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SPRING 2007

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Violence in the Workplace**

**Protecting Food
from Pathogens**

**Building Better
"Boomer" Housing**

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Fayetteville, Arkansas 72701

Office of the Chancellor
<http://chancellor.uark.edu>

A Message from the Chancellor:

Sustainability is one of today's "buzzwords" in business and education. While there's no agreed upon definition for sustainability, one might loosely translate it as how we impact our surroundings. Institutions throughout our country are turning their attention to becoming better stewards of our environment, mindful of proverbs such as: "We do not inherit the earth from our ancestors; we borrow it from our children."

It is the duty of research universities such as the University of Arkansas to lead the way in developing new theories and practices that address the challenges and opportunities presented by sustainability. As a center of learning and innovation, the University brings together highly intelligent and talented people from around the world to originate, encourage and disseminate new ideas. Also, we're uniquely positioned to put our ideas into action.

With this in mind, the University has created the Applied Sustainability Center. The Applied Sustainability Center is an interdisciplinary, collaborative effort that will study recycling, waste reduction and disposal, walkable cities, alternative energy sources and other methods of reducing our imprint on our environment. With the combined expertise of faculty, staff and students throughout campus who have made the commitment to building a sustainable University and society, the center will make a tangible difference. Not only will we become the model of a sustainable university, we will partner with other institutions and companies to reduce their environmental footprint.

The University of Arkansas already has a head start. In recent issues of Research Frontiers, we've learned the University has been at the forefront of sustainability efforts. UA chemical engineering researchers at the Mack-Blackwell National Rural Transportation Study Center are converting chicken fat into biodiesel fuel. Their efforts are leading to biodegradable, non-toxic, renewable and relatively inexpensive alternatives to fossil fuels. Also, we've followed University researchers as they've studied methods of sustaining limited water resources at the Savoy Experimental Watershed.

Dozens of other UA sustainability efforts are underway. Students and faculty with the UA Community Design Center, with Habitat for Humanity, designed a "green" subdivision in Benton County that features narrower streets and stormwater gardens. They're in the process of designing a similar community in Washington County. Members of the landscape architecture and horticulture departments are experimenting with green roofs that reduce stormwater runoff and street temperatures.

While we're off to a good start, there's much work ahead in building not only a sustainable University of Arkansas, but a sustainable society. The formation of the Applied Sustainability Center is a great step in the right direction. In the coming months and years, we will continue to teach, research and, most importantly, apply the principles of sustainability in all we do as a University.

Happy reading,

John A. White

John A. White
Chancellor



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Photos by Russell Cothren

Constructing Drama

By Barbara Jaquish

In Federico Garcia Lorca's dark drama, *The House of Bernarda Alba*, a tyrannical mother in 1930s Spain forces her five daughters into eight years of deep mourning upon the death of their father. In an existence circumscribed by the crumbling walls of the family villa and the brutal patriarchy of rural Spain, the women struggle against an overwhelmingly oppressive world. Written in 1936, *Bernarda Alba* was Lorca's last play, finished just a few months before he was executed by a fascist firing squad in the early days of the Spanish Civil War.

In spring 2007, the drama department produced the play from David Hare's translation. University photographer Russell Cothren followed two master of fine arts students, Adam Micielica and Andrea Williams, as they designed and produced the set and costumes that set the visual stage for Lorca's story. On this page, Cothren offers a sample of the photographs he took during the weeks before the play opened. To view his photographic essay, go to: <http://researchfrontiers.uark.edu>

"In this show, the family is in mourning and so must dress in black. My challenge was to delineate each character with an incredibly limited color palate. It was an opportunity to discover how line and texture can tell the story. I researched what poor people in a poor village would be wearing – maybe hand-me-downs or homemade clothes – and what fabrics and colors would be available to them."

– Andrea Williams, costume designer.



"The whole set is based on who Bernarda Alba is – cold, calculating and uncaring. The house is a metaphor for her and her family, so I wanted to reflect that cold and rough texture. I researched the architecture of Andalusia in southern Spain as a basis for my design. When I design, I prefer big scenery, but simple scenery. There's not a lot of frou-frou."

– Adam Micielica, scenic designer.



RESEARCH FRONTIERS



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A translation must do more than transform words into another language – they must also convey a sense of time, place and culture. Two professors of translation discuss their techniques for transforming Italian poetry and prose into English.



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A team of researchers in food safety examines how to keep food safe from illness-causing pathogens.



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As Baby Boomers edge into retirement, their housing needs will change. Professors in architecture and rehabilitation are working to create safe, affordable housing that will meet the needs of the aging population.



Biofuels as Invasive Species?



Photo submitted

Biofuels could fan the flames of invasive species problems.

As the United States looks to crops as possible future sources of energy, an entomology researcher and his colleagues call for caution, citing the possibility of some biofuel crops becoming invasive species.

Robert N. Wiedenmann, professor of entomology, and his colleagues put forth their argument for ecological studies of biofuel crops in the Policy Forum in *Science*.

"Most of the traits that are touted as great for biofuel crops – no known pests or diseases, rapid growth, high water-use efficiency – are red flags for invasion biologists," Wiedenmann said. "We want

to start a dialog and approach the question of biofuels systematically."

President George Bush announced the U.S. renewable energy initiative in his 2007 State of the Union address, bringing to the forefront the identification and use of potential biofuels as alternative energy sources. The authors of the Policy Forum article in *Science* call for an examination of potential invasiveness as crops are examined for their biofuel potential and before putting such crops into large-scale production.

Seemingly benign crops that have become invasive species have already occurred in the United States. Wiedenmann and his colleagues cite the case of *Sorghum halepense*, otherwise known as Johnson grass. Johnson grass was introduced as a forage grass and now has become an invasive weed in many states, causing up to \$30 million annually in losses for cotton and soybean crops in just three states.

One proposed biofuel crop, *Miscanthus*, can grow up to eight feet in six weeks. Wiedenmann describes it as "Johnson grass on steroids."

"Plants like these, particularly grasses, have great potential from an energy standpoint, but the benefits need to be balanced with the costs," Wiedenmann said. ■

Fishbone Aisles

Customers ordering products online expect to receive their items quickly, and smart companies know that to be competitive, they must store and distribute goods efficiently. Therefore, warehouses have become an essential part of the supply and distribution chain.

Russell Meller has found a way to make warehouses more efficient. By helping companies retrieve products from warehouse shelves faster, customers will receive items quicker.

Meller, professor of industrial engineering, and Kevin Gue, an engineering professor at Auburn University, developed two designs that accept lower overall density of storage space but improve order-picking response times.

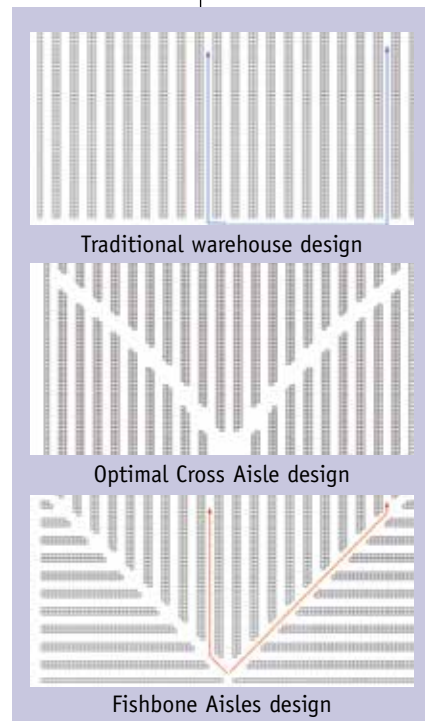
Whereas a traditional ware-

house with 21 picking aisles has no cross aisles, the researchers' "Optimal Cross Aisle" model inserts two diagonal cross aisles that originate at the same pickup-and-deposit point. Viewed from above, the two diagonal cross aisles make a "V" in half of the space occupied by picking aisles and rack rows. Meller and Gue tested this design and discovered that it reduced picking costs by 11.2 percent.

For their second alternative design, Meller and Gue added vertical picking aisles. Viewed from above, the V-shaped cross aisles extend from the bottom to the top of the entire space allotted to picking aisles and rack rows. Horizontal rows of picking aisles occupy the two sections outside the diagonal, V-shaped cross rows. With this design, the researchers added vertical lines of picking aisles on the inside the cross rows.

The researchers call this model "Fishbone Aisles," and this configuration led to dramatic savings. Tests revealed that the cost to make a pick in the 21-aisle warehouse is 20.4 percent lower than in an equivalent traditional warehouse.

"Our approach recognizes the emerging role of distribution centers in industry," Meller said. "A properly designed distribution center can provide a competitive advantage to firms in retail and industrial distribution." ■



Small Organisms, Great Proxies

The present and past compositions of communities of single-celled algae in several Canadian lakes and their relationship to the known climate record suggest that these organisms and the lakes they reside in are highly influenced by sun spot cycles.

This indicates that fossil diatoms in lake sediments provide a proxy for paleoclimatic and paleoenvironmental change.

"The sediment is an environmental archive," said Sonja Hausmann, professor of geosciences. "Like tree rings, the sediment has an annual layer."

Hausmann studies diatoms, unicelled algae with shells of silica, which live and die in the sediments. Up to 400 species of these microscopic creatures can exist in one lake. Diatoms make excellent bioindicators, because the diatom community composition changes with environmental changes in acidity, climate, nutrient availability and lake circulation.

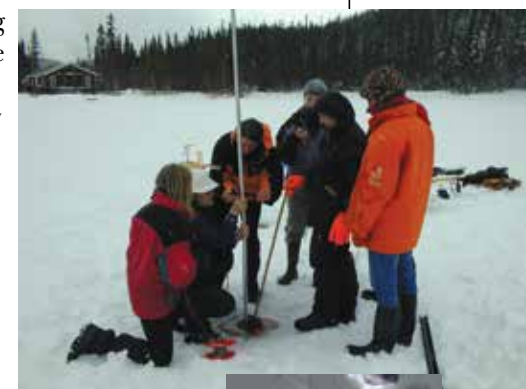
By examining relationships between modern diatom communities and their environment, Hausmann and her colleagues can reconstruct various historic environmental changes quantitatively.

She and her colleagues used sediment traps to study the seasonal fluctuations that occur in diatom commu-

nities in four lakes along a climate gradient in the Laurentian Mountains of eastern Canada. They found that the composition of diatom communities changed seasonally and is dependent upon the duration of ice cover and lake water circulation.

Hausmann then examined the fossil diatom record from sediment cores taken at lac du Sommet and reconstructed lake water circulation patterns. In collaboration with Guillaume St. Onge of the Institut des Sciences de la Mer de Rimouski, she found that the lake circulation patterns inferred by the fossil diatoms showed that the lake responded to past solar activity.

The lake sediment findings corresponded with what is known about historic sun spot cycles, making Hausmann's findings an important addition to understanding past climatic and environmental changes. ■



Photos submitted

Layoffs and CEO Compensation

Finance professor Craig Rennie studied 229 firms that laid off employees at least once between 1993 and 1999 and found that governing boards reward chief executive officers for the decision to cut jobs. For the year after a layoff occurred, CEOs of these firms received 22.8 percent more in total pay than CEOs of firms that did not have layoffs.

"We focused on layoffs because they are common operating decisions that affect shareholder wealth and thus CEO pay," said Rennie.

Rennie, Jeffrey Brookman and Saeyoung Chang of the University of Nevada, Las Vegas, examined CEO compensation to better understand how governing boards achieve the dual objectives of rewarding managers for past performance and motivating them to deliver value-enhancing decisions in the future.

The overall percentage of increased pay for CEOs of layoff firms is only part of the story. Total pay is the sum of cash pay and stock-based compensation. The

researchers' findings confirmed earlier studies showing stock-based compensation aligns managerial and shareholder interests.

"Changes in CEO compensation after layoffs resulted in higher pay levels that persist," Rennie said.

Cash pay was a different story. Salaries and bonuses for CEOs of layoff firms were 10.4 percent lower during layoff years.

"The fact that CEO cash pay is somewhat lower during the layoff year is consistent with political or union pressure on companies during periods of cutbacks," Rennie said.

Rennie emphasized that the period studied was one of economic growth. During the 1990s, layoff announcements were generally considered a wealth-increasing measure that increased efficiency and improved operating performance, a contrast to pre-1990 layoff announcements, which signaled reductions in sales and poor financial performance.

"Our results were consistent with the view that layoffs create shareholder value," Rennie said. ■





True or False: How Do We Know?

A jury's finding can depend on the recollection of an eyewitness to crime, but memory is a tricky thing. In the past 20 years, the notion of false memory has moved from the psychology laboratory to the popular media. People now understand that it is possible to have vivid, complex memories of events that never happened.

"Our memories are not videotape recorders, but there are features in our memory that help us guard against being woefully wrong," said psychologist James M. Lampinen.

Lampinen and Timothy N. Odegard of the University of Texas at Arlington edited a special issue of the journal *Memory* focused on the ways in which people edit memories. The editors assembled leading researchers in the field to contribute.

Psychology research has established that false memories can be created in various situations. However, people use editing mechanisms to correct

for distortion, making it possible for memory to be reasonably accurate. Psychologists have learned that the errors in memory generally make sense and leave people with a fairly accurate gist of past events.

Lampinen called memory a construction project that uses multiple quality-control systems to evaluate the trustworthiness of evidence. The quality-control systems include the degree of detail that makes up a memory, thoughts associated with the memory, related emotions, other contextual information and kinesthetic detail.

False memories can be so vivid and detailed that they seem real. Lampinen and colleagues have shown that people can adopt details from actual events to flesh out false memories in a way that feels real, in a process called content borrowing.

Work on memory editing is still in its infancy, but the authors hope the special issue "will inspire new empirical work and fresh insights into the nature of false memory creation, and into the mechanisms that guard against false memories." ■

Arkansas Models for Italy?

Landscape architecture professors and urban planners have helped create a multinational, interdisciplinary study center that will breathe life into Cervara di Roma, a tiny Italian hill town facing major problems. Their proposals for ecotourism, heritage trails and sustainable development are included in a three-volume publication, *Verso Un Centro Studi/Toward a Study Center*.

The study center will open next summer.

"If the goal of the University of Arkansas is to be a research

institution serving Arkansas and the world, then I think we are really doing that here," said Davide Vitali, director of the UA's Rome Center for Architecture and the Humanities and Cervara project leader.

Founded by Benedictine monks more than 1,200 years ago and long a mecca for poets and artists, Cervara offers sun-washed architecture and stunning views of the Simbruini Mountains. However, economic changes and formidable logistical challenges undermine the town's potential for survival. Cervara has suffered a long decline since World War II as its young people have left farming for jobs in nearby Rome. The city's population has dipped below 500 in recent years.

The aging populace confronts thorny barriers to economic development, including a 115-foot climb from automobile parking to the historic medieval village.

Among the models offered by faculty was Garvan Woodland Gardens, the school's botanical garden in Hot Springs. Garvan Gardens has evolved into a tourist and educational resource that has doubled its attendance figures since opening in 2002.

"Now the Gardens is one of the players in the tourism industry in Hot Springs – and that translates into tourist dollars that support the city's hotels and restaurants," said Fran Beatty, head of the landscape architecture department. ■

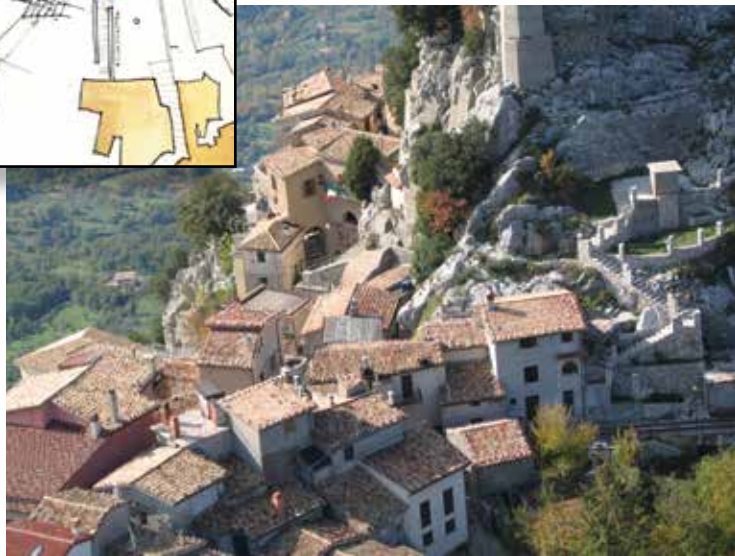
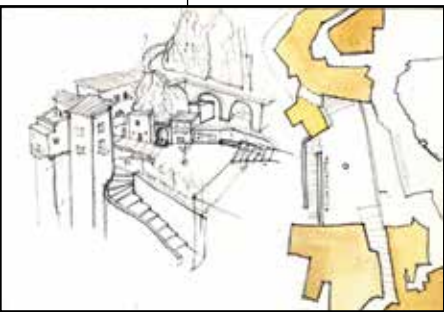


Photo and illustration submitted



The Economist as Liberal Thinker

At a time when the word "liberal" is sometimes referred to as "the L word," political scientist Conrad P. Waligorski has published a study of one of the 20th century's preeminent liberals, John Kenneth Galbraith. He places Galbraith's ideas within the context of liberal theory "during a crucial time in its development" and addresses issues of American political and economic policy.

John Kenneth Galbraith: The Economist as Political Theorist begins with a discussion of the common criticisms that liberalism is mushy and superficial. Rather, Waligorski wrote, liberalism is "multifaceted, diverse, and complicated."

Waligorski noted Galbraith's influence on popular thinking and public policy. Galbraith introduced concepts such as conventional wisdom and affluent society that have framed the way many people see the world.

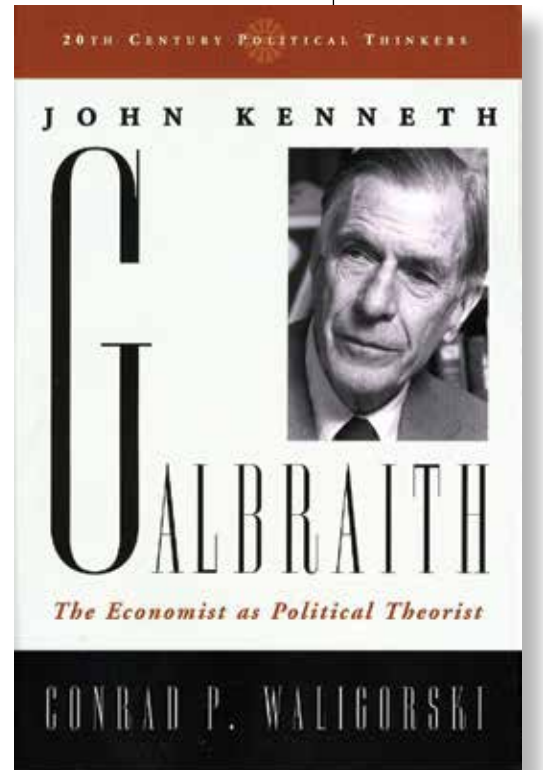
"Many of the issues that drive contemporary public discussion are simultaneously political, economic and ideological. Galbraith epitomizes this nexus," Waligorski wrote.

He credited Galbraith's analysis with discrediting conventional assumptions and pieties and wrote, "At his best, Galbraith insists that we go beyond the popular, beyond surface appearances, and beyond simple tales, and look at consequences."

Galbraith consistently kept in mind the fundamental question: "What kind of future do we want to hold together?"

"Galbraith never lost sight of that," Waligorski said. "I looked at a lot of his private papers and private correspondence, and that question runs through his public work, his private work and through his conversations."

"Galbraith's core social-political concerns – power, equality and inequality, corporate influence over government, education, the fate of people left behind – have timeless relevance," Waligorski wrote in the preface to the book. "The questions he and others like him raise are central to the never-ending debate over what kind of society we currently possess and want, now and in the future." ■



Obstacles to Reducing Medical Error

Both the United States and Japan try to reduce occurrences of injury and death due to medical error. Health officials in both countries realize that to develop successful quality-improvement programs, they must obtain accurate information on the nature, frequency and cause of medical errors.

Law professor Robert B. Leflar says both nations struggle with this problem because obtaining information about mistakes by health-care providers creates tension between the goals of patient safety and public accountability.

Leflar spent a year in Tokyo studying how people and institutions there deal with medical error. He discovered that the Japanese approach differs from U.S. methods, and says both countries can learn from each other.

The two countries differ in the type of law used in medical error cases. In the United States, medical error is almost always treated as a civil matter. In Japan, it is often treated as a criminal matter.

"In the United States, errant physicians and hospi-

tals fear malpractice lawyers," Leflar said. "In Japan, the greater concerns are whistleblowers, the media and the police."

A lack of accountability mechanisms in the Japanese health-care industry appears to explain the criminal-law preference. In the United States, medical accountability is strengthened by peer review, codes of professional ethics, hospital accreditation and fear of civil litigation. Leflar found that although some Japanese hospitals report medical errors voluntarily, the absence of accountability mechanisms means it's not mandatory.

Japan's health ministry has developed a project whereby independent, neutral groups of medical specialists investigate medical accidents. They hope to obtain facts and reach conclusions more quickly, less expensively and perhaps more accurately and objectively than the legal system allows.

"If the Japanese project succeeds," Leflar said, "American reformers seeking to link patient safety and improvement of the medicolegal dispute-resolution system may find the Japanese approach instructive." ■



WALL ART

For Hunter Riley, an honors college senior majoring in economics, political science, and international relations, sidewalks and city walls have become the best places to not only find art, but to observe a rebellious form of political self-expression commonly known as graffiti.

Riley, who has based his senior thesis on the political nature of graffiti, has devoted himself to the understanding and appreciation of this underground art form.

“The first time I really noticed graffiti was on a spring break trip to London my senior year of high school,” said Riley.

While he was outside by Big Ben, Riley noticed some stenciled graffiti that read “This is not a photo opportunity.” Struck by the irony between one of London’s greatest landmarks and the subversive text, Riley felt compelled to snap a photo.

“From then on out, when I was traveling, I would look around in alleys or streets to find graffiti and take photos of it,” said Riley.

Now, having documented graffiti in 20 countries, Riley’s collection of photos allows him to map what he believes to be a globalized phenomenon, which crosses cultural and political boundaries.

“People in general feel that graffiti is graffiti and that’s that,” said Riley. “Really, there’s always a cultural or political message to found.”

While others have argued that graffiti is not always aimed at the powers-that-be, Riley views any decision to engage in the illegal defacement of public or private property as inherently political.

“It’s not just the message that’s political, it’s the action,” said Riley. “If we assume that spray painting a wall flies in the face of a law, then at least at its core, it’s political.”

The gesture in question doesn’t necessarily have to be epic in proportion – even the smallest act can make a statement.

“The other day I found another ‘war’ sticker on a stop sign here on campus that I hadn’t noticed before,” said Riley. “I like the idea of someone putting a cause first and trying to speak out.”

Riley sees his time in the field as something of a history and art lesson mixed with a good dose of secrecy.

“Really, what I want to get out of this research is a better

understanding of what I’m seeing,” said Riley. “I’m jealous of older generations who get to be in on the secret and understand the hidden message.”

There are signs that suggest Riley is reaching his goals. While studying abroad in Argentina, Riley began to suspect that one of his professors was actually a Mendozaan graffiti artist known as Glam Icon. About two weeks after he first noticed the artist’s graffiti, Riley approached his instructor and asked if there was any credibility to his theory.

“She admitted to it, but she definitely didn’t want me saying anything to the people she works with,” said Riley. “She’s definitely underground.”

What Riley was able to get from their talk was instrumental in his research.

“Of all the artists I’ve talked to, she told me the most about her work,” said Riley. “She wants to change the way people view their life and really speak out against their local government. She was adamant in her belief that the spaces she covered were meant for the people to use.”

Riley hasn’t always had as much success getting his subjects to open up.

“Some of the artists will talk to you about what their work means, but you also get lots of rejections” said Riley. “So, the search goes on.”

Though he loves to travel, Riley knows he’s never that far away from the urban art form.

“I know I can walk around anywhere and see graffiti,” said Riley. “Any city I’m in, I’m looking for it on the sides of buildings and along alleyways.”

“Even though I might know what I’m looking for and I’m more familiar with the area, I think Fayetteville has a great deal of graffiti,” said Riley. “I would even say that Fayetteville has more graffiti per-capita than New York or some of the other large cities I’ve been to.”

Well aware that there are some people who will never see graffiti as more than vandalism, Riley still wishes more people would stop and look.

“I know everybody has seen graffiti. I just wish more people would think about what it means.”

Riley’s adviser is Ted Swedenberg, a professor in the department of anthropology in the J. William Fulbright College of Arts and Sciences. ■



From left, “I bomb New York” in Mendoza, 2006. Gas guzzling cars in Buenos Aires, 2006. A portion of the Berlin Wall, 2003. “Resist” in Fayetteville, 2006.



out of 5

By Matt McGowan

Victims of Domestic Violence Experience It in the Workplace

After seven years of marriage, Ruth and Ricky Dale Roberts separated in January of 1991. They divorced two months later, and four months after that, at about 5:45 p.m. on July 25, 1991, Rick shot Ruth five times in the back of the head with a .22-caliber rifle. Ruth, who was 30, died on the driveway of her house in Springtown, Ark. The couple's children were at home when their father killed their mother.

While married, Rick and Ruth Roberts worked together at McKee Foods in Gentry. In January of 1991, the same month Ruth and Rick separated, McKee – maker of Little Debbie snack cakes – fired Rick. Also that month, Ruth was hospitalized because of injuries caused by Rick. Melissa Smith, human resources manager at McKee and leader of Project Ruth, the company's domestic violence awareness and education initiative, said the hospitalization triggered the separation and Ruth's filing for divorce.

"There had not been incidents at work," Smith said. "But Ruth often displayed visible signs of abuse when she came to work. Ruth's coworkers were very supportive of her, and when she chose to leave Rick, they came to her aid."

Across the United States, more organizations are noticing the "signs" of intimate-partner violence – a new and more inclusive name for domestic violence – and, as Ruth's coworkers did, helping victims get help. Despite the popular but crumbling perception that intimate-partner violence is a private matter, business leaders recognize many reasons to get involved. They value their employees as people and assets to the organization, and they want to be good corporate citizens. Furthermore, managers are beginning to acknowledge the extent to which intimate-partner violence affects organizations.

In 2002, Liz Claiborne surveyed Fortune 1000 companies and found that two-thirds of executives indicated that their company's financial performance would benefit if they did something to address domestic violence. One-third of the executives thought their company's bottom line had been

damaged by domestic violence. Specifically, executives recognized that domestic violence had a harmful effect on employees' psychological well-being, physical safety, productivity and attendance.

These opinions underscore a critical void in organizational research: No study has adequately measured the impact of intimate-partner violence on the workplace. Experts emphasized this fact at the 2004 Violence in the Workplace conference, sponsored by the National Institute of Occupational Safety and Health and the Centers for Disease Control, when they identified the lack of data on the business costs of inti-

"During the term of the marriage (Rick Roberts) subjected (Ruth Roberts) to such physical and mental abuse as to render her condition in life intolerable."

– divorce papers filed by Ruth Roberts

mate-partner violence as the primary area in which research is needed.

A year before that conference, University of Arkansas management researchers Carol Reeves and Anne O'Leary-Kelly received \$750,000 from the U.S. Department of Justice to fill part of this void. Last year the researchers released preliminary findings from the first large-scale study specifically examining the impact of intimate-partner violence on the workplace. Their work continues, but they have more to share about the prevalence of intimate-partner violence, its personal and professional impact and its costs to organizations.

Design and Method

Reeves and O'Leary-Kelly gathered data from three organizations based in a Southern state. Each organization agreed to participate in a study of work-family balance. The first organization, an insurance provider, employed 2,552 people, most of whom were women. The second organization was an educational institution with 1,550 employees, evenly divided between men and women. The third organization was a large transportation company with a primarily male work force. With similar response rates across all three organizations, 2,374 workers participated in the study.

A company executive, typically a human resources representative, informed employees about the study via e-mail and solicited participation in a Web-based survey. To ensure anonymity, the survey was based on the researchers' server. Participants were not asked to identify themselves, and because of the sensitive nature of the questions, respondents were asked at several points in the survey if they felt uncomfortable. If their answer was yes, they were then asked if they wanted to continue. Those who said they did not wish to continue were directed to referral information for partner-violence counseling in their area.

Participants first answered general questions related to personal and professional well-being and work productivity. The survey then asked questions about intimate-partner violence. People who reported current victimization – abuse in the past 12 months – were asked if these events had occurred at work. These individuals were then asked to consider the past year and try to identify the frequency with which they had experienced many types of abuse, including stalking, which was defined as a pattern of unwelcoming and harassing contact, such as unwanted phone calls or e-mails that scared the victim.

Reeves and O'Leary-Kelly measured frequency on a five-point scale with 1 representing never, 2 for sometimes, 3 for fairly often, 4 for often and 5 for frequently. They tabulated victimization in two ways to determine victim and non-victim categories and to measure mean level of experience. It is important to note that all respondents who answered 2 (sometimes) or higher were categorized as victims. Lifetime victimization – abuse experienced beyond the past 12 months – was measured and classified on the same number system. Respondents also answered questions about personal well-being (self esteem and depression), professional well-being (perceptions of economic self-sufficiency and family-work conflict) and work productivity (missed work, including whole and part days missed, and disengagement and/or distraction while at work) as they related to intimate-partner violence.

Several components of the research design and methodology deserve attention before discussing the

researcher's findings. In previous national studies on intimate-partner violence among the general population, researchers interviewed subjects by phone or in person in the subject's home, which, in many cases was the very place in which much, if not all, of the violence occurred. When considering victimization rates, this fact cannot be ignored.

"With these studies, it is likely that at least some subjects were being asked about intimate-partner violence in the presence of their intimate partners," O'Leary-Kelly said. "Given the nature of this type of violence, it is understandable that some subjects would not be forthcoming about the violence they had experienced at the hands of those partners."

Knowing that response rates in organizational research are often less than 50 percent and even smaller with high-level managers, Reeves and O'Leary-Kelly worried that employees who responded to their survey would somehow differ from those who did not. They were especially concerned about biases related to victimization. Because victims probably live in a fearful state, would they be less likely to respond than non-victims? The researchers guarded against this limitation by presenting the survey as a study on work and family issues rather than a specific project about intimate-partner violence. Thus, it was not evident to respondents that they would be asked questions about intimate-partner violence until after they had begun the survey.

It also helped that the study was Web-based rather than conducted by phone or in person, not only because it ensured anonymity but also because the researchers could assess the number of subjects who started the survey but opted to end their participation when they reached questions about intimate-partner violence. If respondents had stopped taking the survey at this critical point, it was relatively safe to assume that they were experiencing or had experienced such violence.

"However, we did not see a significant number of respondents choose to stop taking the survey at that point," said Reeves.

Prevalence

As one might expect – considering the strengths of the research method – raw numbers gleaned from Reeves and O'Leary's study are not pretty. Victimization percentages were significantly higher than those reported on a major, 10-year-old study sponsored by the Centers for Disease Control. In the UA study, nearly 20 percent of men and 30 percent of women had previously experienced intimate-partner violence. Ten years ago, the CDC study reported only 7.9-percent lifetime victimization for men and 25.5 percent for women.

Current victimization rates, also higher than the

CDC study, surprised Reeves and O'Leary-Kelly, not simply because the rates were so high but because they were the same – 10.3 percent – for male and female employees. This means that if their findings apply nationally, one out of every 10 U.S. employees, regardless of gender, has been threatened, stalked, hit, pushed, forced into an unwanted sexual act, slapped, kicked, punched, scratched, bit or otherwise physically harmed by an intimate partner in the past year.

Because this finding was not expected, Reeves and O'Leary-Kelly devoted further analysis to answering two questions: Why were their current victimization rates so much higher than the CDC's, and why did it appear that men are abused as much as women? They hypothesized that maybe rates of intimate-partner violence have risen substantially in the past 10 years. However, the U.S. Bureau of Justice Statistics reported that family violence declined dramatically from 1993 to 2002. Could their victimization rates be so high because the study was done on companies headquartered in a Southern state with historically high rates of intimate-partner violence? This explanation seemed implausible because about one-fourth of the respondents were from outside the state – although based in the Southern state, the companies had operations in 38 other states. Moreover, Reeves and O'Leary-Kelly compared responses between the in-state and out-of-state workers and found that prevalence rates of current victims were higher for those living outside the state.

"We believe the more likely explanations for our higher prevalence rates are that employed individuals experience higher rates of intimate-partner violence than the general population," O'Leary-Kelly said. "And, again, we think the method by which we gathered data allowed respondents to be candid and forthcoming about their abuse. It is also possible that subjects are more comfortable answering questions about abuse honestly in the workplace than at home."

Why did it appear that men were abused as much as women? Victimization rates – the percentage of the study's population – are different than frequency and types of violence experienced by male and female employees.

Female employees were more likely to be victims of all types of abuse – threats, stalking, physical hurt and sexual abuse – except for physical aggression. Physical aggression included hitting, slapping, kicking, punching, scratching, pushing, biting or other use of physical force. This meant that if a male employee had been slapped once by his partner over past year and rightfully answered "rarely" on that type of abuse, he was classified as a victim and thus contributed to the overall percentage of current male victims. And a woman who answered "frequently" on all types of abuse contributed equally to the overall percentage of current female victims.

"So, when looking at degree of victimization, we

found that female victims of physical aggression experienced it more frequently than male employees," Reeves said. "In other words, the prevalence of physical aggression was the same for men and women over the past 12 months, but the incidents of physical aggression were higher for women."

For example, of all respondents who had experienced physical aggression in the past 12 months, 53 percent of women but only 27 percent of men reported experiencing it more often than "rarely." Thirty-three percent of women and 18 percent of men reported experiencing physical aggression "sometimes," while 16 percent of women and 6 percent of men experienced it "fairly often." Finally, the percentage of women experiencing it "frequently" was 4, versus 3 percent for men.

While violence affects employees and organizations,

Photo by Russell Cochran



not all of it occurs within the home. One out of five current victims in the UA study reported they had been abused by an intimate partner while at work. Again, if their findings apply nationally, this means that a company with 2,000 employees has at least 200 workers who have experienced intimate-partner violence in the past year. About 40 of these workers experience some kind of abuse at work.

Impact

Reeves and O'Leary-Kelly's findings, similar to those of other studies, show that intimate-partner violence has a profoundly negative impact on people and organizations. Victimized employees in their study missed work

more often than non-victimized employees, had more difficulty concentrating and experienced higher levels of depression and lower levels of self-esteem.

Although most findings were consistent with national studies of the general population, Reeves and O'Leary-Kelly reported one new finding: With regard to personal well-being, the negative effects of intimate-partner violence are not limited to women.

Current male victims also reported lower levels of self-esteem and higher levels of depression compared to non-victimized men.

"Although we argue that female victimization appears to be more severe than male victimization," O'Leary-Kelly said, "it is worth emphasizing that both female and male victims suffer psychological injury as a result of intimate-partner violence."

Female victims reported more difficulty balancing family and work demands and less confidence in their abilities to financially support themselves and their families. In fact, among all current victims, only women reported negative effects on family-work conflict and economic self-sufficiency. The researchers emphasized the significance of this finding because previous

research has established the importance of income to the likelihood of abuse.

"Confidence in one's own economic power cannot be underestimated," O'Leary-Kelly said. "It is directly connected to a female victim's ability to remove herself from a dysfunctional situation."

As predicted, the researchers discovered that intimate-partner violence had a negative impact on worker productivity, which is directly linked to greater costs for organizations. Specifically, lifetime victims were more likely to miss work than non-victims, a finding that suggests intimate-partner violence creates long-term, negative health effects. For example, male lifetime victims missed an average of 104.11 hours per year, while non-victims missed an average of 70.8 hours per year. Female workers who had experienced abuse at some point in their lives missed an average of 138.46 hours per year; female non-victims were absent an average of 109.62 hours.

A somewhat surprising finding was that current victims were no more likely to be absent than non-victims. The researchers speculated that work attendance might serve as a coping mechanism for some victims. For others, strong attendance may reflect the need to keep their job to maintain economic power that will help them escape an abusive partner.

The researcher's examination of intimate-partner violence's influence on tardiness revealed that current victims were more likely to be tardy than non-victims, but the difference in rates was barely significant.

Although current victims seem to be at work as much as non-victims and are late for work only slightly more often than non-victims, that doesn't mean they are productive while at work. Current victims reported higher levels of distraction compared to non-victims. Reeves and O'Leary-Kelly calculated that distraction caused male employees who had experienced abuse within the past year to miss an average of 243.72 hours of work per year. Male non-victims missed an average of 202 hours annually because of distraction. While current female victims missed an average of 248.55 hours per year because they had problems concentrating or had to do work over, distraction only caused female non-victims to miss an average of 175.58 hours per year.

"This pattern was especially strong for female victims," said Reeves. "In addition to the greater number of hours missed, women reported more types of distraction."

When comparing lifetime victims to non-victimized employees, Reeves and O'Leary-Kelly found no differences in levels of work distraction. Also, negative effects, particularly those related to work productivity, appeared to diminish over time.

"Taken together, these findings suggest that victimization may have long-term effects," Reeves said, "but individuals can recover and be highly productive employees."

Costs

Given the disparities between victims and non-victims in work hours missed because of absenteeism, tardiness and distraction, it is reasonable to assume that intimate-partner violence creates significant costs for companies. The CDC estimates that intimate-partner violence is responsible for a staggering \$5.8 billion annually in medical costs and productivity losses – both at work and at home.

To measure costs due to absenteeism, tardiness and distraction, Reeves and O'Leary-Kelly multiplied the total amount of work hours missed, including time at work but not productive due to distraction, with respondents' salary information. Again, lifetime victims had a greater impact. Male employees who had experienced abuse at some point in their lives cost employers an average of \$2,583 a year due to absenteeism. In contrast, male non-victims cost employers an average of \$1,758 annually because of absence from work. Annual absenteeism costs were an average of \$2,331 for female lifetime victims and \$1,953 for non-victims.

Current male and female victims also cost their employers more than non-victims due to absenteeism, but those costs were not as dramatic as the costs from lifetime victims and were not significantly more than absenteeism costs associated with non-victims. Also, current and lifetime victims, both men and women, cost their employers more than non-victims due to tardiness.

Reeves and O'Leary-Kelly were surprised to find that victimization did not predict work-distraction costs.

"While this might be considered surprising given the primary effect of victimization on missed work hours due to distraction," Reeves said, "this result is likely explained by the low salary levels among current victims, which deflates organization costs."

Male and female non-victims reported salaries much higher than current victims. Across all three organizations, male non-victims earned an average of \$66,277 a year, while current and lifetime male victims earned average annual salaries of \$48,749 and \$57,563, respectively. Non-victims earned an average of \$40,481 annually, while current female victims made an average of \$33,426 a year. Interestingly, lifetime female victims reported an annual average salary of \$41,233, \$752 a year more than non-victims.

Conclusion

Reeves and O'Leary-Kelly's research illustrates that employer concerns about the effects of intimate-partner violence are legitimate. But many employers don't know what to do. Traditionally, they have viewed victims as a liability, and one tack has been to terminate victim-employees and rid themselves of the problem altogether.

er. Other employers ignore the problem or argue that it is a private matter.

Legally and ethically questionable, these approaches also are based on flawed logic, Reeves said. Many employees successfully disguise their victimization, but that doesn't mean they aren't negatively affected by it while at work. Because they succeed at hiding it, their employer may know about only a fraction of the victimization or none at all. Also, because of intimate-partner violence prevalence, it would be difficult for business organizations to terminate all victims even if they knew who those employees were.

"A growing number of progressive companies have taken a more ethical and rational approach by recognizing the

significant impact of intimate-partner violence and doing something about it," O'Leary-Kelly said. "Many employers may fear this approach because they think it will entangle them in employees' personal lives, or they will have to become experts in family-violence prevention. But pioneering companies such as Liz Claiborne, Macy's and L.L. Bean and advocacy groups such as the Corporate Alliance to End Partner Violence have established simple and effective programs that show organizations how to get help for employees without being an expert or becoming entangled in employees' personal lives."

Future research will examine the extent to which these and other programs can minimize organizational costs due to intimate-partner violence.

Reeves is an associate professor in the department of management. She holds the Cupp Applied Professor of Entrepreneurship. O'Leary-Kelly is a professor and chair of the management department in the Sam M. Walton College of Business. She holds the William R. & Cacia Howard Chair in Management. ■

"Although we argue that female victimization appears to be more severe than male victimization," O'Leary-Kelly said, "it is worth emphasizing that both female and male victims suffer psychological injury as a result of intimate-partner violence."



Found in Translation

By Barbara Jaquish

Many of us learn enough of a second language to meet our needs – to order dinner or locate a restroom. But to know others in the way we know our family, friends and neighbors takes a deeper and more subtle understanding of language than the average person achieves.

“If we don’t want to have a heads-in-the-sand society, the answer is obvious. We need to be aware of other cultures, and no other human act reveals so much about people as literature,” said

professor John DuVal, director of the literary translation program in the English department of the J. William Fulbright College of Arts and Sciences. “It’s more successful than philosophy or anthropology. In literature you meet people who seem realer to you than people you know. When you read good fiction or poetry, there are no stereotypes.”

The translation program recently welcomed assistant professor Geoffrey Brock to the faculty. His arrival at the university was delayed by a Guggenheim fellowship that gave him a year to “light a fire underneath” a bilingual anthology of 20th century Italian poetry. He continues to edit the anthology while teaching translation and creative writing classes.

Both DuVal and Brock have translated works that offer two different perspectives on Italian fascism, Umberto Eco’s literary examination of Italian history and culture leading up to fascism and Carlo Alberto Salustri’s mocking social commentary on life under fascism.

The Mysterious Flame

In 2006, Brock was honored by the American Translators Association with the 2006 Lewis Galantière Award for his translation from Italian of Eco’s most recent novel, *The Mysterious Flame of Queen Loana*. In his translation, Brock offers readers a literary experience as entertaining in English as the novel is in the original Italian.

Eco’s words that tasted like magic:

Quante parole so perché le ho imparate lì? Perché so anche ora, con adamantina certezza, e in barba alla mia tempesta cerebrale, che la capitale del Madagascar è Antananarivo? Lì ho incontrato termini dal sapore di una formula magica, avvitolato, baciabasso, belzuino, caccabaldole, cerasta, crivellaio, dommatica, galiosso, granciporro, inadombrabile, lordume, mallegato, pascolame, postemoso, pulzellona, sbardellare, specchio, versipelle.

And Geoffrey Brock’s re-creation in English of that magic:

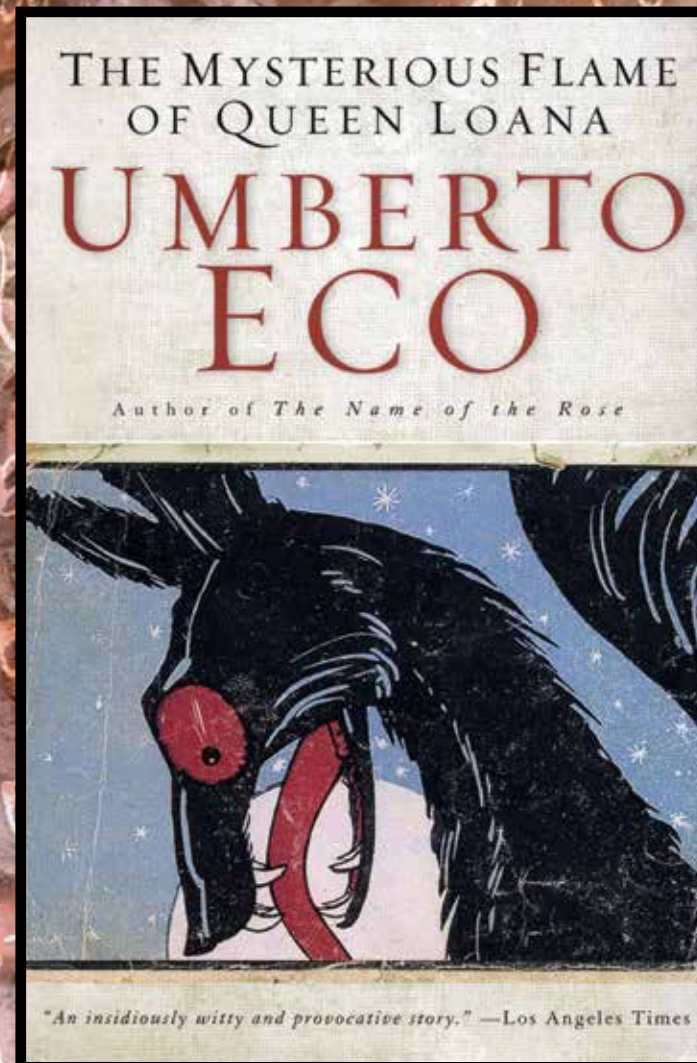
How many words do I know because I learned them there? Why do I know even now, with adamantine certainty, and in spite of the tempest in my brain, that the capital of Madagascar is Antananarivo? It was in that book that I encountered terms that tasted like magic words: avolate, baccivorous, benzoin, cacodoxy, cerastes, cribble, dogmatics, glaver, grangerism, inequation, lordkin, mulct, pasigraphy, postern, pulcious, sparble, speight, vespillo... (p. 111-112)

familiar to Italian readers and make the original humorous and entertaining. Working closely with Eco, Brock’s task was to reproduce that reading experience for English speakers. To do this, he had to replace some of Eco’s allusions to literary and popular culture with

The main character in *Queen Loana* is an Italian bibliophile named Yambo who bears some resemblance to Eco. When the story begins, he has suffered a stroke and is awakening with a type of amnesia that has wiped out his personal memories and left only what he has learned from books. To recover his personal past, he moves into his family’s summer home with its attic filled with everything from his childhood – toys, books and school papers.

“Yambo’s entire childhood is present in objects and in old magazines and newspapers,” Brock said. “As he goes back through all these materials, it becomes a history of a generation and a history of Italian culture in the ’30s and ’40s during the rise of fascism.”

Many of the cultural allusions from the bibliophile’s attic are



different allusions that would be accessible to Anglophone readers—but still plausibly the product of Yambo’s mind. In the case of *Queen Loana*, Brock said, “word-by-word fidelity would sometimes have been an infidelity.”

Brock calls his approach “re-creative translation,” offering readers a literary experience of a work. In an essay about translating the novel, he cited a “cocktail” of elements that create the literary experience for Italian readers of *Queen Loana*. Among the elements are style, voice, tone, diction, humor, character and suspense.

“It follows,” he wrote, “that a faithful translation ought to try to recreate them for English readers, too, or at least to mimic their flavors and effects, in order that the translation function as an analogous work of art in its own right.”

This approach to translation demands more subtlety than a simple literal translation of sentences from one language to another.

“If I had just literally translated it into English, some of the passages might have become obscure or dull and as a result might have failed to achieve whatever humorous or entertaining effect Eco had intended. But Eco is an entertainer and wants his novels to be, among other things, entertaining,” Brock said.

Brock’s re-creative translation offers a rich experience of Eco’s novel with allusions that sometimes spin off the page in rollicking passages melding “a kiss is just a kiss” with a jumbled quote from JFK and bits of Dante with nursery rhymes.

“It’s not important that readers recognize all the quotations – I doubt any would, either in Italian or English,” Brock explained. “But it is important that they recognize enough to decipher the passage’s organizing principle, and that they be, on balance, more amused than confused.”

One passage was quoted from an old mystery novel, and Brock had fun switching gears to give the paragraph “that noir feel.” Even when translating a passage about fog from Bleak House, Brock could not simply lift Dickens’ original English, since Eco had mixed in a bit of “The Little Match Girl” with the Bleak House segment.

At the same time, Brock was conscious of the danger of including so many allusions familiar to English readers that he would turn Yambo into “an insufferable Anglophile” rather than the sophisticated polyglot created by Eco. When he used English-language sources, he tried to select those that Eco had alluded to elsewhere in the novel, such as Shakespeare and James Joyce. In the end, he left enough Italian allusions that “Yambo’s national identity remains, I think, intact.”

In the sixth chapter, a passage presented a particular challenge. Yambo picks up his childhood dictionary and muses on the words he had discovered there many years earlier. He remembers how the

words enchanted him – they “tasted like magic words.” He was more interested in their sound than in their generally obscure meanings. It is their very obscurity, Brock wrote, that “makes him (and us) more conscious of their sonic texture, and of their mystery.”

Brock’s task was to choose words that are “obscure enough and interesting enough in their sounds to have the mysterious ring of magic words.” At Eco’s suggestion, Brock used an English dictionary that would parallel Yambo’s dictionary. He searched the 1913 Webster’s Unabridged Dictionary for words that resembled Eco’s words in sound or appearance.

“My desire was to present a list of words that looked, at first glance, like cognates of their Italian counterparts – they are not just false cognates, but rather a kind of parody of cognates. It was a way of underlining, for myself mostly, but also for anyone who bothered to compare my translation with Eco’s original, not just the irrelevance of meaning here, but the way in which that irrelevance contributes to the magic,” Brock said.

“Every quoted passage had to have its own style and voice in English distinct from the main body of the novel,” Brock said. “That was one of the challenges and pleasures of this translation.”

Mocking Fascism

DuVal faced the challenge of recreation in his translation of *Tales of Trilussa*, a selection of poems by Carlo Alberto Salustri, which received the 2006 Raiziss/de Palchi Prize from the American Academy of Poets for translation

of poetry from Italian. Salustri wrote under the pseudonym Trilussa, an anagram of his last name. *Tales of Trilussa* was originally published by the University of Arkansas Press, which ordered a second printing after the announcement of the award.

“Trilussa’s poems can be successfully carried over into another language only by retaining – or, more precisely, recreating – the dexterity and the bite of the originals, and in John DuVal Trilussa has found his ideal translator,” said Michael Palma, a juror for the American Academy of Poets.

DuVal’s translation offers English speakers access to the mocking social commentary and occasional silliness that still delight Italians more than 60 years after the poet’s death.

“The poetry of Trilussa is in Romanesco, which is the dialect of Rome – the way people speak in Rome, have spoken in Rome – an evolving language since the end of the Roman Empire,” DuVal said. “This prize has been particularly gratifying for me because the language is actually Romanesco rather than straight Italian, and I appreciate the fact that the award-givers and the judges selected a book in dialect, which 20 years ago would not have happened.

“Secondly, it is gratifying to me because this is probably the book

From Tales of Trilussa, translated by John DuVal:

All’ombra

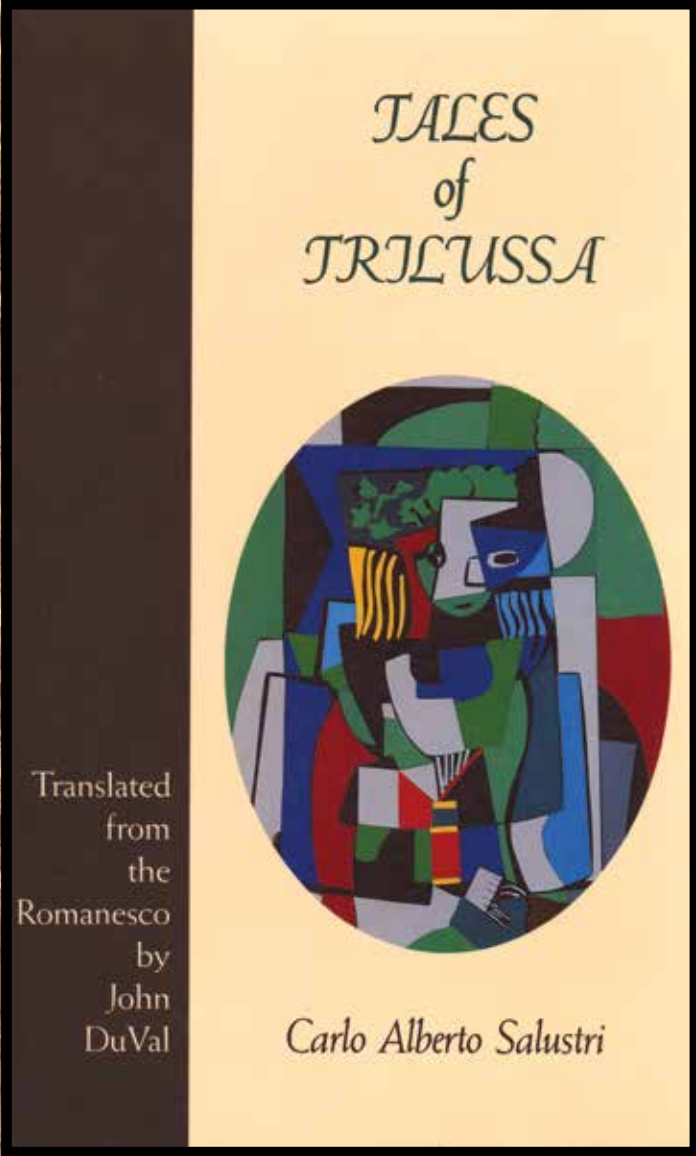
*Mentre me leggo er solito giornale
spaparacchiato all’ombra d’un pajaro,
vedo un porco e je dico:—Addio, majale!—
vedo un ciuccio e je dico:—Addio, somaro!—*

*Forse ‘ste bestie nun me caperanno,
ma provo armeno la soddisfazione
de pot_ di’ le cose come stanno
senza paura de fini_ in friggione.*

In the Shade of a Hay Rick

*I read my paper, back propped against the hay.
Here comes a hog, so I look up and say,
“Goodbye, pig!” And then across the grass
here comes a donkey; I say, “Goodbye, ass!”*

*No way of telling if they’ve understood.
Whether they have or not, it does me good
to call things what they are without the dread
of having to go to jail for what I’ve said.*



of translations that I've had the hardest time writing. Trilussa is a poet of tremendous variety. Every poem is different. He has funny, hilarious poems. He has serious poems. He has sentimental poems. Each time I did a translation I felt like I was starting over again," he said.

In the introduction to *Tales of Trilussa*, DuVal wrote that the poet brought a comic-lyric sensibility to his poems, influenced both by late 19th century Italian Crepuscolari poets, who emphasized simple language and subjects, and by "the popular canzonette sung in the Roman streets and dance halls."

In "La Zampana," or "The Gnat," Trilussa's sonnet celebrates a gnat whose life ends when it is crushed between the pages of The History of Italy, becoming a smear "right in the Campaign for Independence." In the final two lines, Trilussa captures the lesson of the gnat's "mark on one of History's pages":

*"In Italia, a un dipresso,
Se p_ divent_ celebri lo stesso."*

Or, in DuVal's translation:

*"A person's chance for fame, however piddly,
Cannot be altogether squelched in Italy."*

Trilussa, who published his first poem in 1887, was able to make his living with his sonnets, fables, satires and lyrics until his death in 1950. He was already well known nationally and internationally when the fascists assumed control of Italy. Trilussa did not claim to be an anti-fascist poet. Rather, Trilussa said, he was "simply not a fascist."

"His satire exposed the pomposity and double-talk of everyone from street thugs to cabinet ministers. The fascists, when they took power in 1922, were no exception, except that there was a new element to satirize in the new regime: terror," DuVal said. "Such poems as 'In the Shade' and 'The Last of the Bogeyman' become increasingly complex when we realize that they themselves make their author more vulnerable to the terror they mock."

DuVal was introduced to Romanesco by his colleague, the poet Miller Williams, who one day at a party handed him a fat volume of Trilussa's complete poems in Romanesco, saying, "Here, John – here's something you'll enjoy translating." Intrigued, DuVal taught himself Romanesco with the aid of Romanesco-Italian dictionaries and a Louisiana State University Press edition of Romanesco sonnets by G.G. Belli printed alongside what he calls Williams' "masterful translations" into English.

"When I look back through *Tales of Trilussa*, I can have two different sensations," DuVal said. "Sometimes when I just leaf through the book I'm really impressed by the variety, and I take tremendous pleasure in reading it. But too often as I look through I'm impressed with a sense of coming short sometimes of Trilussa's poetry, as I go from one poem to the other. There's just so much to the original."

Guessing at la lingua

DuVal is currently translating accounts by Europeans of their first encounters in North America for an anthology edited by his daughter, an assistant professor at the University of North Carolina in Chapel Hill. Some of the accounts are reports back to

Spain from governors or missionaries in what is now the southwestern United States. The spelling is "awful," he said. "It's hastily written and not grammatical."

In the early 1500s, as Cabeza de Vaca wandered through what is now the southern and western United States, he recorded a long list of the languages he encountered. Many are now extinct. The explorer's writing was better than most of the report writers, but still there were tricky inconsistencies.

One example is the Spanish word *lengua*, which has three meanings in the writings of de Vaca and other Spanish explorers and settlers. In addition to "tongue" and "language," the common meanings today, *lengua* was used to signify an interpreter. While DuVal often encounters puns or double meanings for words, the three different uses make the translation much more difficult. Fortunately, he has experience with Medieval French and old Spanish, and thanks to his study of Romanesco, he is "used to guessing at variations." For *lengua*, he also consulted his University of Arkansas colleague, professor of foreign languages Luis Fernando Restrepo, who informed him that *una lengua*, as interpreter, could be either a man or a woman.

Both DuVal and Brock teach translation at the University of Arkansas, and both have won the Raiziss/de Palchi Prize. No other translation program has had two winners of the Raiziss/de Palchi Prize. Both have also received fellowships from the National Endowment for the Arts – DuVal for translation and Brock for his own poetry.

Brock also received another translation award in 2006, the John Frederick Nims Memorial Prize from *Poetry* magazine, which he received for his translation of a poem by Giovanni Pascoli, a poem he first discovered thanks to a quotation from it in the Eco novel. Brock's translation of *Skylark Farm*, a novel about the Armenian genocide by Antonia Arslan, was released early in 2007. His current projects include the anthology of 20th century Italian poetry and a second collection of his own poems, tentatively called *Voices Bright Flags*.

In addition to *Tales of Trilussa*, DuVal also translated *The Discovery of America* by Cesare Pascarella, which won the 1992 Harold Morton Landon Prize for the Translation of Poetry from the Academy of American Poets.

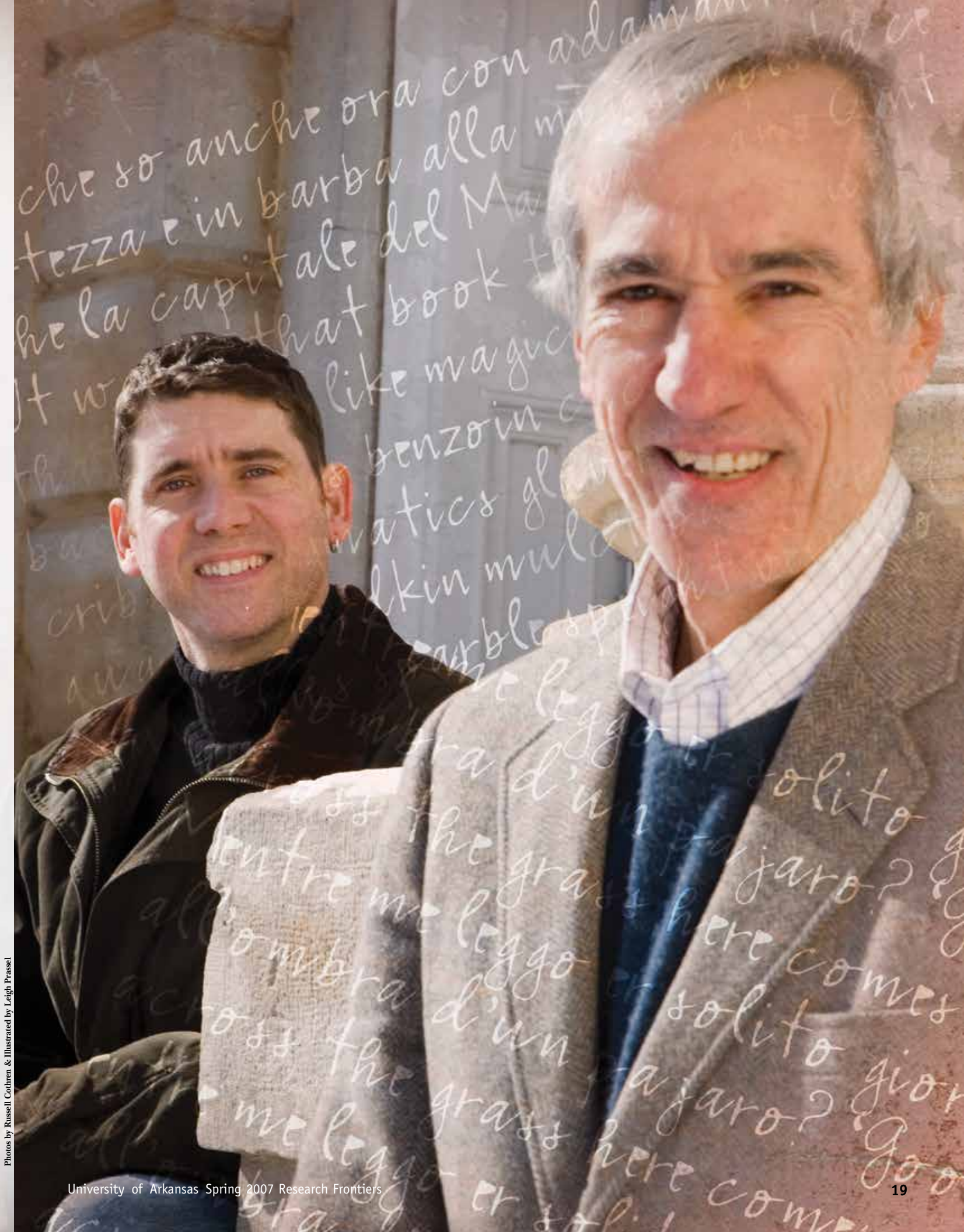
Celebrating Living

A good translation, whether fiction or poetry "functions as a calibration of humanity," DuVal said. Poetry is less popular in translation than fiction because of the difficulty of conveying all that a poem holds. With Trilussa, DuVal was certainly challenged by the great variety of his work – the fables, love poems, sarcastic Romanesco street scenes and philosophy in poetry. When he says he fears he fell short in translating Trilussa, he wonders about "a sense of disunity and a sense of Trilussa not coming across as a person."

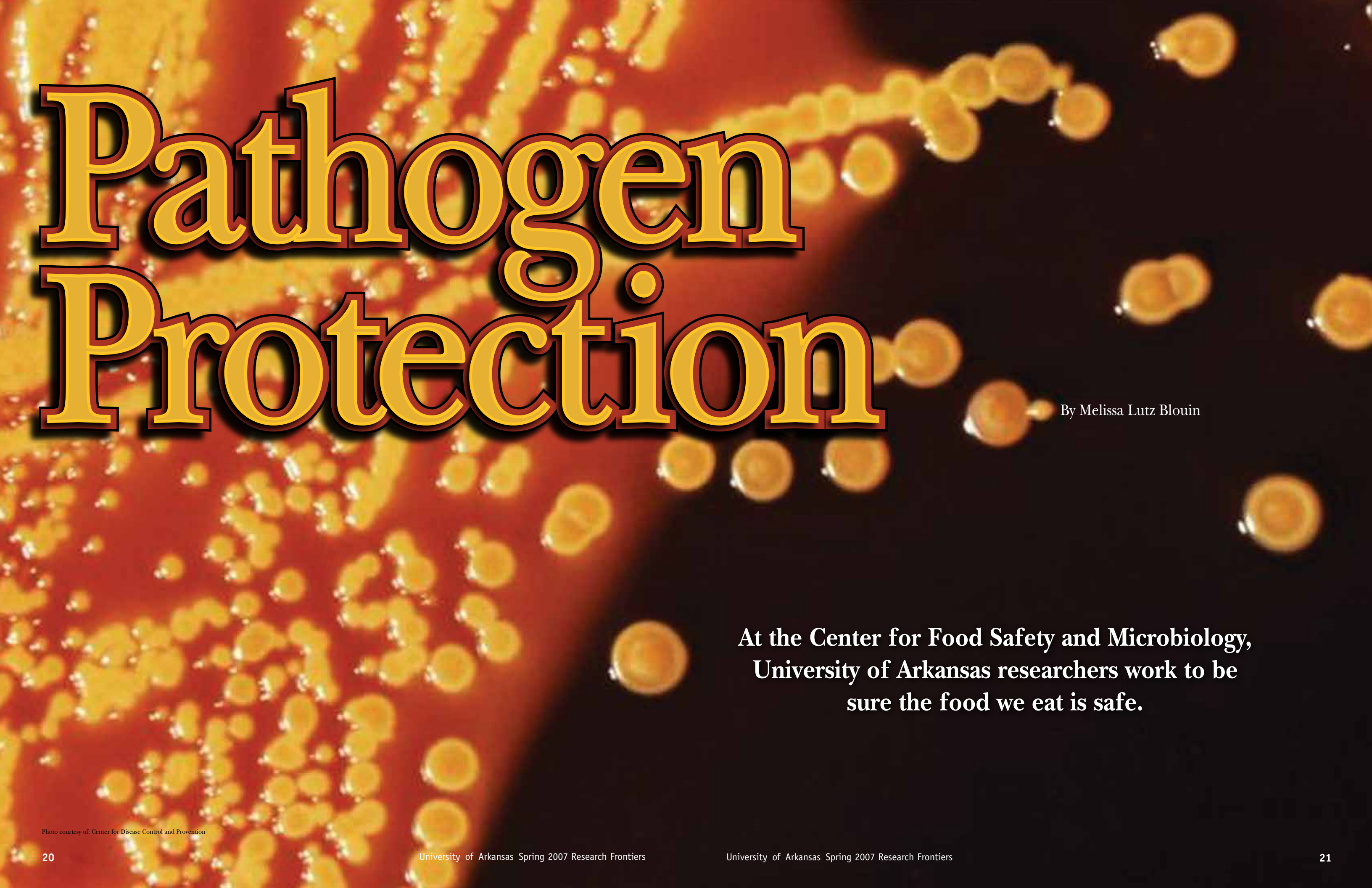
Still, he comes back to the essential hopefulness of his art.

"Poetry is a universal celebration of living, particularly the longing within. Translation of poetry is impossible, because it is impossible to celebrate French, for instance, in English. But still we try to do it."

To hear readings by Brock and DuVal from their translations, go to <http://researchfrontiers.uark.edu>.



Photos by Russell Cothren & Illustrated by Leigh Prassel



Pathogen Protection

By Melissa Lutz Blouin

At the Center for Food Safety and Microbiology,
University of Arkansas researchers work to be
sure the food we eat is safe.

Most people take the act of eating for granted. They bite into the turkey sandwich with gusto and virtuously munch on their spinach salad – or they chow down on the cheeseburger and fries. But whatever the food, the consumer inevitably pays the price at some point in their lives, in the currency of foodborne illness.

The Centers for Disease Control estimates that 76 million people succumb to some form of foodborne illness annually. Cramps, nausea, vomiting, diarrhea – these common symptoms often keep a child out of school or an adult home from work for a few days – a mild dose of discomfort. But out of these cases, about 325,000 people end up in the hospital and about 5,000 people die annually from complications resulting from these foodborne diseases – most often the very old, the very young, and people with existing illnesses.

Why so much illness from the simple act of eating? We live in a microbial world, said Steven C. Ricke, the director of the Center for Food Safety and Microbiology in the Institute of Food Science and Engineering, and the holder of the Donald “Buddy” Wray Food Safety Endowed Chair.

“Most of the pathogens that cause foodborne illness exist in the environment,” Ricke said. “What we need to understand is what triggers the microbes to become pathogens.”

Food has many opportunities to become contaminated on its journey from the farm to processing plant to grocery store to kitchen table. First of all, healthy animals harbor microbes, such as *Salmonella* and *Campylobacter*, and these can potentially contaminate meat during processing.

“Animals are not grown in a sterile environment,” said Mike Johnson, professor of food science in the Dale Bumpers School of Agricultural, Food and Life Sciences. In addition to harboring potential pathogens, animals are exposed to air, water, earth and other animals that could potentially spread disease.

Fresh fruits and vegetables are not immune to invasion by pathogens – they can become carriers if washed with contaminated water. Later in processing, food-

borne microbes can be introduced by infected humans or by cross-contamination through contact with another product. Finally, the way food is handled in the home or restaurant can determine whether or not disease ensues. Under the right conditions, one bacterium can produce about 17 million progeny in 12 hours.

At the University of Arkansas, researchers seek to reduce the number of foodborne illnesses in three ways: Prevention, containment and reduction. While researchers have for years studied containment and reduction, prevention remains a relatively new approach. Ricke looks at ways to predict pathogen behavior so researchers can then prevent problems with foodborne illness down the line.

“Foodborne pathogens are a moving target. They’re genetically dynamic,” Ricke said. “The more we understand the biology of the organisms, the more we will know what they are capable of doing.”

The organisms’ names read like a “who’s who” lineup in Latin: *Campylobacter jejuni*, *Escherichia coli*, *Listeria monocytogenes* and *Salmonella*. These four microorganisms hold the distinction of being the major bacteria of concern in food safety and public health. The Center for Food Safety has researchers working on some aspect of all of them.

Photo submitted



Steven Ricke examines bacteria with student Vesela Chalova-Zhekova.

Ricke studies *Salmonella* in the guts of chickens. *Salmonella* causes somewhere between 2 to 4 million cases of salmonellosis in the United States annually. Most people contract it from raw meats, poultry, eggs and unpasteurized dairy products.

This microorganism typically shuns acidic environments, but it has evolved genes that allow it to tolerate stomach acid. And while the bacteria reside in the intestinal tracts of these birds, they do not always cause infections. Knowing the circumstances that trigger an infection can help researchers determine how to prevent them from occurring.

To look at virulence, Ricke studied the prevalence of *Salmonella* in the gastrointestinal tracts of chickens fed on different dietary regimens. They found that diet modification could lead to changes in the gastrointestinal tract that might encourage virulence and infection.

Killing some of the bacteria through food modification may seem like a good idea, but the ones that remain behind may become more militant, turning into “Ninja” bacteria that multiply and potentially become an infectious strain, Ricke said.

“It’s the same scenario if you suddenly take the pathogen outside of the animal – how does it respond to that rapid change?” he said.

Microbes are the ultimate opportunists, looking for ways to reproduce and continue their existence. Johnson studies ways to protect food – and humans – from one of the hardest pathogens – *Listeria monocytogenes*.

Listeria infection, while rare, can lead to meningitis, septicemia, encephalitis and spontaneous abortion in pregnant women. It has been associated with raw meat and dairy products. But worst of all from the standpoint



E. Coli



Salmonella



C. Jejuni

of those who wish to combat the growth of *Listeria* in food products, the microbe can survive at refrigeration temperatures.

“Most of the hurdles we use to keep food safe from microbes don’t work with *Listeria*,” Johnson said. “So we had to come up with something that would provide protection.”

Johnson and Navam Hettiarachchy, University Professor of food science, together with graduate student Marlene Janes, now an assistant professor at Louisiana State University, developed an edible film, a tasteless, invisible physical barrier between the meat products and the environment. They used zein – a corn protein used as a coating for candy. However, they added an important ingredient – nisin, a bacteriocin that can penetrate the cell membrane and destroy the cell from within. Nisin had been used in liquid form, but the researchers combined it with the zein to form a protein-coating, bacteria-killing edible film.

“You want to see your treatment kill the bugs until they are not detectable,” Johnson said. The researchers used the edible film to prevent *Campylobacter jejuni* bacteria from growing on chicken carcasses. Researchers estimate that *Campylobacter* causes more than 4 million cases of illness a year in the United States.

They also used edible films to prevent the growth of the less pervasive but harder *Listeria monocytogenes* in processed meat products.

While *Listeria* has the distinction of being a virulent, hard-to-kill pathogen, most people find themselves more familiar with *Escherichia coli*, or *E. coli*. In recent years, outbreaks of *E. coli* in vegetables such as spinach and scallions have worried consumers and caused economic havoc for producers. According to the CDC, health-related incidents involving fruits and vegetables are on the rise.

Plants pose a particular challenge because the pathogens don’t generally infect the plant – they just exist on the plant. Hettiarachchy and her research team have started to examine the antimicrobial properties of certain types of plant extracts, peptides and organic acids with the idea of using the extracts and selected substances in edible films to protect fruits and vegetables on the way from the field to the table.

“The consumer is very apprehensive about chemicals in foods,” Hettiarachchy said. “But people are used to eating plant material in their diets.”

Most people are familiar with grape seeds and green tea, two of the items Hettiarachchy and her research team use to make antimicrobial extracts. The extracts are made using liquids water or other food-grade solvents. The researchers have used the extracts alone and in combination with nisin peptide, a protein fragment, and lactic or malic acid – the first acid found in milk and the second in apples.

How to apply the extracts, peptides and organic acids to food products? Hettiarachchy and her team used an edible film containing the antimicrobial extracts, peptides and organic acids. This invisible, tasteless, odorless film can be used to coat meat products, vegetables, fruits and eggs to protect the

products from pathogens.

They currently have a patent for producing edible films that contain soy proteins and organic acids with antimicrobial activity. The films can contain different amounts of the various natural antimicrobial products. The nature of the film will allow immediate release or long-term release of antimicrobials. The edible film technology is available to companies for development and commercialization under license.

In addition to the antimicrobial properties of the substances in the film, the film itself acts as a barrier to any outside pathogens. The organic acids and peptides protect the product from within. Lactoferrin, for instance, a peptide derived from milk, binds to iron, preventing it from entering the pathogenic cell and creating an iron deficiency within the cell.

“The metabolism of the bacterial cell will be affected, leading to death,” Hettiarachchy said. Although much of their work has been with *Listeria*, her research team is also focusing its attention on *Salmonella* and *E. coli*.

“The continuing recalls due to pathogen contamination in food products show that further research is needed to better control and kill pathogens,” Hettiarachchy said. “New and novel multiple technologies are in demand to effectively kill or control foodborne pathogens.” This is the current focus of Hettiarachchy’s research team.

E. coli may be the most well-known “bad guy” of the bacterial world. First documented in 1982, a particularly virulent form of the bacteria, *E. coli* O157:H7, which causes hemorrhagic colitis, was first associated with disease outbreaks in people who consumed undercooked ground meat. In September of 2006, three people died and 200 became ill in more than 26 states and one Canadian province from eating *E. coli* O157:H7-contaminated spinach traced back to a farm in California. In November of 2006, another outbreak of the strain occurred – this time in green onions found in Taco Bell restaurants in the northeast. Dozens of people in New York, New Jersey, Pennsylvania and Delaware became ill.

“Obviously the public would like to see outbreaks minimized as much as possible,” Ricke said. And while researchers work to make food safer in the marketplace and in restaurants, clean kitchen habits at home will always remain a part of preventing foodborne illness. In fact, it’s one of the first things Johnson talks about with his students. It only takes a few bacteria from a dirty chopping knife to contaminate the lettuce that’s cut with it next.

Keep hot foods hot and cold foods cold – so say the researchers. Johnson also emphasizes washing hands while cooking. He points out that cross-contamination can occur when the cook picks up a bun to toast it on the grill using hands that have handled raw meat.

“Pathogens have opportunities they will exploit,” he said. ■



Ramakrishna Nannapaneni, a food science researcher, examines starved cells of *Listeria monocytogenes* impact on targeted mouse cells.



Doctoral student Lisa Bielke of Houston, Texas, streaks *Salmonella* culture on a plate treated with *lactobacilli*, a beneficial bacterium that can be used to treat bacterial infections in poultry gastrointestinal tracts.

Photos submitted

INDEPENDENT LIVING by design



by Kendall Curlee

Above: A model of a home that uses a wrap around porch to function as an access ramp.
Right: Kory Smith stands in front of a prototype of a moveable wall unit that also functions as a wardrobe. Several of the department's model homes are shown in the shelves of the wardrobe.





Across Arkansas,

plywood propped on porch steps and other makeshift ramps bear quiet witness to a looming crisis: the baby boomers are graying, and conventional homes don't cut it when housing older adults and people with disabilities. Steep steps, narrow passageways and bathrooms without grab bars undercut aging at home, which is precisely where most boomers plan to enjoy their retirement.

A recent survey funded by the Universal Design Project,

an outreach program of the UA School of Architecture, found that an overwhelming 95 percent of boomers believe that they will maintain an independent lifestyle, although 81 percent acknowledge that their health will decline as they age.

"A lot of talk focuses on health-care costs for retirees," said Korydon Smith, an architecture professor who directs the Universal Design Project. "As we see it, one of the biggest things currently overlooked is the role of housing."

Picture this: the number of people over 65 is expected to double in the next 25 years, and disability rates will rise as the boomer generation ages. Nursing home care, at more than double the cost of independent living, is not the answer. The need for low-cost, accessible housing is especially urgent in Arkansas, which has the nation's highest poverty rate, the third highest disability rate, the fifth highest percentage of Social Security disability recipients and the seventh highest percentage of residents 60 and older.

Kory Smith envisions a brighter future based on good design. With the help of five architecture students and colleagues across campus, he is taking the first steps to create affordable, accessible housing in Arkansas.

The survey is just one of many projects simmering in his lab, a sunny spacious room in Vol Walker Hall crammed full of site models, wooden house blocks and housing prototypes. During a recent interview, Smith examined one of the prototypes, a white single-story house with the granular look and feel of a sugar cube. Crafted by a rapid prototyping machine, a printer that lays down increments of powder and a glue-like ink, this model for a 1,000-square-foot home in Arkansas City is the most cost-efficient design developed by Smith and his students.

"The Delta area is one of the most difficult places to build inclusive housing," he said. "It's incredibly flat and many sites are in a flood plain. How do you make a home accessible if you're raising it up?"

To explore this and other design questions, Smith and four students canvassed the state last summer. They snapped more than 600 photos of regional housing styles and ad hoc ramps made by resi-

dents to accommodate disabilities. Ultimately they focused on developing designs for sites in Fayetteville, Hot Springs, and Arkansas City that represent three geographical regions in the state.

"Choosing actual sites gave a grounding to the project," said Zack Cooley, a recent architecture graduate who has worked with Smith for two years. "People can understand these concepts much more easily if you show them a concrete example on a real site."

Take the Delta project: Though Smith and his students try to avoid ramps, which can carry a certain stigma, in this design they wrestled a necessity into an asset, wrapping the ramp around the home and turning it into a porch that "faces a soybean field, the levy and the Mississippi river – it's very scenic," Cooley said.

The other models take advantage of sloped sites to provide level access and introduce two additional housing types: a two-story duplex with live/work space and a larger single family home. Darell Fields, a UA architecture professor with expertise in prefabricated housing, is developing a multi-family unit. All of the prototypes use common sense solutions for accessible, low-cost shelter. For example, kitchens and bathrooms share a "wet wall" to save on plumbing, and interior load bearing walls are limited to allow for design adaptations as needed. Smith hopes to begin construction on the prototypes by the end of next summer.



Above: a rendering of a two-story home with one story functioning as a residential area and the second as a business, with both having direct access to the street.

Images submitted

While design work on the prototypes is well under way, Smith's team continues to research the assumptions and preferences that shape the current housing market. On the boards for this spring is a competitive bidding study that will compare blind bids from contractors on two house plans: one inclusive, one conventional.

"An inclusively designed house shouldn't be any more expensive to build. If contractors and builders think otherwise, then we have to find out why," said Brent Williams, a professor in the UA rehabilitation education and research program. Williams believes that any cost difference would be minimal – and that inclusive homes will have a market edge as the population ages. He would like to host forums with builders and contractors to pinpoint areas of resistance to inclusive design and how to overcome them.

"I'm guessing that it's the association with age and disability. We have to convince them that inclusive design isn't just for a specific market niche. Our task is to show them that it's just good design," he said. Williams points to airbags in cars as an example. "Used to be, you didn't care if your car had airbags; now, you expect them. We want people to expect doorknobs that work, hallways that are wide enough, bathrooms that are big enough." To effect policy change, Williams also plans a landmark study that would compare costs of assisted living in an inclusive design environment with long-term nursing home care. The study would take twenty nursing home residents and place them in retrofitted apartments, providing assistance from existing community resources.

"We've already established what the state has been spending on nursing home care – up to \$5,000 a month. The attendant care necessary for someone to live at home runs around \$1,300 a month – that's a savings of a little over \$44,000 a person per year. It's a win-win for everyone; the state's happy because they're saving money and people with disabilities are happy because they're living at home, in the community," Williams said.

While Williams focuses on the nuts and bolts of building costs and community housing strategies, interior design professors Jennifer Webb and Nann Miller are zeroing in on a more intimate issue: what makes a home feel like home. Their work is not just touchy feely decisions about color palettes and floor coverings, what Miller calls "pillow fluffing."

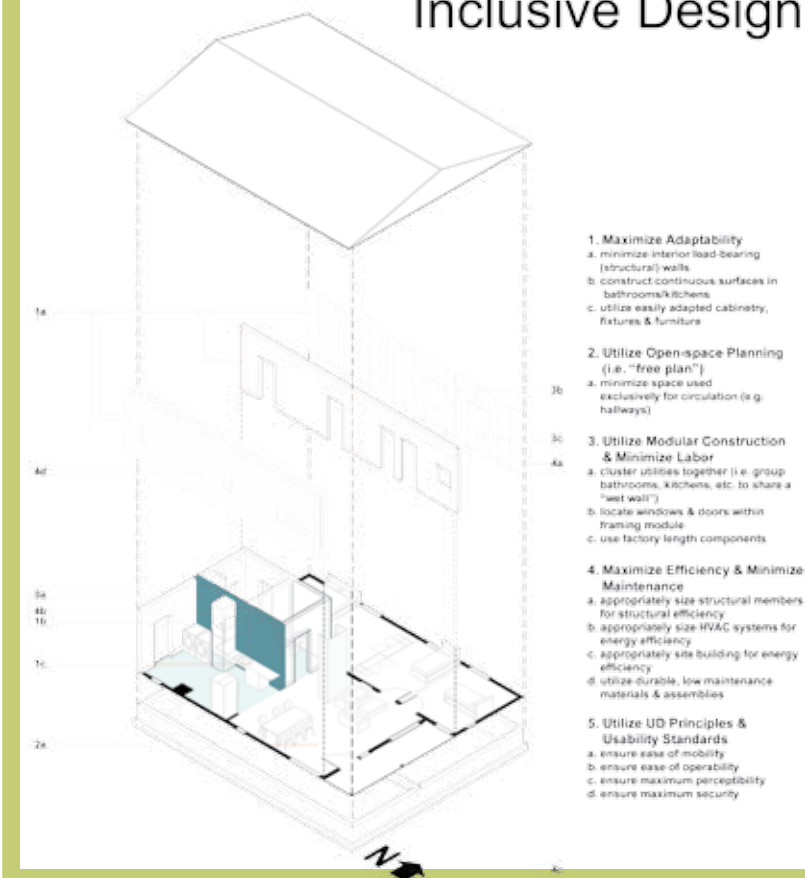
"What we deal with is the health, safety and welfare of the end user," she said. "It's important that the person has enough room to do what they need to do, in an assisted way if that's necessary, and that psychologically, it fits them." To design interiors that provide a good psychosocial fit, they are developing an environmental preference study that will be administered by agricultural extension agents to groups of people around the state. Participants will be asked to rate images of kitchens and sofas, bedrooms and neighborhoods to determine which feel most comfortable.

"What's home to me as a middle-class white woman from eastern Tennessee may not be home to a baby boomer who is African American and lives in the Delta," said Webb. She and Miller hope

that their findings can be used to create sensory-rich environments that reflect the history, culture and values of the homeowner. "If we come up with research methods that could be replicated elsewhere, then that is priceless as well," Webb said.

To share the prodigious amount of research being generated by the Universal Design Project, Smith is compiling two books. The first is a "how to" manual for builders and contractors that charts design alterations along a continuum, from houses that welcome visitors in wheelchairs to homes that fully accommodate

Five Principles of Inclusive Design



residents with a wide range of disabilities. Smith is working with Webb and Williams on the second book, tentatively titled *Just Below the Line: From Marginalization to Equity in Southern Housing*. Slated for publication this spring, *Inclusive Housing* will explore in depth the concept of home and the impact of environment on disability. Numerous models and diagrams will showcase the housing prototypes developed by Smith and his students as exemplars of inclusive design.

Boomers would be well advised to study the book closely. Along with an investment portfolio and health care plan, a well designed home can make aging comfortable and affordable – with no plywood ramps necessary. ■



The Girl in the Tangerine Scarf

Mohja Kahf

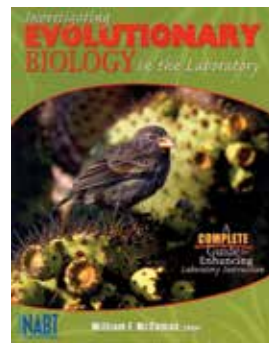
Carroll & Graf

In her first novel, *The Girl in the Tangerine Scarf*, Mohja Kahf, associate professor of English, immerses readers in the world of Khadra Shamy, who grows up in a devout Muslim family in Indiana.

The fictional family and the aunts and uncles of the neighborhood are a cast of characters who nurture, challenge and aggravate the young Khadra, who grows during the course of the novel to become “a woman true to herself.” One of the warmest and most complex characters is Teta, who is the protagonist’s Syrian aunt and a composite of a number of women from the author’s life.

The author shows the adult Khadra Shamy using photography to convey a complex picture of Muslim lives. In one scene, she considers how best to photograph the familiar scene of a prayer hall and decides to use low camera angles to emphasize the experience of prayer.

Within the novel are signals pointing to authors whom Kahf loves. “A caramel colored girl” with a bag of shoes is an echo from the Sandra Cisneros novel *The House on Mango Street*. One kindly individual is the Quaker neighbor, Mrs. Moore, whose name comes from a character in E.M. Forster’s *A Passage to India*. ■



Investigating Evolutionary Biology in the Laboratory

Edited by William F. McComas

Kendall/Hunt Publishing Co.

In *Investigating Evolutionary Biology in the Laboratory*, William F. McComas writes that evolution is “the most important, most misunderstood, and most maligned concept in the syllabus – if it even appears in the syllabus.”

McComas wrote the book’s introductory sections, which engagingly explain the science of evolution and the challenges of teaching this core principle of biology. These chapters are also a valuable resource for parents and others concerned about science education. In a succinct account of the development of understanding of evolution by Darwin and other scientists, McComas suggests that studying the actual history of the theory would teach students more about science in general and evolution in particular than the myths employed by most textbooks.

McComas assembled a host of scholars with rich research and classroom experience to write chapters that examine legal issues, review teaching strategies and present laboratory activities. He begins by establishing the centrality of evolution to modern biology.

“Without evolution, biology would simply be little more than a kind of ‘natural history stamp collecting,’” he said. ■



The Death of A Confederate Colonel Civil War Stories and A Novella

Pat Carr

University of Arkansas Press

Dramatically compelling and historically informed, *The Death of a Confederate Colonel* takes us into the lives of those left behind during the Civil War. These stories, all with Arkansas settings, are filled with the trauma of the time. They tell of a Confederate woman’s care of and growing affection for a wounded Union soldier, a plantation mistress’s singular love for a sick slave child, and an eight-year-old girl’s fight for survival against frigid cold, injury, starvation, heartbreak and lawlessness.

Here are women holding down the home front with heroism and loyalty, or, sometimes, with weakness and duplicity. Will a young belle remain loyal to her wounded fiancé? How long can a caring nurse hold her finger on a severed artery? And how does anyone comprehend the legacy of slavery and the brutality of war?

The Death of a Confederate Colonel triumphs in its portrayal of desperate circumstances coated in the patina of the Civil War era, the complexity of ordinary people confronting situations that change them forever.

Pat Carr has written 12 books of fiction, including *If We Must Die*, a finalist in the PEN book awards. ■



Advanced Electronic Packaging

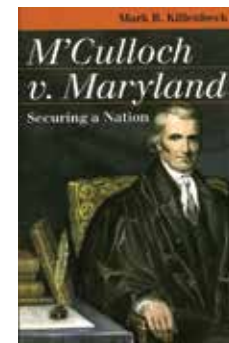
Edited by Richard Ulrich and Bill Brown

Wiley, Inc.

Advanced Electronic Packaging has helped thousands of students and practicing engineers understand the complex task of connecting integrated circuits and other electronic components to make virtually every electronic device, including cell phones, video games, computers and military- and medical-imaging equipment.

For seven years, *Advanced Electronic Packaging* has served as a popular, graduate-level textbook and the industry-standard reference manual. Each chapter was authored by one or more acknowledged experts and then edited to ensure consistency throughout the book. In addition to offering a comprehensive overview of electronic packaging, the second edition contains new chapters on passive devices, radio-frequency and microwave packaging, electronic package assembly, and cost evaluation and assembly. Organic and ceramic substrates, formerly covered within other chapters, now have their own chapters.

This book, which includes many examples and exercises, was written as a teaching text. But industry leaders also have praised the book as a thorough examination of all areas of electronic packaging and an invaluable reference tool. ■



M'Culloch v. Maryland: Securing a Nation

Mark Killenbeck

University Press of Kansas

In *M'Culloch v. Maryland: Securing a Nation* law professor Mark Killenbeck explains why the Supreme Court’s controversial decision in the landmark 1819 case defined the nature and scope of federal authority and its relationship to the states.

In *M'Culloch v. Maryland*, the Supreme Court decided that Congress had the authority to create the Second Bank of the United States, and states could not interfere with the bank’s activities by taxing notes issued by the bank. The decision authorized the federal government to exercise powers not expressly articulated in the Constitution and laid the foundation for a debate that continues more than 150 years after the bank ceased to exist.

The case established parameters for judicial review by the Supreme Court and confirmed that the court would play an important role in the political process. It also demonstrated that the powers of the federal government are limited but supreme.

This book recounts the evolution of the Constitution as a viable, governing document and presents *M'Culloch* as a turning point for the Constitution, the court and the nation. ■



Up Against the Wall: Violence in the Making and Unmaking of the Black Panther Party

Curtis J. Austin

University of Arkansas Press

Up Against the Wall chronicles how violence brought about the founding of the Black Panther Party in 1966 by Huey P. Newton and Bobby Seale, dominated its policies and brought about the party’s destruction.

Austin shows how the party’s early emphasis in the 1960s on self-defense, though sorely needed in black communities at the time, left it open to mischaracterization, infiltration and devastation by local, state and federal police forces and government agencies. He carefully highlights the internal tension between advocates of a more radical position than the Panthers took, who insisted on military confrontation with the state and those, such as Newton and David Hilliard, who believed in making community organizing and alliance-building their first priorities.

Austin interviewed a number of party members who had heretofore remained silent. With the help of these stories, Austin is able to put the violent history of the party in perspective and show that the “survival” programs such as the Free Breakfast for Children Program and the Free Health Clinics helped the black communities they served to recognize their own bases of power and ability to save themselves. ■





what are the odds that an asteroid might strike the earth?

Derek Sears, W.M. Keck Professor of Space and Planetary Sciences, replies:

It depends on the size of the object. Large objects are less common than small objects. Asteroid fragments fall on the Earth all the time, and maybe a dozen meteorites a year end up in national museums. A good

example is the Paragould meteorite currently in the Mullins Library. But objects large enough to destroy a city, or cause major changes in the flora and fauna of Earth are very rare. Most scientists would probably agree that objects large enough to make a city-sized crater occur every 50,000 years or so, and objects large enough to cause global effects occur every 100 million years or so. On the timescale of planets, which can be billions of years old, this is frequent, and most planetary surfaces in space are peppered with impact craters.

While the Paragould meteorite is a perfect size for displaying in a museum, smaller objects, say objects the size of a grain of sand, fall every 30 seconds or so – we see them as meteors as they burn up in the atmosphere. The best example of a crater made by a large object is the Barringer Crater in Arizona that was visited by Arkansas students in the space and planetary sciences program last summer. This crater is about 50,000 years old. It was a 10-kilometer sized object that caused the kind of global change commonly associated with the disappearance of large animals on Earth, like dinosaurs, 65 million years ago.

The odds of a major asteroid hit in the next year or so are several tens of millions to one, but scientists and politicians think this is a serious hazard because, although unlikely, it would be devastating. Even a relatively small impact, especially if near a population center, could trigger a nuclear war, and the military spends enormous effort monitoring objects entering the atmosphere, even if they do not survive passage through the atmosphere. ■



Photo submitted

Are humans the only primates that laugh?

Peter Ungar, professor of anthropology, replies:

As Charles Darwin wrote in 1872, apes “utter a reiterated sound, corresponding with our laughter, when they are tickled, especially under the armpits.” While non-human primates don’t likely have the capacity to appreciate complex jokes or puns, our nearest living relatives are often reported to laugh during tickling or chasing games.

Chimpanzee and bonobo laughter even look and sound like ours to a degree. These apes show a relaxed “open-mouth” display resembling a smile, and exhibit similar changes in frequency and intensity of



Stock Images

sounds while laughing.

Many primatologists speculate that laughter evolved as a communications tool to help regulate social interactions. ■