,577,327	\$40,398,054
FY12	\$77,018,333	\$22,565,629
FY13	\$78,956,087	\$26,585,099
AVG	\$81,627,202	\$34,645,330

*Total awards include research, instruction & training, other sponsored activity (i.e., public service, student services, etc.), and financial aid.

Awards FY08-FY13, in millions



SPONSORED PROGRAM ACTIVITY (CONTINUED)

Sponsored Program Funding
By college/unit FY13

Among UNLV academic units in FY13, the College of Sciences received the largest portion of sponsored program funding, followed by the College of Engineering. At right is the distribution of FY13 external award funding among UNLV colleges and units.

College/Unit	Awards	Amount
Student Life*	33	48,691,351
Sciences	81	9,969,716
Engineering	69	6,698,306
Harry Reid Center	36	5,130,004
Div Health Sciences	45	2,865,540
Liberal Arts	26	1,681,012
Urban Affairs	10	1,164,958
Education	18	749,091
Business	6	591,527
VP Research	6	492,733
Provost	2	216,000
President's Office	2	171,117
Library	2	169,435
Fine Arts	6	150,890
Hotel Administration	3	141,477
VPEO	3	47,279
VP Finance	1	23,862
VPDI	1	1,200
Diversity	1	589
Total	351	\$78,956,087

*Includes 3 awards for \$35.8 million in financial assistance

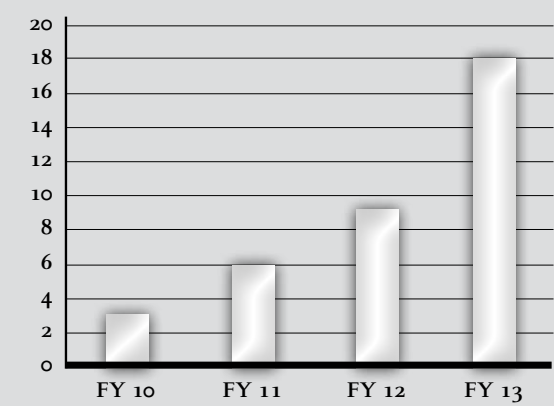


TECHNOLOGY TRANSFER ACTIVITY

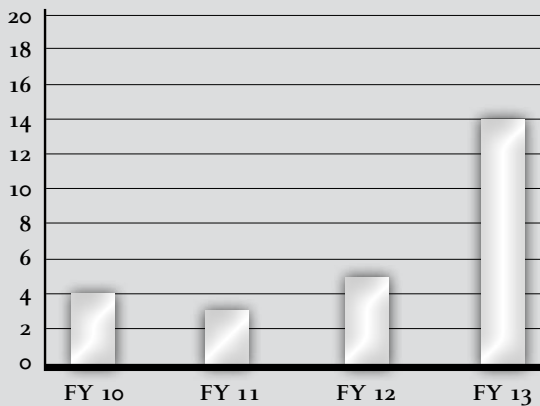
The Division of Research and Economic Development recently enhanced support of faculty development of intellectual property. In May 2012 the division established the Office of Technology Development and Transfer, which helps faculty and staff bring discoveries and inventions to the marketplace. The division also formed the Intellectual Property Committee in 2012 to evaluate and promote university intellectual property. Since that time, UNLV faculty disclosures have increased substantially; the total number of UNLV disclosures on file is currently 140.

UNLV holds 14 patents listing UNLV inventors and has filed 32 patent applications in the last four years. Patented technology available for commercialization can be found at: <http://www.unlv.edu/sites/default/files/24/Available-Technologies-May2013.xlsx>.

Research Disclosures, FY10-FY13



Patent applications filed between FY10-FY13



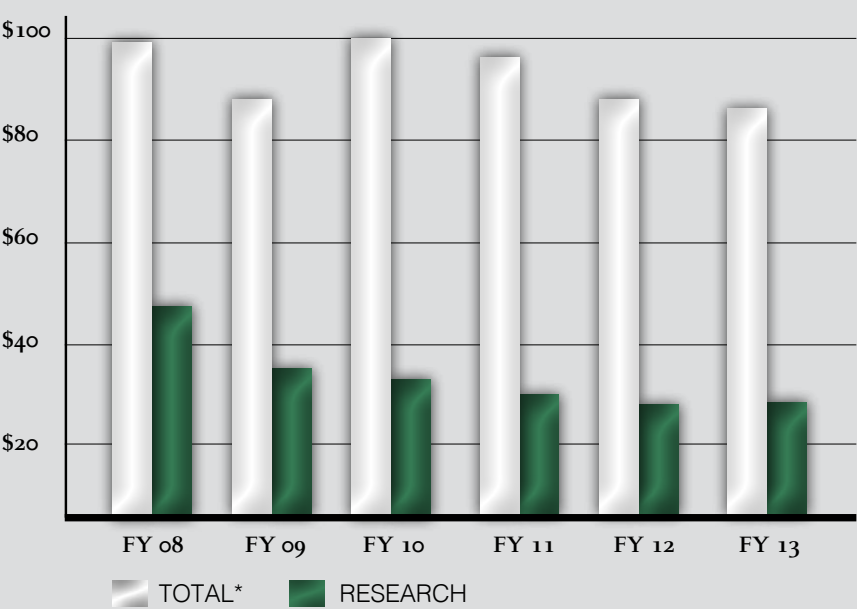
Expenditures

Expenditure data are considered the national standard of measurement for research activity. (Standards for reporting award funding vary by institution, but the reporting of funds expended is standard among all.) Research expenditures also tend to depict research activity more accurately, as the occasional spikes seen in award data are not as prevalent.

EXPENDITURES		
	Total*	Research
FY08	\$99,441,695	\$46,765,293
FY09	\$87,406,279	\$36,156,589
FY10	\$100,005,274	\$35,913,552
FY11	\$96,329,369	\$32,581,329
FY12	\$87,606,979	\$27,072,642
FY13	\$86,928,442	\$27,649,163
AVG	\$92,953,006	\$34,356,428

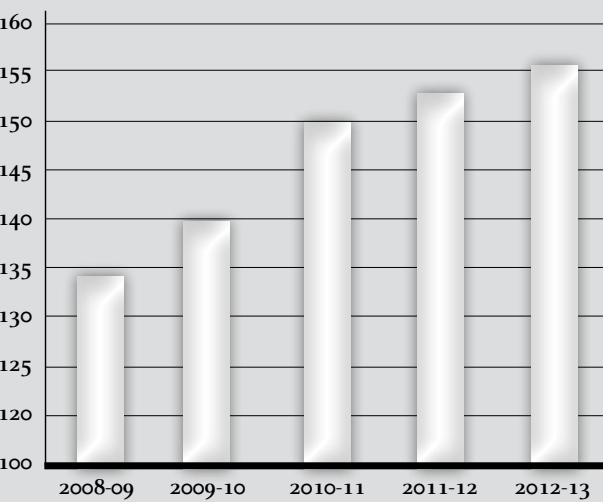
*Total awards include research, instruction & training, other sponsored activity (i.e. public service, student services, etc.), and financial aid.

Expenditures FY08-FY13, in Millions



DOCTORAL DEGREES CONFERRED

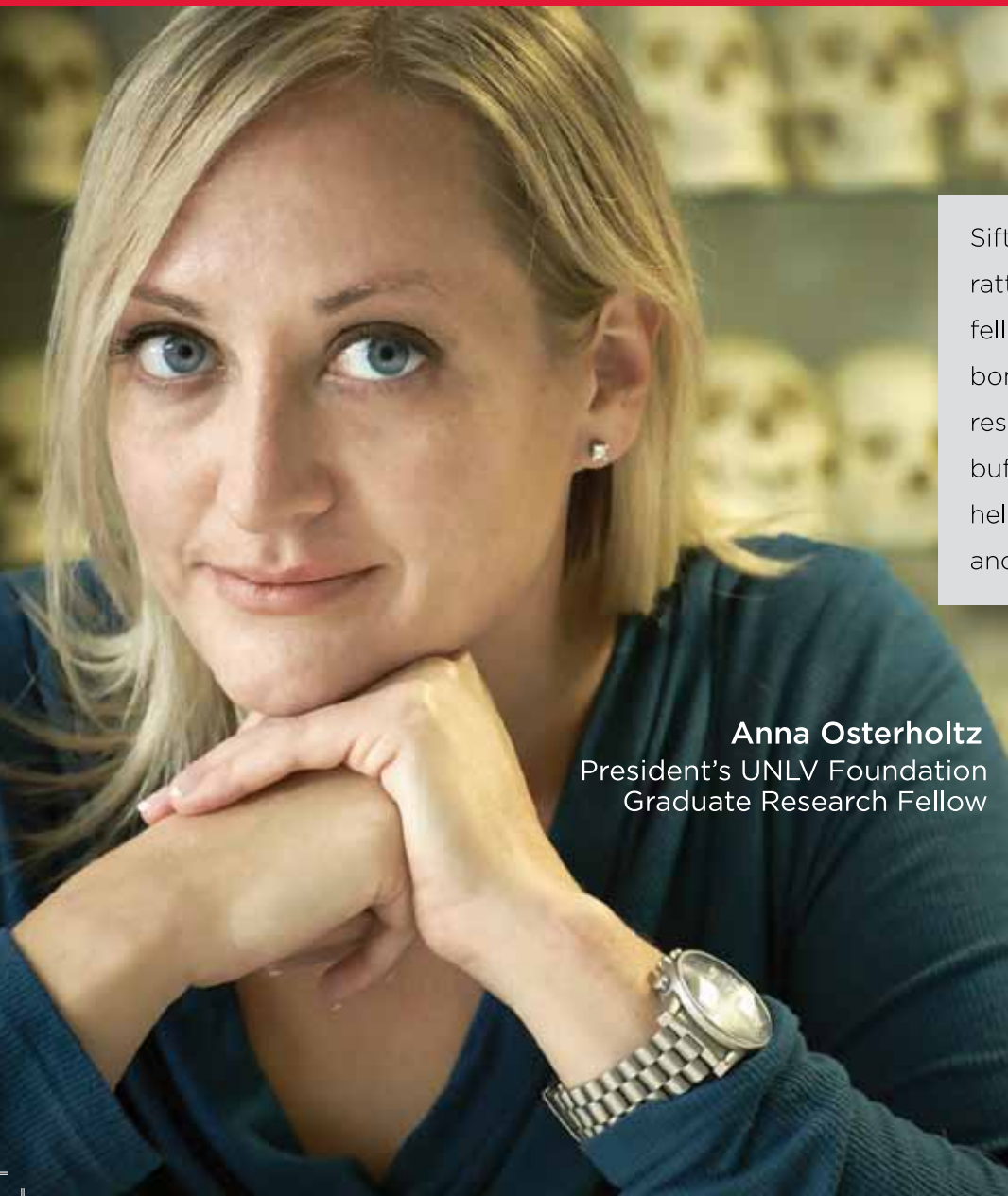
Another measure of university research activity is the number of doctoral graduates, as doctoral programs typically require a strong research component culminating in the doctoral dissertation. The number of doctoral degrees conferred at UNLV has steadily increased since 2008.



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Investing in answers from the past



Anna Osterholtz
President's UNLV Foundation
Graduate Research Fellow

Sifting through human skeletal remains doesn't rattle Anna Osterholtz. The UNLV bioarchaeology fellow is conducting research on Bronze Age bone fragments in Cyprus. She hopes her research will help her understand how culture buffered ancient humans from sickness — and help us learn how we can better adapt to social and biological stress today.

Anna's research is generously supported by the President's UNLV Foundation Graduate Research Fellowship, funded by private gifts to the UNLV Foundation.

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