UNLV

Innovation

The Research Magazine of the University of Nevada, Las Vegas

A Thirst for Knowledge

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Making the Rounds in Research

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IRREFUTABLY BRILLIANT

UNLV's Astrophysics Superstar Bing Zhang

The University's Commitment to Community

Dr. Neal J. Smatresk
UNLV President

On August 6, I was entrusted by the Board of Regents and Chancellor Dan Klaich to build upon UNLV's rich past and lead this university into its next phase of development. Fifty-one years ago the university was established when community leaders in Southern Nevada seized an opportunity to create a place of learning for our citizens. Since that time, UNLV has provided opportunities for our students to get an excellent education and good jobs and for our faculty to teach and do research in an entrepreneurial environment. We have also created opportunities to collaborate with our local community on projects that make a real difference.

In meeting the challenge set by our founders, we have become more than simply a university in Las Vegas; we are a university that is now truly part of this city. At the same time, we remain strongly committed to improving our entire region through the students we prepare for the workforce, the research and creative activities we conduct, and the partnerships we foster.

In this edition of our research magazine, you will find these ideals illustrated in articles about innovations in nursing research, faculty projects addressing water issues that are so vital to our region, and scholarship on the history of the West. You will also learn about research with potential to enhance our state's economic development, a report on the health of Nevada kindergartners, and recent successes of our faculty in the arts and humanities.

I hope you will join us as partners in building UNLV and investing in the future of Nevada.

Dr. Neal J. Smatresk
UNLV President

Dr. Ron Smith
Vice President for
Research and Dean
of the Graduate College

Research That Makes A Difference

UNLV Innovation, the university's annual research magazine, was established to inform Nevadans and other stakeholders about the outstanding research and service being performed by UNLV faculty and students.

Even in these challenging times, something special is happening in Las Vegas. In the weeks and months to come, we will see UNLV become a central hub for activities that diversify our economy, develop our human capital and social systems, and create the critical infrastructure that Nevada needs for a sustainable future.

As we become poised to take a giant leap forward under a new president, we are ever mindful that our ability to do so is built upon years of efforts by our faculty and students. This issue of *UNLV Innovation* celebrates both our past and our future.

Dr. Ron Smith
Vice President for Research and
Dean of the Graduate College

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UNIVERSITY OF NEVADA LAS VEGAS

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Glenn Casale, Theatre Professor

UNLV Theatre Professor Wins Regents' Creative Activity Award

UNLV theatre professor Glenn Casale recently won the 2009 Nevada System of Higher Education Regents' Award for Creative Activity.

This award recognizes significant accomplishments that bring recognition, as well as national and international stature, to the Nevada System of Higher Education.

The honoree receives a $5,000 stipend and a medal.

Casale, who leads the department's graduate-level directing program, joined UNLV in 2003. He has directed a variety of UNLV plays, as well as several major New York and Los Angeles productions. He directed the 1999 Tony Award-nominated and Emmy Award-winning *Peter Pan*, starring Cathy Rigby. He also recently directed a new production of *Dragapella*, which was nominated for Drama Desk and Lucille Lortel awards for best production.

For Reprise he has directed *The Threepenny Opera*, starring Patrick Cassidy and Theodore Bikel; *Anything Goes*, starring Rachel York and Brent Barrett; and *Fiorella!* with Tony Danza. His first L.A. production was *Wrestlers* with George Clooney and Mark Harmon.

Casale has mounted revivals of *The Queen of the Stardust Ballroom* with Tyne Daly and Charles Durning and *Company* with Patrick Cassidy and Carol Burnett. He has also directed a number of television shows, such as the *The Wayans Brothers* show for Warner Brothers TV and *The Faculty*, starring Meredith Baxter for ABC. Casale received his master's degree from UNLV.

Graduate-Level Programs Receive Nod from *U.S. News and World Report*

The quality of two graduate-level programs – one in educational psychology and the other in law – has been recognized by *U.S. News and World Report*.

For the second consecutive year, the educational psychology program at UNLV was named among the top 25 specialty programs in the nation, according to an annual survey by *U.S. News & World Report*. Out of 241 schools with doctoral degrees in education that responded to the magazine's survey, UNLV's program ranked 21st, tying with two other universities. Rankings are based on criteria such as research activity, doctoral students' GRE scores, and faculty awards.

"The effectiveness of homework, how to teach climate change, and online test-taking versus traditional pencil and paper exams are just a few examples of research areas faculty and graduate students are investigating," says Paul Jones, chair of the educational psychology department. "This ranking is an indication of our research mission and our commitment to produce highly qualified scholars and clinical practitioners locally and nationally."

John V. White, Dean, Boyd School of Law

Educational psychology is a long-standing program at UNLV and offers master's and doctoral degrees as well as a specialist degree in school psychology. Students are prepared for professional careers as university teachers, researchers, and mental health care providers in the school and community.

U.S. News & World Report also recognized the quality of the William S. Boyd School of Law at UNLV. The school moved up 13 spots to 75th – its highest rank ever. The move constitutes a 25-place improvement in the past two years for the law school, which was established just 11 years ago.

"The law school – with new, innovative programs and top faculty to lead them – is continuing the momentum that began with a solid foundation. The *U.S. News* rankings of law schools are but one indication of our continued success at building a world-class faculty and cutting-edge program of legal education," says John V. White, dean of the law school. "The law school's achievements in recent years are many, and, irrespective of recognition of outside rankings, we are proud of our work to provide students with an excellent legal education that emphasizes academic rigor, professionalism, skilled representation, and community service."

The Boyd School of Law received special acknowledgement from *U.S. News* for several of its programs, including its Lawyering Process Program, which maintained its ranking as the third best program of its kind, and the Saltman Center for Conflict Resolution, which was ranked the nation's ninth best dispute resolution program.

UNLV Study Addresses Physical Stability of Parkinson's Disease Sufferers

A new study by UNLV researchers found that those living with Parkinson's disease may improve their stability and reduce the likelihood of falling if they change the focus of their attention during movement.

The study, which appears in the February 2009 issue of the scholarly journal *Physical Therapy*, found that postural stability improved significantly among a sample group of patients with Parkinson's disease when they adopted an external rather than internal focus of attention.

An estimated one million Americans suffer from Parkinson's disease, and two thirds of them reported falling within the last year.

In the study, a research team led by UNLV kinesiology professor Gabriele Wulf tested three groups of older adults with Parkinson's disease by asking them to balance on an unstable surface (an inflated rubber disk).

One group was instructed to look straight ahead and focus on reducing movement in their feet (representing an internal focus); a second group was asked to look straight head but to focus on the disk (representing an external focus). A control group was not given attentional focus instructions.

The external focus exercise resulted in significantly greater postural stability than both the internal and control conditions.

"For those with a history of falls, it's much more effective to focus attention on the effects that their movements have on the environment rather than to focus on the internal movements themselves," Wulf says.

"These findings have the potential to improve efforts of caregivers and clinicians providing rehabilitation guidance to Parkinson's patients," she says. "They may also give the patients more control over their lives by providing them with a strategy to manage their posture and movement activities more safely and effectively."

In patients with Parkinson's disease, degeneration occurs in the basal ganglia, the part of the brain that controls motor function and learning. Wulf and her team contend that instructions directing attention to the effect, or outcome, of the movement support a more automatic form of motor control, consistent with that seen from expert performers.

"For example, beginning ice skaters focus all of their attention inward on their movements and adopt a stiff posture just to maintain balance," Wulf notes. "For experts, the act of skating comes naturally, and they're able to focus attention on the environment around them.

"Similarly in rehabilitation, we've found that directing attention externally

UNLV President Neal Smatresk, left, addresses the recent National Clean Energy Summit 2.0, including panelists (from left) John Podesta, president and CEO of the Center for American Progress; former Vice President Al Gore; U.S. Senate Majority Leader Harry Reid; and financier T. Boone Pickens.

UNLV Hosts National Clean Energy Summit

For a second year in a row, UNLV recently co-hosted the National Clean Energy Summit, at which government and industry leaders, scientists, policy experts, and citizens gathered to discuss renewable energy issues facing the U.S. and the world.

The day-long summit, which was co-sponsored by U.S. Senate Majority Leader Harry Reid and the Center for American Progress Action Fund, included presentations by national leaders from a variety of sectors seeking to advance clean energy initiatives.

Speakers included former President Bill Clinton, former Vice President Al Gore, energy executive T. Boone Pickens, U.S. Secretary of Energy Steven Chu, and others.

Following this year's summit, UNLV held its third annual Renewable Energy Symposium on campus as well. Presented by UNLV's Harry Reid Center for Environmental Studies and the Division of Research and Graduate Studies, this symposium focused on renewable energy technologies deployable in Nevada, the Southwest, and across the nation.

Presenters discussed research related to sustainability and renewable energy; concentrated solar-thermal and solar photovoltaic designs; biofuels and bio-energy; fuel cell and hydrogen storage technologies; enhanced geothermal systems; new building technologies; and more.

Renewable energy is one of several sustainability-oriented areas of research expertise at UNLV.

– in this case, keeping the rubber disk as still as possible – allows automatic control processes to kick in and tasks are performed more effectively and efficiently."

The study is available online at *www.ptjournal.org.*

3-D Model Depicts Area's Earthquake Reactions

UNLV researchers have completed the most detailed three-dimensional model to date showing how shallow sediments of the Las Vegas valley will respond during an earthquake.

The model can be used to design safer buildings and highway bridges and is the latest step toward the team's development of a comprehensive seismic hazard map for Las Vegas.

Nevada ranks third in the nation for risk of large-magnitude earthquakes. In Southern Nevada, active faults capable of producing an earthquake of magnitude 6.0 or greater have been identified.

Howard R. Hughes College of Engineering professor Barbara Luke and an interdisciplinary team of UNLV faculty and students performed site surveys throughout the Las Vegas valley over the last two years to measure profiles of shear-wave velocity.

Shear-wave velocity is a measure of the speed at which certain stresses move through the various sediments that make up the valley floor.

"The shear-wave velocity model is important because it will tell us how the different parts of the valley would react to an earthquake," Luke says. "These measurements translate into guidance on structural design requirements in the community."

Barbara Luke, Engineering Professor

By combining results of direct field testing with analysis of more than 160 seismic site classifications filed by others with local government agencies, the UNLV research team compiled a database of 230 shear-wave velocity measurements. Using the database and other sources of information, the team created the shear-wave velocity model for the valley to depths of hundreds of feet.

The final product for the research team, a seismic hazard map, will be used by local officials in disaster relief planning, land use planning, and assessment of existing infrastructure in the event of an earthquake.

Luke and colleagues Aly Said, also a UNLV engineering professor, and Wanda Taylor, interim dean of the College of Sciences and a geoscience professor, were awarded a multi-year grant from the U.S. Department of Energy in part to determine which areas of the basin would be most susceptible should a major earthquake occur.

A more detailed explanation of the project appeared in the November 2008 issue of *The Leading Edge*, an official publication of the Society of Exploration Geophysicists. More information on the project is also available at *http://earthquakes.unlv.edu.*

First-Ever Study of Health Status of Nevada Kindergartners Completed

A team of UNLV researchers recently conducted a statewide study resulting in the first-ever comprehensive health status report on children entering kindergarten in Nevada.

The Nevada Kindergarten Health Survey was conducted by UNLV's Nevada Institute for Children's Research and Policy (NICRP) in partnership with the Southern Nevada Health District, the Nevada State Health Division, and the Clark County School District.

The survey was administered by 15 of the state's 17 school districts in the fall of 2008. Its goal was to provide baseline data on the overall health status of children entering school.

"With this new information we can begin to identify health issues that may ultimately affect the well-being of children, in and out of school, and implement strategies to make improvements," says Denise Tanata Ashby, executive director of the NICRP.

The 22-question survey gathered information on a variety of variables, including insurance status, access to health care, immunizations, weight, and health behavior.

The survey was distributed to parents of the estimated 30,744 entering kindergartners. More than 11,000 surveys were collected. Among the findings:

- 36 percent of kindergartners were either overweight or at-risk of being overweight.
- 18 percent had no health insurance coverage.
- 25 percent indicated using emergency rooms or urgent care facilities for non-life threatening illnesses in the past 12 months.

The researchers hope the study's data will be used to identify and remediate health disparities and may ultimately lead to increased academic success among Nevada's students.

"Studies have shown that there are definite links between the health status of a child and the child's academic success," Tanata Ashby says. "If we can track the trends that may be affecting the health status of children, we can target parent outreach and resources and ultimately increase both the well-being and academic success of children in our state."

The full report is available online at *http://nic.unlv.edu.*

History professor Eugene Moehring's strong record of scholarship and his passion for Nevada history earned him UNLV's most prestigious research award.

Looking Deeper

History professor Eugene Moehring is a respected scholar on urban history issues and the West. But the Harry Reid Silver State Research Award recipient says the students are still the most important part of the research equation.

STORY BY AFSHA BAWANY
PHOTOGRAPHY BY GERI KODEY

Eugene Moehring had the quintessential tourist experience on his first visit to Las Vegas in 1976.

He stayed at the Sands Hotel, lounged by the pool, gambled a bit, and took in Wayne Newton's show.

Given this classic introduction to Vegas, some might speculate that it was the glitz and glamour of the resort town that made him want to move here.

He smiles at the notion. Yes, he says, his stay was enjoyable, and Las Vegas was attractive – but not for the most obvious reasons.

Moehring was in Las Vegas for a job interview with UNLV's history department, and it was the city's rich potential as a research subject that sold him on taking the job.

"In many ways Las Vegas rivals 19th-century Manhattan, which I wrote about in my dissertation," says Moehring. "Like Manhattan, Las Vegas went from being a small town to a big city in 40 to 50 years. For an urban historian, it's a wonderful laboratory."

Moehring also knew Las Vegas was a relatively young city without a published history. Trying to teach western urban history to local students without comprehensive books detailing the town's past was both a challenge and an opportunity.

He saw the need to provide context for students and expanded his research of urban history to Nevada's past. He spent a decade researching and writing his first book on the history of the Las Vegas metropolitan area, and he didn't stop there.

Thirty-three years later, Moehring is the author of five books and an impressive number of journal articles about Las Vegas and other cities of

the West. It is this strong record of research, along with his passion for Nevada history, that led him to become the 2008 recipient of UNLV's prestigious Harry Reid Silver State Research Award.

Moehring joins a small, elite group of UNLV professors who have won the annual award, which was created in 2001 and named in honor of the U.S. senator who has been a strong supporter of the university. The award was designed to recognize research that is not only highly regarded but is also responsive to the needs of the community and state.

A committee composed of UNLV colleagues and a community representative selected Moehring, who is the second historian to receive the award. (The late Hal Rothman, also of the history department, received the award in 2004.) Moehring received a $10,000 stipend, funded with private donations provided by the UNLV Foundation, with the award.

Initially, Moehring wasn't going to apply for the award but was urged to do so by his peers.

"Gene has dedicated much of his professional career to the benefit of Nevada, writing the histories that have enabled residents and non-residents alike to understand the political, economic, and cultural history of the state," says David Wrobel, professor and chair of the UNLV history department. "These contributions enhancing the regional and national understanding of our state, combined with his profound impact on Nevada's students, have made him a natural recipient of this award."

Moehring, who has served as the chair of the history department twice, teaches a full load of undergraduate- and graduate-level courses. He was instrumental in establishing the department's emphases in public history and world history, and he developed courses in Nevada history at the survey level. He integrated much of his research on Las Vegas into his upper-division courses and advocated the creation of the history department's Ph.D. program. He also recently authored the definitive history of UNLV for the institution's 50th anniversary.

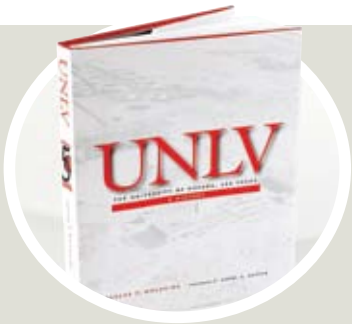
Once a political science major who also considered a career in medicine, Moehring says he became interested in studying history because it provided the background necessary to understand the policies, theories, and principles he studied in political science.

"I wanted to know what happened," he says. "I wanted to understand why political leaders made the decisions they made and what the effects were. History provides those details."

Today, Moehring emphasizes this point to his students, noting that history continues to have a profound influence on public policy.

"It is vital for students to understand that the world today is determined by the past," Moehring says, adding that he still enjoys engaging students and encouraging them to think critically about the historical context that leads to policy decisions.

Moehring has guided the work of more than 70 master's and Ph.D. students through the years on wide-ranging subjects, including the life and times of the late U.S. District Court Judge Harry Claiborne; Nevada's home front during World War II; health care for Hoover Dam construction workers; and the Republican Party during the Civil War. He expects to direct more graduate students next semester.



BOOKS BY EUGENE MOEHRING

Public Works and the Patterns of Urban Real Estate Growth in Manhattan, 1835-1894 (New York: Arno Press, 1981)

Resort City in the Sunbelt: Las Vegas, 1930-1970 (University Press, 1989, updated in 1995 and 2000)

Urbanism and Empire in the Far West, 1840-1890 (University of Nevada Press, 2004)

Las Vegas: A Centennial History, co-authored with Michael S. Green (University of Nevada Press 2005)

UNLV: The University of Nevada, Las Vegas: A History (University of Nevada Press 2007)

Focus on Las Vegas

In his first scholarly book on Las Vegas, Moehring discussed the city's history from the construction of Hoover Dam to the building of the MGM Grand Hotel, now known as Ballys. The growth of Las Vegas in the 1980s prompted Moehring to update the book in 1995 and again in 2000. He says the goal of the book, *Resort City in the Sunbelt: Las Vegas, 1930-1970* (University Press, 1989), was to spawn additional research on the city and generate interest in the state.

It seems to have worked. Hundreds of journal articles, magazine pieces, and books devoted to the history of Las Vegas are now on the market, many of which are housed in the UNLV Lied Library special collections department. (The department is also home to millions of documents and manuscripts, in addition to 1,500 oral histories related to the Southern Nevada region.)

Moehring, an active member in professional and community organizations, has become one of the best-known authorities on Las Vegas history. He has served as a consulting historian to Clark County and the cities of Las Vegas and Henderson, and he has been appointed by several mayors and governors to serve on a variety of committees and boards dealing with community issues.

Though a native New Yorker – Moehring holds a bachelor's and mas-

Moehring met his wife, library technician Christine Wiatrowski, while conducting research in UNLV's Lied Library.

AARON MAYES

ter's degree in history from Queens College and a Ph.D. from The City University of New York – he now considers Las Vegas home. He and his wife, Christine Wiatrowski, a library technician whom he met while conducting research in the Lied Library, enjoy Las Vegas dining and the natural beauty of Nevada, including Red Rock Canyon and Lake Tahoe.

While he embraces the transformation of Southern Nevada in the last few decades, Moehring recalls with nostalgia the Las Vegas that once was: a small town with low-rise casinos and a young university with only a Safeway grocery store nearby. The changes have provided him with ample opportunity for study.

"For an urban historian, to see the growth of Las Vegas in the last 33 years has been very exciting," Moehring says. "Creating public memory is crucial to building a sense of community, as is placing current-day problems in historical context."

To illustrate this point, he notes that it is necessary to reflect on past trends to understand the city's current economic downturn. Despite these tough times, Moehring says, he has faith that Las Vegas-style ingenuity will help the town thrive again.

"I think that becoming the fastest growing city in the United States between 1986 and 2006 was an enormous achievement for a city that has no river, no ocean, no mines, and no major agriculture," Moehring says. "Developing the economy in innovative ways is really an amazing achievement for a desert city like Las Vegas."

Back to the Future

After spending more than 30 years conducting research on the community and state, Moehring says he can still find plenty of history to uncover. He is interested in researching the relationship between the railroad industry and the development of cities, and there are, of course, a few key figures in Las Vegas history he would like to interview as well.

"I'd love to speak with Sheldon Adelson, Steve Wynn, and Kirk Kerkorian," Moehring says. "I would like to do a book about the major resort makers in Las Vegas and how and why they built their properties."

As for his reaction to winning perhaps the most prestigious research award on campus, Moehring – who donated his award stipend to charity before he even received the check – says that he is pleased that his academic reputation might bring attention to UNLV.

"Publications that are well received within the scholarly community have allowed me to achieve a national reputation in my field, which eventually enhances the prestige of my department and of UNLV," he says.

He notes that one of the critically important goals of conducting research as a faculty member is sharing the most enlightening information possible with students. This perspective isn't surprising coming from someone like Moehring, who maintains that teaching is still his greatest joy.

"My goal is to make history interesting to my students, to guide them in identifying research topics of their own, and to help them think critically about important policy issues affecting our city, state, and nation," he says. "This is what I love most about my job."

Diving Into Her Studies

Faculty and students from UNLV's College of Sciences and aquarists at The Mirage resort are engaged in a variety of marine-based research projects that hold promise for discovery in subjects ranging from the handling of delicate fish species to advances in human health. UNLV students participate in these research activities through the Aquarium Internship Program, established in 1992. The program enables UNLV students like Chelsea Hess, seen here in the resort's 20,000-gallon saltwater aquarium, to gain valuable hands-on learning experiences in marine biology, genomic studies, and aquatic species care. Students work with more than 80 species of fish, eels, sharks, and bottlenose dolphins that reside in Mirage facilities. "It's not every day that you get to hand-feed a five-foot moray eel or scuba dive with a porcupine puffer," says Hess, whose internship experiences included taking blood samples from marine specimens, viewing sonograms of pregnant sharks, attending a conference, and participating in the renovation of the aquarium. PHOTO BY AARON MAYES


SCUBAPRO

Progress Report

Nursing professor Sally Miller examines how ghrelin, a hunger stimulant hormone, fluctuates in people who have lost weight.

Making The Rounds In Research

Increasing the number of graduates is still a priority, but UNLV's School of Nursing also seeks to build its research and enhance understanding of the endeavor.

STORY BY TONY ALLEN
PHOTOGRAPHY BY R. MARSH STARKS

When Carolyn Yucha accepted the post of dean of the UNLV School of Nursing in 2004, she knew that building research would be one of her most pressing priorities.

At the same time the state legislature had just issued a mandate to double nursing school enrollments. Nursing research might have easily moved to the back burner as faculty focused on meeting the mandate if the right actions weren't taken.

It was a challenging time for research in the school.

"We had faculty conducting research, certainly, but they didn't have the support and infrastructure needed to really be successful," says Yucha, who was determined to make the changes necessary both to build research and produce more graduates. "At the time, developing creative ways to address the growing statewide nursing shortage was the top priority for the school and its faculty. But we were committed to research as well."

To produce more nurses, the school streamlined its curriculum and extended its calendar to accommodate more students, enabling them to enter the workforce faster. Additionally, a Ph.D. program in nursing education was approved, and several new faculty were hired.

While the new faculty supported the school's classroom goals, they also

Carolyn Yucha
Dean, School of Nursing

incubated what would soon become a brisk and dedicated research endeavor.

"Nursing education was and still is a primary focus, but research is absolutely necessary to move the school to the next level," says Yucha, who previously served as associate dean for nursing research at the University of Florida. "Building a research program, as we're doing in nursing, benefits the entire school. The new knowledge created through research improves our teaching efforts. Also, faculty members engaged in research are able to obtain external funding, which in turn supports the programs we offer."

In the years that followed Yucha's arrival, the school's research effort was bolstered with the hiring of five research-active faculty members, including an associate dean for research, a full-time research coordinator to support new projects, and an editorial liaison to assist faculty with grant applications.

The scholarly productivity of nursing faculty began to climb dramatically: Total publications nearly tripled from 2004 to 2007, and scholarly presentations jumped from 11 to 101. Funded grants climbed from just three to 14 during that time. Given the school's relatively small research faculty of only 14, the results are impressive, Yucha says. Yucha herself contributes to the school's scholarly reputation by publishing, presenting at professional conferences, and serving as editor of the respected journal, *Biological Research for Nursing*.

Understanding Nursing Research

While nursing research continues to grow at UNLV, nursing faculty invariably face a challenge associated with perception: Casual observers tend to overlook nursing as an academic endeavor that benefits, as all do, from the performance of research. Nursing is often perceived as a professional or clinical program rather than a scholarly one; as a result, nurse researchers often encounter a lack of understanding from colleagues in the scientific community about what they study.

"Most people picture nurses in a hospital or clinic because that's what they've been exposed to," says Barbara St. Pierre Schneider, associate dean for research. "While we've all benefited from the care of nurses in these front-line positions – be it in a clinic, emergency room, or even at school – nurses are also working behind-the-scenes, through research, to answer the questions that will lead to improved quality of life."

According to St. Pierre Schneider, many scholars and researchers outside of nursing aren't aware that nursing

professors and students conduct research. After all, it was only a little more than 20 years ago that the National Institutes of Health formally established what is now the National Institute for Nursing Research.

"Nursing is a venerable profession, but nursing research developed only recently," says St. Pierre Schneider. "It evolved because there are questions nurses ask that no one else does."

For example, physicians tend to focus their research on the cause and cure of disease. Nurse researchers, on the other hand, study the physical, psychological, and social response to health and illness; that is, nurse researchers holistically address health both for the individual and the larger population. They also study patient comfort and care, effective nursing practices, and the profession of nursing itself.

"Nursing researchers don't just look at illness, but wellness as a whole. In the end, the total health of the person is at the core," says St. Pierre Schneider.

The changing climate of health care in America is making nursing research more important than ever, according to Nancy York, UNLV assistant nursing professor. Nurses, with their unique positions on the frontlines of care, both in hospital settings and in the community, are perhaps in the best position of all health care professionals to identify problems and test theories.

"Whether it's health promotion, patient or worker safety, or disease prevention, health care delivery has changed," says York. "In many ways, nurses offer a unique perspective in the scientific inquiry process. And it's that unique perspective that has and will continue to allow nurse researchers to play an even greater role in the scientific research community."

UNLV Nursing Research

Nursing research at UNLV incorporates many perspectives, all with a similar aim: to improve human health and wellness. Through work in the classroom, in the clinic, and in the community, nurse researchers are not only effectively educating future health care leaders, they are also improving understanding of significant health issues related to diabetes, obesity, stress, and aging. In addition, UNLV's School of Nursing boasts one of the nation's few dedicated nursing research efforts related to biological and biobehavioral issues. Below are just a few examples of the research projects currently under way in the school.

Preventing Caregiver Depression

Michele Clark, Associate Professor

Michele Clark is looking for ways to prevent the alarming rate of depression among caregivers of the elderly.

A clinician with more than 30 years clinical experience in the home health care setting, Clark developed an interest in this area during her many interactions with the families of dependent elders in her practice. Through time, she began to notice how the complex physical and emotional needs of elders placed their family members at risk for burnout and depression.

Clockwise from left: Nursing professor Nancy Menzel (in black) demonstrates safe patient-lifting techniques to a UNLV student; Menzel conducts research on the use of these techniques and their impact on work-related injuries among nurses. Nursing faculty members Yu (Phillip) Xu and Michele Clark conduct research on numerous subjects; Xu explores issues associated with foreign-trained nurses, and Clark examines rates of depression among caregivers of the elderly.

"More than 50 percent of caregivers are at risk for depression," Clark says. "The common pharmacological treatments for depression can take weeks to months to show therapeutic effect, if they do at all. So, instead of treating caregivers once they become depressed, it seems much more appropriate to prevent depression before it occurs."

In order to develop appropriate treatments, Clark seeks to understand the underlying psychological and physiological factors that place caregivers at risk for depression. Specifically, she is investigating how and why the act of caregiving affects mood, and how a caregiver's individual personality factors increase depression risk. She has also begun evaluating clinical stress assessment tools for their applicability to caregivers, with the ultimate goal of developing a novel instrument to measure stress patterns specific to this population.

"The stress associated with caregiving – beyond leading to depression – places caregivers at risk for heart disease, diabetes, and dementia," she says. "Preventing stress not only improves the health of caregivers, but also enables them to continue providing adequate care for their loved ones without relying solely on an already strained health care system."

Foreign-Trained Nurses and the American Workforce

Yu (Philip) Xu, Associate Professor

As the nationwide nursing shortage persists, health care facilities across the country are becoming increasingly likely to rely on foreign-trained nurses to fill staffing needs, says UNLV nursing professor Yu (Philip) Xu.

Xu is one of only a few researchers in the nation who study how this population adjusts in the American workforce.

Xu, a foreign-trained nurse himself, notes that foreign-trained nurses comprise more than 15 percent of Nevada's nursing workforce, and that number is expected to grow.

According to Xu, most foreign-trained nurses are very capable of succeeding here, but many have trouble adjusting to American culture.

"Hospitals spend upwards of $10,000 per individual to recruit foreign nurses, yet most often there is no specific orientation or cultural training for them," says Xu. "Many do not succeed and are sent back to their home countries – a blow for hospitals, nurses, and ultimately patients. In a field where good communication is a necessity, there has to be a better way."

To address this problem, Xu and a team of UNLV researchers developed "Speak for Success," the nation's first research-based, comprehensive language and communication training program for currently employed foreign-trained nurses.

The program, which is funded by a $300,000 grant from the National Council of State Boards of Nursing, is based on Xu's past and current research. It consists of two inter-related components: a 10-week course with a certified speech pathologist, followed by a series of interactive workshops on practical communication skills, including language use and language variations in the American health care setting.

"Nursing requires constant communication with doctors, co-workers, patients, and families, making communication-focused transition programs for foreign nurses vital for improving both patient safety and quality of care," says Xu.

"With the nursing shortage expected to continue, we need to find ways to reduce turnover among the nurses we already have in the profession and to make certain that all nurses entering the American workforce are adequately prepared to succeed."

Sustainability and Community Health

Nancy Menzel, Associate Professor

Associate professor of nursing Nancy Menzel believes that a healthy community is a sustainable community.

"Without healthy people, a city is not sustainable," says Menzel. "A city's most valuable resource is its people. Government and business leaders must view public health as an investment in the future."

For this reason, Menzel studies a variety of health issues, seeking to ascertain if the community and state are sustainable environments for their citizens. She has explored such subjects as health care services and access, work-related injuries, and the relationship between low-back pain and disability.

Recently, Menzel has focused on workplace health and safety for nurses. Her research has proved that instructing students on the use of safe lifting equipment positively affects the likelihood that care facilities will adopt safe lifting programs, reducing both workplace injuries and employee turnover.

"Many injured nurses leave the field forever," says Menzel. "It's not an effective or sustainable practice to invest funding and time to produce more nurses only to have them leave the field due to an injury through unsafe manual handling of patients. It's obviously harmful to the nurses themselves, and it's detrimental to the profession."

Menzel, who also serves as the current president of the Nevada Public Health Association, not only conducts research on the subject of safe handling of patients, but

"Research is absolutely necessary to move the school to the next level." – Carolyn Yucha, Dean of UNLV's School of Nursing

Nursing professor Sally Miller studies the incidence of and attitudes toward obesity across the lifespan, as well as hormones affecting hunger.

also serves as an advocate for nurses.

In 2006, she promoted legislation to require Nevada hospitals to provide safe patient handling equipment, and she developed a research-based curriculum on safe patient handling principles. Her curriculum project won the Award of Excellence in Public Health Training from the Centers for Disease Control and Prevention.

Helping Combat Obesity

Sally Miller, Associate Professor

With the growing obesity epidemic in the U.S., associate nursing professor Sally Miller is interested in helping obese people lose weight and keep it off.

To achieve that end, Miller conducts research on the incidence of and attitudes toward obesity across the lifespan, with a particular focus on long-term maintenance of weight loss.

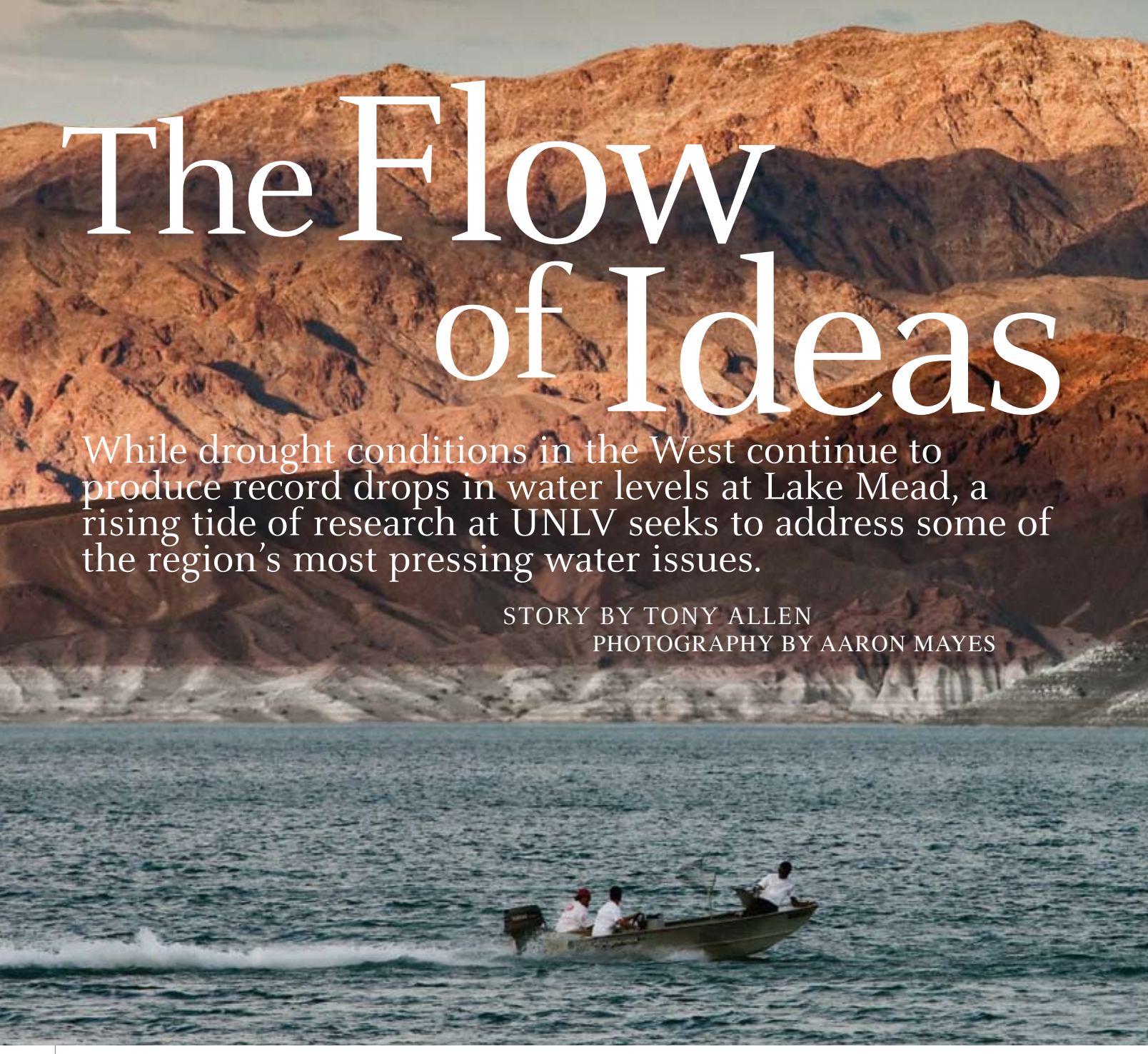
"As a clinician, I found that a great number of patients in my practice have struggled with obesity and suffer from both physical and psychological issues," says Miller, who has received grant funding from the American Academy of Nurse Practioners. "From a nursing perspective, I focus my research efforts on both treatment and prevention by emphasizing the health implications as well as the emotional issues surrounding obesity."

In addition to these areas, Miller has recently investigated a physiological aspect of weight loss: She is currently examining how levels of ghrelin, a hunger stimulant hormone produced in the gastrointestinal tract, fluctuate in people who have lost weight.

Ghrelin was first identified as a growth hormone less than a decade ago, and there is some suggestion that ghrelin levels rise disproportionately after someone loses weight. This increase leads to increased hunger and subsequent weight gain in some people.

"The practical implication is that you work hard to lose weight, have to adjust to diet and lifestyle changes, and then have to live with a hormone that makes you hungry all the time," says Miller. "It's as if you're being punished for losing weight. There has to be a solution to this, and we're working to find it."

To learn more about nursing research at UNLV, visit the School of Nursing website at http://nursing.unlv.edu/research_welcome.html



The Flow of Ideas

While drought conditions in the West continue to produce record drops in water levels at Lake Mead, a rising tide of research at UNLV seeks to address some of the region's most pressing water issues.

STORY BY TONY ALLEN
PHOTOGRAPHY BY AARON MAYES

The white-ringed shores of Lake Mead tell the story. Water levels at the lake have dropped more than 100 feet since 2000. The alkaline buildup along the lake's rocky shoreline has come to graphically symbolize the drought currently plaguing the West and, with it, the uncertain future of the region's water supply.

UNLV researchers are becoming increasingly involved in research on a variety of water issues, including both water quantity and quality. Their research, which is being conducted in collaboration with a number of government entities, comes at a crucial time.

According to a recent Brookings Institution report, of all major metropolitan areas in the Intermountain West, Southern Nevada may be the community most at risk of depleting its supply of water.

This is not surprising given that from 2000 to 2007, the population of greater Las Vegas jumped an astounding 31 percent to more than 2 million, creating a spurt of economic prosperity while at the same time straining the area's limited water resources. It is estimated that by 2035, the greater Las Vegas area may have to conserve almost as much water as it currently uses just to meet demand.

The Brookings Institution report also indicates that the

Sinking water levels at Lake Mead illustrate the effects of drought in the West.

area will need to provide water for an additional 2.4 million people by 2040, a prediction that, if accurate, will require creative and collaborative water agreements and focused investments in research and data collection.

"The water issues facing Las Vegas are quite serious," says Robert Lang, non-resident senior fellow of the Brookings Institution's Metropolitan Policy Program. "University research is needed to tackle the technical and policy challenges of managing limited resources."

UNLV researchers are working to meet these challenges, according to Ron Smith, the university's vice president for research and dean of the Graduate College. He says research teams are addressing issues ranging from the effects of global climate change on water resources to the impact of invasive species on the lake's ecology.

"UNLV faculty and students are committed to researching issues that affect quality of life in our community, state, and the region," says Smith, who also heads the university's Office of Urban Sustainability Initiatives. "Water issues will certainly impact our entire region for generations to come, and our researchers are actively seeking to address the many challenges we face in this area."

All told, dozens of UNLV faculty in many academic fields are currently engaged in research on water issues. Below are several of the water-related research projects under way.

Shawn Gerstenberger

Professor, Environmental and Occupational Health; Executive Associate Dean, School of Community Health Sciences

Shawn Gerstenberger is leading a team of UNLV researchers and graduate students examining the ecological impact of environmental toxins and invasive species in Lakes Mead and Mohave.

Gerstenberger and his team are tracking sport-harvested fish in Lake Mead for mercury and other environmental contaminants for what may lead to the first-ever fish consumption advisories for the lake. His team is also actively testing what shad, the primary food source for the lake's game fish, are consuming. This will help lake managers determine how invasive species are displacing plankton, which could have implications for fish populations in Lake Mead.

Gerstenberger also developed the 100th Meridian Initiative in Nevada, a partnership with the U.S. Fish and Wildlife Service, to educate the general public about the dangers of invasive species in Lake Mead. A primary component of the initiative involves data collection and outreach for boaters who could unknowingly transport invasive species to lakes and rivers in the region.

David Wong

Associate Research Professor, School of Community Health Sciences and the Public Lands Institute

David Wong is one of the nation's leading experts on the ecological impact of invasive zebra and quagga mussels on freshwater ecosystems.

Wong, who holds a joint appointment in the UNLV School of Community Health Sciences and the Public Lands Institute, conducts research on how quagga mussels – first found in Lake Mead in early 2007 – are impacting the water quality, fisheries, and infrastructures in the lake.

According to Wong, Nevada's climate provides an ideal environment for quagga mussels to reproduce year-round, resulting in damage to Lake Mead's ecosystem and millions of dollars in annual maintenance costs on boats, marina structures, and water intake equipment that supplies drinking water to the Las Vegas community.

To combat this growing problem, Wong and a team of UNLV faculty and graduate students have teamed with government agencies, including the National Park Service, the Bureau of Reclamation, and others to form the Interagency Monitoring Action Plan. Through this coordinated effort, researchers can closely track the environmental impacts of quaggas and better understand how they affect water quality and food webs in Lakes Mead and Mohave.

William James Smith, Jr.

Assistant Professor, Environmental Studies

William James Smith, Jr. leads the policy and outreach component of a $15 million project that seeks to determine how climate change impacts not only the state's ecosystems and water resources, but also its diverse groups of stakeholders.

The project is being funded by a National Science Foundation grant awarded to UNLV and other Nevada System of Higher Education institutions.

In addition to collecting socio-economic data and developing modeling and visualization tools related to climate change in Nevada, Smith is tasked with making information on climate change understandable and accessible to researchers, students, decision makers, and the general public through creative outreach techniques.

He is also gathering input from stakeholder groups, such as the business community, Native Americans, nongovernmental organizations, and political entities, in order to share it with scientists. His goal in this part of the project is to help scientists understand their audiences more fully and help them communicate their research more strategically.

Smith also hopes to launch a project examining the potential for demand-side management of water to help sustain human and natural systems in the Lower Colorado River Basin.

Smith also conducts research on water issues in the Federated States of Micronesia, focusing on mapping, capacity building, watersheds, and biodiversity.

Thomas Piechota

Professor, Civil and Environmental Engineering; Director, Office of Sustainability and Multidisciplinary Research

Thomas Piechota tracks how climate change and large-scale climate variability phenomena like El Nino cycles influence regional water supply.

Piechota recently found that increasing temperatures in the Colorado River Basin over the past 55 years have changed the timing and magnitude of the region's streamflow. His research, which is funded by the National Science Foundation, revealed that streamflow is peaking earlier in the year each year now, creating challenges for water managers assessing resource availability. He is analyzing how this phenomenon is contributing to the current drought in the Southwest, which is the most severe in the region's nearly 100-year historical record.

Piechota is also working with the National Weather Service's River Forecast Center to improve the models used to manage water supply in the Colorado River Basin. By incorporating climate variability into the models, resource availability predictions will be more precise. More accurate modeling and climate forecasting contribute to a better understanding of the extent and cause of reductions in water supplies; this, in turn, enables urbanized areas to shift water demand strategies in response to limited supply.

Jaci Batista

Professor, Civil and Environmental Engineering

Jaci Batista leads a team of UNLV researchers working to help rid Las Vegas' water supply of environmental and

Shawn Gerstenberger, environmental and occupational health professor (left), and Jaci Batista, civil and environmental engineering professor

chemical contaminants.

Batista, who has received grant funding from the National Science Foundation and the U.S. Environmental Protection Agency, among other agencies, is researching many issues related to the quality of both wastewater and the municipal water supply.

She is developing techniques for the biological removal of phosphorous and nitrogen from wastewater flowing to Lake Mead; she also recently created a complete model of the fate and transport of the contaminant perchlorate through the Las Vegas Wash and into Lake Mead. The model has influenced environmental policy and has served as the basis for local clean-up efforts.

Batista, along with engineering professor Sajjad Ahmad, life sciences professor Dale Devitt, and graduate assistant Kamal Qaiser, is also developing an interactive water balance model for the Las Vegas valley that will provide extensive data on the transport of water from Lake Mead to Las Vegas. The model will track energy costs, water demand, and water supply for up to 50 years into the future and will facilitate water and wastewater resource planning.

Douglas Grant

Cord Foundation Professor of Law, Boyd School of Law

Douglas Grant examines water law issues and has written extensively on water resources law and water rights.

Grant recently authored an analysis of interim operating guidelines established by the Secretary of the Interior in 2007 to address water allocation in the seven Colorado River Basin states, including Nevada.

Western states are wrangling over their portions of the area's diminishing water supplies as never before, with myriad issues already arising as the states anticipate future water supply and demand conditions after the guidelines expire in 2026.

According to Grant, the Colorado River Basin states and their growing cities need to collaborate on advanced strategies to solve looming water shortages and consider reallocating water from agricultural to urban use.

Grant also studies different legal approaches that western states are taking in their management of ground and surface water sources that are situated in border areas and are shared by different states. Though Nevada has yet to experience many of the issues associated with management of groundwater, Grant says it is important to learn from successful regional approaches as local ground water needs may soon exceed supplies.

Dale Devitt

Professor, School of Life Sciences; Director, Center for Urban Horticulture and Water Conservation

Dale Devitt conducts research on ways that both residential and business consumers can make more efficient use of available water supplies.

For example, he examines the use of satellite irrigation controllers for residential landscape watering and works with golf courses in Southern Nevada as they transition to recycled water to meet their irrigation needs.

For the past five years, Devitt and his team have traced the impact of recycled water on soil-turfgrass systems, equipment, water features, and additional landscaping at nine local golf courses in various stages of recycled water adoption. Researchers have tested for salt buildup in soils and plants and found the recycled water to be an acceptable alternative to the municipal water traditionally used for golf course irrigation.

During the last four years, Devitt has also been involved in a large study to assess water consumption of native plant communities in remote basins in east central Nevada. Additionally, he and his colleagues at the Desert Research Institute are currently investigating the fate and transport of pharmaceuticals in turfgrass systems irrigated with recycled water.

Several UNLV astrophysics faculty members and students conduct research on enormous stellar explosions called gamma ray bursts (GRBs), such as the one depicted here in a NASA illustration. This GRB, which was detected March 19 in the constellation Bovtes by NASA's Swift satellite, was seen worldwide by observatories and even with the naked eye. Image by NASA/Swift/Mary Pat Hrybyk-Keith and John Jones

The Best *and* *The* Brightest

BY GIAN GALASSI

Of all the intellectual pursuits of our species, perhaps the most venerable is our quest to comprehend the cosmos and our place within it. For millennia, we have fixed our eyes on the stars as part of this quest. Though our gaze has become increasingly sophisticated in the past half century – with billions of dollars spent on powerful telescopes and other space exploration technologies – our wonder only seems to deepen with each new discovery, revealing just how far we have to go.

Yet, we continue the quest. Some of us reserve our stargazing for clear nights in our own backyards while others devote their entire careers to the endeavor. This is a story about a subset of the latter group of individuals – a small number of highly accomplished UNLV astrophysicists who have achieved remarkable status in the scientific community in a very short time.

You may not have heard of them, but that's about to change.

If we know anything about astronomy, it's that the brightest stars have a way of capturing our attention. Their energy and influence are undeniable.

Like their counterparts in the night sky, the stars of UNLV's astrophysics program are irrefutably brilliant and have gained the notice of scientists throughout the world.

Although they are small in number – five full-time faculty members and one part-time professor – and their program is relatively new, they have not escaped the eye of the National Science Foundation and NASA. Both agencies now actively fund the group's research and rely on their expertise to ensure mission success.

What's more, institutions around the country and the world are starting to take notice, too, not only because of the way in which UNLV has grown the program in recent years, but also because of the caliber of researchers who have chosen UNLV over more established programs.

In the Beginning

UNLV has offered astronomy courses for more than 30 years. The early astronomy faculty, including former professor Ed Grayzeck (who is largely credited with founding the astronomy program) conducted their research quietly and effectively and provided solid instruction in both physics and astronomy.

As the faculty and its achievements continued to grow over time, the small program began to receive noteworthy acclaim. In the mid-1990s, now-retired professor Donna Weistrop gained recognition for her work on NASA's Hubble Telescope. At the same time, professors Steve Lepp, George Rhee, and Diane Pyper Smith were building research programs of their own in molecular astrophysics, dark matter, and galaxy formation – strong research that continues today.

If the astronomy group needed validation of how well-respected their program had become, it arrived in 2004. After soliciting applications to fill a position vacated by Weistrop's retirement, the group was overwhelmed by the quantity and quality of candidates.

"We had a remarkable pool of applicants," says Rhee, an associate professor of astrophysics who chaired the search committee. "Although Bing Zhang was the obvious choice, we could have thrown darts at our list of top 10 applicants and come away with a top-notch individual. It was that good."

Hiring Bing Zhang was nothing short of a coup. He arrived at UNLV with a superb resume citing a host of impressive accomplishments, including a distinguished record of research success at NASA's Goddard Space Flight Center and Penn State University, both considered bastions of astrophysics research.

It was while working at Penn State that Zhang became a member of the NASA SWIFT Team – a collaborative group of scientists that oversees the first-of-its-kind multi-wavelength observatory dedicated to the study of gamma ray bursts (GRBs).

Zhang has since become one of the most well-known researchers on the topic of GRBs – considered the most brilliant explosions in the universe – and continues to publish on research that advances knowledge about dying stars.

Then, in 2005, a paper on which he collaborated with his SWIFT colleagues was ranked by *Science* magazine as one of the most important scientific breakthroughs of the year. Later that same year, Zhang's GRB group at UNLV was the first to identify five major components of GRBs, an accomplishment that he ranks among his proudest at UNLV.

But Zhang was only getting started. In 2006, he wrote a column for *Nature* magazine in which he redefined how astrophysicists should classify GRBs. Shortly thereafter, *Essential Science Indicators*, a publication that compiles science performance statistics, identified Zhang as one of the most widely cited authors in the field of space science for an article he authored in *The Astrophysical Journal*.

In 2007, the High Energy Astrophysics Division of the American Astronomical Society awarded Zhang and the rest of the SWIFT team the Bruno Rossi Prize for major contributions to the field of astrophysics.

"There is a very supportive research environment at UNLV," Zhang says of his colleagues in the physics and astronomy program. "And, in terms of creativity, our group has now surpassed some of the higher-ranked institutions in terms of research activity."

This growth in activity can, in part, be attributed to Zhang, but it also mirrors the expansion of the program, which included the hiring of acclaimed young researchers Daniel Proga in 2005 and Kentaro Nagamine in 2006.

"We knew that if we could attract that same caliber of candidates as we did with Bing that we should go for it," says professor Steve Lepp. "Injecting three young researchers into a program of our size really raised the bar. While we may not be the size of larger, more well-known programs, we are incredibly active. People in this field are taking notice that UNLV is a place where things are really happening."

The Nevada System of Higher Education took notice as well. New master's and doctoral degree programs in astronomy were approved, and a name change for the department – now called

A small number of highly accomplished astrophysicists have achieved remarkable status in the scientific community in a very short time.

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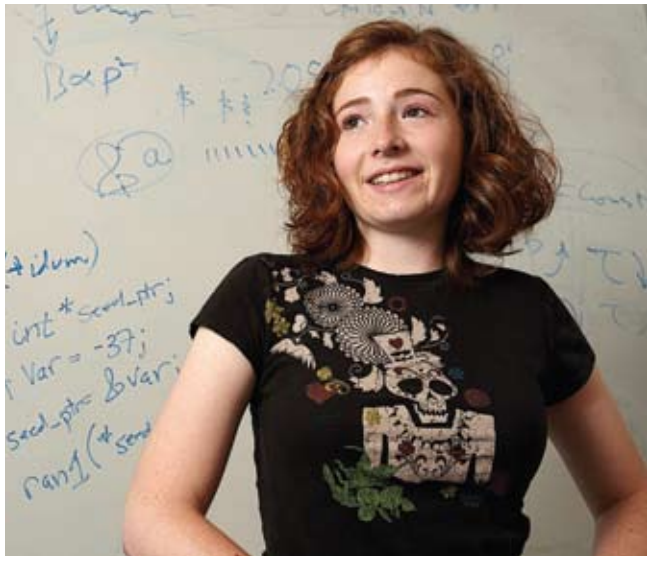

Clockwise from bottom left: Physics and astronomy professors Steve Lepp, Diane Smith and George Rhee, and astrophysics student Tesla Birnbaum.

the UNLV Department of Physics and Astronomy – reflected the mounting prestige of the faculty and the growing interest in the discipline from undergraduate and graduate students alike.

A New Generation of Stars

In 2004, Tesla Birnbaum was a precocious high school freshman, raised on Carl Sagan books and the PBS series *NOVA*, when she contacted Bing Zhang. She was interested, she told him, in becoming an astrophysicist and asked his advice about which universities she should consider. He recommended UNLV's growing program and provided the names of several other institutions well known for astronomy research. She explored his leads thoroughly; shortly after her high school graduation, Birnbaum, a National Merit Scholarship finalist and high school valedictorian, enrolled at UNLV.

"Three years after she initially contacted me, she showed up at my door and said, 'I'm here, and I want to work with you,'" Zhang recalls. "I told her that was great, and she has turned out to be an excellent student."

Birnbaum chose UNLV because of the research opportunities available to her right out of high school; most astronomy students must wait for graduate school for such opportunities.

"I got the feeling from touring other institutions that there

GERI KODEY

was not a lot of focus on the students," Birnbaum recalls. "UNLV has a much smaller program, but the faculty have so much research going on, and they involve students every step of the way. I think that really works to their advantage ... and mine."

Birnbaum has already participated in the National Science Foundation's Undergraduate Research Opportunities Program, where she studied the afterglows of GRBs with Zhang. She is also one of two undergraduate members of his GRB group, where she works as part of an international team of post-doctoral fellows, research associates, graduate students, and visiting scholars from the U.S., China, Poland, and India.

UNLV doctoral candidate Amanda Maxham knows how important experiences like Birnbaum's are for undergraduates. Maxham earned dual bachelor's degrees in physics and astronomy, as well as a master's degree in astronomy, all from much larger, better-known universities. But it wasn't until she arrived to pursue her doctoral degree at UNLV that she realized what she'd been missing.

"UNLV has provided me with a completely different perspective than I had as a student at my previous schools," says Maxham, who also works closely with Zhang. "I am treated with a level of respect here that I don't think you can expect at bigger universities. The faculty here really value students' opinions, which is more conducive, I believe, to having a creative research program and for generating new ideas."

Arriving in 2005, Maxham has seen firsthand how the program's growth has benefited students directly. She says astronomy student activities have increased dramatically, citing as examples the creation of the unit's active Journal Club, a group of faculty and students who meet weekly to discuss the latest research publications, and Astro Coffee, a more informal gathering designed to spark discussion about the discipline.

Maxham, Birnbaum, and their peers agree that the supportive and friendly environment within the department facilitates serious academic accomplishment and encourages professional success among students.

"To think that I can make even a small contribution to the body of knowledge in astronomy is really exciting," says Birnbaum. "And it's very rewarding to help answer questions that humans have always had about where we live and how we fit into the universe."

Down to Earth

College of Sciences Interim Dean Wanda Taylor couldn't be happier with the success of the astrophysics program.

"This group is one of several on campus that are putting UNLV on the map in the world of research," Taylor says. "The acknowledgement they've received in the scientific community has a wonderful impact on our recruitment efforts as well as our academic reputation."

While she acknowledges that subject matter such as black holes, dark matter, or the afterglows of gamma ray bursts may seem far removed from today's most pressing earthly

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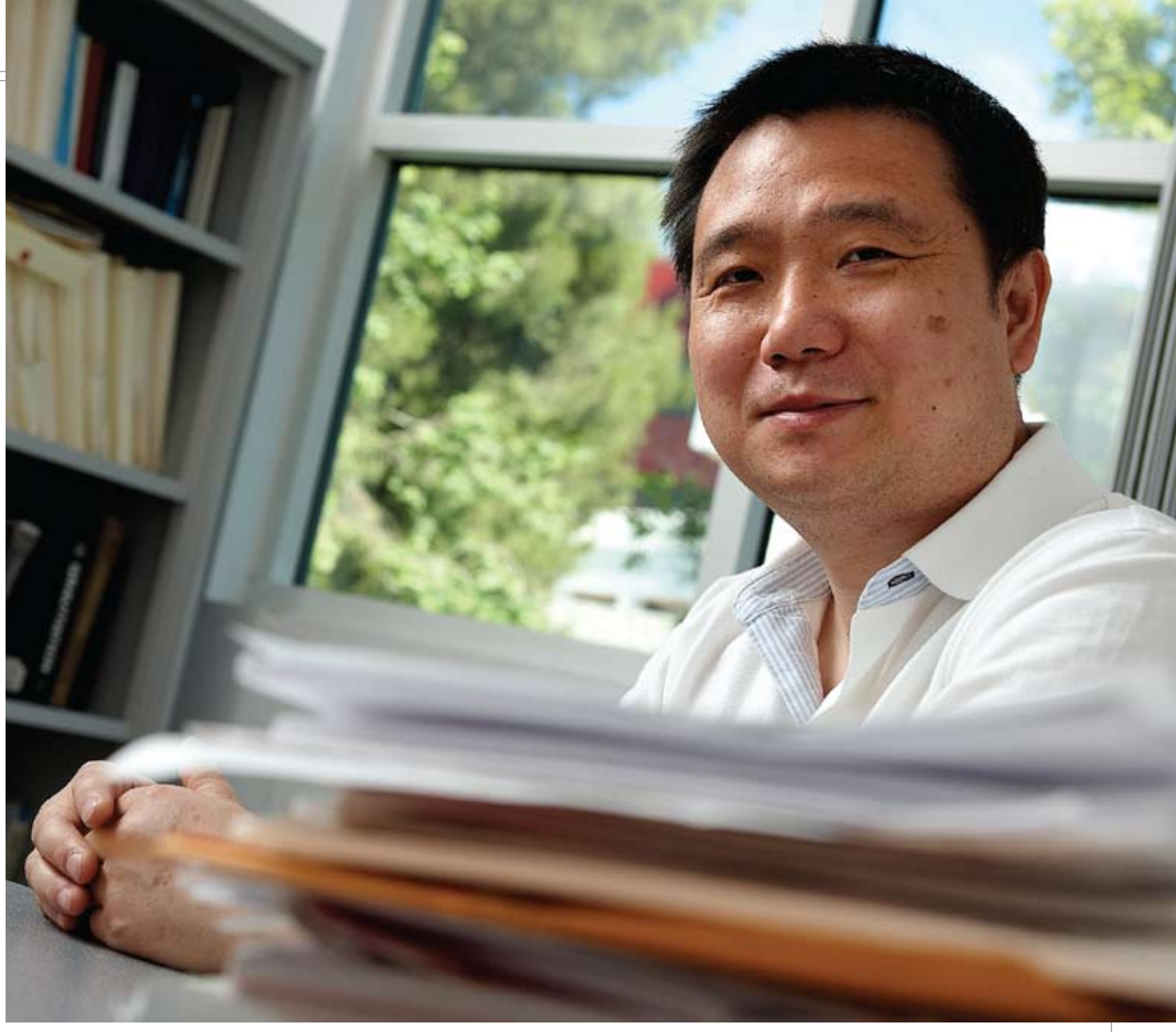


R. MARSH STARKS

Astrophysics professors Kentaro Nagamine (far left, facing page) and Daniel Proga (left) joined the UNLV faculty shortly after Bing Zhang (above).

concerns, Taylor says she still believes in the commitment to discovery that guides university research.

"Pure research can and does create the foundation upon which all other 'applied' research builds," Taylor notes. "The innovations born out of pure research could very well create principles or inventions that we'll need down the road, whether it's in 20 minutes or 100 years from now."

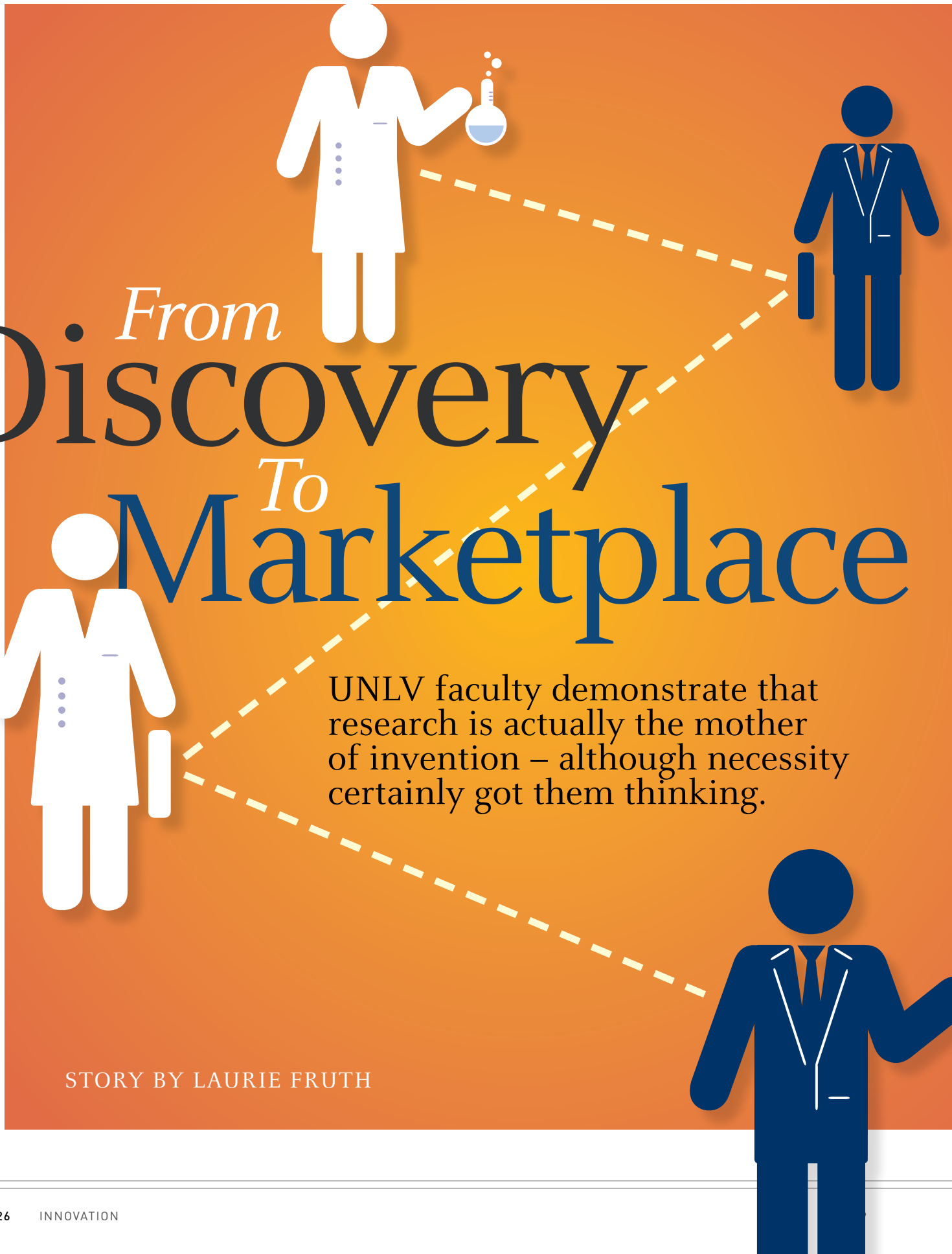
Take, for example, a lesson from the past: Four hundred years ago, the first telescope was used by Galileo to begin exploring the heavens. This led to discoveries of vast consequence, but no one at the time had the remotest understanding of their significance. Yet, the sum of all knowledge of the cosmos rests on the foundation of one man's decision to turn a then-newly devised invention to look at the night sky.

This fact is not lost on astronomy faculty members like George Rhee.

"We don't necessarily remember who the local tradesmen were in Florence at that time, but we do remember that there was someone there who did something remarkable – something that is remembered and celebrated 400 years later," says Rhee. "These types of discoveries – some of which may be made right here at UNLV – resonate with people. Down the road, people may ask, 'How did we find out about this or that?' Well, maybe the answer will be that Zhang or Nagamine or Lepp or Proga did something remarkable, too."

While such acknowledgement would clearly be a welcome byproduct of their research, this stellar team of UNLV astrophysicists clearly didn't enter the discipline to make headlines – even if they happen to do so along the way.

"It's a natural human desire to learn about the universe," says Nagamine. "People have been asking these questions since ancient times. We are just beginning to find answers, so it is important that we continue the search and continue to educate the next generation of scholars who will carry on."



From Discovery *To* Marketplace

UNLV faculty demonstrate that research is actually the mother of invention – although necessity certainly got them thinking.

STORY BY LAURIE FRUTH

UNLV researchers are developing innovations that can help solve real-life problems, and the university is working to help them bring these discoveries to the marketplace.

"There is a great deal of opportunity here," says Ron Smith, vice president for research and dean of the Graduate College. "UNLV faculty have some wonderful ideas for inventions. Our job is to help them see the commercialization potential of their discoveries and to make companies aware of the work that they are doing."

The university is seeking to connect faculty with private-sector partners who may be interested in obtaining the licensing rights to these discoveries. Licensing a patented invention or process to a company for commercialization is the traditional way to move technology from the lab to the marketplace. Another way to successfully commercialize a new invention is through the creation of a spin-off company.

Through either scenario, the faculty member, the university, and their private-sector partners can realize benefits.

"This process is advantageous not only for the faculty member, but also for the university; if successful, such innovations could produce significant revenue to all involved, including the institution," Smith says.

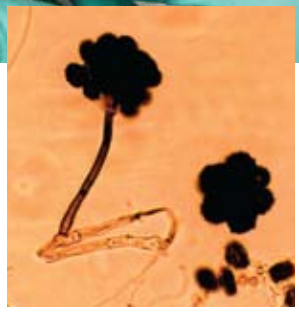
Many UNLV faculty members have produced intellectual property with great commercialization potential and are searching for the right private industry representatives to explore partnership opportunities. Here are just a few of these projects.

Speeding the Mold Detection Process

Patricia Cruz spends her days looking at organisms that the rest of us try to avoid.

An expert in molds, Cruz conducts research on *Stachybotrys chartarum* – a black mold that thrives in damp or water damaged environments. It poses potentially serious health risks to occupants in contaminated buildings.

R. MARSH STARKS



Researcher Patricia Cruz has developed a new process to detect mold in buildings. At right, a magnified image of spores and a spore-bearing structure from the *Stachybotrys chartarum* mold.

The risks from exposure to *Stachybotrys chartarum* spores can be mitigated by early detection and eradication. But current methods to identify the mold are time-consuming and require special expertise.

"Say, for example, that someone suspects this mold exists in a school building," Cruz explains. "A sample is obtained and is taken to a lab to grow. But many molds don't like to grow in the laboratory, and even when we can get them to grow on an agar plate, it may take up to 10 days to produce a large enough colony to identify."

What was needed was a faster way to detect the presence of a mold in a particular sample. So Cruz and her colleagues in the Harry Reid Center for Environmental Studies developed specific polymerase chain reaction (PCR) tests

to detect *Stachybotrys chartarum* and two other molds quickly and definitively.

PCR is a method used by scientists to amplify small pieces of genetic material from a particular sample. All organisms, including microorganisms, contain genetic material unique to that organism. Much like a photocopier, the PCR process copies this unique piece of genetic material millions of times.

"Once the target DNA has been amplified, scientists can identify the organism," Cruz says.

But for PCR to be useful, the scientist must be certain that the genetic sequence copied is unique to the target organism in question. And this is where the real work began.

With help from her colleague Mark Buttner, Cruz identified the unique bits of DNA that distinguish *Stachybotrys chartarum* from all other organisms and developed a testing method to detect it. The test could be used by laboratories to quickly identify this particular mold.

"The lab would no longer need to grow a mold colony," Cruz says. "They could simply extract the DNA out of the spores, do the PCR test, and know by the end of the day if the organism was present and in what amount."

Because the invention has been patented, commercial or clinical laboratories that are interested in using the invention are invited to enter into a license agreement with UNLV. A patent for detecting a second mold, *Aspergillus fumigatus*, is being pursued, and Cruz hopes to license the PCR process for detection of this mold as well.

Cruz says the *Aspergillus fumigatus* mold is particularly problematic for individuals with compromised immune systems, such as burn victims or cancer patients.

"Burn units in hospitals do everything they can to eliminate this organism. Identifying this organism quickly may prevent some of the serious infections that result from exposure," Cruz says.

AARON MAYES

Engineering professor Biswajit "BJ" Das conducts research on processes through which nanoscale particles, tubes, and wires may be standardized and mass-produced. At right, the magnified carbon nanoropes and nanotubes seen here are produced in Das' laboratory. The widest nanorope shown has a width of about 0.4 microns; a sheet of paper is about 100 microns thick.

Combating Identity Theft

Law enforcement officials may soon have better ways to detect stolen credit card information and verify identity, thanks to a series of innovations developed by UNLV researchers.

These innovations, known as CardSleuth, are the product of a dynamic partnership between Hal Berghel, director of UNLV's School of Informatics, and the Las Vegas Metropolitan Police Department.

Berghel says the idea for the innovations was born in 2003 when Metro police officers arrested several suspects with large numbers of hotel room keys in their possession.

Then-Metro Deputy Chief Dennis Cobb, a UNLV alumnus, brought the room keys to Berghel, who confirmed that the magnetic stripes on the keys held large amounts of stolen digital credit and debit card information. Cobb then asked Berghel to develop a portable device that officers could use in the field to verify the existence of such information on plastic cards, such as hotel keys or casino player cards.

A partnership grew out of Cobb's inquiry. UNLV's School of Informatics soon teamed with the Las Vegas Metropolitan Police Department to establish the Identity Theft and Financial Fraud Research and Operations Center. CardSleuth 1.0, the aforementioned portable device, was the first invention to come from the newly established center.

"Had Dennis not brought the idea to us, we would never have come up with CardSleuth. Academics don't think like criminals, and law enforcement can't design computer equipment," Berghel says. "The magic in this project is that law enforcement can bring a problem to the university, and the team immediately starts working on a technical solution tailored to the crime."

UNLV filed for a provisional patent on CardSlueuth in 2005. Since then the center has focused its efforts on developing other innovations, including credentialing technology that incorporates biometrics, encryption, holograms, digital photography, and a host of other features into a single, secure form of identification.

Several other patents have been pursued since CardSleuth 1.0, and the technology has garnered private-sector interest. Berghel says he will continue to work collaboratively with Metro to stay one step ahead of the criminals.

"It's the uncertainty of what technology criminals will use next that provides the thrill in this line of research," he says.

Manufacturing Nanotechnology

For UNLV engineering professor Biswajit "BJ" Das, creating nanotechnology in the laboratory is not enough.

For the world to reap the benefits of such technology, he believes private industry must be able to manufacture nanoscale structures in much greater numbers.

"Nanotechnology" is a term now commonly used to describe engineering performed at the molecular level. Currently, the tiny particles and structures considered nanotechnology – some of which are 100,000 times smaller than the thickness of a sheet of paper – are produced in the laboratory environment under the supervision of researchers and their graduate students.

However, patent applications are being pursued on a series of processes through which useful nanoscale particles, tubes, and wires can be standardized and mass produced, effectively lowering cost and increasing their availability. The goal, he says, is moving production of these structures from the laboratory to the factory.

With these processes, Das envisions a variety of applications, including improvements to solar power technology, electronic circuitry, and computer memory. He is also seeking a way to make carbon nanotubes more uniform, which will facilitate their use in biomedical applications.

These tiny component parts of equipment can achieve the same functions as larger components, but in a drastically smaller space. The possible applications seem endless.

"Nanotechnology can impact every facet of our lives," Das says. "In the next 10 years, we will see the biomedical industry directly affected by nanotechnology. And nanotechnology will have an even greater impact on the electronics industry, which reinvents itself constantly."

In fields such as electronics – where miniaturization of components has become de rigueur – nanotechnology applications are already being developed. But researchers have lacked a way to create uniform structures. When nanoscale structures are all the same size and length, they become more efficient and easier to use in applications. Enter Das and his team.

"We're engineering the catalyst to make more controlled nanostructures," says Das. "What people don't realize is that making the nano is only a small part of it. It has to fit in the whole chain – not the other way around."

Das hopes that rights to his processes will be acquired by a private-sector partner that will move nanotechnology into the marketplace on a much wider scale.

"There's so much potential," Das says. "What drives me now is the desire to see something that I developed become a real product."

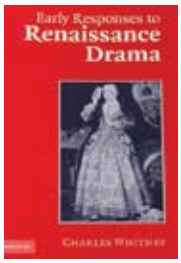
Afsha Bawany contributed to the reporting of this story.

For more information about UNLV faculty research with commercialization potential, call (702) 895-5082.

In Print

Renaissance drama, the history of gambling, and more capture the scholarly interest of faculty authors.

STORY BY BARBARA CLOUD
PHOTOGRAPHY BY R. MARSH STARKS



Early Responses to Renaissance Drama
By Charles Whitney
Cambridge University Press, 2006

If researchers want to know what contemporary theatre audience members think of a play, they can simply ask them – usually through a survey or a personal interview.

Or, better yet, they can look at ticket sales.

But for scholars seeking to understand the thinking of audiences long dead, the challenges are, well, a bit more daunting.

It takes the resourcefulness of a scholar like UNLV English professor Charles Whitney to sort through archives to find pertinent materials, interpret their meaning, and reconstruct the responses of those who attended plays more than 400 years ago.

Whitney's clever approach to the subject is observed in his award-winning book, *Early Responses to Renaissance Drama.* The book has been called "remarkable" and "brilliant" for its success in uncovering the thoughts of those – including the "ordinary" people – who attended Shakespeare's plays in the 16th century. The book has been awarded the 2008 Elizabeth Dietz Memorial Prize from *Studies in English Literature 1500-1900* for the best book in early modern studies.

Whitney says the impetus for *Early Responses* dates back some two decades, before his 1988 arrival at UNLV. He had decided he wanted to write a book on English

Renaissance drama because, "It was at the center of exciting new movements in literary studies." But, he notes, he was a latecomer to the study of drama and felt that he needed a previously unused approach.

"Eventually, I realized there was a lot written on how people had responded to and interpreted Renaissance drama through the later centuries, but no one had written on responses during the period of the Renaissance itself," he recalls. "No one thought there was enough evidence around to know how the earliest audiences responded. Yet, the earliest group was the most important because the plays were written for it."

"I was attracted to the challenge of this project because it required thinking outside the box," he continues. "I loved the idea of trying to turn things upside-down by showing how the experiences of ordinary people could be as interesting in their own ways as the work of the Bard."

During the 11 years or so after deciding on his focus, Whitney traveled to England to examine historical documents in the British Library and the archives of craft guilds around London. He also visited the Huntington Library in southern California, which has a huge collection of rare books from the Renaissance.

"I met many fascinating people who had been dead for hundreds of years until we brought them to life through research, imagination, and writing," he says.

He "met" these people when he delved into a treasure trove of commentary in letters, diaries, pamphlets, poetry, and other materials; some of these materials have been published since they were written hundreds of years ago, but others were originals found in dusty archives.

As for his findings, Whitney discovered that the "earliest audience members of Renaissance drama weren't polite and respectful."

"They appropriated what they saw or read to suit their own purposes, creating their own interpretations of Shakespeare's work and that of his worthy contemporaries, Christopher Marlowe and Ben Jonson," Whitney says.

Charles Whitney
English Professor

The earliest audiences included a considerable number of women, and Whitney deals with both gentlewomen's and street vendors' reactions to the plays. Acknowledging that the sources of some responses attributed to women "are not unimpeachable," he offers convincing reasons for accepting them in the book.

Today, Whitney continues to explore the implications of his work by examining the artistic goals of Renaissance playwrights, which, he asserts, seem to be different from those of today's playwrights. "Renaissance playwrights seem to have deliberately provided material for audiences to re-work," he notes.

He is also taking a thematic approach to the subject of Renaissance drama, "working with religious responses and what they imply about understanding plays such as *King Lear*."

He is also developing a new area of research in the growing field of "ecocriticism" in order to study early literary representations of the natural world through the lens of today's perspective.

Prison City: Life with the Death Penalty in Huntsville, Texas
By Ruth Massingill and Ardyth Broadrick Sohn
Peter Lang, 2007

When Ardyth Broadrick Sohn moved to Huntsville, Texas, in 2000 to serve as an endowed scholar at the university located there, she was fascinated by the campus's proximity to the nearby prison.

It was four blocks away from Texas' infamous "Huntsville Unit" prison facility, where, at one time, more legal executions took place than in any other location in the world.

"When I arrived, I was astounded that I seemed to be the only one on campus who would pause when the whistles blew to count the inmates," recalls Sohn, now the director of the Hank Greenspun School of Journalism and Media Studies. She was surprised at how little attention the prison seemed to garner from her colleagues.

"I knew that the prison and the university [Sam Houston State University] were both important to the economy of the town of Huntsville. Beyond that, I didn't see more than a superficial relationship between the town, the university community, and the prison – at least initially."

As time went on, however, Sohn realized that she was wrong.

"There was actually a great deal of interaction between all these entities," says Sohn, who immediately recognized the potential for research on this subject. "As we began to explore the fabric of the community, we learned just how complex that relationship is."

Sohn was joined in her research by Ruth Massingill, a native Texan and a communication department colleague at the time. The two began interviewing Huntsville residents with the help of communication students.

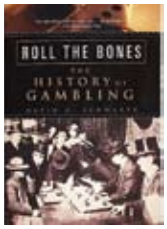
Through their research, Sohn and her team learned of some fascinating connections between locals and the prison. They met a criminal justice professor who opposes capital punishment and, thus, keeps public vigil outside the death house for every execution. They interviewed faculty members who teach courses to prisoners as part of their service to the community, as well as students who work as guards or support staff at the prison to pay for college.

They also talked with residents who would host members of the victims' families – as well as the families of those being executed – during the week preceding each execution.

"Town leaders, including the former warden, who now runs the new prison museum, are thoughtful, pragmatic individuals who are well aware of the role their community plays in Texas criminal justice," Sohn notes.

Sohn and her colleague also examined media interaction at the prison. Members of the community frequently encountered "outsiders" – including some very hostile international or national reporters – visiting town for "an insultingly quick take" on the Huntsville Unit prison and the surrounding community.

"The research took me on a journey that tested cultural boundaries," Sohn says. "We began the book wondering how this town could so comfortably coexist with the prison, given its reputation and activities. Our research led us to a much greater understanding of how these people have adapted to what is essentially the primary industry in their community. It has implications for all communities, particularly those where prisons reside."



Roll the Bones: The History of Gambling
By David G. Schwartz
Gotham Books, 2006

In his third book, *Roll the Bones*, David Schwartz offers a comprehensive exploration of the history of gambling – from its most primitive forms to today's high-tech world of high rolling.

Schwartz, director of the Center for Gaming Research, previously examined Las Vegas as the modern mecca for gambling in *Suburban Xanadu: The Casino Resort on the Las Vegas Strip and Beyond* (2003). Later, he analyzed the newest – and most far-reaching – venue for gambling in *Cutting the Wire: Gaming Prohibition and the Internet* (2005).

In *Roll the Bones* he takes a comprehensive look at his subject, going back – way back – to pre-Christian times when priests "rolled the bones" to foretell the future and when hunters did so, perhaps, to divide up the results of the hunt.

One of Schwartz's first orders of business in the book is to explain the origin of the term "bones": The earliest dice were made from the astragalus, a bone found in the ankle of hoofed animals; it could be thrown to produce a more or less random result, similar to dice of today. Schwartz cautions, however, that, "Modern-day craps players bear little resemblance to Sumerian priests 'rolling the bones' for hopeful supplicants."

Schwartz's book covers a wide range of topics associated with gambling, including cheating, lotteries, and the 16th-century origins of the science of gambling.

Schwartz conducted much of his research at UNLV's Center for Gaming Research, located in Lied Library's special collections department. The department possesses an outstanding collection of works on gambling from which Schwartz gathered information as he traced gambling activity through the millennia.

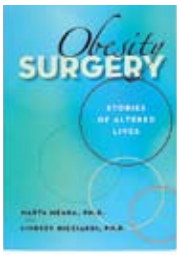
But Schwartz pursued his topic at other locations as well, including the Library of Congress in Washington, D.C., casinos in Macau, and the Wynn Las Vegas Resort and Country Club.

Las Vegas figures prominently in the book's 592 pages, which cover such diverse topics as the poor ventilation in a Macau casino to the latest technologies employed in Las Vegas megaresorts.

The final section of the book focuses on Steve Wynn's achievements on the Las Vegas Strip, including the Mirage, which opened in 1989 and his opening of the Wynn.

Schwartz recalled that during his tour of the Wynn Resort on opening night in 2005, he saw elements of décor from virtually every period and location he had discussed in his history of gambling. "That one casino," he says in the book, "had in its DNA the entire history of gambling."

Schwartz's research on gambling continues with his current project, a biography of Jay Sarno, the man who built Caesar's Palace and Circus Circus, thus introducing themed casinos to Las Vegas.



Obesity Surgery: Stories of Altered Lives
By Marta Meana and Lindsey Ricciardi
University of Nevada Press, 2008

It started as a graduate student's thesis project.

UNLV psychology professor Marta Meana was serving as faculty mentor to master's student Lindsey Ricciardi, who was conducting her thesis research on the psychosocial impact of dramatic weight loss through gastric bypass surgery.

"A colleague of ours had told us that there was a gastric

bypass surgeon in town who was very interested in the psychological impact of the surgery as well as the ways in which psychological factors impeded or facilitated progress after surgery," Meana says.

When contacted by the psychologists, the surgeon, Dr. Barry Fisher, immediately agreed to cooperate, so Meana and Ricciardi decided to attend a workshop he offers to prospective patients.

"We were fascinated by the topic and by the people we heard speak at that workshop," Meana recalls. "We wanted to know how the lives of people who had been morbidly obese changed when they lost vast amounts of weight. We approached Dr. Fisher about the idea of interviewing his patients, and he was extremely cooperative."

Six years later, the resulting book provides valuable insight into the psychological complexities that accompany profound weight loss.

"We went looking for a story about losing weight and found a story about finding self – a story about what happens when you get rid of the one thing you are convinced is standing between you and your dreams," the two authors wrote in the introduction.

The psychologists suspected that the weight loss "would involve a cascade of other effects that would seriously alter the system that had been their interpersonal lives."

Indeed, they found extensive changes and complicated stories in the interviews they conducted with 33 patients. Ricciardi's master's thesis, which was based on the interviews, resulted in two scholarly publications reporting the findings.

"However," Meana says, "we felt that the richness of the patients' narratives were lost in these articles, which were by necessity rather short." The authors also realized that the general public probably would not access articles in scholarly journals.

"We wanted the stories we had heard to have a broader audience of individuals going through the surgery or the decision process, as well as individuals who counsel these patients," Meana says, noting that writing a book was a natural choice.

Most of the interview subjects were women, Meana says, adding that the preoperative weight averaged 372 pounds; three individuals weighed more than 500 pounds before the surgery. The majority of the interviews were conducted within three years of the surgery.

The interviews tended to focus on the patients' changes in self-image and in interpersonal relationships, especially with family and friends. The interviewees described their lives before the surgery and explained why they decided to have the procedure.

The excessive weight they had previously carried often prevented the individuals from participating in activities that many people take for granted. One woman told the researchers that after the weight loss she could finally show her 10-year-old daughter how to properly shampoo her hair. "I've had to backtrack a lot and teach them," she told the researchers.

Marta Meana
Psychology Professor

Health changes made by parents also influenced their children's health habits. Prior to the weight loss, many obese parents felt they set a poor example for their children.

"I'm teaching my children a different way of eating," one said. "My children got involved in caring for me after the surgery," said another, "and it has also made them more health conscious."

Several patients told the researchers that after years of being invisible to salesclerks and others, they wondered why they had been ignored. One woman said, "People looked past me before. I don't know why. I don't even know if I'd call it discrimination. I don't know how at 290 [pounds] I could have been invisible. But I was."

Women patients who had been tolerating unsupportive, sometimes alcoholic husbands gained a new and stronger sense of self that gave them the confidence to be more independent – so independent, in fact, that they sometimes filed for divorce.

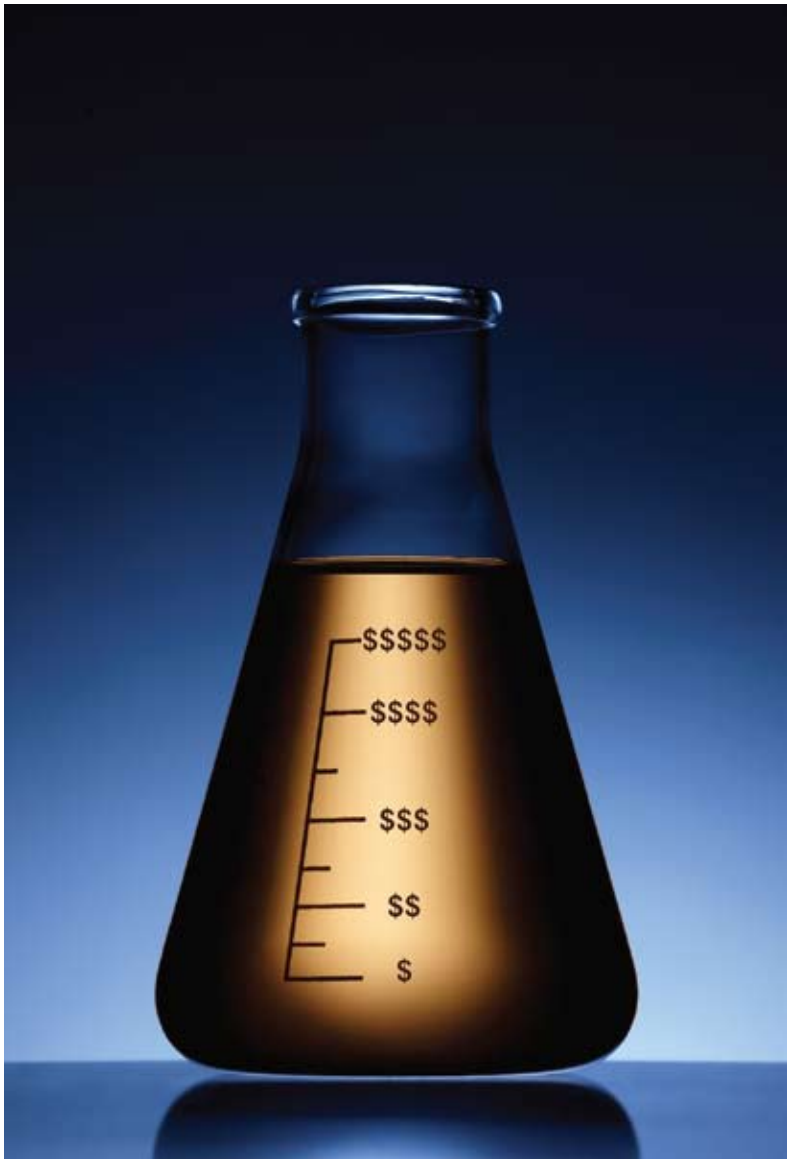
Yet, a few said they still felt like the fat person they had been, despite the new image in the mirror.

After completing her master's degree, Ricciardi went on to complete her Ph.D. in 2005 under Meana's mentorship; today, she provides clinical services to individuals struggling with eating disorders. Meana's current research focuses on female sexuality and sexual dysfunction. Both say they hope that their book will be helpful to those considering gastric bypass surgery in the future.

Research Dollars and Sense

Why embrace research during tough economic times?

ESSAY BY SUZAN DIBELLA
PHOTOILLUSTRATION BY R. MARSH STARKS



As public universities across the country face budget constraints produced by the nation's recession, many are hoping to strengthen their research endeavor as a way to build support for their programs while helping to bolster their states' economies.

Research, after all, not only produces a revenue stream in the form of millions of dollars awarded to universities in grant funding each year. It also offers the very real and lucrative prospect of business partnerships emanating from discoveries produced by researchers. (More discussion of these benefits is offered in a related article on technology transfer on page 26 of this issue as well as later in this piece.)

The choice to build research during difficult economic times like these, however, may not be so obvious to some. This may be attributable in part to a misunderstanding of the nature of research and what it seeks to accomplish. Research is sometimes viewed as the icing on the cake of academe – an activity that competes with teaching, that cloisters the faculty away in corners inaccessible to students. Nothing could be further from the truth.

In the higher education community, research *is* education. Large numbers of both undergraduate and graduate students participate in research at UNLV. Their research experience provides them

with tremendous benefits: They learn the process of creating new knowledge and acquire valuable skills while doing so. This prepares students for sophisticated jobs after graduation and helps them learn effective approaches to problem solving. As a result, research-based educational programs produce a well-educated workforce – an attractive commodity to businesses eyeing Las Vegas as a prospective location for their new ventures.

For the faculty, research is an integral component of their professional lives. If for some reason research were not part of the mission of UNLV, many members of the faculty would likely maintain a personal commitment to the pursuit anyway. In truth, research is so woven into the fabric of academe that it would be virtually impossible (not to mention undesirable) to unravel it. To grasp this more fully, we must understand the roots of scholarly orientation among faculty.

Through their own education, faculty are imbued with a sense of responsibility for the discovery of new knowledge. Research is revered in higher education, in part, because of this. The theory is that many people can teach what other scholars have learned, but it takes a rare individual who can discover that which is completely new and then pass it along to others.

Perhaps for this reason, research is considered the cornerstone of a university's reputation. It is the yardstick by which academic quality is measured. As we so often remind our key constituencies, if UNLV seeks to continue building its prestige throughout the nation and the world, enhancing its research endeavor is the right course of action to take.

One might speculate that it is because research is so venerated that its economic value is not widely discussed or understood. After all, it seems a bit petty to talk hard dollars and cents while in the same breath discussing the lofty goal of discovery. Yet, in times of economic hardship like these, it does not seem poor form at all to note the economic benefits of research activity. Thus, it should be welcome news to all that UNLV faculty and staff have received approximately $300 million in research funding in the last five years, plus nearly $145 million dedicated to other types of sponsored projects. These funds are used to buy equipment, to build laboratories, to hire student assistants and staff, and to address some of our community's most pressing problems. A significant portion of this funding is poured into our state's economy through jobs created and services rendered.

Meanwhile, many of the research projects under way at UNLV produce valuable intellectual property that may be licensed to businesses for a fee. Called "technology transfer," this process seeks to move innovations – in the form of inventions, drugs, or processes – into the marketplace. Universities all over the country have benefited from this commercialization process, which produces revenue for the institutions and creates a climate that invites high-tech industry into their communities.

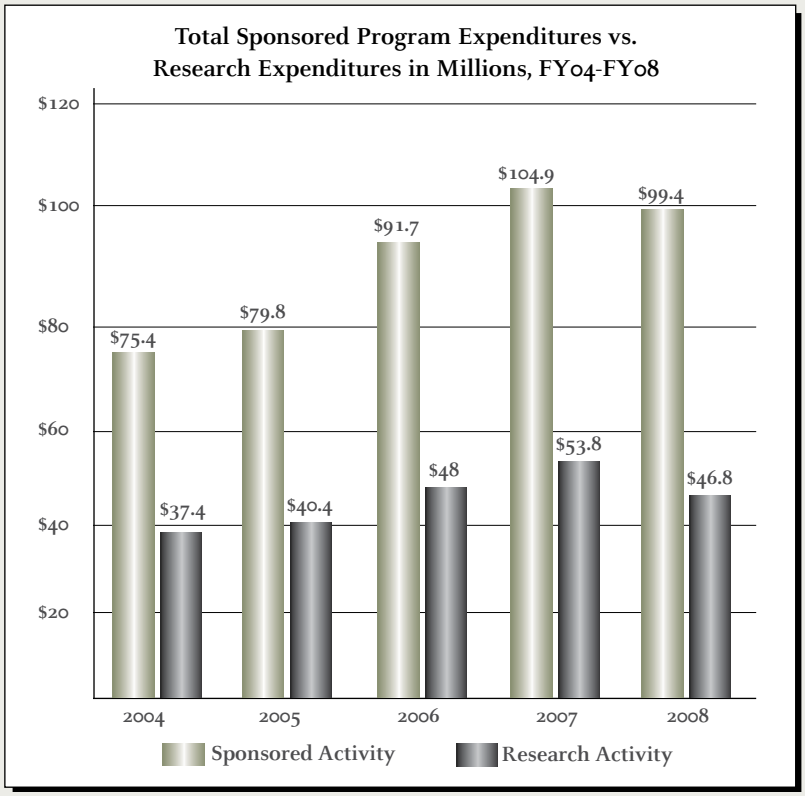
And all of these benefits say nothing of the improvements to the quality of life that result from the study of myriad community issues by researchers or the enhancements to the intellectual life of the community that research brings.

Thus, as we seek to address the many challenges facing our state, we may wish to look to research as an investment, not a cost. In a state that prides itself on practicality and in a city known for its diversions rather than its science, research may seem an unlikely panacea for our woes – economic and otherwise. Yet, it may just be the best remedy we can imagine.

Interested to hear what UNLV faculty say about research? Go to http://research.unlv.edu/voices.

Research-based educational programs produce a well-educated workforce – an attractive commodity to businesses.

Research Report UNLV Highlights



Sponsored program funding serves as one indication of research growth and sophistication

UNLV is a doctoral-degree-granting institution with more than 28,000 students, approximately 6,500 of whom are graduate/professional students. The university is ranked in the category of "high research activity" by the Carnegie Foundation for the Advancement of Teaching. Nearly 120 graduate degree programs are offered, including 38 doctoral and professional degrees. UNLV offers a broad range of respected academic programs and is increasingly recognized as a premier metropolitan research university.

Awards

In FY2009, UNLV received approximately $76.5 million in external award funding with nearly $40.1 million supporting research, including significant support from a number of federal agencies:

Dept. of Energy–$12.3 million
Dept. of Education–$9.0 million
Dept. of Interior–$4.8 million
Dept. of Agriculture–$3.3 million
Dept. of Defense–$2.7 million

Top Five Academic Areas Receiving Research-Related Award Funding in FY2009

Sciences–$11.5 million
Engineering–$9.7 million
Harry Reid Center for Environmental Studies–$7.7 million
Education–$7.0 million
Research and Graduate Studies–$5.7 million

Award Funding By Sponsor Type in FY2009

Federal–$55.7 million
Federal Pass Through–$15.2 million
State–$2.8 million
Foundation/Corporate–$1.9 million
Local–$828,000

Expenditures

Research expenditure data – the amount of funding expended for the purpose of research – is the gold standard for measurement of research activity in higher education. (See graph at left.) It indicates the amount of external funding spent by faculty and staff to conduct research; hence, it accurately reflects the productivity of funded researchers. Sponsored program expenditure data reflects activity on all types of sponsored program projects, including those dedicated to instruction or public service, as well as research. Hence, research expenditures are a subset of total sponsored program expenditures.

R. MARSH STARKS

National Science Foundation Funds Climate Change Project

Researchers from UNLV and partner Nevada System of Higher Education institutions have received $15 million from the National Science Foundation (NSF) to investigate climate change and its effects on Nevada.

The five-year effort is teaming nearly 20 UNLV faculty members with researchers from UNR, the Desert Research Institute, and Nevada State College to develop the infrastructure necessary to determine how climate impacts the state's ecosystem services, specifically water resources.

Faculty and students also plan to work with community leaders to direct research efforts that will inform policy and decision-making across the state.

"Climate change and its associated impacts to resources, economics, and society are among the most important issues facing the region, nation, and world," says Thomas Piechota, co-principal investigator and UNLV director of sustainability and multidisciplinary research. "This project will not only improve our understanding of how climate change impacts our ecosystems and water resources, but will also focus on solutions to scientific and social issues that lead to informed decision making."

The impact of climate change on Nevada's arid environment will be one of the areas studied.

GERI KODEY

An interdisciplinary team of faculty from each institution is using the grant to focus on six interrelated components – climate modeling, ecology, water resources, policy and outreach, education, and cyberinfrastructure. UNLV will participate in all of these areas with a focus in water resources, policy, education, and outreach.

Project highlights include the development of an ecological monitoring network designed to measure the basic parameters of climate change necessary to determine the potential impact of climate change on the state's water resources and biodiversity. The network of stations will contribute to research in the areas of ground water recharge, wildland fires, and invasive and endemic species.

Aside from infrastructure, the grant will fund three new faculty positions, two technicians, graduate student assistantships, undergraduate fellows, and postdoctoral fellows. Also, more than $1 million will fund interdisciplinary research teams from multiple institutions that will take advantage of the infrastructure developed through the grant.

Grant funding from the NSF will be distributed equally among partner institutions, with UNLV to receive approximately $4.5 million. As part of NSF requirements that states show commitment to their projects, the Nevada System of Higher Education will provide $6.5 million in total funding to the project from non-federal sources.

The grant was funded by the NSF through Nevada EPSCoR (Experimental Program to Stimulate Competitive Research).

For a complete description of the grant and progress updates, visit the Nevada EPSCoR web site at *www.nevada.edu/epscor*.

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