


4-1-2010

## WKU Scholar

Pamela Napier, editor-in-chief  
Western Kentucky University, [pnapier@agnesscott.edu](mailto:pnapier@agnesscott.edu)

Follow this and additional works at: <http://digitalcommons.wku.edu/wkuscholar>

 Part of the [Educational Assessment, Evaluation, and Research Commons](#), [Educational Psychology Commons](#), [Health Services Research Commons](#), and the [Laboratory and Basic Science Research Commons](#)

---

### Recommended Citation

Napier, editor-in-chief, Pamela, "WKU Scholar" (2010). *WKU Scholar*. Paper 19.  
<http://digitalcommons.wku.edu/wkuscholar/19>

This Other is brought to you for free and open access by TopSCHOLAR®. It has been accepted for inclusion in WKU Scholar by an authorized administrator of TopSCHOLAR®. For more information, please contact [connie.foster@wku.edu](mailto:connie.foster@wku.edu).



# SCHOLAR

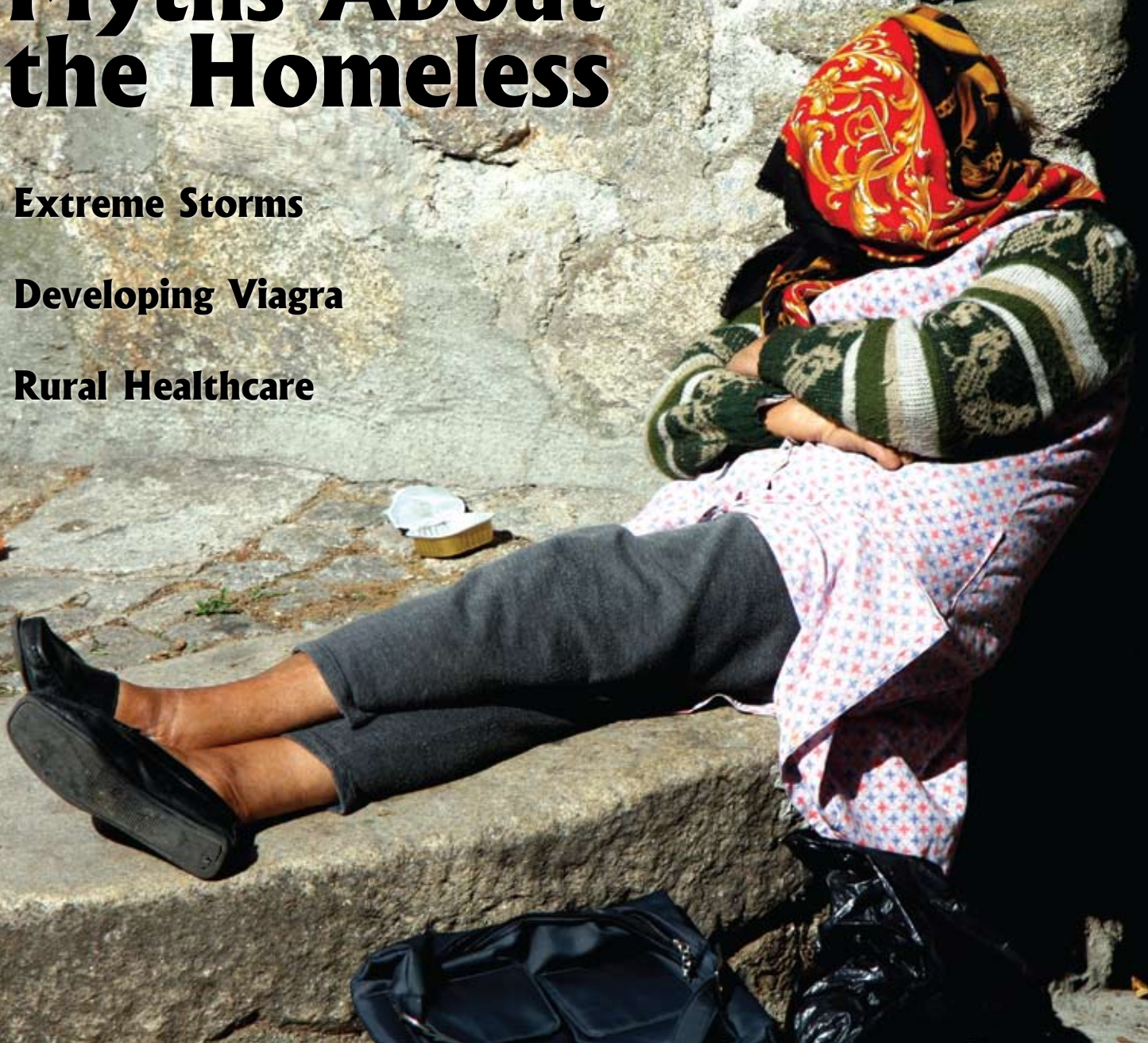
THE SPIRIT OF SCHOLARSHIP AND RESEARCH AT WESTERN KENTUCKY UNIVERSITY

## Myths About the Homeless

**Extreme Storms**

**Developing Viagra**

**Rural Healthcare**





Richard G. Bowker

Of the many measures of universities, the successes of students and the scholarly contributions of faculty to their disciplines are most important for me. The former is obvious; the latter is often poorly understood and yet crucial for several reasons. First, scholarship synergizes teaching. Active scholars bring to their classrooms an infectious enthusiasm for discovery and exploration and consequently open important new pathways for some of our students. Simply learning that accumulating knowledge about a subject is a very different activity than working as a scholar and advancing the disciplinary knowledge base is an important lesson for our students to learn. Discovering that research or creative activities are accessible to them is an even more important one. Fostering this transition from student to scholar is one of the most important responsibilities of the professoriate, and it is the active scholars who catalyze this change. The process involves providing students with the disciplinary knowledge base and skills to frame appropriate questions, nurturing their intellectual curiosity, and encouraging them to succeed. We at WKU can be rightfully proud of both the numerous opportunities we provide for our students and for the scholarly successes that ensue.

Second, the creative and scholarly work of faculty provide a base of ideas that may enrich the world either directly or indirectly. Many university scholars work in a world of ideas and discoveries that may seem arcane, or worse, irrelevant to those outside the academy. Perhaps this interpretation results from our failure to educate them about the fundamental importance of new ideas and the ways the discovery process works. Unfortunately, basic discoveries leading to significant applications are frequently met with puzzlement or even derision, until they are applied. Yet pure and applied scholarship are intimately related as noted by the great French scientist Louis Pasteur almost 150 years ago:

*"Il n'existe pas de sciences appliquées, mais seulement des applications de la science".*  
(There are no such things as applied sciences, only applications of science.)

In this issue of the *WKU Scholar* you will find a spectrum of scholarship that ranges from fundamental discoveries and explorations to significant applications of scholarship. Enjoy the scholarly endeavors of these members of the WKU family.

**Richard G. Bowker, Ph.D.**

*Vice President for Research  
and Dean of Graduate Studies*




**FACULTY SCHOLARSHIP  
COUNCIL MEMBERS**

Dr. Steven J. Haggbloom  
Co-Chair

Dr. Kinchel Doerner  
Co-Chair

Ms. Kristina Arnold  
Dr. Kristi Branham  
Dr. Aaron Celestian

Dr. Yining Chen  
Dr. Walter Collett  
Dr. Youn Kim

Dr. George Kontos  
Dr. Kelly Madole  
Dr. Dean May  
Dr. Stephen K. Miller  
Dr. Clay Motley  
Dr. Tom Nicholson  
Ms. Laurin Notheisen  
Dr. Rhonda Patterson  
Dr. Gay Helen Perkins  
Dr. Afzal Rahim

Dr. Tom Richmond  
Dr. Michael Seidler  
Dr. Sharon Spall

**EDITOR-IN-CHIEF**

Pamela Napier  
Office of Sponsored Programs  
<pamela.napier@wku.edu>

**CONTRIBUTING EDITOR**

Katherine Pennavaria

**COPY EDITOR**

Stacey Biggs

**ART DIRECTOR**

Tom Meacham

**DESIGNERS**

Marcus Dukes  
Senior Designer

Scott French  
Graphic Designer

John Harris  
Bennett Hibbler, Jr.  
Tony James  
I-Ping Kuan  
Naketia Staten

**PHOTOGRAPHERS**

LaDonna Harmon  
Clinton Lewis

**WRITERS**

Aaron S. Dugger  
Brooke Hadley  
Katherine Pennavaria  
Michael J. Sobiech  
Jeanne Sokolowski

**CIRCULATION MANAGER**

Diane Amos

*The WKU Scholar* is published semiannually for members of the public interested in Western Kentucky University scholarship and research. It is produced by the Office of Sponsored Programs, the Office of Public Affairs, University Libraries, and the Office of Graduate Studies and Research.

Western Kentucky University  
1906 College Heights Blvd.  
Bowling Green, KY 42101-1026



# SCHOLAR

THE SPIRIT OF SCHOLARSHIP AND RESEARCH AT WESTERN KENTUCKY UNIVERSITY



## 2 *Myths About the Homeless*

by Michael J. Sobiech

Jay Gabbard hopes to dispell some of the stereotypes about the homeless, who are increasingly targets of violence.



## 6 *Extreme Storms*

by Brooke Hadley

Josh Durkee studies the types of atmospheric events that create hazardous outcomes.



## 10 *Sharron Francis: WKU graduate, world-renowned expert on erectile dysfunction drugs*

by Katherine Pennavaria

Sharron Francis became a world-renowned expert on erectile dysfunction drugs after attending WKU.



## 14 *Improving Rural Healthcare: A Lifelong Mission*

by Aaron S. Dugger

Susan Jones is working to improve the health of rural residents and promoting safety among agricultural workers.



## 19 *Biology by the Numbers*

by Michael J. Sobiech

Richard Schugart's love for math leads him to cutting-edge research on mathematical models of wound healing.



## 22 *No Potential Left Behind*

by Jeanne Sokolowski

Julia Link Roberts has been an advocate for gifted and talented children throughout her career.



## 26 *The List Maker*

by Katherine Pennavaria

Charles Smith's collection of Alfred Russel Wallace articles has made him an authority on this nineteenth-century biologist.



## 28 *Marrying the Mind and the Emotions*

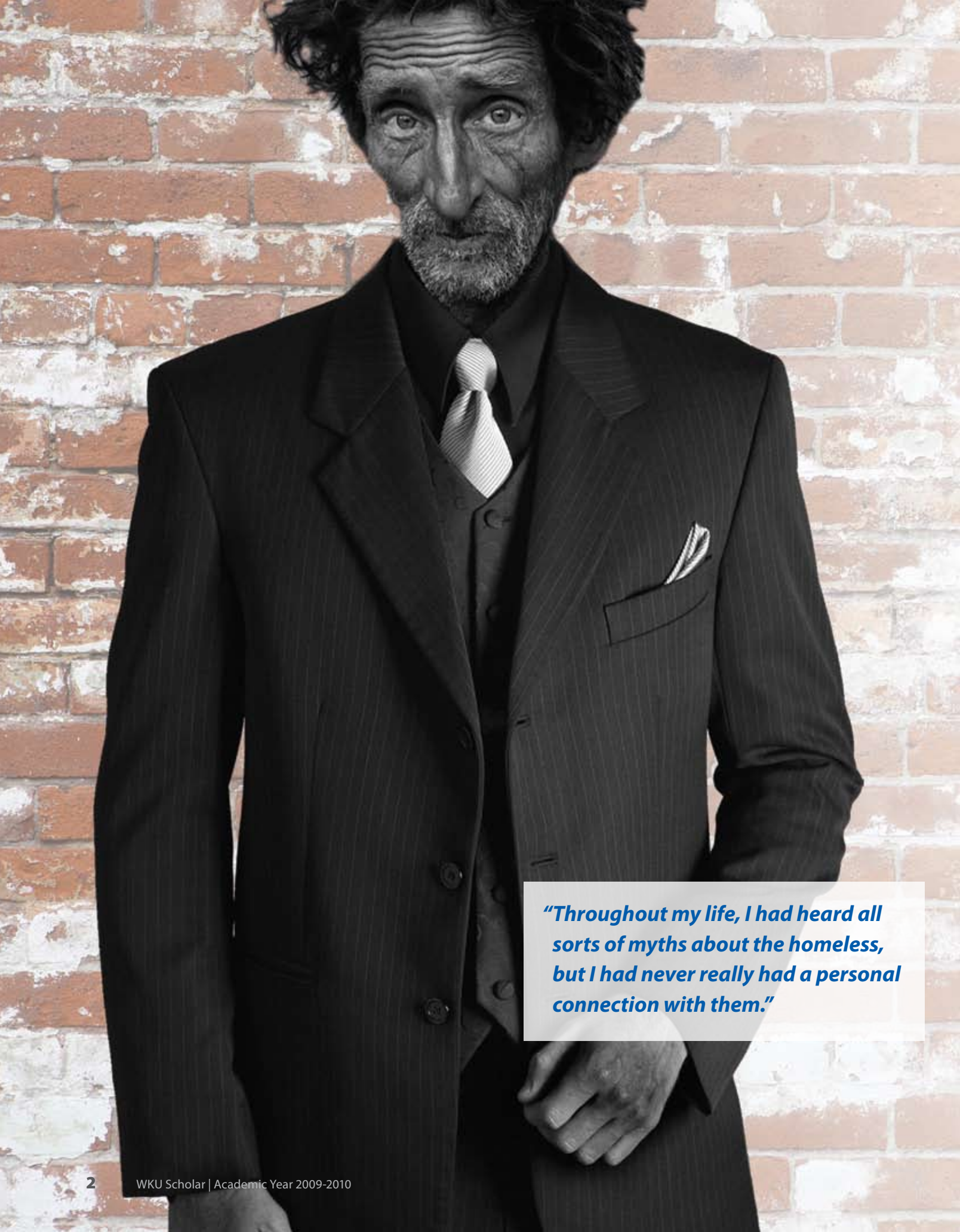
by Jeanne Sokolowski

Elizabeth Lemerise studies how cognition and emotion function together in infants.

## 31 *Research Briefs*

GSKyTeach

The WKU Student Research Conference



***“Throughout my life, I had heard all sorts of myths about the homeless, but I had never really had a personal connection with them.”***



# MYTHS ABOUT THE HOMELESS

BY MICHAEL J. SOBIECH



Jay Gabbard

**“WHAT COMES TO MIND WHEN I SAY THE WORD ‘HOMELESS’?” WHEN DR. JAY GABBARD, ASSISTANT PROFESSOR OF SOCIAL WORK AT WKU, ASKS THAT QUESTION, HE INITIALLY HEARS MOSTLY NEGATIVE RESPONSES: BUM, LAZY, DUMB, WINO, SCUM, SCAM ARTIST, LOSER, DIRTY, CRAZY. BUT THROUGH HIS RESEARCH, HE HOPES TO DISPLACE SOME OF THE MYTHS ABOUT HOMELESSNESS, AN ESPECIALLY URGENT GOAL GIVEN THAT THE HOMELESS ARE NO LONGER JUST PEOPLE WITHOUT A HOME — THEY NOW ARE TARGETS OF HORRIFIC VIOLENCE.**

Gabbard’s work began with stereotypes. “Throughout my life, I had heard all sorts of myths about the homeless, but I had never really had a personal connection with them.” That changed while he was working on his doctorate in social work at the University of Alabama. “Through my church, I started a ministry where some guys and I would drive to Birmingham and spend the night at the Firehouse Shelter. We’d help process the men off the street, get their bed linens ready and, in the morning, serve them breakfast,” he said.

At about the same time, Gabbard began serving on a community board in Tuscaloosa, which was composed of various providers of services to the homeless. “Those two experiences caused me to change the focus of my doctoral work from disabilities to homelessness.”

Initially, Dr. Gabbard’s research focused on a seldom-studied aspect in the life of the homeless — their spirituality and religiosity. For his dissertation, Gabbard (who, at one time, had planned on going to seminary) was able to combine his interests in spirituality with his interests in homelessness. “There wasn’t much in the literature about the religiousness of the homeless, but in my experience, it typically was very important to them — all different types of spirituality came up a great deal in my conversations with them. And since religion and spirituality is so important to the homeless, it should certainly be a part of the academic conversation.” Unfortunately, in contrast to the relative lack of awareness concerning their religiosity, negative stereotypes about the homeless abound. “Homelessness is not typically caused by just one factor; usually there are several issues that cause a person to live on the streets. This is why it’s one of the most complex social problems to study.” But the complexity of homelessness cannot be seen in the simplicity of its myths.

**“I’m only a paycheck away from the street.** That’s really not true — as long as you have a social support system. If you have family and friends who can take you in during a rough spot, you won’t become homeless. The problem is that some of the homeless burn bridges with family members who could help them; and some families who would help don’t have the resources to take them in because of their own poverty,” explained Gabbard.

**“They like to be that way.’** Of course, that’s true for some. A small minority do prefer to live a ‘homeless life.’ But if you were to ask most of those on the streets if they prefer the ‘great outdoors’ to a warm, safe apartment with a job and security, they would choose a home over the street. Most would not choose a life of being ridiculed, poor, spat upon, called names, and in some cases, set on fire,” continued Gabbard.

**“They are stupid.’** Over half have high school diplomas. I have met a number of homeless people who were college graduates, a few who went to graduate school, and even one with an earned doctorate,” Gabbard stated.

**“They’re lazy.’** Some are lazy, but others have difficulty holding a job because they don’t have a fixed residence or because they have substance abuse or mental illness — about one third of the homeless have some type of mental illness. How can they hold down a job when these other issues are not addressed? You have to get on your feet before you can handle a job.” Gabbard concluded, “And I would add that many are far from lazy; they are quite resourceful because survival takes energy!”

Gabbard thinks people might be surprised to know that about 40% of homeless males in the United States are veterans, many of whom are suffering from Post-Traumatic Stress



***“I have met a number of homeless people who were college graduates, a few who went to graduate school, and even one with an earned doctorate.”***

Disorder (PTSD). And the fastest-growing group among the homeless is single women with children, and the reason they’re on the street is because of domestic violence. They were not the primary breadwinner, and for many, the only place they had to turn was a shelter or the street.

“There are individual problems. But society doesn’t tend to think about what society contributes to the problem. Nor do we seem willing to spend money on people who are often seen as the dregs of society. But if we were proactive and did what we could on the front-end of the problem, we would actually save money,” said Gabbard. “The real problem is that we don’t address fundamental issues like a lack of affordable, low-income housing, the gentrification of poor neighborhoods, an abysmally low minimum wage, and the lack of adequate aftercare for individuals when they are

released from prisons and mental health facilities. What we have is a blame game and no one wins.”

Of great concern to Gabbard are not only the dehumanizing myths but also the increasing abuse against the homeless. According to the National Coalition for the Homeless (NCH), since 1999, 774 violent acts, in 235 cities, in 45 states and Puerto Rico, have been committed against the homeless — 217 of America’s homeless have died as a consequence of these acts of brutality.

“People have been set on fire, pushed in a river, and run over by cars,” said Gabbard. “We have had people film ‘bum fights’ where a couple of homeless guys are paid money to fight. We’ve even had people pay and film homeless people going to the bathroom on the street. The dehumanization of these homeless human beings is just appalling.”



The NCH reports that the criminals in these cases are more often younger and male. "Skin heads, other hate groups, and delinquent teens attack them because they think they are expendable," states Gabbard. "And some of the worst crimes are against the most vulnerable, such as homeless people suffering from schizophrenia."

Along with three of his students, Dr. Gabbard is currently coauthoring a comprehensive overview of the growing problem of hate crimes against the homeless. "We are looking at annual reports from the National Coalition for the Homeless, local reports of single incidents, and pertinent research in order to critically evaluate the etiology of the problem, the characteristics of offenders, motives behind the violence, the pervasiveness of the problem, recent legislative efforts, and proposed solutions.

Gabbard concluded, "We hope that our critical review of an apparently growing social problem will contribute our unique perspective as students of social work to the interdisciplinary

knowledge base on the problem of homelessness."

Helping people deal with violence is nothing new to Dr. Gabbard. Before he began his graduate work, he spent a year in a forensics hospital. "Most of the people there were accused of serious crimes — multiple murders, arson, rape. We worked with the forensic psychologists and psychiatrists to determine whether these people were competent to stand trial, criminally responsible, or not guilty by reason of insanity."

And now he plans to return to crime. "I understand the perspective of the homeless, but I want to understand the other side, too. What motivates people, especially the young, to be so violent toward the homeless?" And so this fall, Dr. Gabbard will return to the classroom not as a teacher but as a student. "I'm taking a criminology course here at WKU, and I'll probably end up getting an MA."

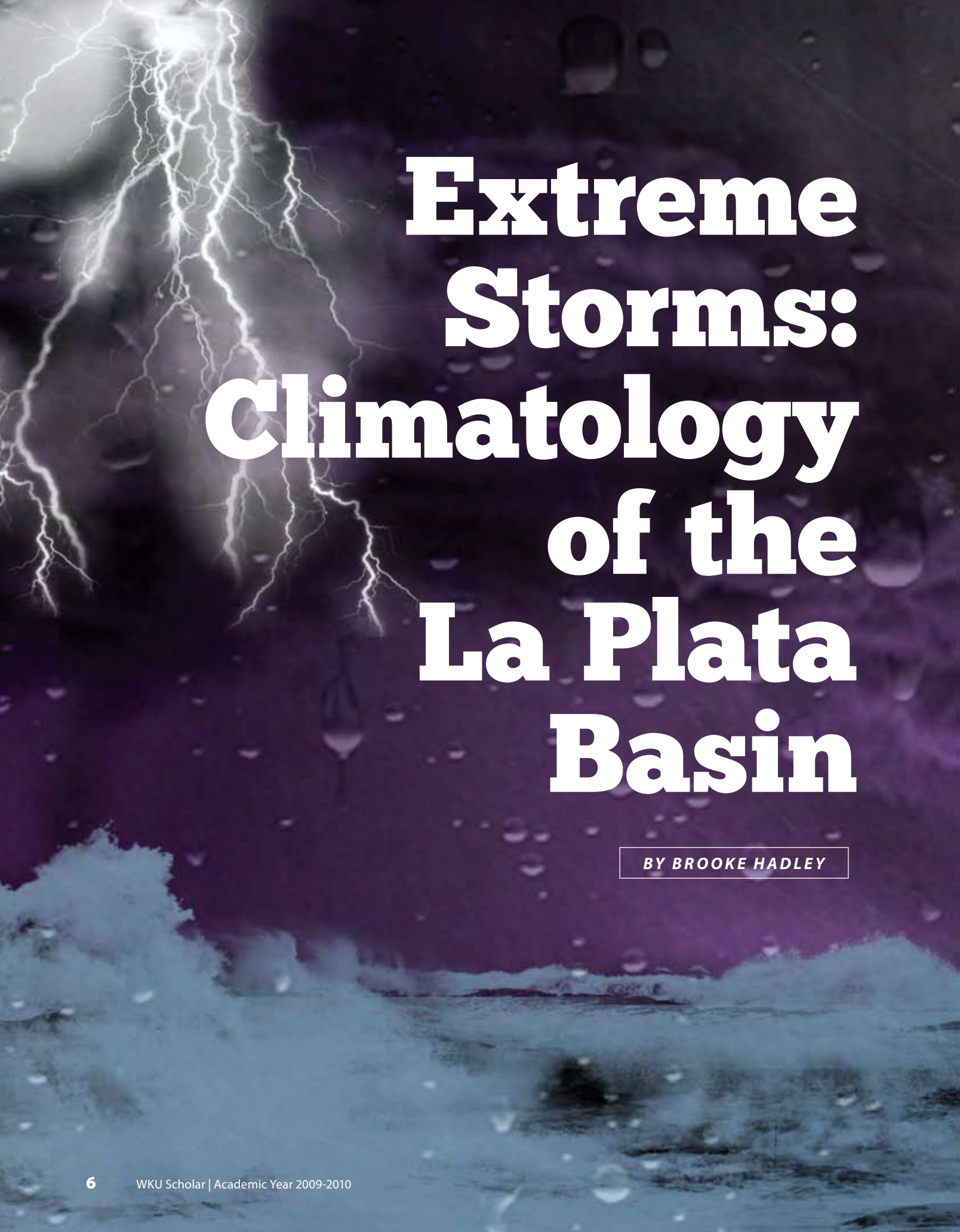
For Gabbard, the homeless are not just a problem to be studied — they are people to be helped. In 2008, after teaching an

elective graduate-level class on the subject, he and his students staffed a shelter in Owensboro, Kentucky. And this year, he and students are trying to help the homeless in Elizabethtown, Kentucky. "My students and I have been trying to raise money and community awareness of the need for an overnight shelter in Elizabethtown. One thing we have done, for instance, is have a sleep-out with students from WKU's Elizabethtown campus."

Of course, a hands-on approach to a situation that many turn away from is not unexpected in Gabbard, who came face-to-face with the homeless — and his own misconceptions — years ago in a Birmingham shelter: "The value for me in staying in that shelter was that I was able to see the social problem with no filter, which is something that I preach to my students here at WKU. If you want to know about a social problem, go experience it. Spend time with people in that situation because when you do, you'll find that it's a lot harder to stereotype problems — and people." ■







# **Extreme Storms: Climatology of the La Plata Basin**

*BY BROOKE HADLEY*

**DR. JOSH DURKEE'S FASCINATION WITH WEATHER, ESPECIALLY SEVERE STORMS, BEGAN AT A VERY YOUNG AGE. "I REMEMBER WHEN I WAS FOUR. I WAS STAYING WITH MY BABYSITTER AND A TORNADO CAME THROUGH THE NEIGHBORHOOD. THE OTHER KIDS WERE SCARED, BUT I THOUGHT IT WAS PRETTY COOL. I KNEW THAT I WANTED TO LEARN MORE ABOUT SEVERE WEATHER EVENTS. I'VE KNOWN FOR A VERY LONG TIME THAT I WANTED TO DO SOMETHING WEATHER-RELATED, BUT I DIDN'T KNOW I WANTED TO BE AN ACADEMIC UNTIL I GRADUATED FROM WESTERN KENTUCKY UNIVERSITY, WITH A BACHELOR'S DEGREE IN GEOGRAPHY." DURKEE WENT ON TO EARN A MASTER OF SCIENCE AND PH.D. IN GEOGRAPHY AT THE UNIVERSITY OF GEORGIA. IN 2008, HE RETURNED TO WESTERN KENTUCKY UNIVERSITY TO FULFILL HIS DREAM OF TEACHING METEOROLOGY AND RESEARCHING EXTREME WEATHER AND CLIMATE PHENOMENA.**

"I don't necessarily study just the hazards *per se*, but I tend to study the types of atmospheric events that create hazardous outcomes," he explained. "For example, the number one convective weather-related fatality causing event is flash flooding. Subtropical South America experiences a high occurrence of large, long-lasting thunderstorm complexes — called mesoscale convective complexes or MCCs — that often produce prodigious widespread flooding rains but I realized that there were a limited number of studies in that region pertaining to these types of thunderstorms. The studies I found that pertained to these extremely large South American thunderstorms were typically short in scope, focusing on only one or two years, leading to a lot of speculation of the frequency and magnitude of these events. My goal became to develop an MCC climatology across the subtropical region of South America, which is prone to deadly flooding events."

Dr. Durkee achieved his goal. He developed a climatology of these particularly large, long-lived thunderstorms across the South American subtropical region, specifically the La Plata basin, which is the fifth largest river basin in the world. Climatology, unlike meteorology, which focuses on short-term weather systems, is the study of the frequency, trends, and long-term patterns of weather events over time in a specific region. Climatology can be used as a basis for weather forecasting or to build weather models. As a climatologist, Durkee has extensively studied the hydroclimate of the La Plata Basin region.

"There are many factors that influence the formation of these massive storms in South America, some of which have spanned over one million square kilometers, but the primary factors are moisture and atmospheric instability," said Durkee. To gauge the sheer size of these



Josh Durkee

***"There are many factors that influence the formation of these massive storms in South America, some of which have spanned over one million square kilometers, but the primary factors are moisture and atmospheric instability."***

***“I am just beginning the next phase of my research. I plan to collaborate with people who work with numerical weather models to see what happens when environmental changes, such as the removal of the rainforest or an increase in global temperatures, take place. I believe there are huge implications for the removal of the rainforest.”***

storms, Kentucky is approximately one-hundred thousand square kilometers, so these storms cover an area ten times the size of Kentucky.

“In the United States, we get a lot of our moisture from the Gulf of Mexico, and in South America the primary source of moisture is the Amazon rainforest even though they have oceanic sources too. However, the water vapor from the rainforest can be double what the oceans provide. In addition, the Andes Mountains provide cold upper-atmosphere temperatures, while the rainforest provides a relatively warm, humid lower atmosphere,” he explained.

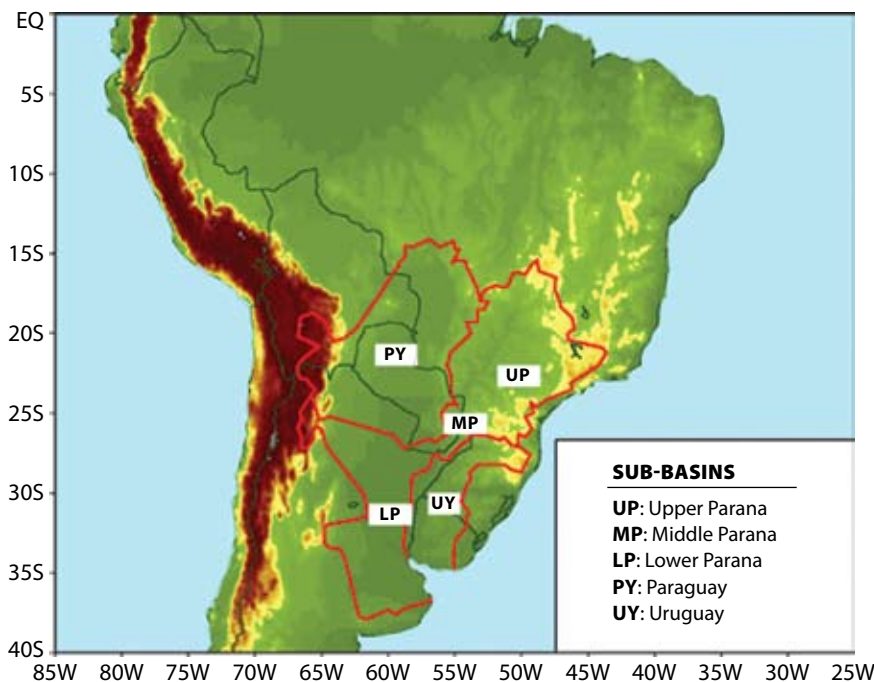
“Storms like these can develop quickly with rapid vertical changes in temperature. The more extreme the vertical changes in temperature, the

greater the potential for an extreme storm. It is the geography of the La Plata Basin that helps provide prime conditions for the onset of these types of storms. Typically, these thunderstorm complexes begin as a group of smaller, individual storms that later merge into one larger thunderstorm complex that typically lasts for fourteen hours. The rain from just one of these large storms could fill up an area the size of the state of Kentucky with nearly 2.5 inches of water during that time.” Durkee continued, “These storms are often linked to flash flooding; those people who don’t die in flash floods may also be prone to disease from the devastation resulting from persistent regional flooding. This was the case during the 2006-07 warm season across much of Paraguay.”

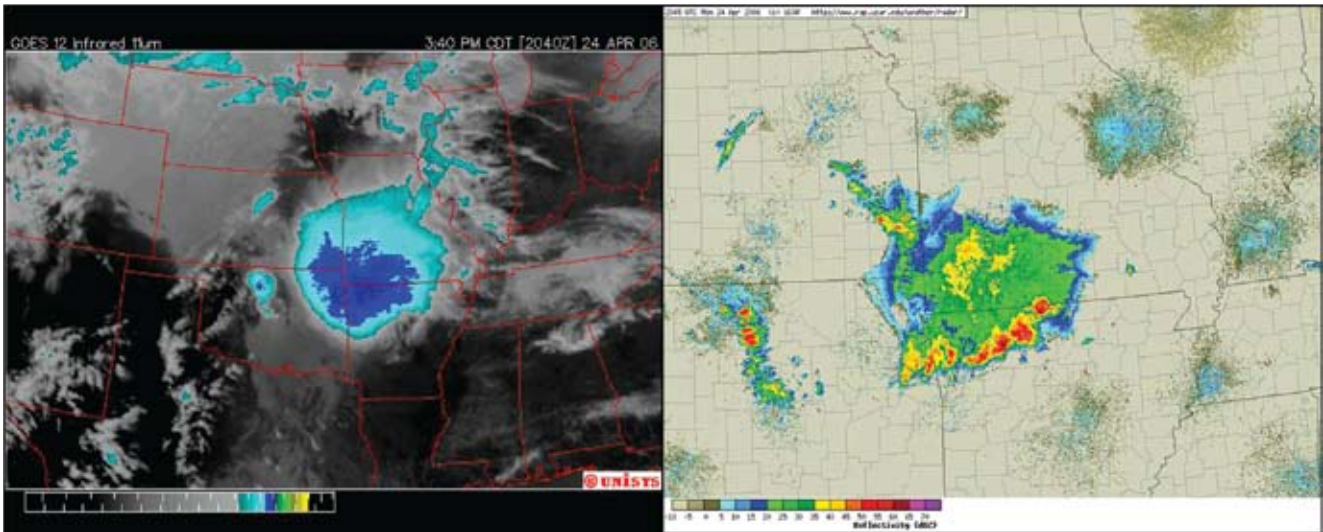
The unusual part of Dr. Durkee’s research is that he’s never been to South America. “I use remote sensing data. I am able to do this because it’s the only thunderstorm that is identified by its cloud attributes. Many thunderstorms are identified by radar attributes. In this case, the storms are so big that we look at the size, shape, and temperature of the clouds and how long the storm persists. That’s truly what identifies these storms. That makes it easier to use satellites to find these types of cloud systems. Then we can catalog those events. Another aspect about looking at the rainfall in South America is that a lot of their weather data is not as developed as in the United States. There are tremendous variations of the quality and availability of data, since the data span numerous countries. Whereas here in the United States we have rain gauges all over the state, in my study region there might be a hundred miles between rain gauges. I am able to use satellites to estimate the rainfall,” said Durkee.

The use of technology to study South American climate appeals to Dr. Durkee’s students. “Most people who think about severe weather think about the Great Plains and general storm activity in the United States, but there are many places where the storms can easily trump North America. When I discuss storms in South America, my students usually respond that they’ve never thought of severe weather in that area. I think what’s fun for me is that while I study severe weather phenomena in the United States, I have also developed a research platform in South America and I can expose my students to

## LA PLATA BASIN







MCC: Color-enhanced infrared satellite image (left) and radar reflectivity (right) of a particularly large, long-lived thunderstorm complex, known as a mesoscale convective complex (MCC), over the central U.S. during April 24, 2006.

weather events in other countries they haven't thought of studying before. I have a real example to show my students how various technologies can be used to study climate almost anywhere. They really get into that."

Although the process is lengthy and involves multiple stages, Dr. Durkee's climatology of the La Plata basin could eventually lead to the development of enhanced weather models and forecasting of these large storm systems, providing the residents of the basin with valuable information and warning before the storms occur.

"I am just beginning the next phase of my research. I plan to collaborate with people who work with numerical weather models to see what happens when environmental changes, such as the removal of the rainforest or an

increase in global temperatures, take place. I believe there are huge implications for the removal of the rainforest; if you remove it you strip away the primary moisture source and perhaps the frequency and severity of these storms decreases. That might sound good, but these storms are very important to the La Plata Basin. They provide essential rainfall for agriculture, which many people depend on for their income, and hydroelectric plants, which are a large source of electrical energy for much of subtropical South America," said Durkee. "There's a delicate balance. When MCCs occur on average, not too big or too often in one area, they're actually a great resource for both agriculture and power generation."

In addition to studying climatology, Dr. Durkee, while at the University of Georgia, also studied

the impact and effectiveness of geography education. "While working on my Master's thesis, I realized the lack of engaging and interactive activities undergraduate students often experience. Most students only get to work out of the book or with computer simulations and graduate with little practical experience. One of my goals at Western Kentucky University is to provide hands-on experiences to the students."

"In the classroom, students typically enjoy talking about severe weather. Everyone has a severe weather story. It's awe inspiring. Students want to learn more about severe weather," said Durkee. "I can use my research to encourage students' interests and give them more of an opportunity to research storms first-hand in the field. WKU is very encouraging and open to developing a more interactive approach to provide these authentic experiences."

Currently, Dr. Durkee is working on developing a more hands-on approach to teach meteorology and climatology, including developing a class in which students would spend several weeks in the field studying severe weather and chasing storms. ■

***"Most students only get to work out of the book or with computer simulations and graduate with little practical experience. One of my goals at Western Kentucky University is to provide hands-on experiences to the students."***





# Sharron Francis:

## WKU graduate, world-renowned expert on erectile dysfunction drugs

BY KATH PENNAVARIA

**IF ACADEMIC INSTITUTIONS KEPT GUINNESS-STYLE RECORD BOOKS, THEY WOULD SHOW THAT 1965 WKU GRADUATE SHARRON FRANCIS HAS A COUPLE OF FIRSTS TO HER CREDIT — AMONG THEM BEING THE FIRST FEMALE STUDENT TO RECEIVE A PH.D. IN THE DEPARTMENT OF MEDICAL PHYSIOLOGY AT VANDERBILT UNIVERSITY.**

Raised on a working farm near Bowling Green, Francis attended Warren Central High School, and planned to become a high school biology and chemistry teacher. Those plans changed when she became an undergraduate at WKU. Today, Francis teaches at a major American university and is a world-renowned expert on drugs that are used to treat erectile dysfunction and pulmonary hypertension. She could not have imagined this career for herself when she enrolled at WKU in the early 1960s as a biology major and chemistry minor.

For a female college student at that time, becoming a research scientist was almost an impossible dream. Fortunately for Francis, two exceptional and inspiring WKU faculty members, Dr. Don Bailey and Dr. Bill Norris, recognized the young lady's potential and gave her not only encouragement and advice, but also employment as a laboratory instructor in Biology. As for her class work in the sciences, said Francis, "I just loved it. The more I found out, the more I wanted to know, and the more I realized I didn't know."

She finished her WKU degree in a lightning-fast three years. Bailey and Norris helped her find graduate

programs that offered scholarships, a new possibility in academia stemming from the government's decision to devote money to science education after the Sputnik news broke in the late 1950s. Immediately following graduation from WKU, she entered the graduate program at Vanderbilt to seek a Ph.D. There she had her first opportunity to do original laboratory research. The results of that research formed the basis for her thesis, and she earned her Ph.D. in Medical Physiology in 1970, the first female to do so at Vanderbilt. She finished her doctoral degree in five years, published five manuscripts in high-profile scientific journals, and then launched her post-doctoral career, which took her first to Washington University in St. Louis, then to the National Institutes of Health to the Heart and Lung Institute in Bethesda, Maryland, and finally back to Vanderbilt as a faculty member, where she remains today.

"So I came back to the same department where I earned my doctoral degree and began my career as a scientist and teacher," said Francis. She credits WKU with preparing her for the competitive environment at a major research institution. "WKU gave me a very strong and solid foundation in biology and chemistry," she said. "You have to have that as your bedrock. I came out of WKU well-armed and prepared." As a newly hired scientist at Vanderbilt, Francis began to focus on the ways that hormones regulate cell function. "At the time we knew a little about how some hormones worked, but the research was in its infancy," she said.



Much of her training had been on determining how cell proteins carry out their functions, such as allowing cells to metabolize. She eventually became a specialist in this area, and particularly on the interaction of small molecules with proteins. She and her research group studied a process called “second-messenger signaling,” a new scientific concept at the time which won its creator, Earl Sutherland, a Vanderbilt faculty member in Medical Physiology, the Nobel prize in Physiology or Medicine in 1971. “First-messenger signaling,” she explains, “is when a hormone travels from one cell type to another where it binds to a “receptor” protein typically on the surface of the target cell.” This “first messenger molecule” then causes production of another chemical, or a “second messenger,” inside the cell, she said. Cyclic GMP is one such “second messenger,” and Francis began to work on developing an understanding of the actions of cyclic GMP to change cellular functions.

During the research, Francis and her colleagues found a heretofore

unknown protein that interacted with cyclic GMP differently than other known proteins. The new protein proved difficult to isolate and characterize. She decided to focus first on purifying this protein in order to determine its function. Further lab work helped them determine that the mystery protein was a phosphodiesterase, a particular

the clinical testing soon shifted to test this medication as a treatment for impotence. Sildenafil is now marketed as Viagra for treatment of erectile dysfunction and as Revatio for treatment of pulmonary hypertension in adults and neonates.

The process of erectile dysfunction was poorly understood at this time, but based on their

***“WKU gave me a very strong and solid foundation in biology and chemistry,” she said. “You have to have that as your bedrock. I came out of WKU well-armed and prepared.”***

kind of cellular enzyme that breaks down cyclic GMP and terminates its action in cells. The newly discovered protein, labeled PDE5, is involved in the relaxation of smooth muscles in blood vessels, airways, and the gastrointestinal tract. Other labs were working in the same area, but the unique approach taken by Francis and her colleagues demonstrated that the “second messenger” known as cyclic GMP and its signaling pathway were critical for relaxing muscles.

Based on this research and that of others, scientists in academia and pharmaceutical companies began efforts to develop new drugs that would block PDE5 action and have potential use in treating hypertension, a disease in which the smooth muscles encircling the blood vessels are excessively contracted, thereby compromising blood flow to organs. Indeed, a new drug (sildenafil) that blocked PDE5 action was developed by Pfizer and tested. Its efficacy for controlling high blood pressure was not as optimal as desired, but male patients reported marked improvement in erectile function, which depends on adequate blood flow to penile tissues. The focus of

research, Francis and her colleague, Jackie Corbin, had earlier proposed that inhibitors of PDE5 would be useful in treatment of impotence. When a man is sexually aroused, his brain sends a signal to nerves in the penis to release a compound (nitric oxide) near the smooth muscles surrounding penile arteries and specialized vascular structures in the penis. This nitric oxide increases production of cyclic GMP in these tissues. At the same time that cyclic GMP production is increased, it is also being broken down by PDE5 in these same cells. With normal erectile function, enough cyclic GMP accumulates so that the muscles in the blood vessels relax, blood rapidly flows into penile tissues, and erection occurs. However, for many men suffering from diabetes, hypertension, depression, vascular maladies, or spinal cord injuries, cyclic GMP does not accumulate sufficiently to effectively bring about the process. One reason for this is that PDE5 may break down the cyclic GMP faster than it can be made. Insufficient hormone signaling can also occur with aging, and it is estimated that erectile dysfunction affects more





than 50% of males over forty years of age. The active compound in Viagra (sildenafil) blocks PDE5 action so that when a patient takes a Viagra pill (or related medications such as Cialis or Levitra), cyclic GMP can accumulate to a level that relaxes the blood vessels. "It may take a bit more time," said Francis, "but they can get a normal erection."

Francis believes that her work has improved the lives of both men and women by improving their sexual lives as well as helping countless young men who have spinal cord injuries or Type 1 diabetes and are still starting their families.

"This subject is not commonly discussed," she acknowledges. Even writing about erectile dysfunction was unusual until the late 1990s. Malfunctions of other systems do not cause the embarrassment that erectile dysfunction does, which bothers Francis. "We take medication to relieve heart disease, headaches, diabetes, and other conditions, and everyone talks freely about it. With erectile dysfunction, it's different." Prior to the advent of Viagra, reliable data on the incidence of erectile dysfunction was hard to come by, and doctors often did not ask patients about it because little could be done

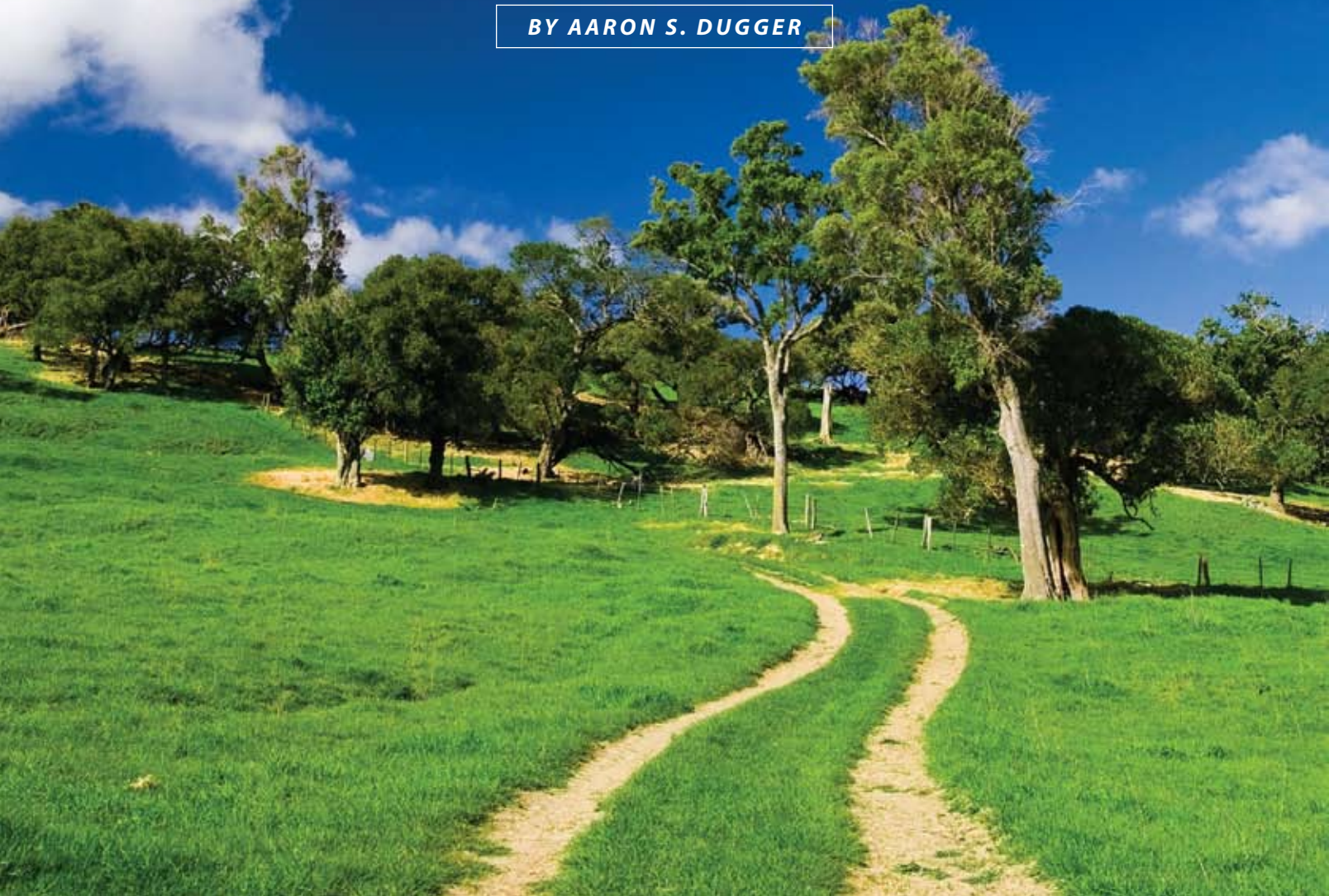
to relieve the problem. Impotence was once thought to be largely a psychological problem, she said, "but today we know it's primarily biological, and these drugs have worked miracles in people's lives — serious miracles." She notes, "Work on possible use of PDE5 inhibitors in treatment of a number of other maladies is currently a vibrant and exciting area of biomedical research."

Knowing she has contributed to the physical and psychological health of so many people helps Francis shrug off the jokes about her research. "This is biology," she said firmly, "and it's a normal bodily function." ■



# IMPROVING RURAL HEALTHCARE: A LIFELONG MISSION

*BY AARON S. DUGGER*





**LIMITED ACCESS TO HEALTH CARE IS A PROBLEM IN MANY OF KENTUCKY'S RURAL AREAS. LACK OF EMPHASIS ON PREVENTIVE CARE FURTHER COMPLICATES THE SITUATION. WKU SCHOOL OF NURSING PROFESSOR SUSAN JONES IS WORKING DILIGENTLY TO IMPROVE THESE CONDITIONS.**

As a member of the university's faculty for nearly four decades, Dr. Jones's long list of collaborative research activities, community service projects, publications, and awards is extraordinary. More remarkable, however, is her steadfast commitment to improving the health of rural residents and promoting safety among agricultural workers.

After growing up in rural Macon County, Tennessee, Jones earned her bachelor's degree in nursing from the University of Tennessee at Memphis. She first worked as a staff nurse and eventually as head nurse at Vanderbilt University Hospital. "I was not one of those people who always wanted to be a nurse. Sometime in the early 1960s, however, I became very interested in the medical field through reading and working as an aide in a local hospital. I found it very rewarding to use art, science, and self in the service of others," Jones explains. In the fall of 1970, she began her career at WKU as an assistant instructor of surgical nursing and returned to Vanderbilt University to complete her master's degree the following year. Over the next two decades she also spent several summers working as a staff nurse at The Medical Center in Bowling Green. Additionally, Dr. Jones served as a Hospice nurse volunteer from 1982 until 1990. In 2004, she earned a Ph.D. in Nursing Research at the University of Cincinnati, an institution with which she continues to collaborate regularly.

"During the past fifteen years my primary research focus has been



*Susan Jones*

in the area of agricultural health and safety," says Jones. "We know that agriculture alternates with mining and construction as being the most dangerous occupation. If you work in the emergency room or critical care, you quickly realize that agricultural workers are engaged in dangerous work. Coming from

a family of farmers, I wanted to help change this statistic, to reduce injuries and illnesses." From 1992 until 1996, Dr. Jones coordinated the implementation of a W.K. Kellogg Foundation grant project designed to empower rural women to reduce agricultural injuries and illnesses on their farms. An outcome of this activity was the creation of a non-profit organization, the Kentucky Partnership for Farm Family Health and Safety, Inc. Jones continues to serve as the liaison between this organization and the nursing faculty and students at WKU.

Her ongoing collaboration with the Partnership has opened the door to students wishing to participate in health promotion programs for rural residents. "Students have been involved in such activities as agricultural safety days, health promotion projects at country stores,

***"If you work in the emergency room or critical care, you quickly realize that agricultural workers are engaged in dangerous work. Coming from a family of farmers, I wanted to help change this statistic, to reduce injuries and illnesses."***





and specific community outreach activities with targeted populations such as old order Mennonites and migrant workers,” Jones reports. These activities resulted in the creation of an interdisciplinary (agriculture, public health, and nursing) university course dedicated to addressing the various dimensions of rural health care.

In the teaching arena, Jones serves as Coordinator of the RN to BSN program. “Using methods of distance education, this entire nursing curriculum is televised or taught by web, making the program accessible to many place-bound, working, rural nurses. Some counties had limited nurses prepared at the bachelor’s level until this program was made available,” explains Jones. She describes this as her proudest accomplishment, adding, “I think it has the largest potential to impact and influence the health of rural people.”

Between 1998 and 2005, Dr. Jones’s research continued unabated as she participated in multiple projects. During that time she worked to earn the trust of an Old Order Mennonite community in Allen County. “An outcome of this

**“Using methods of distance education, this entire nursing curriculum is televised or taught by web, making the program accessible to many place-bound, working, rural nurses.”**

relationship was the organization of a monthly health clinic for its members,” Jones points out. “This interdisciplinary project continues to provide learning opportunities in cultural awareness and competency for WKU nursing students and faculty, as well as medical residents from the University of Louisville. At the same time, it provides health promotion services for members of this rural community.”

In 2001, Jones served as the primary investigator for the National Institute of Occupational Safety and Health’s (NIOSH) Pilot Research Project Training Program. Jones conducted focus group interviews with employees of industrial swine operations to identify the factors which necessitate the use of respiratory protection on the job. This endeavor eventually formed the basis for her 2004 doctoral dissertation, *Predicting the Use of Personal Respiratory Protection among Workers in Swine Confinement Buildings*. During that same year, she worked as a co-investigator on another NIOSH program designed to reduce the risk of hearing loss in farmers. The project evaluated the effectiveness of an intervention designed to increase the







use of hearing protection by farmers in two south central Kentucky counties.

Improving the quality of life for elderly individuals is another example of Dr. Jones's commitment to public service. As a recipient of a 2005 Summer Faculty Scholarship Award at WKU, she completed a unique project entitled *Empowering Elders in Residential Facilities through the Use of Technology*, in which elderly residents were taught to use computers as a means of keeping in touch with family and friends. Jones's fervid devotion to improving rural health conditions has continued throughout the second half of the decade, as demonstrated by her current projects.

Jones is presently engaged in an innovative research project with two colleagues from the WKU School of Nursing, Deborah Williams and Eve Main. Their goal is to study the use



of B&W Salve and leaf therapy by members of Mennonite and Amish communities. B&W is short for "burns and wounds," and the salve is an amalgam of natural ingredients such as honey, aloe vera gel, white oak bark, and marshmallow root. The salve is used in combination with certain leaves, such as those of the burdock tree, to treat burns and other conditions.

"The Amish and Mennonite communities desire to use this treatment when their members are admitted to the hospital," Jones explains. Though some might dismiss it as a mere folk remedy, the trio of researchers is not attempting to supplant the practice with modern medical treatments. After collecting completed questionnaires from individuals who have used this form of treatment, they will analyze the data and present their findings to the broader medical community. "Our goal is to get an article published in the medical journals so healthcare providers will have some information when they are confronted with this request," says Jones. "The article will be designed to inform health care providers of the qualitative value of this culturally-related treatment practice." Interestingly, the project is international in scope. "Data will be

collected from members of Amish and Mennonite communities across the United States, Central America, and Canada.”

Dr. Jones is also working with Professor Tiina Reponen of the University of Cincinnati’s Department of Environmental Health. Their goal is to determine the workplace protection measures currently used by agricultural workers against biological particles and bioaerosols. “My role is to assist in the recruitment of farmers to participate in the study, gain their consent, and conduct the online medical clearance for each subject. Thus far, we have used grain farms, cattle, horse, and swine barns, and feed mills for data collection. We hope the study will provide generalizable information to refine the guidelines for respirator use and to design more efficient respirators for agricultural workers.”

Jones’s successful mission to improve the health of rural Kentuckians is largely achieved through her talent for writing grant proposals. In 2003, she was inducted into WKU’s Million Dollar Club in recognition of dollars generated through external grant awards. In 2005 alone, Jones submitted three proposals totaling over \$650,000. “In all grant proposals I attempt to involve junior faculty members and students.” Such collaboration, however, is not confined to WKU. She is currently working with colleagues at the University of Kentucky to submit yet another grant proposal. Their goal is to assess the effectiveness of an intervention aimed at controlling childhood asthma in rural farm areas. “The long-term objective of this randomized, controlled clinical trial is to improve pediatric

asthma outcomes by enhancing adherence to recommended asthma self-management,” Jones explains. “Seven through eleven year-olds with persistent asthma and their parents or guardians will be recruited from physicians’ practices in central, western, and eastern Kentucky. My role will be accessing farm children who are willing to participate,” she concludes.

While Dr. Jones collaborates regularly with her peers, her commitment to student engagement is evident. “Whatever I’m doing professionally,” she states, “I believe I have a responsibility to get students involved. For example, it is important to encourage and assist students to participate in the process of disseminating scholarly work. Also, I think learning occurs best when they participate in hands-on activities. Serving others and experiencing the difference one can make in the lives of others reinforces this learning. Getting students involved in research instills in them a quest for knowledge and a commitment to lifelong learning.”

Jones also believes that current students, alumni, and Kentuckians in general can work together to improve rural healthcare conditions across the Commonwealth. “We must learn to collaborate and form partnerships to assist rural residents in solving their own problems. I think people can be empowered to find their own solutions. In fact, most sustainable change begins at the grassroots level.”

When asked about her future research goals, Dr. Jones responds cheerfully and without hesitation. “I anticipate continuing in the same direction, even after retirement. After all, isn’t ‘retirement’ doing what one wishes to do?” ■

***“We must learn to collaborate and form partnerships to assist rural residents in solving their own problems. I think people can be empowered to find their own solutions. In fact, most sustainable change begins at the grassroots level.”***







# BIOLOGY BY THE NUMBERS

BY MICHAEL J. SOBIECH

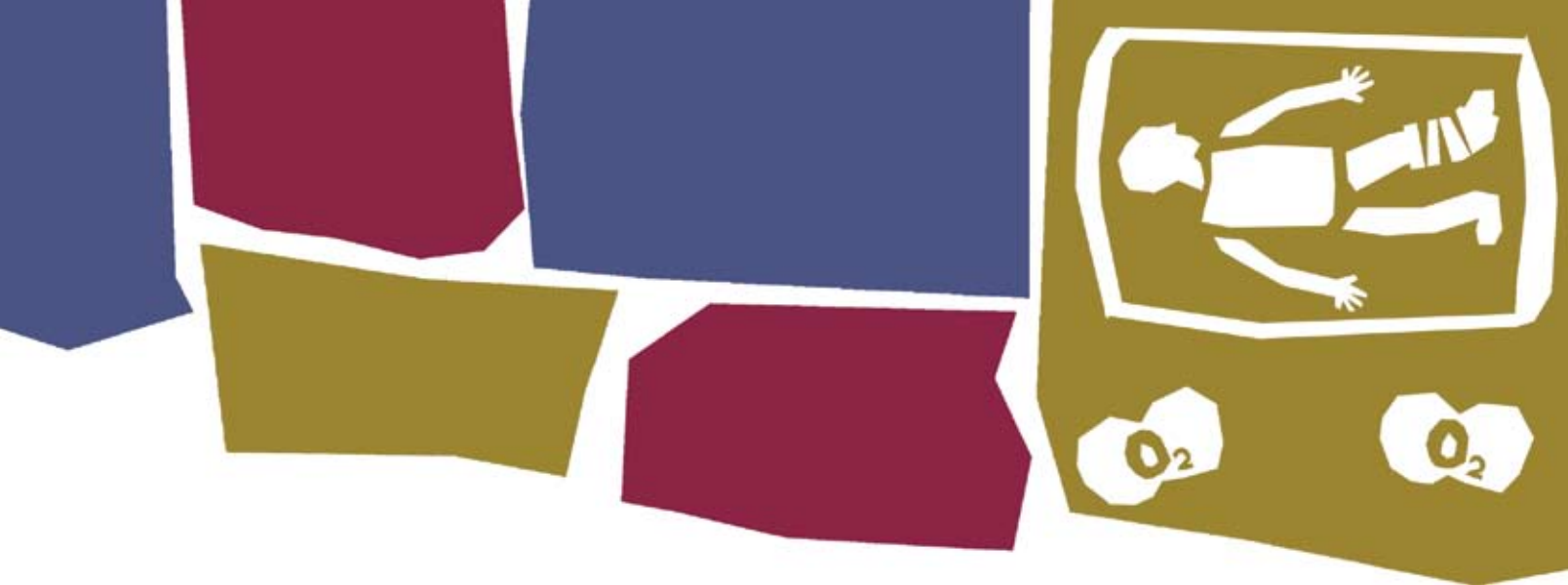


*Richard Schugart*

**WHEN A YOUNG RICHARD SCHUGART ASKED HIS MOTHER TO DRAW HIM SOMETHING, SHE SKETCHED GEOMETRIC FIGURES. “MY MOM, A HIGH SCHOOL MATH TEACHER, WASN’T GREAT AT DOING CREATIVE ART OR DRAWING PICTURES,” HE SAYS. “BUT I WAS THE ONLY KID IN KINDERGARTEN THAT KNEW WHAT A TRAPEZOID WAS — I DID, HOWEVER, CALL IT A ‘CRAPEZOID.” SCHUGART’S EARLY, AND NATURAL, LOVE FOR MATH EVENTUALLY LEAD HIM NOT TO ART, BUT TO BIOLOGY, AND CUTTING-EDGE RESEARCH ON APPLYING MATH TO BIOLOGY FOR THE POSSIBLE HEALING OF THOUSANDS.**

Schugart, an assistant professor in WKU’s mathematics and computer science department, always knew he wanted to study math, “But the question I faced was — What do I do with math? Go into business? Be a math teacher?” Initially, he decided he would follow in his mother and father’s footsteps (his father had been a high school math teacher but changed to teaching computer science at a two-year college). “In undergrad at the State University of New York (Genesco) I started off in secondary education with a focus on math and physics. But physics showed me that I was really more interested in applied math.”

When he chose to go on to graduate



school, he almost pursued physics as his field: “But I decided that I was more interested in the mathematics behind the physics than physics itself.”

Schugart’s desire to study applied mathematics led him from New York to North Carolina and North Carolina State University. “Along with all the connections they have to Duke, UNC, and various industries in Research Triangle Park, NC State has a strong applied math program; the area is a researcher’s paradise.” Like many Ph.D. students, he was not entirely sure what he specifically wanted to focus on: “But there was so much there that I knew I could figure it out.”

In determining his focus as a scholar, Schugart came across a new, and unexpected, interest: biology. “When I was in high school I hated biology. People in math often hate biology because they look at it — wrongly — as just a bunch of memorization. But when I saw more mathematical applications, I developed an interest.”

His advisor Mansoor Haider, a scholar of applied mathematics, was also interested in biology. “Mansoor collaborated with the orthopedic lab at Duke University Medical Center, where he researched properties of cartilage using mathematics.” And through his advisor’s work, Schugart found his own. “For my dissertation, I developed a computer algorithm for the kinds of problems that typically arise in soft-tissue mechanics, and I designed mathematical equations to use in studying the material properties of cartilage.”

Following his time at NC State, Schugart accepted a post-doctoral fellowship sponsored by the National Science Foundation (NSF). “The NSF funds six to seven mathematical institutes, such as the Institute for Advanced Study at Princeton. In 2001-2002, they started the Mathematical Biosciences Institute (MBI) at The

Ohio State University; MBI focused on mathematical applications to biology.” Schugart, who began his three-year post-doc fellowship in 2005, was a member of one of MBI’s first cohorts.

During his time at MBI, Schugart was able to collaborate not only with his fellow post-docs but also with the hundreds of mathematical and biological scientists who visit the institute, along with OSU’s noteworthy faculty.

In bringing together math and biology, Dr. Schugart has chosen to focus on a common, complex, and chronic illness: skin wounds, such as bedsores, post-operation surgical wounds, and diabetic ulcers that refuse to heal quickly, if at all.

And what does a mathematician do with a biological problem? “We formulate a set of equations that reasonably capture the wound-healing process. Of course, that’s a very complicated process. So one of the things we do in crafting a mathematical model is make decisions about what to include and not include. And to be candid, this is an art.”

Schugart continued, “Understandably, some biologists want everything in there, but if you do that, if you include an equation for all the hundreds of proteins and cells and their interactions, you won’t be able to do anything with the math. However, if you work with just one or two equations, the math will work well, but it often won’t capture the biology. The art is determining what’s essential to include and not include in the mathematical equations. What we’re doing right now is breaking down the wound-healing process, and then working on equations for different stages or processes. Ideally, we will have equations for each stage and then combine all those into one comprehensive model, but that’s still down the road.”



Currently, Schugart and others are working on a mathematical/biological approach to try and promote blood vessel formation in a wound. "When there's a wound, the blood vessels get cut. When this happens, oxygen and other nutrients are not being delivered to the wound region. The cells need the oxygen and nutrients in order for proper healing to take place. I am looking at how we might get oxygen to the wounded area in order to help it heal."

Schugart explained, "There are different ways of getting oxygen to a wound, but I am focused on using hyperbaric oxygen. This is when you put someone in a chamber and give the person 100% oxygen at two to three times normal pressure. The person breathes in an increased level of oxygen, which the lungs process into a higher concentration of oxygen in the bloodstream. The extra oxygen will, we hope, improve blood vessel formation, which in turn, will aid in the wound healing process."

Along with the director of MBI and other researchers, Schugart has done the first step: formulate

the equations and validate the mathematical model with computer simulations. Now they are using this model to explore the use of hyperbaric oxygen in wound treatment.

"We hope to accomplish at least two objectives with our mathematical model. First, the math will give us new insight into how things work — it will provide a different way of looking at a biological problem. And second, we can use that knowledge to describe potential treatments."

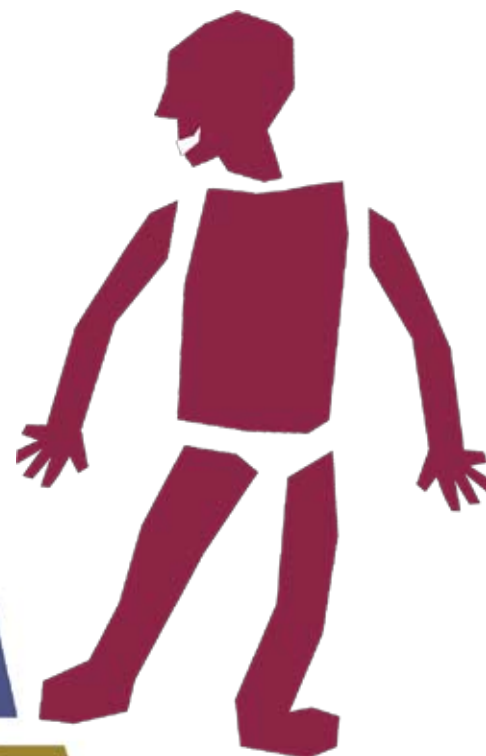
And the research community is paying attention. With Schugart as lead author, he and co-researchers recently (2008) published "Wound angiogenesis as a function of tissue oxygen tension: a mathematical

model" in the prestigious journal, PNAS (Proceedings of the National Academy of the Sciences).

As with his love for math, there is a personal connection for Schugart and biology: "My dad has diabetes and diabetic ulcers caused by neuropathy." As the research continues to prove beneficial, the possible positive impact is immense — and not just for Schugart's father. "Billions are spent in the USA alone each year on treating wounds," he states. "And millions are dealing with this."

If wound healing is complex, so is the math that attempts to capture it. But the hope remains that part of the cure for humanity's wounds lies not only in biology but also in math. ■

***"The extra oxygen will, I hope, improve blood vessel formation, which in turn, will aid in the wound healing process."***



**FOR SOME EDUCATORS AND LEGISLATORS, THE IDEAL CLASSROOM SITUATION MAY BE ONE IN WHICH NO CHILD IS LEFT BEHIND: ALL CHILDREN MEET CERTAIN GRADE-LEVEL REQUIREMENTS AND MASTER A MINIMUM SET OF COMPETENCIES. BUT, FOR DR. JULIA LINK ROBERTS, MAHURIN PROFESSOR OF GIFTED STUDIES, FOUNDING DIRECTOR OF THE CENTER FOR GIFTED STUDIES, AND EXECUTIVE DIRECTOR OF THE GATTON ACADEMY OF MATHEMATICS AND SCIENCE, THAT SCENARIO SETS THE BAR TOO LOW. NO CHILD MAY BE LEFT BEHIND, BUT, AS ROBERTS NOTES, "FOR ANY KID WHO IS AT PROFICIENCY OR ABOVE, THERE IS NO PLACE TO GO, IF THAT'S WHERE INSTRUCTION IS FOCUSED. CONSEQUENTLY, IT IS A TERRIFIC IMPEDIMENT TO LEARNING." THESE ARE THE GIFTED AND TALENTED CHILDREN ON WHOSE BEHALF ROBERTS, A DISTINGUISHED UNIVERSITY PROFESSOR, HAS ADVOCATED DURING HER CAREER.**

Roberts' career began as a middle school teacher in Kansas City, Missouri, and Stillwater, Oklahoma. It was during this time that she was offered a chance to teach literature to gifted students in the summer, an experience that had a profound impact on her. Shortly thereafter, she began an Ed.D. program at Oklahoma State University, receiving her degree in 1970. Dr. Roberts then came to WKU in 1974, working for several years with grants before joining the faculty in what is now the School of Teacher Education, where she continued her work in the field of gifted and talented education.

"Gifted and talented" is a federal designation that refers to children who demonstrate high achievement capability in one or more of the following areas: general intellectual ability, specific academic aptitude, creative or productive thinking, leadership ability, or the visual and performing

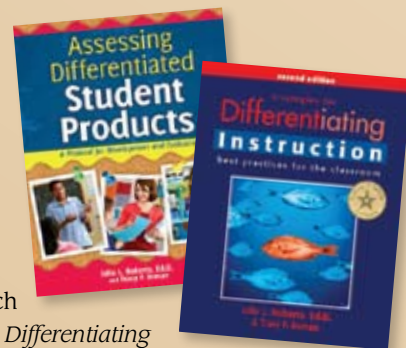
# No Potential

**BY JEANNE SOKOLOWSKI**



arts. Roberts also describes them as marked by their pace of learning and desire for a complexity of content. Much of Roberts' scholarly writing addresses this question: How can teachers create a classroom atmosphere in which lessons are differentiated in order to allow all students to make continuous progress? With Tracy Ford Inman, she has coauthored two books which offer answers: *Strategies for Differentiating Instruction: Best Practices for the Classroom* (2nd edition) (2009) and *Assessing Differentiated Student Products: A Protocol for Development and Evaluation* (2009).

As Roberts and Inman note, several obstacles hinder the creation of a differentiated classroom: lack of time (to find resources and do the additional planning required); lack of instruction for teachers on how to differentiate; and a lack of understanding about how gifted children learn and develop. Many teachers subscribe to the myth that gifted children will somehow succeed on their own.







*Super Saturdays students*

the Summer Program for Verbally and Mathematically Precocious Youth (VAMPY), hosted since 1984 in cooperation with the Duke Talent Identification program. In addition, The Center also runs the Summer Camp for Academically Talented Middle School Students (SCATS), and during the academic year, coordinates Super Saturdays, which allow gifted students in grades one through eight a chance to learn outside of the regular classroom setting. It is the SCATS camp which serves as the setting for the practicum required of those graduate students working toward a gifted certification.

# Left Behind

Roberts' scholarly publications provide much-needed resources for teachers; she also runs workshops on differentiation in the classroom. Her teaching at WKU — where gifted certification is offered — helps fill the gap in instruction for teachers in south central Kentucky and beyond. Western Kentucky University is the only institution in the state which has offered that endorsement sequence continuously since 1982, and teachers can complete the required practicum here, as well. And her tireless efforts at advocacy for gifted children include efforts to educate teachers and the community about the special needs of these talented students.

One of the most impressive of her accomplishments is the creation of The Center for Gifted Studies. Dr. Roberts and then-dean of the College of Education and Behavioral Sciences, J.T. Sandefur, brainstormed the idea for The Center in response

to public interest. What began as a series of informal talks with other deans, parents, and teachers eventually became The Center in its current form. Opened in 1981, The Center, which is self-supporting through tuition, fees, grants, and endowments (like the Mahurin Chair which Roberts holds and the Berta gift which funds an annual professional development seminar), is now in its 29th year.

Several programs are available for gifted children through The Center for Gifted Studies, including

The SCATS, VAMPY, and Super Saturday programs all offer valuable opportunities for gifted and talented children to interact with their intellectual peers, Dr. Roberts notes. These programs, she adds, are filled with a diversity of children from all socioeconomic, racial, and ethnic backgrounds. Most significant, however, is the fact that interaction with others who are both their age mates and their intellectual peers provides these children with a comfortable and stimulating experience. These are children who

***One of the most impressive of her accomplishments is the creation of The Center for Gifted Studies. What began as a series of informal talks with other deans, parents, and teachers eventually became The Center in its current form.***

have not only unique cognitive needs, but special social and emotional ones, as well.

What is it like for a gifted child in a regular classroom, where she may not be able to fully realize her talents? “Well, it’s lonely,” Dr. Roberts explains, “and if you’re not careful, children think something is wrong with them because they don’t see the world the same way as their peers.” Gifted children are sometimes forced to act as tutors to struggling peers; Roberts is quick to point out that research has shown that this doesn’t cultivate empathy in gifted students, nor do their peers who are struggling to learn the material view them as role models. In these instances, Roberts says, “you really

WKU provost and president, and the dean of the College of Education and Behavioral Sciences for The Center. And it’s worthwhile to note that Roberts is the type of person who makes things happen when it comes to gifted and talented children. She has a passion and a talent for advocacy and building long-term relationships with those in charge of the allocation of local and federal funds. Her advocacy skills were recognized by the National Association for Gifted Children in 2001 when she became the first recipient of the David W. Belin NAGC Advocacy Award.

Another of her projects which recently came to fruition is the Gatton Academy of Mathematics and

Science in Kentucky. Though it took about ten years to become reality, Roberts persisted in her efforts to get the Academy up and running. While the idea for a statewide residential school for math and science for gifted high school students was not a new one — the North Carolina School of Mathematics and Science has been around for thirty years now — securing support for an institution like this, funded by the state budget, required continued advocacy, and a good relationship with lawmakers and others in decision making positions. Luckily, she and Jody Richards, then Speaker of the House, shared a commitment to bringing the Academy to Kentucky. It opened two years ago, the fourteenth school of its

***Another of her projects which recently came to fruition is the Gatton Academy of Mathematics and Science in Kentucky. Securing support for an institution like this, funded by the state budget, required continued advocacy, and a good relationship with lawmakers and others in decision making positions.***

take a peer relationship that’s already a little strained and exacerbate it.” In fact, she adds, when gifted children move to other instructional settings (separate classes or different schools altogether), this opens up opportunities for other students, and new leadership emerges from the children remaining in the classroom.

Her concern for the spectrum of needs of gifted children fuels her dreams for the future of The Center for Gifted Studies. “I’d love for this to be a counseling center for children and their families,” she states. “And I’d like for us to be able to offer assessment capabilities.” Though not possible yet due to staffing limitations, Dr. Roberts gratefully acknowledges the support of the



*Julia Roberts speaks at a Javits grant press conference*





*SCATS students walk past the Gatton Academy of Mathematics and Science in Kentucky*

kind in the United States, and Roberts marks the dedication ceremony as one of the most significant moments of her career.

Dr. Roberts has also experienced great success in the realm of grant proposal writing. She has been the co-director of five Eisenhower Math and Science grants, co-director of one Field-Initiated Research grant, and principal investigator of three Jacob K. Javits grants, including the current one entitled Project Gifted Education in Math and Science (GEMS). The Javits Gifted and Talented Students Education Program is the main source of federal funding for gifted services and programs. The Javits legislation was successfully passed in 1989, due in large part to the advocacy efforts of Roberts with former Congressman William H. Natcher of Kentucky, whose vote as Chair of the Appropriations Committee was decisive in getting that legislation through. Roberts notes that the Javits grants have provided funds for much needed research about gifted education with a focus on children who have traditionally been underrepresented, and funding for services for children who are gifted and



*The Gatton Academy*

talented. Her current Javits grant will focus on identifying and providing services for gifted math and science students in six local elementary schools.

Other projects in the works include a book she is co-writing with her daughter, Julie Roberts Boggess, who is an

elementary school librarian in Mt. Juliet, Tennessee. They were invited to put together a survival guide for first year gifted resource teachers. Roberts is also hard at work lobbying for Equity in Excellence, federal legislation aimed at helping gifted kids from low income families. And a responsibility and an honor has recently been bestowed on Dr. Roberts: her election to the Executive Committee of the World Council for Gifted and Talented Children. Roberts is one of seven representatives, and the only one from the United States.

With her long list of accolades and accomplishments, the Council would have been hard-pressed to find someone better suited to work on behalf of these special kids. Julia Link Roberts' life and career is a testament to her own gift for leadership and service. ■

# The Distmaker

BY KATH PENNAVARIA



**CHARLES SMITH IS A COLLECTOR. AS A KID, HE COLLECTED COINS AND BASEBALL CARDS; TODAY, HE COLLECTS (AMONG OTHER THINGS) COPIES OF ARTICLES PUBLISHED BY ALFRED RUSSEL WALLACE, A MAJOR NINETEENTH-CENTURY FIGURE IN THE HISTORY OF BIOLOGY.**

As WKU's Science Librarian since 1995, Smith has spent much of his academic library career reconstructing Wallace's published work in biology and philosophy, and has made over seven-hundred Wallace writings available in HTML full-text. In fact, his collecting efforts on behalf of Wallace's legacy have made him an international leader in the field of Wallace studies.

He first encountered Wallace in 1972, while a senior at Wesleyan University in Middletown, Connecticut. A few years later, while seeking a master's degree in

biogeography at Indiana University, Smith encountered Wallace again, and this time the connection stuck. "Wallace was the father of biogeography," says Smith, "but I realized that the bibliographic coverage of him was poor. So I started investigating him." Soon Smith was finding a plethora of un-cited and un-indexed articles by Wallace. "Only one bibliography was created after he died, and that had around 400 items. Since I started finding more, the number has risen to 920." So Smith has single-handedly more than doubled the indexed articles published by this early theorist.

Wallace published so much, in fact, that Smith decided early on to exclude unpublished writings and correspondence from his bibliographic work. "You've got to draw the line somewhere," he says. "Wallace published in more than 300

different serial titles — just finding his published work is enough of a challenge." He notes, however, that other researchers have undertaken to find and categorize Wallace's unpublished writings.

For Smith, it is not enough merely to find out the name and bibliographic information about an article. He obtains actual copies and then transcribes everything into digital format. "I've done several hundred articles this way, either entered manually or scanned with OCR [Optical Character Recognition] software." These digitized Wallace articles are freely available at [www.wku.edu/~smithch](http://www.wku.edu/~smithch).

"I put everything that I can online," Smith says, "but I keep finding more stuff. In fact," he adds, "after thirty years of looking, I'm finding things at an accelerated rate." Though this increased rate of discovery seems counter-intuitive, Smith notes that nineteenth-century publications are increasingly becoming available through digitization projects going on throughout the world. He has also continued to refine his search strategies over the years.

To supplement the primary writings, Smith investigates as well what others have written about Wallace, and collects historical information about him at the main Wallace site. A second site, called "The Once and Future Wallace," contains explorations and discussions of Wallace's philosophy. "My goal for all of this is to make Wallace better known," Smith says.

In addition to the web sites, Smith has published four books and





numerous articles, all of which have contributed to bringing Wallace to the attention of modern scholars. "I'm not the only person working on him," Smith notes, "but in terms of pure mass, I am the largest contributor to Wallace scholarship." His research data has been used in biographies of Wallace and many writings on the biological sciences published in the last ten years. "I get about one email a day asking for information or, sometimes, for an interview," he notes.

Recently, Smith received grant money to annotate, edit, and publish the journal Wallace kept on a North American lecture tour he took from 1886 to 1887. Wallace went across the country from Boston to California, giving talks and exploring the land. He didn't make much money at his speaking engagements, but the journal he kept confirms his reputation as a superior field observer, Smith says. "In fact, he may well have been the greatest field naturalist in history."

Wallace also met countless American scientists and other dignitaries on his trip, and noted their names in his journal. For Smith the science historian, the names have been a gold-mine: "The listmaker in me has been clicking into gear," he says laughingly. Right now he has about 125 names of people Wallace met who are in some major biographical reference source. "That's a good enough reason alone for doing something with this," he says.

His defense of Wallace has succeeded in making room for this historical figure in any discussion of major contributors to the science

of evolutionary biology. As is well-known today, as a young man Wallace drew conclusions from his own research which echoed the same thoughts being mulled over by the more mature scientist Charles Darwin after his voyage on the HMS Beagle. In 1858 Wallace wrote

***My goal for all of this is to make Wallace better known.***

an essay outlining his ideas about evolution and natural selection, but instead of publishing it, he sent it to Darwin for comment. Darwin, though recognizing that his own original ideas might seem derivative if Wallace's saw publication, nevertheless had the article made public — but then hurriedly brought out his book *On the Origin of Species* (1859). Wallace never seriously sought to gain recognition for himself.

Through his own research, Smith has uncovered a fuller picture of Wallace's interests. In addition to his fascination with evolution and natural selection, says Smith, "Wallace was a vocal spiritualist, and very interested in social problems." Wallace published articles on land planning, legal reform, economics, and (against) eugenics. He was an early advocate of women's voting rights, fair pay for overtime work, and a vegetarian diet. He believed passionately that if women could vote and earn money to support themselves, they would not be forced to marry just for economic reasons.

If they could marry out of free choice alone, he thought, they would more often choose better mates, and society would benefit. Smith notes that Wallace's ideas on this subject have some problems, but his interest is in making Wallace's published work available so a debate can take place about those ideas.

Perhaps by now you think Charles Smith does nothing but think about Alfred Russel Wallace. Nothing could be further from the truth. His research interests have spanned a wide range, and today he maintains a total of eleven research-based web sites. In addition to the two on Wallace, he has five sites focusing on biogeography and natural history, three focusing on music (primarily classical and folk), and one on Australia's exploration history.

But the Wallace work remains a primary focus, and he recently returned from an invited, all-expenses-paid presentation at a Darwin conference held at a Brazilian university. "I was the token Wallace person," he says with a smile. ■





# MARR

## the Mind and

**EMOTION HAS FASCINATED PSYCHOLOGY PROFESSOR ELIZABETH LEMERISE SINCE EARLY IN HER STUDIES: WORKING AT AN INFANT LAB, WHERE SHE STUDIED INFANTS' VISION AND PERCEPTION, SHE FOUND THAT THE INFANTS' EMOTIONS MADE THAT KIND OF WORK DIFFICULT. FROM THAT EXPERIENCE CAME A DESIRE TO FOCUS ON THE STUDY OF EMOTION, BUT IT WAS ALSO IMPORTANT TO LEMERISE TO CONSIDER HOW COGNITION AND EMOTION FUNCTION TOGETHER.**

These days, when she studies children who find themselves in provoking situations — like having someone cut ahead of them in line — she doesn't just look at what

those children are thinking. "If a situation is provoking, it doesn't just provoke cognition," she says with a laugh. "It also provokes emotion."

The two used to be studied as discrete processes, with cognition receiving greater attention, and emotion, a "messier" area of inquiry, being relegated to the role of "stepchild." Lemerise studies both, and sees her work as part of a larger trend in psychology, and the sciences as a whole, of taking what she calls a "cross-area" approach to the complicated task of understanding human beings. The relationship between emotion and cognition lies at the heart of her research, and throughout her career, she has sought to understand how those

different processes affect one another by looking specifically at the social competence of children between the ages of 3 and 12.

First, Lemerise gauges the social popularity of children as a measure of their social competence; children who are better at negotiating social situations with their peers also tend to be more popular. A peer-based measure helps Lemerise ascertain a child's level of social popularity. Children are asked to fill out questionnaires, in which they indicate how well they like each member of a classroom, thus demonstrating a child's overall acceptance by his or her peers; the children also have the opportunity to nominate individuals as "best



# YINING

## the Emotions

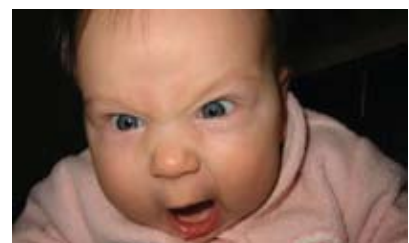
BY JEANNE SOKOLOWSKI

liked” or “aggressive” or “shy.” Lemerise is then able to assess the children she observes in her research with reference to their scores on this measure of social popularity. Lemerise notes the accuracy and usefulness of this measure. “If we take a measure done like this for children who are eight years old,” she says, “it’s the single best predictors of adult outcomes. It’s better than parent report, it’s better than teacher report.”

The Social Information Processing (SIP) model then helps Lemerise explain the individual differences between children in their levels of social competence. The SIP model itself contains six steps which help researchers understand how

situations are processed, and is primarily cognitive in focus; the model includes steps such as reading the cues of one’s social partner, and making decisions about how to respond. Her contribution to the field has been to investigate how emotion complicates the picture and affects certain stages of this process. Lemerise’s position holds that emotion is a significant element in this process, and her work has integrated emotion into the extant SIP model. She has researched, for example, how, in provoking situations, the emotion or mood expressed by a child’s peer can influence how that child interprets the situation, as well as his or her decisions about how to act.

Though her research examines the entire range of individual differences in social competence in children, Lemerise has done work specifically on children at one extreme: those who have difficulty regulating their emotions. Sometimes this manifests as aggression, which Lemerise explains as having two causes. “In at least some percentage of those children, that problem arises from having difficulty regulating those



emotions. There's another small group of children who are aggressive who suffer from the opposite problem: they aren't emotional enough, they aren't empathic, they don't feel other people's pain."

Feelings of empathy, says Lemerise, are at the root of moral behaviors. Like the separation between the study of emotion and cognition by psychologists, theorizing on emotions and moral reasoning has also taken place without much dialogue between the two, a situation that Lemerise seeks to correct. Her recent research includes an edited collection of essays which is now under contract entitled *Emotions, Aggression, and Morality: Bridging Development and Psychopathology*. In that volume, the contributors, which include academics from various countries, consider emotions as a motivating element in moral behavior. While many people may believe that children are deterred from certain behaviors for fear of punishment, Lemerise says the research shows that's not really the case; rather, it is an "empathic orientation" that allows children to imagine how their behavior would impact others. As the recent nomination of Sonia Sotomayor for Supreme Court Justice has demonstrated, some people downplay the importance of empathy in our society, but, as Lemerise notes, "empathy is a basic human trait, and when it doesn't develop appropriately, this has some very bad implications for society."

Lemerise's expertise with the social development of children prompted another question: have children — their emotions and behaviors — changed over the past few decades? Are they more or less able to regulate their emotions now? "I don't think I've really seen any changes, I really don't," she

***"Parents who are sensitive and accepting and engaged with their infants have infants who form strong relationships with their parents, and that actually helps infants regulate their emotions."***

said, and asserted that parenting still plays a large role in the social development of children. When asked what the biggest parental factors that encourage the development of social competence, Lemerise had this to say: "I think it starts very early, with infancy. Parents who are sensitive and accepting and engaged with their infants have infants who form strong relationships with their parents, and that actually helps infants regulate their emotions." As children get older, she continued, parents have to adapt. For parents of pre-school age children, Lemerise stressed that it is especially important to label the child's emotions and give him or her strategies for coping in order for children to learn how to read emotions in themselves and others, and to regulate them.

Though, as a basic researcher, Lemerise doesn't work with children as a practitioner, her research has very practical implications, and, in fact, she notes that more than half of the people who cite her research are child psychologists or school counselors who use her work to create interventions. She is also an active mentor, having

been involved in the past with the National Science Foundation's program, Research Experiences for Undergraduates, and currently works with numerous undergraduate students, both psychology majors who assist her with her research, and students writing their honors theses. She also feels gratified that so many of her former students have gone on to receive terminal degrees. An article that she is currently revising for publication is being co-written with one of those success stories: Bridgette Harper, who received her MA from Western Kentucky University in 2001, is now an assistant professor at Auburn University at Montgomery. Finally, just when you think she must have more hours in the day than the rest of us, Lemerise mentions an additional responsibility, and a prestigious one at that: since 2006, she has been co-editor of the international journal *Social Development*. What's next for this University Distinguished Professor? With a smile of regret, Dr. Lemerise admits that she has more ideas for potential research than she'll probably ever be able to find the time to carry out. ■





# RESEARCH BRIEFS

## GSKYTEACH: PREPARING MATH AND SCIENCE TEACHERS FOR HIGH-NEED SCHOOLS



Roger Pankratz

Thanks to a \$5 million grant WKU received from the U.S. Department of Education, Dr. Roger Pankratz and Dr. Vicki Metzgar

are recruiting applicants for the innovative GSKyTeach program. Dr. Pankratz, GSKyTeach Executive Director, and Dr. Metzgar, Program Director, plan to select the first cohort of twenty students by March, and begin the year-long training in June 2010. The grant is funded for five years.

In partnership with the Jefferson County Public Schools (JCPS) in Louisville and WKU's Ogden College of Science and Engineering, the WKU College of Education and Behavioral Sciences established the teacher residency program for graduate students, called GSKyTeach, to prepare and place new math and science teachers in high-need high schools. GSKyTeach's primary

purpose is to improve teaching and learning in math and science in underperforming schools.



GSKyTeach is a graduate version of WKU's new and highly-innovative SKyTeach program that prepares science and mathematics majors for inquiry teaching and learning. A unique feature of the program is the use of the high school classroom as a laboratory for learning to teach under the guidance of Mentor and Master Teachers.

College graduates nationwide with majors or the equivalent in each of



Vicki Metzgar & David Erbach

the three content areas (mathematics, physics, and chemistry) will work alongside Mentor Teachers and receive instruction from Master Teachers as they learn to teach in high-need high schools. Teacher residents will be paid \$30,000 plus benefits during their year of preparation and will complete a Master of Arts in Education degree from Western Kentucky University with teaching credentials.

After their year in residency and preparation to teach, candidates will be employed as full-time, certified teachers in the Jefferson County Public Schools and must commit to teaching three years in a JCPS high-need high school. Teacher residents will continue to receive ongoing support from a mentoring team consisting of a Master Teacher in their content area, their high school principal, and WKU GSKyTeach faculty.

To read more about GSKyTeach, or to apply to participate in the program, visit the web site at <http://edtech.wku.edu/gskyteach>. ■



**THE WKU STUDENT RESEARCH CONFERENCE:  
SUPPORTING A TRADITION OF STUDENT ENGAGEMENT**



Rodney King

Western Kentucky University has a long tradition of encouraging and supporting student engagement.

February 2010

marked the 40th annual WKU Student Research Conference.

The roots of this conference can be traced to the strong tradition of student engagement created by the WKU chapter of Sigma Xi, a national scientific research society dedicated to promoting the research enterprise, fostering integrity in science and engineering, and strengthening the public's understanding of science for the purpose of improving the human condition.

For many years, students engaged in scientific research at WKU showcased their accomplishments and perfected their presentation and public speaking skills at the annual Sigma Xi student research conference. The successful tradition established by this conference was a strong foundation on which to launch a new engagement initiative.

In 2007, Dr. Barbara Burch, WKU Provost and Vice President for Academic Affairs, established the Student Research Council (SRC), a standing university committee charged with coordinating an annual WKU student research conference with broad appeal. For the first time, all academic disciplines were encouraged to present their scholarly activities and creative work to the academic community. That year twenty six different departments from across the WKU campus were represented. The SRC has continued to build and improve this new tradition.

Dr. Rodney King, Chair of the Student Research Council, explained the value of the conference:

"Students who participate in the WKU student research conference have been engaged in hands-on research and other scholarly and creative activities under the guidance of a faculty mentor.

They come together to share their accomplishments through oral presentations, poster presentations, and displays of their creative work. The WKU student research conference is a unique opportunity to showcase the talents of WKU's students and the rich variety of scholarly and creative activities in which they are involved."

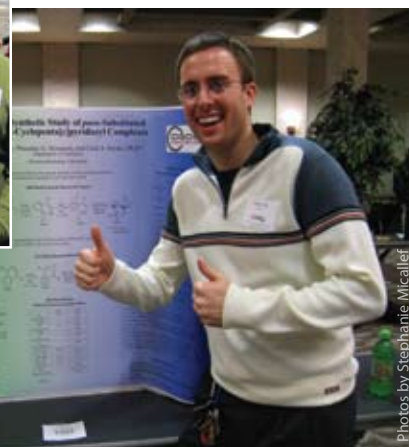
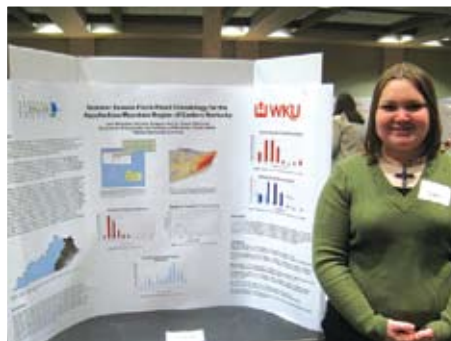
WKU graduate Ali Wright, who studied with Dr. King, said of her participation in an earlier conference, "As an undergraduate, the student research conference was one of the first places where I presented my research. This experience helped me learn how to present research and gain confidence as a speaker. I was also able to discuss my research with knowledgeable faculty. In addition,

the conference allowed me to learn about ongoing research in other labs and departments at the university."

Another WKU alumna, Katharine Stewart, stated, "Overall the experience helped prepare me for graduate school, and I would recommend it to anyone thinking about pursuing a graduate degree."

The organization of the WKU Student Research Conference is a collaborative effort. The conference is sponsored by the College of Education and Behavioral Sciences, College of Health and Human Services, Gatton Academy of Mathematics and Science, Gordon Ford College of Business, Graduate Studies and Research, Potter College of Arts and Letters, Ogden College of Science and Engineering, Honors College, Student Government Association, University College, Bowling Green Community College, University Senate, the WKU chapter of Sigma Xi, the Office of the Vice President for Research, and the Provost's Office through a Provost's Initiatives for Excellence grant.

Learn more at [www.wku.edu/studentresearch](http://www.wku.edu/studentresearch).



Photos by Stephanie McCallie