BUILDING MILITARY CONNECTIONS
Welcome to the fifth edition of UTSA Discovery. Researchers at UTSA continue to seek new insights into and solutions for complex questions and problems in energy, health, security, sustainability, and human and social development. Many of the research programs address two or more of these areas, and most require multidisciplinary collaborations. In this volume, we present seven feature articles on researchers who are contributing to improving the quality of our lives now and in the future:

- Our cover story (“UTSA Builds Military Connections”) focuses on the many UTSA collaborations with the military and other San Antonio institutions to work on projects in medicine, engineering, and cyber security.
- In “Mathematics and the Bilingual Brain,” studies of the brains of bilingual people contradict previous views that people access math concepts more efficiently in the language in which they were learned.
- The various programs at UTSA designed to train students for graduate school and develop faculty and support research in the biomedical sciences are detailed in “Training Our Nation’s Next Generation of Scientists.”
- UTSA has produced important studies on the impact of hydraulic fracturing on the economy, community and environment of South Texas which inform policy makers and stakeholders. “A Modern-Day Gold Rush” presents the challenges and opportunities of the Eagle Ford Shale.
- “DoD Funds Infection Genomics Research Center” discusses the multidisciplinary, integrated program that facilitates research in microbial pathogenesis and uses genomics to find solutions the Department of Defense can use.
- The thrill of the early history of the San Antonio area being dug up today by UTSA’s Center for Archaeological Research is described in “Discovering History along the River.” The discoveries greatly expand CAR’s understanding of how native cultures evolved under Spanish influence.
- “Tramps Abroad” compares and contrasts iconic American authors Mark Twain and Jack London and offers information not generally known about them.

In addition to these feature articles, the Abstracts give you an overview of the breadth of programs from basic to applied and translational research. The Commercialization Corner describes innovative work which may be the next biggest stent-related innovation to be generated in San Antonio since the invention of the Palmaz stent itself. Our research expenditures at UTSA continue to expand at double-digit rates as we move toward becoming a Tier One Research University.
Today’s research issues are so complex that they require multidisciplinary teams.

SALSI Research Projects and Collaborating Investigators Awarded during the First Cycle

- Microencapsulated Delivery of Oncolytic Respiratory Syncytial Virus for Targeting Prostate Tumor in Vivo. Yuheng Feng, Ph.D., Computational Bi Engineering and Nanotechnology Lab (UTSA), and Santanu Bose, Ph.D., Microbiology and Immunology (UTHSCSA)
- Preclinical Optimization of a Novel Antitumor Agent CB-44. Drug E. Frantzi, Ph.D., Chemistry (UTHSCSA), and Susan L. M. Oostruy, Ph.D., Pharmacology (UTHSCSA)
- Whole-Spectrum Fluorescence Microscopy with Ultraspect
- Supercontinuum Excitation. Jing-Ying Yu, Ph.D., Biomedical Engineering (UTSA), and James Donald Lechleiter, Ph.D., Cellular and Structural Biology (UTHSCSA)
- Aging, Hearing Loss, and the Cocktail-Party Problem. Rama Ratnam, Ph.D., Biolog (UTSA), and Suzette D. Tarfield, Ph.D., Cellular and Structural Biology/Baylor Institute for Aging and Longevity Studies (UTHSCSA)
- Nanoparticle Platform for drug delivery. Jing-Yong Ye, Biochemistry (UTHSCSA), and Shou-jiang Zhang, Ph.D., Electrical and Computer Engineering (UTSA), and Maria Gaczynska, Ph.D., Cellular and Structural Biology (UTHSCSA)
- Decoding Variable gene expression using a Computational Proteomics approach. Michael K. Kao, Ph.D., Biology (UTHSCSA), and John P. Hart, Ph.D., Biology (UTHSCSA)
- Development of a New Lipid Nanoparticle Platform for Drug Delivery. George R. Negro, Ph.D., Chemistry (UTHSCSA), and Andrew B. Barlow, Ph.D., Cardiology/Radiology (UTHSCSA)
- Expression of the HIV Envelope glycoprotein in mammalian cells. Yue Wu, Ph.D., Biology (UTHSCSA), and Robert Brener, Ph.D., Physiology (UTHSCSA)
- Science Partnerships to Adapt Research for K-5 Teachers (SParKT). Carmen Fiss, Ph.D., Interdisciplinary Learning and Teaching (UTHSCSA), and Michael J. Lichtenstein, M.D., Medicine (UTHSCSA)
- Alkaline Phosphatase–An Early Appearing Marker for Pneumococcal Tumori. James P. Chambers, Ph.D., Biology (UTHSCSA), and Robert G. Renthal, Ph.D., Biology (UTHSCSA), and David J. Weiss, Ph.D., Physiology (UTHSCSA)
- Building a Healthy Temple. Maiz Hu, Ph.D., Health and Kinesiology (UTHSCSA), and Deborah Parra-Medina, Ph.D., Epidemiology and Biostatistics (UTHSCSA)
- Chromatin Modulation of Neural Stem Cells in the Adult and Developing Brain. Gary O. Gaudo, Ph.D., Biology (UTHSCSA), and Anna M. Pena-Prima Smith, Ph.D., Cellular and Structural Biology (UTHSCSA)

SALSI Research Projects and Collaborating Investigators Awarded during the Second Cycle

- Neighborhood-Level Nutritional Assessments as an Innovative Teaching Approach to Understanding Root Causes of Health Disparities. Thanh K. Sunil, Ph.D., Sociology (UTHSCSA), and Adelita Gonzalez-Cantu, Ph.D., KNN, Chronic Nursing Care (UTHSCSA)
- A Computational Proteomics Approach for Genome-wide Identifying MicroRNA Targets. Jacquy (Michelle) Zhang, Ph.D., Electrical and Computer Engineering (UTHSCSA), and Shou-jiang Gao, Ph.D., Pediatrics (UTHSCSA)
- Dyeing Ocularular Blood Flow in Glaucoma: Application of Novel MRI Technologies. Irena Bizos, Ph.D., Biomedical Engineering (UTHSCSA), and Timothy Duong, Ph.D., Ophthalmology/Research Imaging Center (UTHSCSA)
- Stem Cells and Regenerative Medicine: New Solutions to Old Problems. John R. McCuone, Ph.D., Biology (UTHSCSA), and Christi A. Walter, Ph.D., Cellular and Structural Biology (UTHSCSA)
- Molecular Changes in Aging Breast Stroma, Jianhua Ruan, Ph.D., Computer Science (UTHSCSA), and Ron G. Li, Ph.D., Molecular Medicine (UTHSCSA)
- A Novel Non-Polymer Drug Delivery Platform for Coronary Stents. C. Mauri Agrawal, Ph.D., Biomedical Engineering (UTHSCSA), and Marc Feldman, M.D., Medicine (UTHSCSA)
- Development of New Technologies to Target 265 Proteasome with Anticancer Drugs. Jing-Ying Yu, Ph.D., Biomedical Engineering (UTHSCSA), and Maria Sicigunya, Ph.D., Molecular Medicine (UTHSCSA)
- Ligand-induced Conformational Changes in Ion Channels Detected by Luminencescence Energy Transfer. Robert D. Renthal, Ph.D., Biology (UTHSCSA), and David S. Weiss, Ph.D., Physiology (UTHSCSA)
- The Role of BFGH in Diabetic Complications. Richard G. Lebhar, Ph.D., Biology (UTHSCSA), and Reto Asmis, Ph.D., Clinical Laboratory Sciences and Biochemistry (UTHSCSA)
In order to improve education for students from preschool through college, the University of Texas at San Antonio (UTSA) College of Education and Human Development (COEHD) has established the Center for Research and Policy in Education (CRPe). Housed in the UTSA Department of Educational Leadership and Policy Studies, the center will research and inform the educational community about critical factors that affect the academic success of key student groups.

“South Texas, and particularly San Antonio, has a population that demographic forecasts suggest will continue to grow over the next few decades, so it seems fitting to establish a center here to focus on educational processes and policies that will affect the next generation of students,” said Betty Merchant, dean and Henrietta Frances Zelula Lowak Endowed Distinguished Professor in Health and Kinesiology, COEHD.

“This new center will coordinate and facilitate research collaborations on critical educational challenges such as student access, retention and graduation, informing policymakers of the systems needed to allow all students to achieve their personal best. At the end of the day, we hope to have a positive impact on education policy,” said Merchant.

Through the center, UTSA scholars will work with local, regional and national education experts to create a knowledge base on important educational topics that affect students from preschool through graduate school. A sampling of research topics includes kindergarten and college readiness, Latino student success, diversity in education, first-generation college student support, college retention and graduation, diversity in education and educational costs.

In one of its first projects, the center is partnering with the American Association of Hispanics in Higher Education (AAHHE) and the Educational Testing Service (ETS) to develop and distribute educational policy briefs on topics related to the academic success of Latino/a college students. Hispanics, the nation’s fastest-growing minority, are expected to compose 30 percent of the nation’s population by 2050, according to the U.S. Census Bureau.

UTSA education scholars Amaury Nora and Laura Rendon will serve as co-directors of the center. Both are professors in the UTSA Department of Leadership and Policy Studies. Vijay Kanagala, UTSA’s first postdoctoral associate in educational policy, will manage the center’s daily activities.

Nora, COEHD’s associate dean for research, specializes in student persistence models, retention models that integrate economic theories and psychosocial factors, and the role of college on diverse student populations. Currently she is the editor of The Review of Higher Education, the journal for the Association for the Study of Higher Education. He also served on the National Advisory Board for the evaluation of the national Gear UP initiative and on the technical review panel as consultant on the “Educational Longitudinal Study: 2000” for the National Center for Education Statistics (NCES).

Rendon’s research interests include access, retention and graduation of low-income first-generation college students and the transformation of teaching and learning to emphasize wholeness and social justice. She served as lead researcher on large-scale projects funded by the Ford Foundation, Lumina Foundation and U.S. Department of Education. She also serves on the National Advisory Board of the Bill and Melinda Gates Completion by Design Project to promote college community student success. Rendon is chairwoman of the board of the National Council for Community and Education Partnerships, which deals with P-20 education projects such as Gear UP across the nation. Kanagala earned his Ph.D. in educational leadership with a higher education emphasis from Iowa State University. His research interests include persistence, transition and campus life experiences of students of color with special emphasis on South Asian American and international college students.

“Human and social development is one of the five major research areas we are focusing on to push UTSA to Tier One,” said Special Assistant to the President Robert Gracy. “The Center for Research and Policy in Education is a critical building block for us. Through the center’s work, we expect to develop new and exciting research partnerships that will improve education for our children and their children.”

Do paid advocates prevent juvenile delinquency better than volunteers?

Supported by a $280,000, two-year grant from the Office of Juvenile Justice and Delinquency Prevention, researchers J. Mitchell Miller in the UTSA College of Public Policy Department of Criminal Justice and Mark J. Garcia in the UTSA College of Education and Human Development Department of Counseling will partner with the international nonprofit Youth Advocate Programs Inc. to study professional advocacy as a treatment for chronic juvenile delinquency.

In Texas the most serious and chronically delinquent offenders are sent to the Texas Youth Commission (TYC). According to the TYC’s most recent statistics (2009–2010), 93 percent of those youth were boys, 44 percent were admitted gang members, and the group’s average age was 16. In addition, 72 percent had high or moderate need for alcohol or other drug treatments. The group also had a sixth-grade median reading level.

“Mentoring is widely accepted as a delinquency deterrent; however, few in the field really understand what advocacy looks like, particularly for the youth who need it most, those right on the cusp of a criminal career,” said Karcher. “This study will provide a picture of what advocacy for delinquent youth looks like, and it should reveal the elements of advocacy that are most helpful. We hope the findings will help mentors across the country hone their skills and boost their impact on the youth they mentor.”

When compared to general youth mentoring, youth advocacy is an intense form of support. It generally takes place over a shorter time frame than mentoring, and it requires the participation of people from different parts of the youth’s life, such as parents, family members, teachers, advocate program administrators and staff, and probation officers.

“From a pure research perspective, we want to know whether paying adult mentors or relying on volunteers makes a difference in youth outcomes,” said Miller. “We also want to distinguish the subtler differences between advocacy and traditional mentoring modalities to see how each best aligns with various troubled youth populations.”

The UTSA researchers will conduct the two-year study by collecting qualitative and quantitative data at Youth Advocate Programs in Tolando, Ohio; Las Vegas, Nevada; Mobile, Alabama; Atlantic City, New Jersey; and Fort Worth, Texas. Led by Jeff Fleischer, YAP is a national nonprofit-youth work organization with professional advocates active in 17 U.S. states, Europe and South America.
UTSA, UTD, Purdue shone NSF grant

The University of Texas at San Antonio (UTSA). The University of Texas at Dallas (UTD) and Purdue University announce a $3 million, five-year grant from the National Science Foundation for new cyber security research. Under the direction of principal investigator Ravi Sandhu, executive director of the UTSA Institute for Cyber Security, professor of computer science and Lutzer Brown Distinguished Chair, the researchers will study assured data provenance, the discipline of computer science concerned with the integrity and privacy of data sources, contents and successive transformations. The other two principal investigators are Murat Kantarcioglu, associate professor of computer science and director of the UTD Data Security and Privacy Lab, and Elisa Bertino, computer science professor and interim director of the Purdue Cyber Center in Discovery Park.

Senior researchers participating in the project are UTSA’s Greg White, associate professor of computer science and director of the Center for Information Assurance and Security; Shouhua Xu, associate professor of computer science; UTD’s Alain Bensoussan, professor of operations management and director of the International Center for Decision and Risk Analysis; Bhavani Thussatasingh, Louis A. Beecher Jr. Distinguished Professor of Computer Science and director of the Cyber Security Research Center; and Gabriel Ghinita, a former postdoctoral student of Bertino at Purdue who is now an assistant professor at the University of Massachusetts, Boston.

"With the proliferation of data on the Web, the source, or provenance, of data has become a critical factor in establishing data truthfulness and establishing business and scientific disciplines," said Sandhu. "To be useful, provenance data must have high integrity and accuracy. At the same time, it can be confidential and private, so it should only be selectively disclosed, if at all. How do we balance these conflicting goals? Over the last decade, there has been significant progress in data provenance techniques and models. However, thus far, there is no overarching, systematic framework for the security and privacy of data provenance.

The researchers from UTSA, UTD and Purdue will develop a comprehensive framework to address the security and privacy challenges of provenance data, allowing society to receive maximum benefits from provenance data with realist tradeoffs. The project will develop reference architectures, offer provenance-related definitions, recommend ways to implement provenance plans in enterprises and provide a risk management framework to guide application developers, designers and users.

"Data, like a historic painting or piece of literature, can have tremendous value since it is widely used to make policy, medical and other important decisions. To its reliability and authenticity is critical," said Bertino. "Through this project, our team in Purdue’s cyber center will focus on the challenging issues in defining models that can provide context for provenance data, its analysis for scientific applications and how it can be transmitted securely and other important decisions. To its reliability and authenticity is critical," said Bertino. "Through this project, our team in Purdue’s cyber center will focus on the challenging issues in defining models that can provide context for provenance data, its analysis for scientific applications and how it can be transmitted securely.

Nanochip will accelerate research results

UTSA professor Anand Ramasubramanian, College of Engineering Department of Biomedical Engineering, and José López-Ribot, College of Sciences Department of Biology and South Texas Center for Emerging Infectious Diseases (STCEID), have developed a prototype nanochip to accelerate testing in drug delivery and diagnostics.

The chip uses high-throughput screening, technology that allows researchers to test simultaneously hundreds of thousands of small molecules for specific characteristics.

"This project started when Dr. Palabackah and I met at an interdisciplinary seminar held at UTSA," said Ramasubramanian. "We talked about his Candida albicans research, and he said that the current industry standard is 96-plates well plates. We thought there had to be a better way to leverage today’s technology to achieve faster testing.”

With assistance from Anand Sinisivasan, a graduate student in biomedical engineering, and Surya Uppuluri, a postdoctoral researcher in biology, the researchers began developing a high-throughput nanochip to screen potential antifungal drug candidates for Candida albicans. Often fatal to individuals with weakened immune systems, the fungal organism is the third most common hospital-derived infection in the United States.

With grants from the UTSA Office for Research Commercialization and Innovation Proof of Concept fund and the University of Texas Health Science Center at San Antonio’s (UTHSCSA) Institute for the Integration of Medicine and Science, and capital equipment support from STCEID, the researchers developed a nanochip comprising 768 equivalent and spatially distinct Candida albicans nano-biofilms on a single microscope glass slide.

The chip already is effective in research; its advantages include:

- Accelerated research results
- Less chemical reagent use and increased savings
- The opportunity to conduct tens of thousands of tests at once because the process to create high-throughput slides is automated, and multiple slides can be printed at once
- Durability, since slides do not dry out easily and can be washed multiple times
- Productivity and convenience for researchers, who no longer have to wait for results from repeated testing

Now that a prototype has been created, Ramasubramanian and López-Ribot are testing large libraries of compounds for potential antifungal activity. Ramasubramanian recently received funds from the Seng Russ Foundation of the San Antonio Foundation and from the San Antonio Life Sciences Initiative to develop separate high-throughput chips to diagnose chlamydial infection and to improve the well-being of the international community. Klose and Alexander Abdel-Noor, chairman of the microbiology and immunology department at AUB, were awarded the funds for the exchange program, which will also involve Lebanon scientists from AUB visiting UTSA.

UTSA infectious disease researchers develop international partnerships in Lebanon

Professor of Microbiology and University of Texas at San Antonio’s South Texas Center for Emerging Infectious Diseases (STCEID) Karl Klose, with colleagues Bernard Arulananandum, associate dean for research and innovation and Jane and Roland Blumberg Professorship in Biology, and Janakiram Seshu, associate professor of microbiology, traveled to Lebanon May 9-14 to develop collaborations with microbiology/immunology researchers and clinicians at the American University of Beirut (AUB).

Their travel was funded by the U.S. Department of State through the American Association for the Advancement of Science (AAAS). The AAAS Center for Science, Technology and Security created the exchange as part of “International Engagement Representatives for Science and Security Program.” The program introduces U.S. researchers to researchers in the Middle East or northern Africa to develop collaborations in health, agriculture and security to strengthen ties and improve the well-being of the international community. Klose and Alexander Abdel-Noor, chairman of the microbiology and immunology department at AUB, were awarded the funds for the exchange program, which will also involve Lebanese scientists from AUB visiting UTSA.

UTSA biologist awarded NIH grant for brain research

Carlos Paladini, UTSA associate professor of biology, was awarded a $1.3 million, five-year grant from the National Institutes of Health to study which inputs in the brain drive dopamine cells to fire faster.

Dopamine cells release a chemical, or neurotransmitter, in the brain called dopamine, which drives motivated and reward-related behaviors. The loss of dopamine cells in the brain is associated with Parkinson’s disease cases, and the effects of drugs of abuse on dopamine cells can lead to addiction. Paladini hopes the research results will eventually assist in helping to find therapies to cure drug addiction and treat patients with Parkinson’s disease.

The researcher and his graduate students are focusing on the spikes of electrical activity associated with dopamine cells in the brain and the effects they have in driving motivated behavior. They hope to learn how dopamine cells get access to information in the brain that drives reward-related behavior.

"We want to find out what are the inputs to the dopamine cells that actually drive the cells to either increase their activity in terms of a reward or reward signal or decrease their activity if the reward that we are rewarding them with is not available," said Paladini. "We don’t know which inputs or which parts of the brain connect to dopamine cells to inform the cell and give it all the information it needs to calculate whether it should fire faster or slower.”

UTSA infectious disease researchers travel to Beirut on behalf of STCEID, was established to support UTSA’s teaching and research initiatives in molecular biology, microbiology, immunology, medical virology, virology, microbial genomics, vaccine development and biodefense. The center also supports study the pathogenesis of emerging infectious diseases such as chlamydia, tularemia, choler, Lyme disease, valley fever and others.

"When you collaborate with international researchers, it's so important to meet face-to-face in order to understand their research capabilities, scientific culture and most pressing research concerns," said Klose. "And it's critical to keep up those relationships through personal contact. That is the key to the most successful scientific collaborations. Because of our visit to AUB, we now have a better idea of areas of common scientific interest and the expertise available in Beirut.”

The American University of Beirut was established in 1866 and is home to nearly 170 faculty members and about 8,000 students. It is ranked among the world’s top 350 universities and is highly renowned as offering the Middle East and Africa’s best medical and engineering schools. Researchers in UTSA’s STCEID also collaborate with scientists and clinicians in India, Chile, Colombia, Malaysia, Malawi, Germany, Austria, Spain and Norway.
Religious belief may have connection to obesity prevention

According to the Institute for Latino Studies at the University of Notre Dame, more than 90 percent of Latinos are members of faith-based organizations. This statistic led Melzi He, M.D., associate professor of health and kinesiology in The University of Texas at San Antonio (UTSA) College of Education and Human Development, to wonder if churches might help Latinos combat obesity with seed money from the Robert Wood Johnson Foundation. Dr. He and her colleagues embarked on a pilot research project: “Building a Healthy Temple—A Faith-Based Community Participatory Research Project for Preventing Childhood Obesity among Latino Families.” They traveled to nine churches in San Antonio to elicit the attitudes and beliefs of Latino parishioners toward healthy eating and living.

After speaking with the members of five Catholic and four Protestant churches, the researchers learned that Latino church leaders and members perceive a strong link between faith and health. The Latinos surveyed generally viewed life as a God-given gift, creating a responsibility for Christians to take an active role in their spiritual and physical well-being.

Dr. He’s research identified several factors for a successful obesity prevention program:

- Having clergy serve as role models
- Free after-school or summer camps providing physical activities for parents and children
- Healthy-cooking classes
- Changes in food at church and home
- Financial constraints
- Lack of nutrition knowledge
- Lack of access to sidewalks, parks and physical activity programs
- Busy lifestyles
- Cultural barriers, such as unhealthy traditional Latino foods

With a grant from the San Antonio Life Science Partnership between UTSA and the University of Texas Health Science Center at San Antonio (UTHSCSA), He and Deborah Parra-Medina, UTHSCSA professor of epidemiology and biostatistics, developed and pilot-tested comprehensive, culturally sensitive obesity prevention programs for faith-based organizations. Their curriculum spans religious sermons, Sunday school classes and social events. They plan to apply for NIH funding to implement their program in more churches.

“...”

Dr. Kaufmann’s work focused on replacing the current synthetic stent-graft material with a tissue engineered scaffold for aneurysm repair (TESAR). This patent-pending technology promotes a tissue barrier to the aneurysm, helping to reduce the problems seen in existing stent-grafts. Furthermore, the graft fully integrates at the site of the aneurysm and atheroscleroses into the body. The results have been shown in animal studies, and the potential to improve the surgical success rate is getting noticed in the industry.

With such a high potential, Kaufmann entered and won the first-ever University of Texas Horizon Fund Student Investment Competition, which includes $50,000 in seed funding. She will be using the money to launch her new company, Cardiove, with Agrawal and Bailey. Between now and March 2013, they will work together to refine the manufacturing of the TESAR, and they will test it to ensure that it conforms to the highest safety and quality standards.

When looking at technology commercialization, this kind of high-impact research falls into a sweet spot of congruent conditions, including an identifiable market need, technological innovation stemming from university research and a market potential that is large enough to warrant investment in further product development. As Cardiove moves forward, UTSA has established the means to help nurture the company, including patenting and licensing procedures that help protect the intellectual property for the company, an incubator on campus to enable the company to be near its founders, and the ability for the company to contract with the University for sponsored research and the use of core facilities that would be prohibitively expensive for a young start-up to capitalize on its own at this stage. As a result, the likelihood of technological success is higher and results in greater returns to the University and the broader San Antonio and state economy.

From Innovation to Commercialization

UTSA alumna wins $50,000 for new stent-graft start-up company

by Dr. Cory Hallam

Chief Commercialization Officer

The New Venture Incubator (NVI) (http://research.utsa.edu/commercialization/nvi.php) on the UTSA 1604 West campus also houses other partner companies at UTSA, including Rochal Industries (http://www.rochalindustries.com/), a local technology development company focused on wound care. They are currently engaged in joint-sponsored research with UTSA’s Dr. Rena Bizou, and like many incubated companies, they have the potential to partner with our researchers, hire our students and accelerate technology commercialization at UTSA.

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In the world of biomedical engineering, the application of sound scientific research to real-world problems is a key to developing new treatments for patients. For potential recipients of an aneurysm stent-graft, recent developments at UTSA provide hope for healthier and safer surgeries that can save lives. The innovative work of Dr. Jordan Kaufmann (UTSA ’12) and advisors Dr. Mauli Agrawal and Dr. Steven Bailey (UTHSCSA) may be the next biggest stent-related innovation to be generated in San Antonio since the invention of the Palmaz Stent itself.

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language is an inseparable part of mathematics. For educators and scientists who are fascinated with the bilingual brain, the language in which you access your mathematical concepts, “it is OK to be bilingual early in life,” she said.

Good research is the foundation for effective teaching programs, both for children who are not native English speakers and for English speakers who learn a second language.

The conventional view has been that people access mathematical concepts in each of their languages. Wicha started this line of research with then-postdoctoral assistant Professor Nicole Wicha is interested in understanding the factors that affect language comprehension in the brain and how language experience affects other cognitive abilities, such as math cognition, cognitive control and sound perception. A primary focus in her lab is in understanding the unique processing of the bilingual brain. Her lab uses both behavioral and brain-imaging techniques, in particular, event-related brain potentials (ERPs) and electroencephalograms (EEGs) with excellent precision in the time domain. Wicha has used this technique to study the temporal dynamics of the brain processes underlying language comprehension. In 2010 she received funding from the National Institute of Child Health and Human Development to study how bilinguals access simple arithmetic concepts in each of their languages. Wicha started this line of research with then-postdoctoral fellow Elena Sanfeliu and has continued to pursue a rich line of questions that are immediately relevant to the large bilingual population in South Texas. She has authored or co-authored 19 publications and has been invited to present her work internationally.

Wicha received a bachelor’s degree in Spanish and psychology from The University of Texas at San Antonio and a master’s and Ph.D. in cognitive science from the University of California at San Diego.
American soldiers who go to war rely on the best and brightest minds back home to help keep them safe and effective during their dangerous missions. The Department of Defense and each branch of the armed forces pour millions of dollars every year into research and development efforts at universities and private companies around the nation. There, scientists and engineers continuously strive to implement the latest knowledge and newest technology to improve everything a soldier uses, from aircraft and tanks to weapons and computers and uniforms. In biomedical fields, the military is at the forefront of research projects to develop new medications, protective vaccinations and wound care—work that simultaneously supports improved civilian health care. In the training venue, military leaders and university scholars take contemporary knowledge about leadership skills and human psychology into the classroom and training fields to prepare the next generation of officers and recruits. In mental health, there is a growing awareness that soldiers who deploy to the battlefield and their family members who stay home face unique life challenges that can benefit from the help of trained psychologists. Increasingly, the American armed forces are finding that UTSA is a capable partner in this ongoing task of improving the tools and the readiness of the nation’s military might. Research collaborations are the cornerstone of this thriving relationship. UTSA has also built programs around military needs, including an undergraduate minor in military leadership and a psychology doctorate that focuses on the special needs of soldiers and their families. Thriving ROTC programs also work to prepare the next generation of military officers. “Over the last five to seven years, our working relationship with the military really has grown,” said Jim Massaro, a retired Air Force colonel who now is UTSA’s assistant vice president for research security and military liaison between the University and the various military branches. “We are building more collaboration between the military and other San Antonio institutions to work on projects in medicine, engineering and cyber security.” The University’s location is a contributing factor. Air Force and Army installations have long been part of the fabric of life in San Antonio. The most recent federal base realignments consolidated military medical training at Fort Sam Houston, a strategic move that now brings even more active duty military personnel to the Alamo City. The city’s total military base population is now 78,000 people, 10,000 more than a few years ago, Massaro said. These growing ties between UTSA and the military rely heavily on the University’s expanding research capabilities. As UTSA recruits top faculty members in biological, engineering and computer sciences, the number of military grants and contracts continues to grow. “We’ve got tremendous faculty members. Many are world-renowned researchers, experts in their fields. They bring us top students, and they attract new research interests.” UTSA is also building bridges to connect with major companies that routinely seek government contracts. The University has a federal designation as a minority-serving educational and research institution. This attracts companies that need to meet federal goals for hiring subcontractors owned by minorities or using research institutions that serve minority students, Massaro said. Biomedical research has brought the biggest grants so far, due in part to the medical research and training programs at Fort Sam Houston. The proximity of this military mission makes collaborative studies efficient for both the military and regional research institutions. In addition, UTSA has access to regional collaborative partners, such as the University of Texas Health Science Center at San Antonio, which also has clinical and basic research initiatives with the military branches. One of the newest programs is a $4.6 million grant from the Department of Defense to support a Center of Excellence in Infection Genomics (CEiG).
We are building more collaboration between the military and other San Antonio institutions to work on projects in medicine, engineering and cyber security.}

centered at UTSA but involving scientists from the health science center and other regional research institutions. The scientific strategy, said CEIG Director Bernard Arulananadam, Ph.D., Jane and Roland Blumberg Professorship in Biology, is to undermine potentially dangerous infectious agents by learning about their most basic genetic structure and understanding how these genes interact with the genes of an infected human. “The whole idea is to study how the genes from the microorganism and the host interact. That merging of biology and mathematics determines which strains should be covered in the millions of vaccine doses manufactured and dispensed every year. CEIG is an umbrella that will cover teams of researchers who will work together and share resources as they explore genomics of respiratory infections, cholera, tuberculosis, fungal infections and other vectors that can affect troops in the field as well as civilians at home, Dr. Arulananadam said. UTSA also is responding to the military’s interest in helping soldiers and their families with the stress of this lifestyle. Last February the Texas Higher Education Coordinating Board approved a doctoral degree in psychology that will focus on mental health issues relevant to military men and women and their families. Like other military-related research programs, the new program in the College of Liberal and Fine Arts will build on the collaborative efforts of researchers from military and civilian institutions in the San Antonio area. UTSA leaders expect the University to become one of the leading programs in the nation for investigating health and mental health care issues that relate to military personnel and their families. Engineers and physicists also are involved in the development of potential biomedical tools. USA Foundation Distinguished Professor and Chair of the UTSA Department of Biomedical Engineering Anson Ong, Ph.D., has a grant from the Army to develop synthetic scaffolding that can be used to help the body’s own repair mechanisms in rebuilding bone tissue damaged by battlefield wounds. Astronomy Department Chairman and Lutcher Brown Distinguished Chair Miguel José-Vacamas, Ph.D., has a grant from the Air Force to study interactions of cells with various nanoparticles. Mechanical and civil engineering faculty at UTSA also are working on large and small projects to improve military hardware. Drew Johnson, Ph.D., assistant professor of civil engineering, has an Air Force research grant to study heat transfer through nanofluids, technology that may lead to smaller and more efficient heating and cooling equipment for military gear. Chair of Mechanical Engineering and Zachary Mechanical Engineering Department Endowed Chair Harry Millwater, Ph.D., is an expert in fracture mechanics and is testing new methods of analyzing fatigue in various metals and other materials that are used in military equipment. One of the more imaginative projects, by Arturo Ayón, Ph.D., associate professor of physics, is to test whether body heat can be captured by specialized fabrics and converted into usable energy. “The average Army guy is carrying 66 pounds of equipment and batteries with him when he marches off into the desert,” Jim Massaro said. “The question at hand is whether there is a way to capture the heat his body is generating and turn it into a storable form of energy.” Can he generate power just by walking and transmit it through his clothes into a storage device? UTSA is at the forefront of trying to figure out if this can be done. Computer security is another vital area of work for national security. The UTSA Institute of Cyber Security, led by Lutcher Brown Distinguished Chair Kavi Sandhu, Ph.D., does research and development on ways to protect the vast amount of confidential data stored in computers everywhere, including the military. Shouhuai Xu, Ph.D., associate professor of computer science, has a contract with the Air Force to secure its computers from malware that can connect them to botnets, networks of computers that have been invaded and compromised so that they automatically forward information to other computers.

Most of these research programs are, by design, training grounds for master’s and doctoral level students, who then move on to become the next generation of experts in immunology, cybersecurity, mechanical and electrical engineering, and psychology. But UTSA also has its mission with the military into the undergraduate and even high school levels through its computer competitions, ROTC programs and undergraduate degree coursework. The core of this effort is through Reserve Officer Training Corps (ROTC) programs. Both the Army and the Air Force operate regional ROTC programs that are headquartered at UTSA and draw students from UTSA and several other regional colleges and universities. ROTC students can earn academic scholarships to complete undergraduate or graduate degrees as they simultaneously train for appointments as military officers. The University’s ROTC detachments have grown in size and prestige in recent years. In 2009 the Air Force Detachment 842 at UTSA won the Right of Line Award, the most prestigious recognition presented each year by the Air Force. UTSA also recently added a study program that allows Army military trainees to earn a minor in Military Management and Leadership. This 21-course-hour program introduces students to principles of military leadership and offers courses on the historical, political, social and geographical context of global regions where officers may be deployed to lead soldiers in their military missions.

High school students have opportunities to learn about military missions through Cyber Patriot, a national competition in computer security that the Institute of Cyber Security hosts each year. It has grown into the world’s largest high school cyber security competition. Each April the institute also hosts the National Collegiate Cyber Defense Competition, which is the nation’s largest cybersecurity-themed competition for college students.

The work continues for those on campus tasked with making sure business and community leaders know about UTSA and its expanding capabilities for developing new products and training young leaders. There is more to talk about each day, Massaro said. “As we have continued in business development here, we have gone out and visited with these people and given them briefings on our capabilities, so whenever they need someone in these areas, we hope they will call on us.”

“The average Army guy is carrying 66 pounds of equipment and batteries with him when he marches off into the desert.”
TRAINING OUR NATION’S NEXT GENERATION OF SCIENTISTS
by Kate Hunger

“You need some laces to pull yourself up by the bootstraps.”

When Javier Barranco arrived at The University of Texas at San Antonio in the summer of 2011 from the Dominican Republic, he already knew he wanted to delve further into biomedical research. The first-generation college student found the tools and support he needed in a federally funded program that has been training student scientists at UTSA for more than three decades.

The Minority Biomedical Research Support (MBRS) program has not only paid the biology senior for his work in a faculty member’s research lab but has also covered his costs to attend conferences and made him have more competitive opportunities. Barranco has participated in either MBRS or MARC. “They are coaching us in the ‘human side’ of being a scientist,” he said. “They are more interested in the students, so that when they leave, they have a clear mission, he said. The award includes $25,000 for research facilities at minority institutions and $2 million annually, said George Negrete, program director and professor of chemistry. The resulting feedback provides benefits that flow far beyond the research lab of the faculty member, Barea-Rodriguez said. "It is developmental because we like to focus on junior faculty. Because these faculty members teach in a minority institution, their access to building research here is going to benefit all of our students." The SCORE office assists faculty applying for funding under the program by sending their applications out for blind review before they are submitted, Negrete said. The resulting feedback allows the faculty to polish their applications. "As a result, our success rate for funded applications is pretty high—26.2 percent. This is about as good as it gets right now." Developing students into scientists has been the life’s work of CRTS Director of Athletics. Over his 30-year career at UTSA, Tsin received the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. Meeting President Barack Obama in the Oval Office was an honor and a highlight of his career, he said. The award includes $25,000 from the National Science Foundation to further the recipient’s mentoring activities. The award will mostly be used to support projects in other institutions to do STEM research during the summer. Tsin also was named a fellow in the American Association for the Advancement of Science (AAAS) in Section on Biological Sciences, the only UTSA professor elected a fellow in 2011. The tradition of peer-elected AAAS fellows began in 1874.

Tsin’s mentoring talents made a big impression on Melusia de la Garza. She mentored de la Garza while she earned her master’s in biology. She worked in his lab, where his research focuses on the biochemistry of the visual process. "He really cares about his students," she said. "I don’t think he is trying to push anybody to do what they don’t want to do. He always pays attention to what you are doing and will help you if you need him." Although she went to veterinary school instead of into a Ph.D. program, de la Garza said she continues to engage in research environment in her position at the Texas Biomedical Research Institute, where she is the primary clinician for the facility’s chimpanzees. Her participation in the MARC program made

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A Modern-Day Gold Rush
by Analisa Nazareno

The promise of a better education and better quality of life for thousands of South Texans

The Eagle Ford Shale is rapidly transforming the economy and quality of life in once-declining rural communities in South Texas. The hydrocarbon-producing formation generated $25 billion in total economic output last year in an area stretching from Maverick County to Gonzales County on the east.

“This is a very quickly evolving business story,” Robert McKinley, director of the UTSA Institute for Economic Development (IED), told several hundred South Texas business owners, oil and natural gas exploration and production companies, supported by Analisa Nazareno, the University of South Texas and the Eagle Ford Shale stakeholders on May 9, 2012, when announcing the results of an IED Center for Community and Business Research (CCBR) economic impact study of the Eagle Ford Shale.

“If you look at this last year, 2010 and 2011, natural gas production doubled. If you look at the same time period, oil production was six times this last year in an area stretching from Maverick County to the Eagle Ford area, “The need for small business development services has more than doubled since EFS came into play,” Gonzalez said. “We thought this would be a way to augment services and support staff because it’s happening so fast.” Representing UTSA, Gonzalez is part of the Eagle Ford Consortium, which coordinates discussions around workforce, community and economic development of the 24 counties that make up the Eagle Ford region. He visited the Bakken formation in North Dakota, where energy explorers began hydraulic fracturing two years ahead of the Eagle Ford Shale, to learn about the issues that stakeholders there faced and how they responded to them.

Azza Kamal, a senior lecturer in the UTSA College of Architecture, said how community leaders were struggling with the challenge of displaced residents who are now homeless. “Rental prices are increasing because of the greater demand from incoming workers,” Kamal said. “So now the people who benefited from Section 8 voucher programs cannot find housing they can afford. That’s forcing them to move in with friends or just on the street.” She presented a study to the Eagle Ford Consortium in February 2012 showing that the population of the six counties in the EFS area will reach as many as 86,297 people from 2010 to 2025. Some of those people will be transient workers, but others will be permanent workers.

To address homelessness and the greater demand for permanent, semipermanent and temporary housing, Kamal’s report made suggestions for landowners and local officials: Develop home repair and rehabilitation programs to fix currently vacant housing units to help meet demand. Use family-oriented planning patterns, including open spaces and green spaces, for all types of housing developments, including crew camps. And while some can profit from building permanent multifamily and single family homes, at the beginning there will be a greater need for semipermanent residential developments, such as mobile home parks, to accommodate the workers who have homes in other communities.

Workers are filling up apartment buildings, hotels and motels, renting rooms and garage apartments, as well as living in haphazardly arranged trailers and campers. “This is a major problem,” Kamal said. “This is a huge burden on the infrastructure, on services, grocery stores and schools. It’s an undesirable way to grow a town.”

Turnstall said by studying the events and issues in other oil and gas plays throughout the world and analyzing the situation and resources in the Eagle Ford area, UTSA can help local officials and business owners avoid mistakes made in years past.

“With all of these changes, communities are being tested. An encouraging sign we see is that communities are attempting to employ revenue and investment strategies that look farther into the future than perhaps leaders have been used to doing. This will require good governance and good management, an engaged citizenry, fiscal discipline and a workforce that will be able to support this.” Another concern that residents in the area have about the hydraulic fracturing process that enables the energy companies to extract oil and natural gas from the rock formation is the large amount of water required to perform the process and whether drinking water will become contaminated over time.

Les Shephard, director of the Sustain
able Energy Research Institute and Robert F. McDermott Distinguished Chair in Engineering, addressed some of those questions during the Eagle Ford Shale Consortium Inaugural Conference on February 29, 2012. Population growth, the water-intensive hydraulic fracturing process and ongoing climate change issues are going to create pressure on the limited supply of water. And studies from the University of Texas at Austin showed that, while hydraulic fracturing itself didn’t contaminate ground water supplies, improper casings, poor cement jobs and poor drilling practices in general did.

Shephard said he and his colleagues are working on “the energy water nexus” and pursuing grants in the area. “Our whole emphasis is on understanding the system that provides water for people, for water quality, and the role of innovation.

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CEIG supports four research areas

by Analisa Nazareno

DoD FUNDS INFECTION GENOMICS RESEARCH CENTER

The South Texas Center for Emerging Infectious Diseases (STCEID), under the directorship of Dr. Bernard Arulanandam, received a $4.6 million grant from the U.S. Department of Defense (DoD) to support four areas of research.

Center of Excellence in Infection Genomics (CEIG) is one of the four research areas supported by the DoD grant. Led by José López-Ribot, professor of biology, and Jay Klose, associate professor of biochemistry, the CEIG researchers study the genes of the microbes that cause diseases in humans. Specifically, the grant funds four themes of research:

- Genomics of Enteric and Respiratory Pathogens
  - Karl Klose, professor of microbiology and director of STCEID, focuses his work on gastrointestinal and respiratory bacterial diseases, using Vibrio cholerae, which causes cholera, and Francisella tularensis, which can cause tularemia and pneumomia, as models for understanding bacterial infection in the GI tract and respiratory system.
  - The group works closely with researchers at the University of Texas Health Science Center at San Antonio, where Arulanandam, Klose and López-Ribot hold cross appointments.
  - The grant supports the continued collaboration between UTSA and UTHSCSA.

- Vaccine Development
  - Arulanandam's research in the area of anti-chlamydial vaccine development involves the development of vaccines for other diseases, including the areas of research within CEIG.
  - His work with Klose has already led to a patent for a potential vaccine candidate for Francisella tularensis. Arulanandam is named as a principal on a total of four patents, including one which was licensed to Merck in 2008 for the development of a vaccine for chlamydia. STCEID is in the process of hiring a genomics expert to collaborate with CEIG researchers. "This group is highly collaborative," Arulanandam said. "We meet on a regular basis. And we move our research forward."
  - The grant supports the hiring of doctoral students, who will be assisting the professors with their research. CEIG serves as a conduit for the training of PhD, master's and undergraduate students with dedicated projects in microbial, genetic and infectious disease laboratories.
  - The center is committed to increasing the pool of South Texas students interested in pursuing a career in microbiology research.
  - "As we do this high-end research, we are also tasked with training the next generation of students," said Arulanandam.

- Understanding and developing treatment strategies
  - When the Ph.D. students aren't working in the laboratories assisting professors with their research, they are reaching out to high school students. CEIG graduates visit the schools regularly, discuss their own research and career paths, and assist with science fair projects.

- Immunopathogenesis of Fungal Infections and Antifungal Drug Development
  - José López-Ribot, professor of biology, Stephen Saville, assistant professor of genetics, and Floyd Wormley, assistant professor of microbiology and immunology, study the vexing problem of developing effective treatments for fungal infections and fungal immune systems that have been compromised, such as persons with HIV/AIDS.

- Biochemistry and Molecular Biology of Vector-borne Pathogens
  - Janakiram Seshu, associate professor of microbiology and pathogenesis, and James Chamber, professor of biochemistry, study infectious agents transmitted to humans and animals through vectors such as spiders and insects. One disease that they are studying is Lyme disease, which is transmitted to humans through ticks.

The center is committed to increasing the pool of South Texas students interested in pursuing a career in microbiology research. "As we do this high-end research, we are also tasked with training the next generation of students," said Arulanandam. "So it's focused on students learning and becoming scientists, with an emphasis on gastroenteritis and respiratory bacterial diseases, using Vibrio cholerae, which causes cholera, and Francisella tularensis, which can cause tularemia and pneumomia, as models for understanding bacterial infection in the GI tract and respiratory system.

Understanding and developing treatment strategies for infectious diseases are also of great interest to the Department of Defense (DoD), which last year awarded a $4.6 million, five-year grant to professors at the University of Texas Health Science Center at San Antonio. The grant supports the continued collaboration between UTSA and UTHSCSA.

This is a multidisciplinary, integrated program that facilitates research in the area of microbial pathogenesis and uses the power of genomics to come up with solutions that the Department of Defense can use," said Bernad Arulanandam, project director for CEIG, professor of microbiology and immunology, associate dean of research for scientific innovation, and holder of the Jane and Roland Blumberg Professorship in Biology.

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Karl Klose’s research interests include understanding bacterial pathogenesis in order to develop effective vaccines and therapeutics. His laboratory studies Vibrio cholerae and Francisella tularensis as well as several other human bacterial pathogens. Klose is the founder and director of STCED, which comprises 19 infectious disease laboratories. He is the recipient of the UTSA Distinguished Research Achievement Award and has authored or co-authored more than 84 articles in peer-reviewed scientific journals.

Klose received a bachelor’s degree in biochemistry from the University of California, San Diego, and a Ph.D. in microbiology from the University of California, Berkeley. His postdoctoral research in microbial pathogenesis was conducted at Harvard Medical School.

Bernard Arulanandam’s research interests include understanding host-microbe interactions and identifying approaches for inducing optimal mucosal protection and immunity. In addition, he is interested in vaccine development (Chlamydia trachomatis and Francisella tularensis). Arulanandam has authored or co-authored more than 70 articles in peer-reviewed scientific journals.

He received a bachelor’s degree in biology and a master’s in microbiology from Minnesota State University and then earned his Ph.D. in microbiology and immunology from the Medical College of Ohio. His postdoctoral research was conducted at Albany Medical College in New York. Arulanandam also received a master’s degree in business administration from The University of Texas at San Antonio.
Humans have lived along the San Antonio River for more than 10,000 years, according to evidence unearthed by University of Texas at San Antonio (UTSA) archaeologists.

Spear points, stone tools, charcoal and other prehistoric artifacts discovered during excavations in the area of the San Antonio River Improvements Project paint an illuminating picture of the continuum of human habitation along the river, said project archaeologist Kristi Ulrich, who led the dig in which the oldest artifact—a 10,840-year-old spear point—was found last year in Brackenridge Park. "It was one of those places where, as you pull things out, you see time going back farther and farther," she said. "That people were using that river area as far back as 10,000 years ago and that people are still using it today as a recreation area is amazing."

"There’s a reason the signs of Paleo-Indian life are found by the water, Ulrich pointed out. "You have water, which you need to live. You have fish as a food source and pecan trees all over the area. It’s one of those areas where, if you had to find a place to live, this is where you would want to be. Also, they were getting the chert (flint) to make their stone tools from the river basin."

Ulrich works in UTSA’s Center for Archaeological Research (CAR). Established in 1974, the center conducts research throughout Texas and beyond; performs excavations for local, state and federal agencies; trains students; and curates archaeological collections. It will curate the artifacts collected as well as related materials in perpetuity, CAR Director Steve A. Tomka said. "We have over 10 million artifacts. Some of them are from the National Park Service. Some are collections from federally funded projects. The majority are from projects funded by various state agencies."

The artifacts are housed in CAR’s state-certified curation facility, one of only three such facilities in Texas affiliated with universities. UTSA researchers do not have equipment to radiocarbon date organic material and must send those samples to an outside lab. "We would love to have a radiocarbon dating laboratory here on campus," Tomka said. "There are not that many across the country. Even better would be a mini nuclear research reactor with the capacity to do a much larger suite of cutting-edge analyses."

Much of CAR’s work is contract archaeology having to do with construction of roads, which Tomka calls its “bread and butter.” But the center also has discovered the true location of the Acequia Madre, built between 1719 and 1721 to supply water to the Alamo’s fields. After the irrigation channel was buried in 1905, its location was lost. CAR was hired to locate it and its dam, and, after studying historical maps and aerial photos and digging a dozen trenches, they found them in front of the Witte Museum. Among the artifacts discovered during the excavation was a frying pan used during ratlesnake fry fundraisers in the early days of the Witte, Tomka said.

The chance to really dig into the area’s archaeology came with the San Antonio River Improvements Project, a multiagency effort that includes recreational amenities and ecosystem restoration along 13 miles of the river. SARP sought a survey of the site before construction of a sidewalk system and lighting. It has given researchers an opportunity to work continuously on a long-term project, and they are learning more about life along the river through the millennia. The project has “allowed us now, for the first time in 30-odd years, to consistently approach archaeology along the river from up here all the way down to Wilson County, and that is really giving us a better perspective on how prehistorically life changed a lot at the river,” Tomka said. "It’s also giving us perspective into how life was in the 1700s, when the missions were established, all the way back to about 10,000, 12,000 years ago. This is the first time we’ve been able to do projects where we are discovering things that are 15,000 years old. We’ve never had anything quite that old because the archaeology didn’t go deep enough into the deposits.”

Completed several years ago, excavations on the Museum Reach yielded relatively few prehistoric artifacts by virtue of urban development. Most of the finds dated to the 1920s, including large quantities of beer bottles from area breweries. So far, about 5,000 artifacts have been collected during the project, ranging from stone-tool making debris to snail shells to those ubiquitous beer bottles, Tomka said. Excavations continue along the more rural Mission Reach segment of the project. Eric Oksanen is project archaeologist for the current fieldwork being done, which is expected to continue through 2013. He said the sheer size of the excavation area is a rare opportunity for researchers who typically work within a much smaller swath of land. "I don’t know of any other study of a river system that will be this complete. This reach of the San Antonio River, more than anywhere else, will have a continuous record of the soils, underlying geology, archaeology and chronology of these dates."

As of May, the Mission Reach fieldwork had yielded evidence of a 6,000- to 7,000-year period, with radiocarbon dates that place human occupation of the area from 600 to 6,000 years ago. And new finds can be revealed at any moment. "At one of the sites we stripped,” he said, "we found a spear point that is about 9,000 years old in the last 30 seconds we were there.” What’s more, Oksanen said he is finding well-preserved organic material, such as charcoal, which can be dated to provide a long-range view of changes in the Mission Reach area.

Researchers have found prehistoric signs of life along water sources as well. While excavating an area near Cibolo Creek in Boerne which was going to be disturbed for a sewer line project, CAR archaeologists found knives, hide scrapers and woodworking tools ranging from 3,500 up to possibly 8,000 years old. Spear points suggest that earlier occupants of the site on the banks of the creek had connections to the Lower Pecos, while more recent occupants—if 3,500 years ago can be so described—suggest connections to Central Texas, Tomka said. "When you compare the projectile points made in those two different zones, you will see the material is very different.” Two acres of the site have been preserved for use as a field school to train student archaeologists beginning in 2014. The SARP work has also benefited another ongoing project by allowing researchers to collect clay samples to compare shards of pottery in order to learn more about pottery making in the South Texas missions. Part of the research has included mak- ing pottery with various clays gathered from around the region in order to compare them to vessel shards, Tomka said. Making the pottery allows researchers to find out which clays are suitable for making ceramics before sending off samples for testing. "We are trying to put the two together to understand who made pottery in the missions, when they were making it, and whether they were exchanging it among the different missions across Texas.”

Samples of the raw clays and shards of vessels found at mis- sions will be sent off for specialized analysis of their mineral composition. Any matches will help answer the question of where natives gathered the clay for making pottery. "That will point us to which tribes might have been the ones who made pottery and whether it was just one group who made pottery and distributed it with Spanish help throughout all the missions or whether people in different missions had their own sources of clay nearby,” Tomka said. "The same pottery shows up from El Paso to Espiritu Santo in Goliad and even East Texas. This has implications as to how the native cultures changed.”

Mission life meant learning new skills and practices for the native hunter-gatherers. “They start to learn agriculture; they start building irrigation ditches so the Spanish can irrigate the mis- sions fields, they start shifting from stone tools to metal tools. All of these things changed their lives in very significant ways, and ceramics is one of these things. Many of them didn’t make ceramics, and then suddenly they were forced to either learn to make or to acquire ceramics and cook in and eat out of ceramic bowls that they didn’t have before,” Tomka said. "The ultimate thing we are trying to understand is how their identity was changing over time as a result of the Spanish influence.”

While SARP researchers are focused on finding ceramics, missions ceramics might seem like a very specific area of study, it underscores a larger point: Understanding how people adapt to the changes in their world is not a quick pro- cess. The researchers at CAR are on the case, digging up answers to these questions piece by piece.

by Kate Hunger

Steve Tomka
Director, Center for Archaeological Research

Steve Tomka’s research interests include the archaeology of South American camelid domestication and hunter-gather adaptations in Texas. As an ethnoarchaeologist, he has conducted extensive research on Andean agricultural systems of food production in Bolivia. Prior to that, he participated in excavations at the coastal preceramic site of Paloma, south of Lima, Peru. As an archaeologist and lithic analyst, Tomka has worked with materials from throughout Texas, west-central New Mexico and Missouri. His interests include hunter-gatherer land-use strategies, origins of food production, organization of technology, and mass production and identity formation. He has authored or co-authored over 30 peer-reviewed reports and journal articles.

Tomka received a bachelor’s degree in anthropology from The University of Texas at Austin, and both his master’s and Ph.D. in archaeology from The University of Texas at Austin.
“TRAMPS ABROAD”
JEANNE REESMAN ON MARK TWAIN AND JACK LONDON

Offering something new to say about America’s favorite writer was a challenge for Jeanne Campbell Reesman, professor of English, Jack and Laura Richmond Endowed Faculty Fellowship in American Literature and Ph.D. Graduate Advisor of Record. She sees it like challenges—her latest book is titled Mark Twain vs. God: The Story of a Relationship, to be released in 2015. Reesman, who has written, edited or contributed to more than 50 books on late 19th- and early 20th-century American authors, noted, “There have been important books and articles on Twain and religion, but it seems many scholars have not wanted to talk about God was not just personal; he saw God as unfair to everyone, at God was not just personal; he saw God as unfair to everyone, in Biblical times, if a man commit- ted a sin, the extermination of the whole surrounding nation—cattle and all—was likely to happen, I knew that Providence was not particular about the rest, as long as he got somebody connected with the one he was after.” In Letters from the Earth, Noah is ordered to turn around and go back for the housefly, since without it, many of the worst pestilences would not exist. Twain used Satan as a narrator and humor itself as literary devices to mask his critique of God.

“Yet,” Reesman added, “Twain also experienced powerful desires to believe: his best friend was a clergyman; he loved to play the piano and sing old hymns; and he tried his hardest to be a Christian with his beloved wife, Olivia. He certainly had a strong Calvinistic sense of guilt, but it seems he wanted a better God than the one he was taught about as a boy. On his deathbed, his last words expressed his hope to see his daughters in the afterlife.”

Twain’s faith was not in the church, but in a small number of individual figures such as Joan of Arc, about whom he wrote a serious biography based on the trial records. Twain portrayed ancient and modern concerns: the court of King Arthur taken over by a “Connecticut Yankee”; politics and finance in Washington, D.C., in The Gilded Age; new forensic discoveries in Pudd’head Wilson. He had a fascination with dreams, space travel and new inventions (to lose money on). From beginning to end, his work reflected the intense influence of Darwin (as in “Was the World Made for Man?”).

“Twain formulated a new vernacular national voice for American literature, most of all in the person of Huckleberry Finn. Black voices are strongly present. His fame is based on his portrait of the Mississippi River and its great valley and its fertile tales,” Reesman claimed. For this, William Dean Howells called him “the Lincoln of our literature.” But, she added, “Twain also traveled the globe, as he relates in Following the Equator: Anti-Imperialist Essays and A Tramp Abroad.”

Like scientific researchers, literary scholars pursue theories that must be explored and tested through research and evidence. But instead of working with specimens in petri dishes in a laboratory, the literary scholar delves into letters, archives and artifacts. "Primary research is firsthand material, manuscripts, unpublished letters, notes, author's files. I've even looked at the matchbooks that Jack London made notes in," said Reesman, a leading scholar on Jack London in addition to her work on Twain. “It's imperative for literary scholars to go to the archives to create an accurate edition with scholarly notes or write a biography, and just to understand the subject when it comes to literary interpretation and criticism, which is secondary research. A lot of times, students don't realize that the book in their hands may not be what the author wrote.” Primary research also includes the study of historical contexts of literature. For this book on Twain, Reesman will be doing a combination of primary and secondary research.

Her primary research will take her to the Huntington Library in Southern California to delve into the Mark Twain archives and to Elmira College in New York to examine Twain's annotations in his books. She will be applying for grants to finance her research trips. She gratefully acknowledges the endowment research funds she receives as the Jack and Laura Richmond Endowed Fellowship in American Literature. She first met the local donors when Jack Richmond's interest in American literature was $12,000 to $24,000. Throughout her career, Reesman has received $305,900 in grants from the NEH, the Fulbright Program, the Huntington Library, the American Philosophical Society, the National Science Foundation, and UTSA, as well as from private donors, to conduct research, teach abroad and lecture at conferences on American authors. A large part of those funds, $80,000 from private donors, went towards the research and photo printing for her book Jack London: Photographer, which she co-authored with Huntington Library curator Sara S. Hodson and photographer and photo preservationist Philip Adam.

As Reesman noted, “While London is largely defined by his naturalistic, Darwinian tales of struggle and survival, he was also a journalist, as was Twain when he started out. He coincided with the advent of film-based photojournalism. London covered the Russo-Japanese war in Korea in 1904 for Hearst newspapers. A year earlier, he had captured the Rump life in the East End of London in his illustrated book The People of the Abyss. In 1907-09 he sailed the world with his wife and a small crew on their sailboat, Snark, photographing people from Hawai’i to the Solomons. London took great care to portray with dignity and respect the people he met during his travels abroad and increasingly shed his earlier racist views as he encountered more and more the results of colonialism in the South Pacific. His several series of portraits reveal his photographic intent. He did not use the standard poses for ‘natives.’ He was also a primary photographer of the San Francisco Earthquake on April 18, 1906. Jack London, Photographer took 12 years to accomplish: “We had to raise money because we made silver gelatin fine prints, sometimes using original negatives. We also had to do quite a bit of research on early photography and cameras.”

Reesman explained that she was drawn intellectually to London at an early age for the same reasons many other readers throughout the world have been touched by his work—his representation transformation and freedom. She said that the snobbish critical views of Jack London in the past made it fun to advocate for him. "He wasn’t considered fit for the college clas-
room. He was too Western, too popular, too socialist, too women’s rights. Unlike Twain, who was taken up by the Eastern literary establishment, London remained outside respectability.

“But it’s not really a logical choice as to how you choose an author,” she added, “because at a certain level of performance you have to develop an instinct, almost a sense of kinship with an author, to really ‘get’ him or her and be able to see patterns. It’s similar to the instinct good teachers have for their students. It takes time and work as well as inspiration.”

“I’m drawn to writers who are complicated and contradictory,” Reesman said. “In them I have the opportunity to discuss both narrative and ethical issues.” She sees Twain and London as related in fundamental ways: they were famous for writing about a region, even a specific river; they were known for boys’ books but were writing for adults; they were tremendous observers not just of “nature” but of human nature in frontier environments; they were strongly influenced by Darwin; they were critical thinkers; they endured the terrific financial depressions of the 1890s; and Ford was more socially critical. And London was known for boys’ stories, especially London. Twain’s views on race were progressive but not really egalitarian. “I believe I have no prejudices whatsoever. All I know to need is that a man is a member of the human race. That’s bad enough for me.”

“Everyone gives there is a benefit to the work being done in the humanities. But they aren’t usually sure what it is. Can it make us better people? If Twain and London were called as witnesses, he would say no, but then, if that were so, why did he bother to write? We have to look at how writers like London and Twain who transgressed certain rules in literature helped make way for us today. ”

“One of the arts, literature tells the human story from lots of different perspectives,” Reesman concluded. “It gives pleasure. And it does instruct. Outcomes of all human stories are based on many factors, including biology and environment, but also on moral and ethical choices that the characters make. London called literature the ‘language of humanity.’ Authors don’t just entertain people with great works of literature. They promote a common language of humanity.”

JOE C. REESMAN
Professor of English, Jack and Laura Richmond Endowed Faculty Fellowship in American Literature

Jeanne Campbell Reesman’s research interests are in the realist and naturalist writers of the late 19th and early 20th centuries. She is a member of the Executive Board of the American Literary Association. She has taught and lectured as a Fulbright Senior Specialist at the Université de Provence in Aix-en-Provence (spring 2013) and was a Fulbright Professor at Aristotle University of Thessaloniki, Greece (fall 2006). Reesman is presently on a work in a new book titled Mark Twain vs. God. She has written, edited or contributed to more than 60 publications, among them The Norton Anthology of American Literature, Vol. C 1865-1914, Jack London: One Hundred Years A Writer, Trickster Lives: Myth in American Culture and Literature, No Monster But Myself: Jack London on Writers and Writing (with Dale Walker), Jack London: A Study of the Short Stories, Speaking the Other Self: American Women Writers, Revisiting Jack London (with Leonard Cassuto), Jack London's Critically Acclaimed Edition (with Earle Labor), third through sixth editions of A Handbook of Critical Approaches to Literature (with Wilfred Guerin et al), and American Designs: The Late Novels of James and Faulkner.

Reesman received a bachelor's in English from Centenary College of Louisiana, a master’s in English from Baylor University and a Ph.D. in English from the University of Pennsylvania.

UTSA, UT-D, PURDUE SHARE NSF GRANT

“We also hope to advance tools in how provenance data is captured, using various computer operating systems and application software, and systems to ensure the data is authentic without compromising confidentiality and privacy.”

UT Dallas will build privacy-aware access control policies for provenance data. "At UT Dallas, we will enable policies to protect certain sensitive paths in the flow of provenance," said Kantarcoglu. "In addition, our group will research data sanitization techniques to limit the disclosure of sensitive data sources due to provenance release, and we will develop a risk management framework for provenance releases." Ultimately, the research will benefit the research community by providing protocols to increase the trustworthiness of data found online and transmitted and processed by computers.

UTSA, UT-D and Purdue began collaborating on assured data provenance research through a Multidisciplinary University Research Initiative (MURI) funded by the Air Force Office of Scientific Research. The project enabled the team to develop the preliminaries of a model for assured data provenance, which the team was able to apply for NSF funding. The research also offers the universities an opportunity to train graduate students in the theory and practice of data provenance.

NANOCCHIP WILL ACCELERATE RESEARCH RESULTS

Screen potential breast cancer drug candidates. The project will be in collaboration with researchers from STC/IED and UTRiCSSA. Shankar Evan, a research fellow in Ramasubramanian’s laboratory, will assist.

Lopez-Ribot is the recipient of grants from the NIH National Institute of Allergy and Infectious Diseases to study C. albicans biofilms and the pathogenesis of candidiasis. With the long-term view of successful technology commercialization, the UTSA Center for Innovation and Technology Entrepreneurship (CITE) team researchers with graduate students in the management of Technology program to create a strategic technology business plan that assesses the market potential and outlines the technology roadmap necessary to bridge the gap between research development and new technology ventures.

“Are these the kind of synergies we can create at UTSA, bringing together phenomenal research innovation with warranted class projects that both improve the educational model for our students and help propel technology from our laboratories into the market,” said Cory Hallam, CITE founding director.

TRAINING OUR NATION’S NEXT GENERATION OF SCIENTISTS

It possible for her to earn her bachelor’s and master’s degrees at UTSA, she said. “It was lifesaving. I say that first month I was here in San Antonio I lost 10 pounds because I didn’t have money for food. I remember my paycheck was $417 a month. I lived well on that $417. It paid my tuition as well. Financially I would not have been able to do it, and it opened so many horizons for me. I never imagined I would be working in a research lab and going to conferences. I thought I was going to get a job at the mall.”

UTSA offers a range of programs designed to support underserved and disadvantaged students. Among these are the NSF-funded Louis Stowe Alliance for Minority Participation program to increase the number of underrepresented students completing STEM programs; A Comprehensive Strategy Based on Established Best-Practices for Increasing Female Minority Participation and Success in Engineering, a project of the Center for Excellence in Engineering Education in the College of Engineerings, funded by the U.S. Department of Education, Lib-OFF: Curriculum Improvement for Enhancing Minority Education in Engineering, a partnership between UTSA and San Antonio College funded by NASA; and Minority Student Recruitment, funded by the National Action Council for Minorities in Engineering.

A MODERN-DAY GOLD RUSH

and technology relative to water treatment, reclamation and allocation.

Couple that with this broader systems perspective to allow us to project where this needs to go in the future and inform policy based on sound science. What are the appropriate policies, and what are the ramifications of the policies?” At UTSA continues to produce studies and reports on the impact of Eagle Ford Shale hydraulic fracturing on the economy, community and environment, the University is informing stakeholders in real-time about potential policy considerations and best practices.” “This is a study that actually provided a lot of value to the industry, to the community and to policy makers,” Texas Railroad Commissioner David Porter said during the May meeting. “I think when the history of the Eagle Ford is said and done, this study and the first study, the second study and follow-up studies are actually going to be very important documents that were used by policy makers.”

DOF FUNDS INFECTION GENOMICS RESEARCH CENTER

developed a viable treatment for tularema, more animal trials and funding for that research will necessary to prove the safety and effectiveness of that cure. “We did tests in rats, and the vaccine is very effective against what I would call the weaponized form of this organism, which could be used as a bioweapon,” Klose said. “If the rats were protected against the weaponized form of tularemia, and the government is very interested in finding a vaccine that works against that. I think the results are great. Getting someone to be interested and getting them to pay for the next vaccine trials are where we need to go.” While this DoD grant is very important to the research, he said it is also important to finding funding for the research. “Without the support of the scientists within STC/IED, which is primarily funded through the National Institutes of Health, The National Institutes of Health and the grant from the National Institutes of Health for the year 2013.

“Funding has gotten very tight. Obviously this grant from DoD is helping everybody because these are really talented scientists, and NIH is the major source of funding for research in the United States. Thank goodness for DoD!”
Faculty and students at UTSA are involved in a wide variety of exploratory and scholarly research projects. These efforts are documented through the research articles they publish. To highlight the scope and depth of this work, we have listed a few of these below.

Dr. Holly Ventura Miller, assistant professor of criminal justice, College of Public Policy, received the Outstanding Article Award from the Southern Criminal Justice Association for "The Social Context of Acculturation: Findings from a Sample of Hispanic Adolescents." The award is given to the best article published in SCJAs official publication, American Journal of Criminal Justice. The article was chosen from 50 that appeared in the publication over the last year.

In a highly cited article in the journal Neuropsychology, Dr. Rebekah Smith, as social policy of psychology, explored the impact of traumatic brain injury and how our ability to remember could be altered when we are distracted by too many concurrent tasks. In our multitasking society, this finding provides suggestions for more effective treatment strategies for soldiers returning from war with lingering cognitive deficits.

An article in the prestigious journal Neuroscience by Roland K. and Jane W. Blumberg Professor of Neurobiology and Director of UTSA’s Neurosciences Institute Dr. Charles Wilson described the activity patterns in the subthalamus, a part of the brain involved in movement. His insights advance our understanding of disorders such as Parkinson’s disease.

UTSA Dean of the College of Science and Professor of Biology Dr. George Perry published a highly cited article in the Journal of Alzheimer’s Disease titled “Increased Iron and Free Radical Generation in Preclinical Alzheimer’s Disease and Mild Cognitve Impairment.” Dr. Perry is one of the top ten Alzheimer’s disease researchers in the world, and this article expands our understanding of this disease and suggests new avenues of diagnosis and treatment.

Dr. Robert Hard, professor of anthropology, explored the bones of individuals who lived on the Texas Gulf Coastal Plain during the Late Prehistoric Period (ca. A.D. 700-1400) utilizing specialized chemical analysis equipment. This work was documented in American Antiquity and reveals that this group had a stable hunter-gatherer diet that consisted of fish as well as local plants and grains. These results also provided evidence that mobility was constrained among these groups and that population increases were correlated with an increasing use of plant resources.

Dr. Banglin Chen, professor of chemistry, has pursued research which explores the use of nanoparticles and metal-organic frameworks for their utility in industrial processes and future alternative-fueled vehicles. His recent article in Nature Communication reveals that vehicles of the future may run on gas supplied to vehicles within our existing gas supply infrastructure at low pressure. It also means that methane-fueled cars will not pollute the atmosphere in the way that CO2 emissions from fossil fuels are doing.

Department of Communication Associate Professor Dr. Sara DeTurk’s article, “Allies in Action: The Communicative Experiences of People Who Challenge Social Injustice on Behalf of Others,” published in the Communication Quarterly, was selected as the 2012 Eastern Communication Association Article of the Year. It reveals the experiences of people who act to address social injustices and the communication styles they utilize when they resist social peer pressure to refrain from acting.

Dr. José Lopez-Ribot, associate professor of biology and associate director of the South Texas Center for Emerging Infectious Diseases, and Dr. Anand Ramasubramanian, assistant professor of biomedical engineering, published a highly cited article in PLoS Pathogens titled “Dispersion as an Important Step in the Candida albicans Biofilm Developmental Cycle.” Their work explores how biofilms form on surfaces and are the source of many infections that occur after surgery or after severe burns. This research reveals new treatment approaches.

Dr. Dr. Marcelo Mariscal, assistant professor of physics, and their students. They observed that nanoparticles made of gold and cobalt changed their shape when the temperature changed, suggesting alternate manufacturinmg methods. This research was documented in the esteemed journal Nanoscale.

Exceptional Opportunities

At The University of Texas at San Antonio, education is about exceptional opportunities—in the classrooms, in the laboratories, in the studios, in the recital halls and on the playing fields. Education is about preparing yourself to be a citizen of the world and a good neighbor in your community.

With world-class faculty, quality classes, hands-on lab experiences, and a vibrant campus life, including our new football team—these are the kinds of experiences that you’ll find at UTSA, and that is what makes our university top-tier.

Our excellence is made possible by community support. The We Are UTSA capital campaign is providing a foundation for us to do even more, for the benefit of our students and our faculty, and for Texas and beyond.

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