

Spring 2004

The Western Scholar

Editors

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The Western

SCHOLAR

THE SPIRIT OF SCHOLARSHIP AND RESEARCH AT WESTERN KENTUCKY UNIVERSITY



This issue of *The Western Scholar* provides further illustration of the broad avenues of scholarship prevalent within the Western Kentucky University teaching and research community. As Dr. Gay Perkins, co-editor, remarked in the previous issue — citing the perspective of Ernest Boyer, past president of the Carnegie Foundation for the Advancement of Teaching — scholarship endeavors may be categorized as falling into: the scholarship of discovery through research, the scholarship of integration, the scholarship of application to consequential problems, and the scholarship of teaching and attracting future scholars to the discipline.

These categories provide us with a truly meaningful scheme for looking at the wide range of scholarly interests and activities at Western Kentucky University represented in this issue as well as the past issues of *The Western Scholar*.

In this issue you will find reports of research by faculty from the Physical Education and Recreation, Psychology, and Economics departments exemplifying the scholarship of discovery. There is a report of the devotion by Dr. Matt Green over his entire professional career to researching a phenomenon called “Ratings of Perceived Exertion” (RPE), which he describes as “a subjective way of monitoring exercise intensity.” Dr. Steven Haggbloom describes a research project that used multi-based criteria for judging the value of research contributions to the discipline of psychology that led to a list of the top 100 psychologists of the twentieth century and was published in a prestigious journal in the field. Dr. Stephen Lile, over a thirty-year career, has pursued a variety of research topics in economics — from taxation to the tobacco wars and religious organizations.

The scholarship of integration is represented in this issue by a report of research being conducted by Dr. Andrew Wulff, Department of Geography and

Geology, on volcanoes. Dr. Wulff’s studies have focused on a wide range of geologic issues, including the mineralogical content of kidney stones and the geochemistry of Native American artifacts.

Reflecting the scholarship of application to consequential problems is research being done by Dr. Kinchel Doerner, Department of Biology, and Dr. Cathleen Webb, Department of Chemistry, each addressing significant problems affecting the

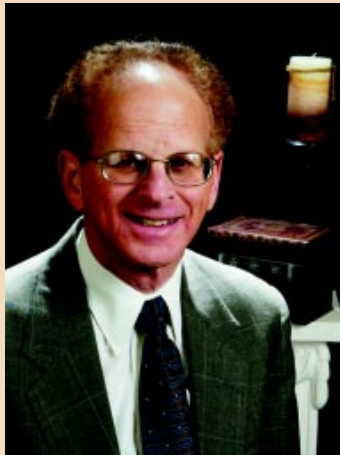
environment, particularly the purity of our water. Dr. Doerner’s research on chicken litter looks at the problem posed by poultry being fed diets high in calcium phosphate. Dr. Webb’s investigations focus on lowering the arsenic levels of drinking water through a limestone filtering process.

Lastly, the scholarship of teaching and attracting future scholars is especially on display in the Department of Physics and Astronomy and in Sylvia Kersenbaum’s long piano teaching

career. Astronomy faculty, including Drs. Michael Carini, David Barnaby, Sergey Marchenko, Richard Gelderman, Richard Hackney, Karen Hackney, Roger Scott, and Charles McGruder regularly engage their students in a variety of research projects, including a NASA-funded program called “Students Training for Achievement in Research Based on Analytical Space-science Experiences” (STARBASE). Sylvia Kersenbaum, an internationally acclaimed pianist who records for the EMI-Angel label, has transferred her abundant musical knowledge and skills to countless students over a twenty-seven-year career at Western.

I encourage you to read each of the articles in this issue and discover for yourself just how wide ranging and interesting research and scholarship is at Western Kentucky University.

Dr. Michael B. Binder, Dean
University Libraries



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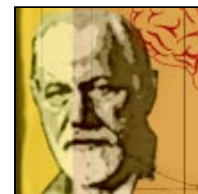
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THE SPIRIT OF SCHOLARSHIP AND RESEARCH AT WESTERN KENTUCKY UNIVERSITY

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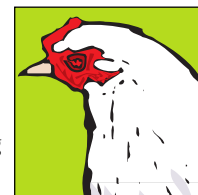
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Dr. Andrew Wulff is using his research to help people living in the shadow of a volcano.

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Ratings of Perceived Exertion or RPE is a subjective way of monitoring exercise intensity. Exercising individuals are asked how they feel rated on a numerical scale. Illustration by Tom Meacham and Inga Dora Gudmundsdottir.

RATINGS of PERCEIVED EXERTION

BY JESSICA SASSEEN

DR. MATT GREEN HAS DEVOTED HIS PROFESSIONAL CAREER TO RESEARCHING A TOOL THAT MAKES EXERCISE PROGRAMS SAFER AND MORE EFFECTIVE. THIS TOOL ALLOWS INDIVIDUALS TO MAINTAIN THE CORRECT INTENSITY LEVEL WHILE EXERCISING, WITHOUT OVEREXERTING THEIR BODIES.

The focus of his research is called Ratings of Perceived Exertion or RPE. Dr. Green, an assistant professor in the Department of Physical Education and Recreation at Western Kentucky University, describes RPE as “a subjective way of monitoring exercise intensity.”

“The big advantage to RPE is it decreases the need to monitor heart rate or any other technical, physiological variables,” Dr. Green said. “Many exercisers attempt to closely monitor their heart rate but with varying degrees of accuracy. RPE is so effective that studies suggest if you’re using RPE, monitoring heart rate isn’t absolutely necessary.”

To measure RPE, exercising individuals are asked questions concerning how they feel and asked to answer based on a numerical scale.

“There are various scales we have used like one to ten or six to twenty,” Dr. Green said. “While a person is exercising, we show them a scale and say ‘How hard is that exercise for you?’ and they respond with a number. It has to do with how much fatigue and pain they’re feeling, how heavily they’re breathing, how hot they feel. Just various things they perceive about their body while they’re exercising.”

In one study conducted by the Department of Physical Education and Recreation, participants exercised for more than an hour in an environmental chamber, with a controlled temperature. Dr. Green’s research found that, during these periods of exercise, the participants’ RPE corresponds with their heart rates in both hot and cool environments.

“Basically, as your heart rate goes up, so does your RPE,” Dr. Green said.

The RPE scale research is useful to the exercising community by working toward the goals of maximizing the benefits of a fitness program while making workouts time-efficient and safe.

Dr. Green is currently studying blood lactate levels and how RPE corresponds to the lactate threshold. He described blood lactate concentration as a physiological marker of exercise intensity.

“As the exercise gets more intense, the blood lactate concentration goes higher and higher,” he said. “As a result, your RPE goes higher and higher.”

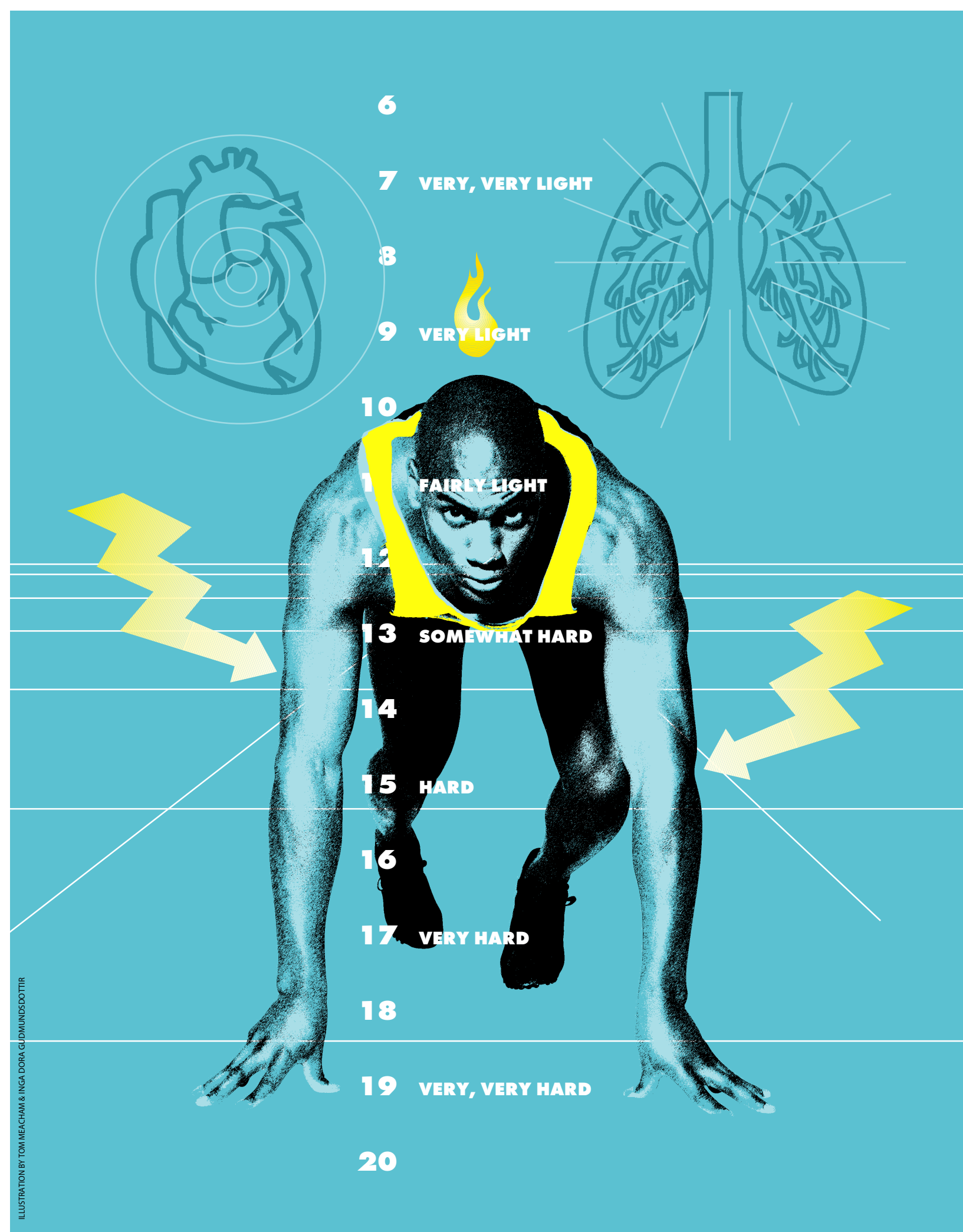
One RPE application supported by the American College of Sports Medicine (ACSM) is for pregnant individuals, Dr. Green said. According to ACSM, as pregnant women exercise, they should

not over exert themselves. When they start to feel like the exercise is too intense, it’s time to slow down. They get different feedback mechanisms from their bodies. By using RPE and answering questions like “How hot am I? How heavily am I breathing? How difficult is the work to my legs?” they can gauge their level of intensity.



Dr. Matt Green

PHOTO BY SHERYL HAGAN-BOOTH



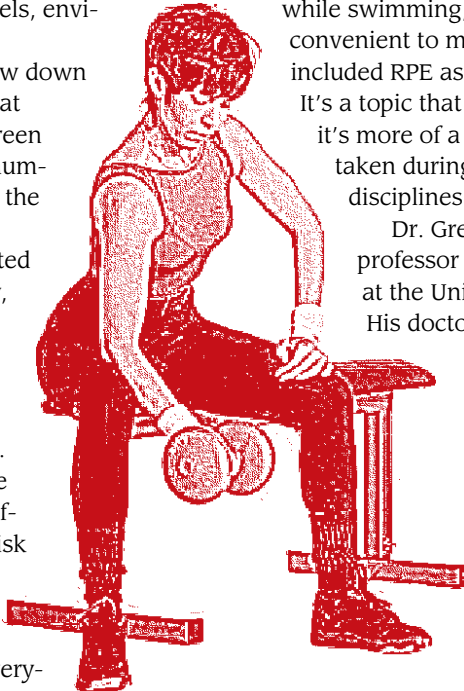
"RPE is based totally on perception, rather than physiological measures," Dr. Green said. "The American College of Sports Medicine suggests that individuals, while exercising, maintain intensity which feels 'somewhat hard' to 'hard' on the RPE scale."

He said advantages to the RPE scale are that it tends to self adjust for varying fitness levels, environmental conditions, and fatigue levels.

"If it's hot outside, you're going to slow down versus if it's cool outside, because the heat makes the exercise more difficult," Dr. Green said. "If you're pregnant and carrying X number of pounds, you'll slow down because the exercise feels a little bit more difficult."

The major killers of people in the United States are chronic conditions like obesity, diabetes, and heart disease. There is a current boom in the fitness industry and an increased interest in fitness and exercise as preventative medicine regarding these life-threatening conditions, he said. RPE is a tool for people to use to enhance their fitness program and make it more effective, he added, thus decreasing their risk of developing these diseases.

"An effective fitness program applies across the student versus the average population spectrum because everybody is, rightfully so, being pushed and



Dr. Green became interested in the RPE scale during his master's degree thesis work at Middle Tennessee State University where he monitored physical intensity during swimming.

"It's very difficult to monitor your heart rate while swimming and it's difficult to monitor blood lactate while swimming," he said. "Our idea was it might be convenient to monitor RPE instead. Since then, I've included RPE as a variable in every project I've done. It's a topic that stretches across disciplines because it's more of a psychological measure, but it's taken during physical activity. So it crosses the disciplines of psychology as well as physiology."

Dr. Green came to Western as an assistant professor immediately out of his Ph.D. program at the University of Alabama in July of 1999.

His doctorate is in human performance studies with a specialization in exercise physiology. He now teaches applied exercise physiology, fitness programming, and various graduate classes in the Department of Physical Education and Recreation.

Through Dr. Green's research of RPE at Western, student involvement in research and scholarly activity has increased significantly at the undergraduate and graduate levels. One of the Physical Education and

participants can monitor their exercise intensity using RPE during everyday exercise.

"Using RPE, you can be pretty sure your heart rate is where it's supposed to be, your blood lactate is where it needs to be, and that you are maintaining the correct physiological intensity," he said.

Interns working in the lab assist with data collection and help develop the research projects. "The research experience requires students to work in the laboratory, which better prepares them for jobs in the fitness and exercise physiology field," Dr. Green said. "Lab skills are an absolute requisite. They have to be able to work in the lab."

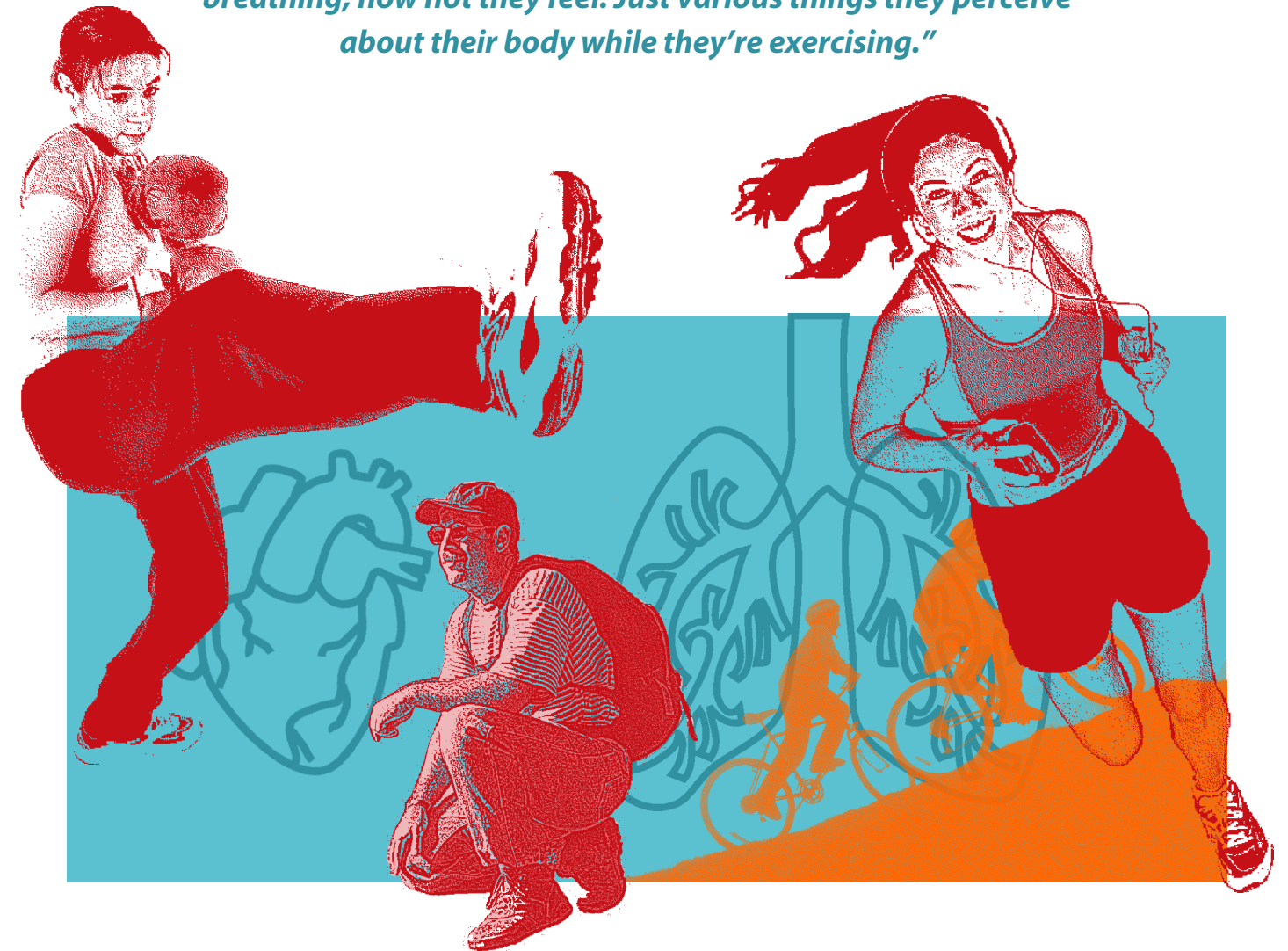
Dr. Green has published nineteen articles concerning RPE or thermoregulation during his tenure at Western. Involving students in research and the integration of teaching and research are key concepts to him.

"Western has a perfect combination of emphasis on teaching and research responsibilities for my desire," he said. "I like the combination of research and teaching. There's plenty of opportunity to do research, plenty of support from administration, and plenty of opportunity to involve students. We have really made a push to get as many students as possible involved in what we do. Teaching and research are too often viewed as independent of each other."

By using his research in the classroom, Dr. Green teaches students what happens to the body physiologically, but makes the data come alive in the laboratory. Students are able to see the changes in the heart rate and blood lactate levels, and they are able to see what happens during a maximal exercise test.

"Research really is the creation of new knowledge," Green said, "and to involve students in that is one of the bright spots of being able to be a professor and do research."

"It has to do with how much fatigue and pain they're feeling, how heavily they're breathing, how hot they feel. Just various things they perceive about their body while they're exercising."



"While a person is exercising, we show them a scale and say 'How hard is that exercise for you?'"

encouraged to take better care of themselves," Dr. Green said. "Regular exercise programs enhance the quantity and quality of life."

He described a practical example of RPE used in a cardiac rehab setting: heart patients taking beta blockers, which prohibits their heart rate going above a certain level. Dr. Green said RPE is an ideal tool to use during this type of patient's exercise. They can describe how they feel using RPE's numbered scale, including factors such as their chest hurting or a sense of fatigue.

Dr. Green stressed the importance of exercise in everyone's life, no matter what form the exercise may take.

"Exercise is preventative medicine," he said. "Nobody is immune to chronic disease. Everyone should take personal responsibility for his or her health and well-being, and a sound exercise program is a big part of that. For health benefits, simply be non-sedentary. A main part of a healthy lifestyle is to live an active lifestyle."

Recreation departmental action plan goals was to have more student work published and presented. There have been twenty-eight total student authorships and co-authorships on journals and published abstracts from within the department.

Since beginning his research at Western in 1999, Dr. Green estimated there have been a few hundred people tested in the lab. A lot of the volunteers have been fitness enthusiasts who are involved in the exercise science program, he said. Also, some members of the Bowling Green Running Club have participated in Dr. Green's research. Most of the research volunteers want to find their current fitness levels in order to improve their personal exercise programs.

Volunteers in the lab perform some type of exercise on the treadmill or cycling. During the exercise session, heart rate, oxygen consumption, blood lactate, and RPE are monitored. Then, based on the physiological response,

PSYCHOLOGY'S GREATEST HITS

BY BOB SKIPPER

THE BEGINNING OF A NEW CENTURY IS A POPULAR TIME TO REFLECT ON THE ACCOMPLISHMENTS OF THE PAST. AS THE YEAR 2000 APPROACHED, STEVEN HAGGBLOOM NOTICED THE PROLIFERATION OF "TOP-100" LISTS. DR. HAGGBLOOM, THEN A PSYCHOLOGY PROFESSOR AT ARKANSAS STATE UNIVERSITY, CAME UP WITH AN IDEA FOR HIS OWN LIST.

"I just had this idea that it might be kind of fun and interesting to put together a list of the most important 100 psychologists for the century," he said. "I decided to turn it into a class project. That's how most of the legwork, the gathering of the data, was accomplished."

Dr. Haggbloom, who is now head of the Department of Psychology at Western Kentucky University, picked a group of nineteen students to work on the project. "The ones who are co-authors stayed with it after the class ended," he said. The result, "The 100 Most Eminent Psychologists of the 20th Century," was published in *Review of General Psychology* in 2002. The list has already been cited in some recent history of psychology textbooks.

What started out as a fun and interesting project turned into a groundbreaking look at a discipline that had undergone tremendous transformation in the twentieth century. And the methodology developed by Steven Haggbloom and his students proved to be unique in its own right.

Past lists dealt with a narrower slice of time, or used one measure, such as citation frequency in journals. In addition to spanning 100 years, Dr. Haggbloom's list employed three quantitative measures and three qualitative measures to rank psychologists. "The more important thing that we did that was methodologically different was that we used a

variety of measures and then tried to merge those into a single index," he said. "That was a unique feature and a more important feature in what we did."

The variables Dr. Haggbloom's study included were journal citation frequency, introductory psychology textbook citation frequency, survey response frequency, National Academy of Sciences membership, election as American Psychological Association (APA) president or receipt of the APA Distinguished Scientific Contributions Award, and surname used as a term in psychology.

The variety of measures considered helped alleviate concerns of bias because of the long time span. The team, however, struggled with the idea of giving one value more weight than another.

"That's one of the real challenging and interesting aspects of doing something like this. There's no real agreed-upon and well-developed methodology," said Dr. Haggbloom. "Most studies of eminence had used only one, maybe on occasion two measures, and so we were essentially working in the dark to come up with some way of merging all these measures together into a single index. In the end we decided to let the chips fall where they fell and not use any weighting."

The quantitative variables — journal citation, textbook citation, and survey citation frequency — were designed to help combat potential biases for American psychologists and psychologists prominent in the later part of the century. One problem was a "disappointing and inexplicably low" 5.6 percent return on a survey e-mailed to about 1,725 members of the American Psychological Society. "That's potentially problematic, but we argue that if you look at the names on those responses that came back,

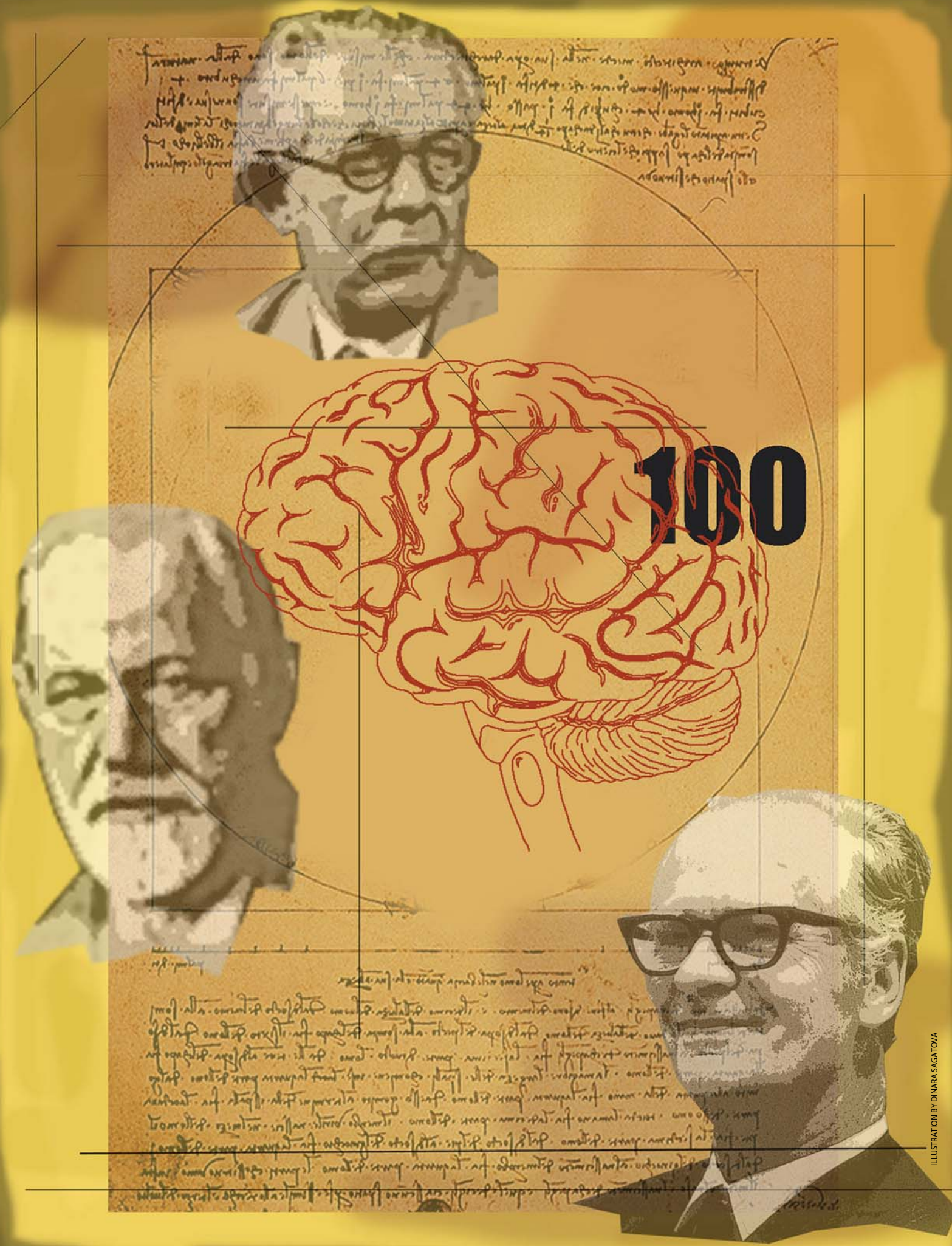


ILLUSTRATION BY DINARA SAGATOVA

people didn't make off-the-wall kinds of suggestions," Dr. Haggbloom explained.

These measures were used to develop a list of 219 psychologists. Researchers then applied the qualitative measures to those names. Those measures were a name used as an eponym, a term in psychology such as "Skinner Box" or "Freudian psychology," election to membership in the National Academy of Sciences, and election to the presidency of the American Psychological Association or receipt of the APA Distinguished Scientific Contributions Award.

Dr. Haggbloom said that less than 0.1 percent of APA members are elected to NAS membership. "Almost by definition, if people are in the National Academy of Sciences, they're eminent psychologists," he said.

Even so, only about 50 of the 150 or so psychologists who have been elected to NAS made the list, which may lead Dr. Haggbloom to a follow-up study of why the others did not, he said.

Because they were breaking new ground, the researchers were faced with countless "choice points" along the way. "We could have done this, or we could have done something else, so we had to make a decision about which way to go," he said. "I think that people are aware of that and they see it as something that was fun and interesting. It was fun to see who fell where on this list."

The top three, B. F. Skinner, Sigmund Freud, and Jean Piaget, are all very well known, even outside of psychology. Haggbloom elaborated, "the inclusion of Elizabeth Loftus (#58) is probably one of the more controversial aspects of the list. She is widely known for her work on the fallibility of eye-witness memory. It's a hot area, and she made the list largely because she is so heavily cited in introduction to psychology textbooks. Most of the others on the list have done work that has withstood the test of time, and I think that will be true for Loftus as well. After the list came out, Loftus' friends had a t-shirt made for her with the number 58 on it."

Dr. Haggbloom said he let the students make many of the decisions, or at least make them with his guidance. "The feedback that I got from the students was that it was a really good learning experience for them," he said. "This wasn't a research area that I had any background in, so as much as they were, I was flying by the seat of my pants. We were sort of inventing what we were going to do as we went along."

The discussions about the methodological choices they were making were beneficial to the students, he said. "It probably gave them a lot of insight into the fact that (in

research projects) there are lots of choice points where there aren't necessarily right or wrong ways to do it. But you have to think about why you would do it one particular way or use one type of methodology as opposed to something else."

The other obvious benefit is their names on the publication, he said. He called the students the "cream-of-the-crop," adding that all but one went to graduate school and all but two are now in doctoral programs.

Feedback from those on the list has been positive. Dr. Haggbloom sent the list, along with a request for biographical information, to all the psychologists on the list who were living. "I got some interesting replies back from them," he said. "Maybe the most interesting feature is that nobody who made the list thought that there was anything wrong with the methodology or that we did a bad job. They all thought it was wonderful."

No matter what methodology was used, any list would face criticism from the supporters of many great psychologists who didn't make it. Dr. Haggbloom took

a cue from one of the researchers cited in the work — Eugene Garfield — and only reported 99 of the 100 names.

"So anybody's best case he can make just might be number 100," he said, adding that even his collaborators

don't know who that is. "I won't reveal that to anyone," he said with a laugh. He is, however, considering giving clues in subsequent papers of follow-up work. "Maybe over the course of four or five papers, somebody could put all the clues together and figure it out."

Prior to becoming head of the Department of Psychology at WKU, Dr. Haggbloom spent twenty five years at Arkansas State University. He holds bachelor's and master's degrees from Indiana State University in Terre Haute and a doctorate from Purdue University in Lafayette, Indiana.



Dr. Steven Haggbloom

PHOTO BY SHERYL HAGAN BOOTH



Making the Number\$ Count

BY CAROL CUMMINGS

A MORGAN STANLEY DEAN WITTER INTEREST RATE CLOCK HANGS ON HIS OFFICE WALL. THIS TELLING SYMBOL REVEALS MUCH ABOUT DR. STEVE LILE, WHO HAS SPENT HIS CAREER CALCULATING FIGURES THAT HELP FAMILIES, BUSINESSES, AND NON-PROFIT INSTITUTIONS ACROSS KENTUCKY. AS HE TALKS ABOUT HIS RESEARCH PROJECTS, AND THE IMPLICATIONS THEREOF, HE MAKES THE NUMBERS COME ALIVE, EVEN THOUGH THE BATTERY IN HIS CLOCK DIED SOME TIME AGO.

Taxation Research

"My first research was on comparative major taxes that families pay," he said. "I took a detailed look at what families of a given size, income level, and source of income would pay in taxes based on where they lived."

Dr. Lile's research estimated the major state and local taxes — sales tax, income tax, property tax, cigarette and gasoline excise taxes — that hypothetical families pay in different states assuming a number of different family sizes and income levels. "My research showed that some states that are viewed as high tax states are actually low tax states whereas other states conventionally thought to be low tax states are in fact relatively high tax states," he explained.

Dr. Lile's research showed that conventional measures of tax burden — total state and local taxes, expressed either on a per capita basis or as a percent of state personal income — are misleading because they implicitly assume that all business tax collections are a burden on residents of the state where the taxes are collected. "For example, Nevada collects a lot of taxes from people who visit but do not live there." States vary in ability to export taxes, and this unequal ability to export taxes to nonresidents leads to erroneous conclusions as to which states place the highest tax burden on their residents." Dr. Lile's early work was even quoted in a 1970 issue of the *Wall Street Journal*.

"For the past thirty years, I have been able to use my research to make the classroom a little more interesting to students, and to supplement what the textbook says," he said. "Familiarity with the Kentucky tax system enhances students' classroom experiences, particularly in the public finance course that I teach each spring."

Having served on many committees and advisory groups related to taxation and policy-making, Dr. Lile's research has allowed Western to help serve the state. Lile has been called as a witness by the Appropriations and Revenue Committee of the General Assembly in Frankfort. He served in 1988 as a member of the Governor's Economic Roundtable, an advisory group, and WKU President Gary Ransdell recently appointed Lile to serve on a special committee of the Council on Postsecondary Education that will look into revenue enhancements and expenditures.

Tobacco War Research

In a unique research interest, Dr. Lile partnered with WKU colleague Dr. Brian Goff in 1996 to write an article titled "The Tobacco Wars: Evidence of Monopsony Power or Rent Seeking" for the *Kentucky Journal of Economics and Business*. "A monopsony exists when there is only one buyer for a product, whereas a monopoly exists when there is only one supplier," Dr. Lile explained. "Tobacco growers felt that the Duke Tobacco Trust, which owned the American Tobacco Company, was mistreating them. However, our research showed that most of the decline in tobacco leaf prices received by farmers was not due to monopsony power wielded by the American Tobacco Company, but to the general economic deflation that was occurring during that time and to federal taxation of tobacco products."



Albert Einstein once wrote, "Not everything that can be counted counts, and not everything that counts can be counted."



PHOTO BY LADONIA HARMON

Churches and Clergy Salaries

For the past three years, Dr. Lile's research interests have led him to study an important segment of the non-profit sector: churches. He has looked at attendance and membership of major denominations in both Texas and Kentucky and learned that some denominations that were dominant in the religious marketplace in years past are no longer dominant. More recently, he has collaborated with WKU colleague Dr. Michelle Trawick using economic analysis to explain variations in Southern Baptist clergy salaries throughout the South. They are presently preparing to submit their paper to a refereed journal.

"We have looked at a variety of factors that economic theory suggests would influence clergy salary, including church age, congregational demographics, population and population growth of the county, income of the county, congregational receipts, missions spending, and competition," he said. "We have computed a Herfindahl Index to measure the degree of competition that exists in the religious market for each county in the seven-state area of the South that we are studying." Lile said that their model explains about fifty-five percent of the variation in Southern Baptist Convention (SBC) clergy salaries.

"As an economist, I am naturally interested in looking at economic explanations for the way things are," Dr. Lile said. "I first became interested in studying the fiscal dimension of churches when my wife and I were married in 1973 by her great uncle, Dr. Homer Grise, a staff member of the Baptist Sunday School Board in Nashville, who actually helped found the Vacation Bible School effort. I met with him a few times and said I would be interested in getting data from the Baptist Sunday School Board."

Dr. Grise put him in touch with the Sunday School Board (which has since been renamed Lifeway), and Dr. Lile obtained data from the Annual Church Profile, an annual survey of individual SBC congregations. The database that Lile and Trawick are using contains observations for approximately 40,000 SBC churches.

"There is probably no other denomination that collects as rich a database from its congregations," he said. "I was able to obtain a treasure of information, including staff salaries, church budgets, baptisms, and members lost through death and transfers."

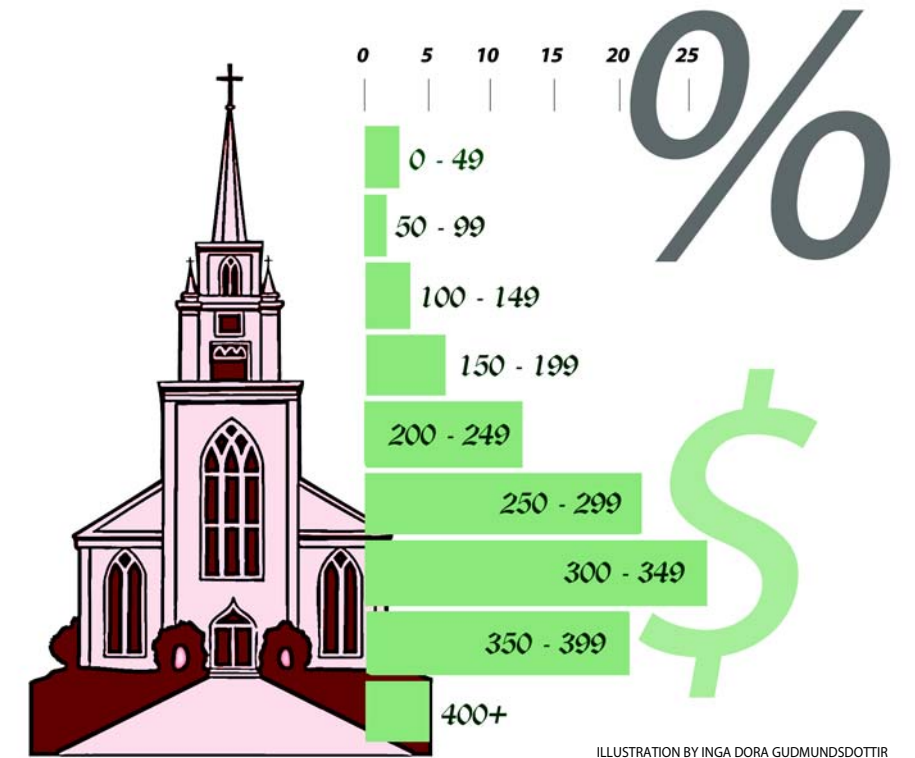


ILLUSTRATION BY INGA DORA GUDMUNDSDOTTIR

The bar graph shows that SBC clergy salaries vary widely when expressed on a per-church member basis. The graph shows that the vast majority of SBC churches pay annual salaries between \$50 and \$250 per church member. About 5% pay less than \$49 and about 3% pay more than \$400 on a per member basis.

Dr. Lile added, "The religious economy, like its secular counterpart, is dynamic. History shows that a denomination that was dominant during one period of time is often replaced by others. This is also true about individual churches within a given denomination."

For Dr. Lile, thinking of churches as firms competing in the marketplace is logical. In his line of work, it is all about the numbers.

Albert Einstein once wrote, "Not everything that can be counted counts, and not everything that counts can be counted." But Dr. Lile has made a career of both counting and of making his findings count.

Dr. Lile received his Ph.D. in economics in 1969 from the University of Kentucky, where he completed his dissertation on interstate comparisons of family tax burdens. He taught at the University of Richmond in Virginia from 1969 to 1973 and has been at Western since 1973. Dr. Lile is a past president of the Kentucky Economic Association, a former editor of the *Kentucky Journal of Economics and Business*, and a frequent textbook reviewer. Dr. Lile has in excess of forty-five publications (with several appearing in refereed journals such as *National Tax Journal* and *Public Finance Review*) and attributes his success in research, in part to his choice of timely and interesting topics, and to his good fortune in collaborating with colleagues in Western's Department of Economics.

Notes from Mineralogy lecture on the chemistry and structure of various minerals (pyroxenes and amphiboles) that could crystallize from slowly cooling basalt magma. The different minerals reflect the changing conditions (temperature and composition) in a magma chamber deep in the earth's crust.



PHOTO BY RYAN FILLOON

Andrew Wulff and several undergraduate students take a break from sampling lava flows to plan the next traverse, under the imposing edifice of Volcan Cerro Azul in the Chilean Andes.

SITTING ON TOP OF THE WORLD

BY TOMMY NEWTON

SOMEHOW IT SEEMS FITTING THAT MINERALOGIST ANDREW WULFF WOULD BE SITTING IN AN OFFICE ON TOP OF THE HILL. AFTER ALL, THE WELL-TRAVELED VOLCANO RESEARCHER HAS SPENT MUCH OF HIS CAREER SITTING ON TOP OF THE WORLD.

Dr. Wulff, an assistant professor in Western Kentucky University's Department of Geography and Geology, has been studying volcanoes since working at Crater Lake National Park after his sophomore year in college. His doctoral work at the University of Massachusetts gave him necessary analytical training and experience, and he continued that research at Whittier College in California, where he served as chairman of the Geology Department, and at the University of Iowa before coming to Western in the fall of 2002.

His work has focused on unraveling the eruptive history of several large volcanic complexes in the Andes Mountains in Chile, but he also conducts research on volcanoes in Java along with his numerous other geologic interests.

Dr. Wulff seeks projects that can involve undergraduate students to teach them research skills and to expose them to different cultures. "That kind of involvement is what makes the academic experience special," he said. "Once students leave here, unless they get an extraordinary job, they're not going to have the time or the resources to explore a new part of the world in this way, with the same measure of freedom."

Or to make a difference in the lives of people living in the shadow of a volcano.



PHOTO BY RYAN FILLOON

Wulff poses on the edge of the vent at Volcan Quizapu, site of two of the largest historical eruptions in South America. The volcano Descabezado Grande looms behind.

The Descabezado Grande-Cerro Azul (DGCA) volcanic complex in the Chilean Andes was the site of two of the largest eruptions in South American history, the last one in the 1930s, but a billion-dollar hydroelectric plant is being built within ten kilometers of the volcanoes.

"That seems foolish and it is," Dr. Wulff said. "They didn't make any exceptions for the fact they were building the plant under these big volcanoes — simply because the last big eruptions were sixty years ago. This hydroelectric plant is projected to be responsible for one-quarter of Chile's electrical power, and in five

minutes, an eruption could knock it out."

That's where Dr. Wulff's research has an impact for the government, geologists, and people of Chile.

"When we're looking at volcanoes in the Andes, we have a rare opportunity because the rates of both uplift and erosion are quite high, exposing parts of volcanoes that normally you can't see," said Dr. Wulff, who received his bachelor's degree at Oberlin College and his master's at the University of Maryland. For example, one large sector collapse (landslide) removed the south side of Volcan Cerro Azul, revealing the lay-

ers of lava flows and ash flows that built up the mountain.

In the regions exposed by erosion of these half-million-year-old volcanoes, Dr. Wulff is able to sample the lavas that poured out of the vents and built up the volcano, flow upon flow. "Sampling each flow allows us to evaluate the separate cycles of eruptive activity. By looking at the mineral compositions and whole-rock chemistry of the ancient lavas, we can tell something about how the volcano has behaved over time. This means we can make more accurate predictions of what will happen in the future," he said.

Two of his WKU undergraduate students are working with Chilean lava samples to determine whether the volcanic complex is currently in a period of rapid growth or slower growth. "By compiling all these eruptive events into a composite history, we can get a good idea of how this complex behaves, and we can model individual eruptive episodes. That's a different approach from what most others are doing."

Dr. Wulff expects to complete research at the DGCA complex in two to three years then continue his work a little farther to the north in the Andes.

"Traditionally volcanologists have thought that every volcano was a separate entity and they weren't related in any way. This is unsatisfying because it suggests that there are no large-scale controls on volcanic behavior," he said. "We're finding out that the comprehensive sampling we're doing is reaping benefits in terms of identifying some of these controls and by allowing us to compare eruptive histories."

The area where he conducted his doctoral research is about twenty kilometers from his current research site and he's finding similar lavas and results. "We're starting to think that every volcano is not a mountain unto

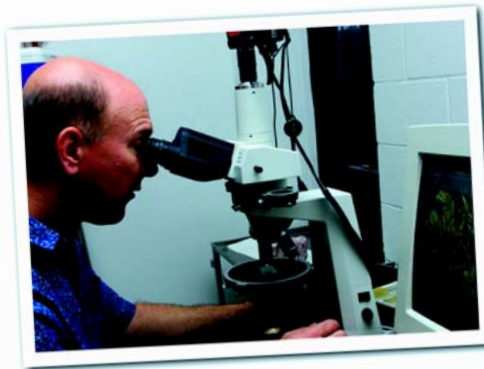


PHOTO BY LADONNA HARMON

Wulff uses a polarizing microscope to identify different minerals and textures in lava samples from the Chilean Andes. Digital photomicrographs can then be used as "maps" for further investigations using the SEM and electron microprobe.



PHOTO BY LADONNA HARMON

Samples of lava flows from a volcanic complex in Chile are cut into slabs and made into thin sections for microscope investigations. Portions of each sample are crushed, powdered, and melted for analysis of major and trace element composition, for isotope analysis, and age determinations.

“They didn’t make any exceptions for the fact they were building the plant under these big volcanoes -- simply because the last big eruptions were sixty years ago.”

A view into the crater of Villarrica volcano in Southern Chile shows a pool of lava.

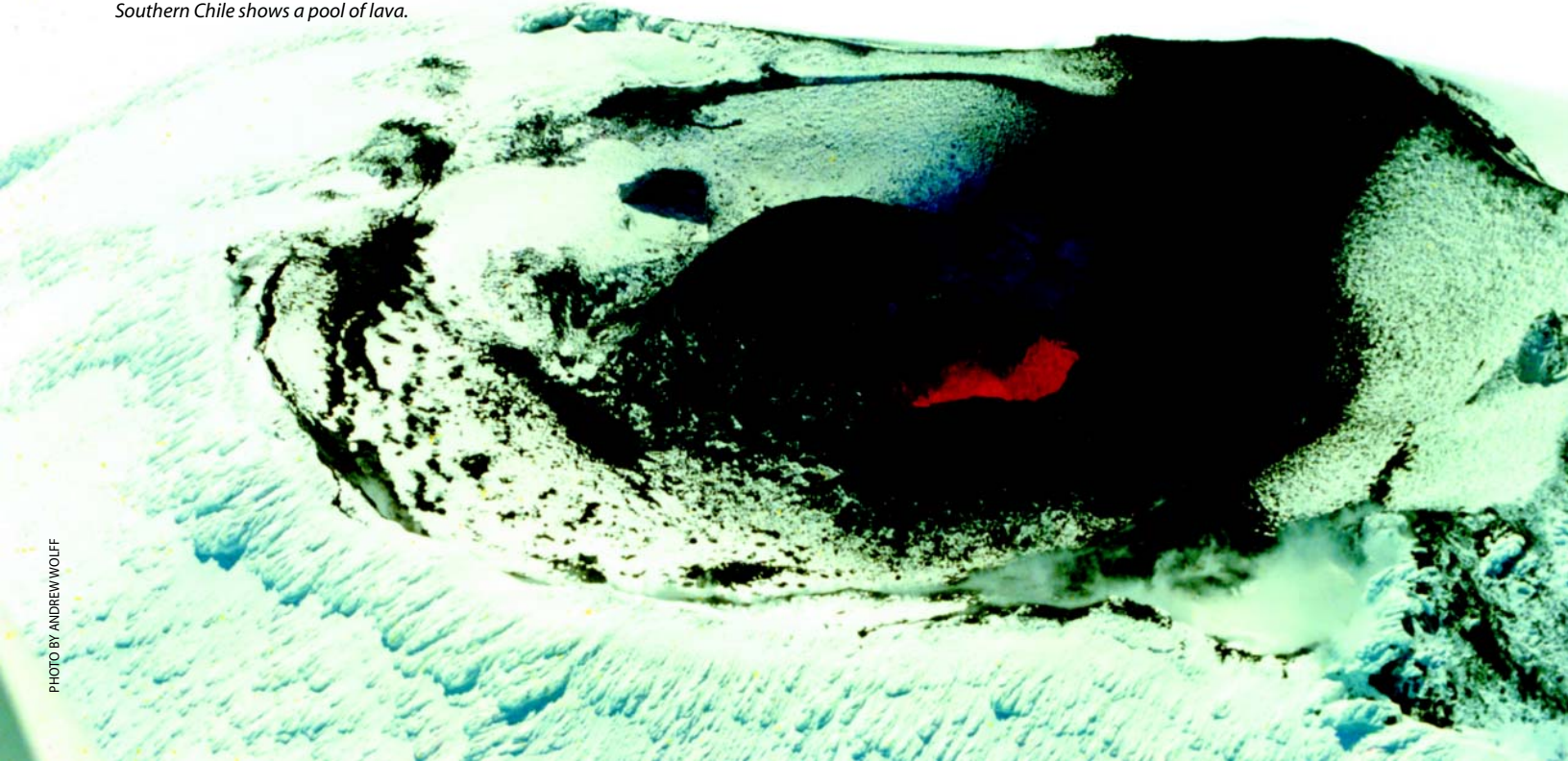


PHOTO BY ANDREW WOLFF

itself. There really are larger scale tectonic factors that may similarly influence entire segments of a volcanic arc,” he said. After we identify these large-scale factors, we can study them closely and then consider other areas that might be influenced by the same factors.”

That means the research under way in Chile may provide clues to volcanic activity in the Cascade Mountains of the northwest United States where Mount St. Helens erupted two decades ago. “If there are long-term, large-scale factors that control eruptions, our work in the Andes may provide us with a predictive tool for volcanic activity in other regions, such as the Cascades. Perhaps Mount St. Helens was telling us that the entire region is very active, and that we need to monitor the other volcanoes closely also,” he said.

A recent increase in large geyser eruptions and in the temperature of soils and groundwater in Yellowstone National Park could even be related to what’s happening in the Cascades, Dr. Wulff said.

“The idea is, if we can figure out what’s happening in the Andes where everything is remarkably well-exposed, then we can take those models and bring them home to the Cascades, Alaska, Japan, and other subduction-related volcanic regions.”

He’s also bringing his expertise on volcanoes and other geologic issues — mineralogy, petrology, and medical geology — into the classroom. Wulff’s geology background includes working with a urologist to study the mineralogical composition of kidney stones, studying sediments in Chesapeake Bay, studying the distribution and health effects of radon in Maryland and Pennsylvania, and working for the Maryland Geological Survey and for a gold exploration firm in Utah and Idaho.

He is continuing his research of radon, an issue for Southcentral Kentucky’s karst region; the medical implications of breathing airborne mineral and chemical particulates; the connection between geology and archaeology, a key feature of his research on human migration in Java; and his work on the geochemistry of chert and obsidian artifacts, which reveal clues about migration patterns and trading routes of Native Americans.

“That’s what is fun for me, where geology impacts all these other things,” he said. “The idea is that we can get students here to understand that geology really has a global impact on other subjects of study. If you’re in economics, you need to know who has the gold and the resources. The study of history is the study of geographical and geologic boundaries. Who has the resources? Who is living on the hill and who is living in the swamp? Literature and the arts have so many rich references to Earth and the processes that form it. And, from the standpoint of understanding geopolitics, students need to have some understanding of the ‘geo’ part.”



PHOTO BY ANDREW WOLFF

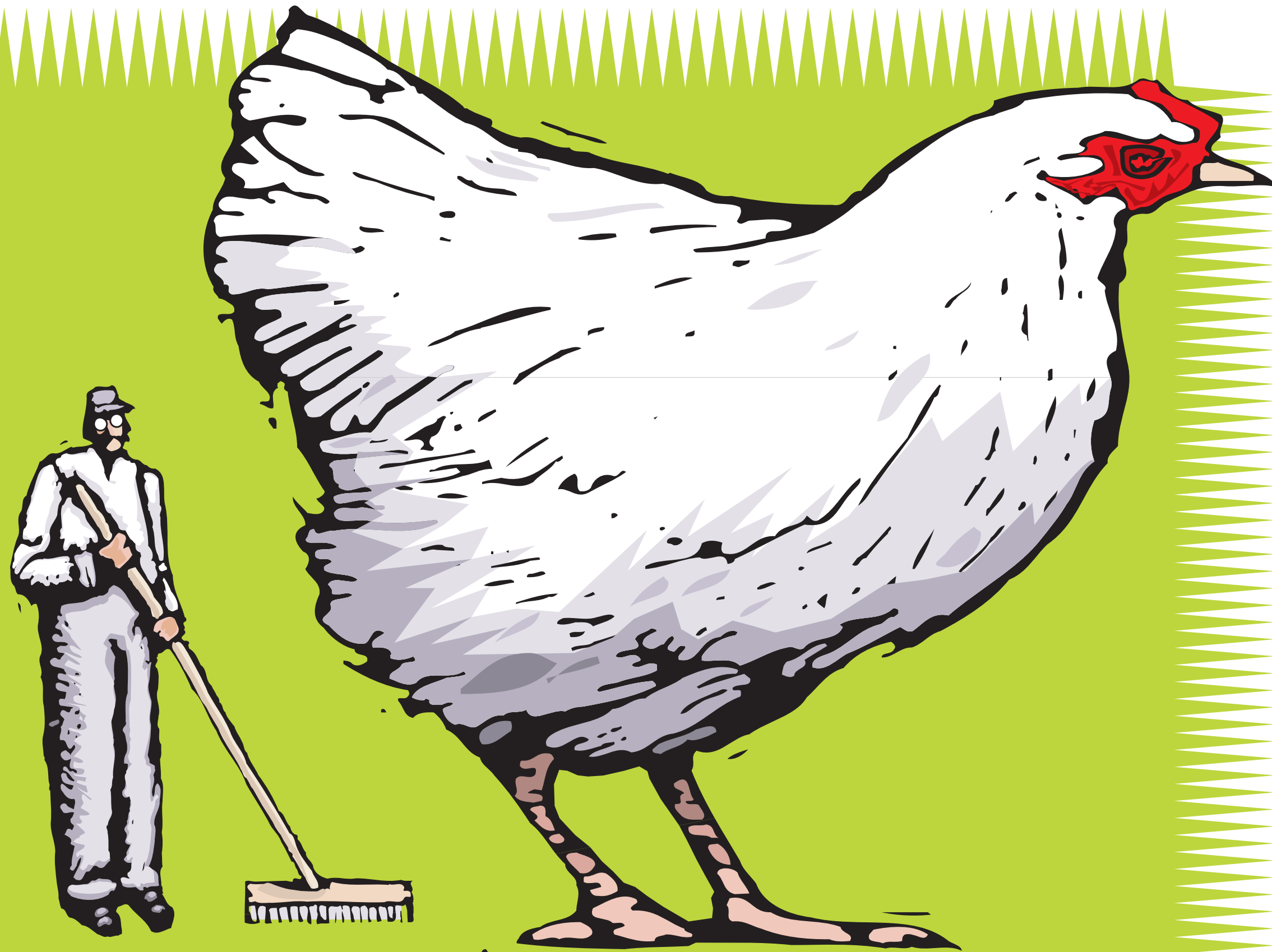
A minor eruption of Villarrica volcano shows lava flowing down the snow-covered slope.

“Western’s Department of Geography and Geology is well-positioned to have a significant impact on research and on student achievement,” he said. Undergraduate students have the opportunity to work alongside faculty mentors, to participate in regional and national conferences and to operate analytical equipment like a scanning electron microscope or an X-ray diffractometer. For example, two geology majors just presented their research at a national meeting of the Geological Society of America in Seattle.

“Those are skills that make them employable, but it also means that they have a depth of understanding of material that students at other schools simply are not going to get,” Dr. Wulff said. “As we get deluged with data and information from all directions, it is becoming increasingly important to understand experientially such aspects as sample preparation techniques, causes of analytical error, and biases in the manipulation of data.”

The scientific method, he said, is designed to train people to make sense of the unknown. “When you get a science degree, you should be equipped in a different way to handle something entirely unknown to you,” he said. “You should have discovered a discipline that allows you to systematically explore the unfamiliar and the familiar in the world around you. The analytical and observational skills that students develop working on these types of projects will make them much more comfortable and creative when working on a project here at home.

“There are no volcanoes in Kentucky, but there is no shortage of geologic issues for people in our region. The idea is that when you get students involved in research they may not do that research for the rest of their lives, but they’re going to use these new skills. We encourage them to change from students to scientists.”



BY JOY BAUM

SOME PEOPLE COLLECT STAMPS OR RARE COINS. KINCHEL DOERNER COLLECTS CHICKEN LITTER.

Dr. Doerner, an associate biology professor at Western Kentucky University, has been working on bacteria associated with the gastrointestinal tracts of animals his entire career. His most recent endeavor is working on a USDA contract to remediate phosphate in chicken litter. This is his first time working with poultry.

"When poultry are fed, their diets are high in calcium phosphate to meet the requirements for rapid bone growth," Dr. Doerner said. "The phosphate comes out of the bird into the litter, which is often used as fertilizer. The problem is, phosphate runs off very quickly into the water. Phosphate causes large algal blooms that prevent photosynthesis from occurring in other organisms. The end result is less oxygen in the water, which in turn kills animal life, such as fish. After this it's just basically polluted water."

Dr. Doerner is trying to come up with a solution for the problems.

"The idea is to figure out how to prevent or delay the phosphate from getting into the water. If you can sequester phosphate on the inside of the bacterial cell, it might delay phosphate runoff," he said. "This is a big problem because Kentucky soil is very different. We live in a karst area, and the topsoil is very thin. Whatever is there, it will potentially pass very quickly through that topsoil into the water system."

The poultry industry in Kentucky is expanding, and Southcentral Kentucky is in a high poultry production area. In order to reduce trucking costs and time for bird transport, chicken growers have to be located in a fifty-mile radius of the

A Whole Lot of Chicken...Whatever



Dr. Kinchel Doerner and his students are trying to “stress” poultry microorganisms in hopes of causing polyphosphate formation, bottling up the phosphate on the inside of the bacterial cell.

slaughterhouses. This means that all the waste is generated in a relatively small area. In addition to the high phosphate content, the litter is low in nitrogen. If the farmer applies the manure at a rate based on nitrogen content, then the phosphate is applied in vast excess, he said. This potentially exacerbates the pollution problem, and could cause the Federal or state government to dictate new manure application rates based on the phosphate concentration in manure. “It wouldn’t be nearly as effective. If the manure application rates are based on phosphate content, then farmers will have manure stores building up without a means to get rid of the manure,” Dr. Doerner said.

One way Dr. Doerner and his students have tried to solve the problem of phosphate runoff is by applying stressful growth conditions to poultry microorganisms in hopes of causing polyphosphate formation.

“What’s stress to a microorganism? The same thing that is stress to you,” he said. “Drinking saltwater, cranking up the heat, changing the pH. Starvation is stressful, like withholding carbohydrates or nitrogen sources. That’s basically what we’ve tested.”

The litter is put through a regular household blender and the microorganisms are knocked off what they are attached to. The freed cells are then collected using centrifugation. Those cells are given carbohydrates or ammonia and then monitored.

“If I withhold food from you, you are stressed from lack of food. That’s what I’m doing to the bacteria. And, in fact, that’s what we have seen. If we withhold a carbon and energy source or a nitrogen source, we see

Poultry litter is often used as fertilizer. The phosphate runs off very quickly into the water, causing large algal blooms that prevent photosynthesis from occurring in other organisms. The result is less oxygen in the water, which in turn kills animal life, such as fish.

increases in the polyphosphate inside the bacterial cell. Also, we know the phosphate is coming from the litter, because phosphate levels outside the cell decrease.”

Dr. Doerner has one graduate student, Yoga Vadari, working with him and together they travel out to the poultry farms and collect samples of the litter. Vadari, an international student, started in September 2001.

“The research is challenging,” Vadari said, “but we have produced promising results at the USDA conference twice.”

After the samples are collected, they are brought back to the lab for examination under a microscope by Bryan Mason, the lab assistant.

Mason has worked on the project since August of 2002, and said he really enjoys working with Dr. Doerner.

“It’s refreshing to be able to work on a project where there is a correlation in which one can see that the amount of quality of scientific effort directly corresponds to the scientific project,” Mason said.

This project lets students get out of the classroom and get their hands dirty, understand scientific design, and develop critical thinking, Dr. Doerner said.

An important aspect of the research for the students is that this is cross-disciplinary. Biology students are working on the phosphate project along with agriculture students.

Dr. Doerner has a doctorate in microbiology from the University of Illinois, Urbana-Champaign. He plans to continue work on this project in hopes of generating a practical, low-cost solution for local producers and also protecting Kentucky’s water supply.

Arsenic in Drinking Water:

A Solution to an International Problem

BY JOY BAUM

WHEN YOU DRINK A GLASS OF TAP WATER, DO YOU EVER THINK IT COULD BE SLOWLY POISONING YOU?

IN SOME PARTS OF THE WORLD, THIS IS TRUE.

CATHLEEN WEBB, HEAD OF THE DEPARTMENT OF CHEMISTRY AT WESTERN KENTUCKY UNIVERSITY, IS TRYING TO COME UP WITH A SOLUTION TO THAT PROBLEM.

Dr. Webb is working on a project to lower arsenic levels in drinking water using a low-tech solution that all Kentuckians can appreciate. She is filtering the water through modified limestone. She has been working on this solution since 1999 when the Environmental Protection Agency (EPA) announced it was going to lower the amount of acceptable levels of arsenic in drinking water in the United States.

"When they announced that the arsenic was going to be lowered, it suddenly occurred to me there was going to be significant economic pressure on small rural communities," she said. "Communities of a few hundred people, or ranchers that might have one or two wells, lacked the resources to impose the sophisticated technology that is available for large water quality systems that have trained operators and engineers managing their water treatment facility."

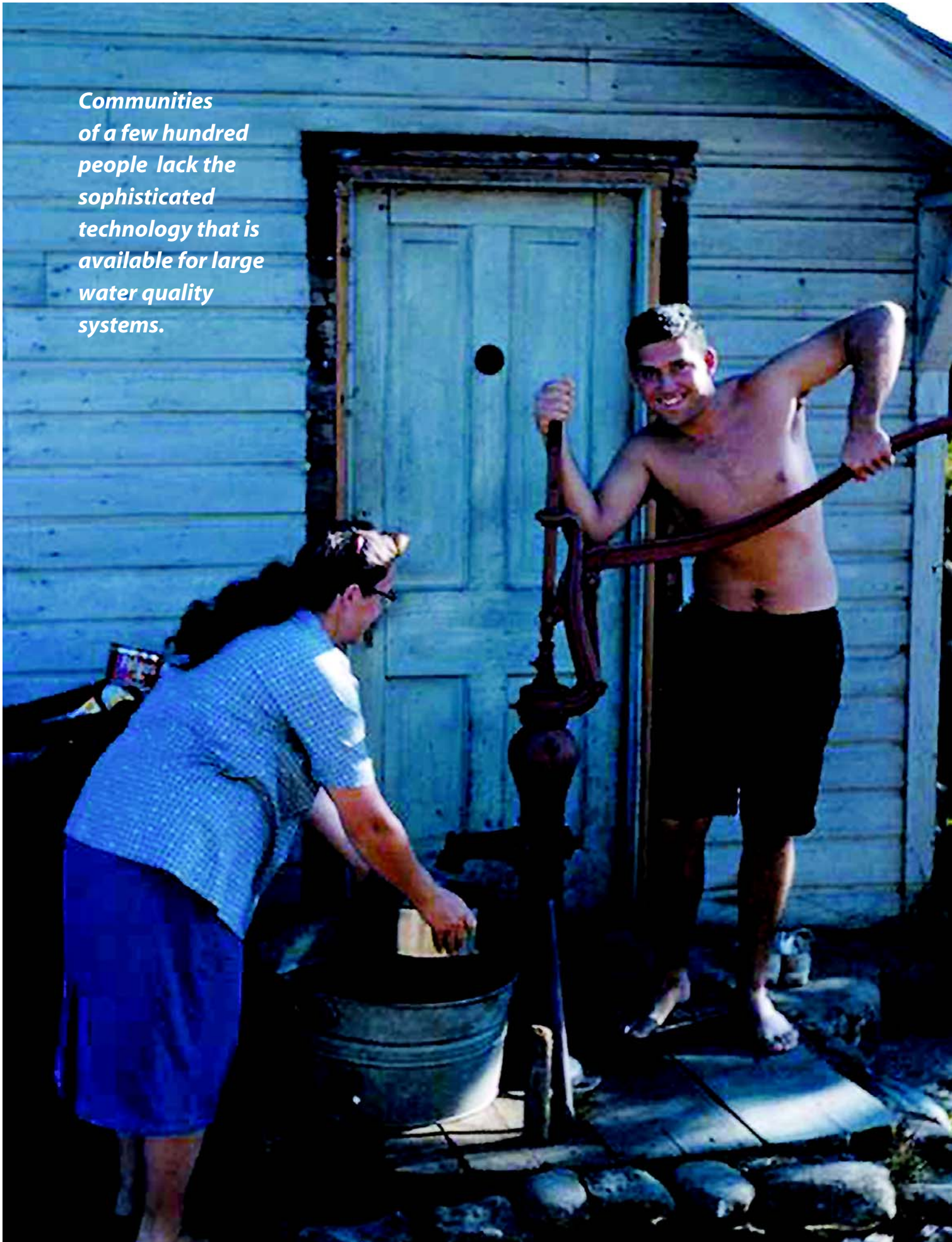
Dr. Webb discovered the inexpensive solution by accident while working on a watershed study in South Dakota. She noticed that levels of other metals were the

same after water passed through a limestone basin, but levels of arsenic were lower. "That was actually only a minor piece in a very large project then," she said.

But now, her acute observations have started to pay off. She began her work at the South Dakota School of Mines and Technology, and brought the project with her when she came to Western in 2001. She still collaborates with an engineering team (Drs. Arden Davis and David Dixon) from the South Dakota School about once a month, where she is still formally on a graduate committee.



Communities of a few hundred people lack the sophisticated technology that is available for large water quality systems.



Dr. Cathleen Webb

Dr. Webb noticed that levels of other metals were the same after water passed through a limestone basin, but levels of arsenic were lower.



Gretchen Berryman examines sample of limestone that will aid in the detection of arsenic in water.

When the limestone idea was first proposed, there were a number of program directors who were a little skeptical, but the research has convinced them. “We never make claims that we can achieve the level of efficiency of the much more expensive materials,” she said. “We never try to fool them into thinking this is a perfect solution. But we do have a niche, and we can solve one of their problems. It seems so straightforward. We could make it more efficient but then we would go into expensive modifications, and we don’t want to do that. The point is to keep it simple and inexpensive.” She is currently working on a patent for her project.

Small communities in the United States may not be the only ones affected by her research. Poor countries like Taiwan, China, and India may be able to use her limestone solution to filter their water as well.

“I think this a really great project,” she said. “I’ve never worked on a project that could have the potential for such a global impact. This is a chance to vastly improve quality of life for many people.”

The Bluegrass state may benefit from the project as well, if limestone for the project is mined from Kentucky. “Since limestone is the base for my material, and limestone is an important mineral in Kentucky, this is an obvious new market for an important native resource. There are economic benefits. This is why the Kentucky Science and Engineering Foundation has, in part, funded the project.” The Kentucky Science Engineering Foundation gave her a \$59,942 grant in May 2003.

Funding also comes from the Environmental Protection Agency, Kentucky Water Resources Institute, the United States Geological Society, and the National Park Service.

She is working with two undergraduate students, Gretchen Berryman and Chelsea Campbell. Both students agree that they really enjoy working on this project and working with Dr. Webb, who sees this as a chance for students to participate in applied research for environmental problems. “It gets them out of the classroom and into the real world,” she said.

Even in her introductory classes she tries to give her students hands on experience. One project they do in Chemistry 475 is to bring in paint samples from their homes to test for lead. Dr. Webb said students are usually surprised at the results they get. “I had one student bring in her child’s blocks that were painted. We were shocked at the lead levels in the toys.”

Dr. Webb has her doctorate in chemistry with an emphasis on physical chemistry. Her specialty is environmental geochemistry, specifically with the fate and transport of heavy metals in ground water. Her passion for this came from growing up in a small mining town, Butte, Montana.

“I grew up playing in large piles of mine tailings as a child, and back then, nobody really thought anything about it,” she said.

Through the Telescopic Lens

BY TOMMY NEWTON

WESTERN'S DEPARTMENT OF PHYSICS AND ASTRONOMY IS THE LAUNCHING PAD FOR MANY STUDENTS TO REACH THEIR GOALS IN SCIENTIFIC RESEARCH OR OTHER CAREER OPTIONS.

"All of our work is predicated on the engagement of students," said Dr. Michael Carini, associate professor. "We never lose the student focus."

Since 1992, Western faculty and students have received sixty-five awards for research in astronomy, chemistry and physics through programs like the NASA Kentucky Space Grant Consortium and the Kentucky NASA Experimental Program to Stimulate Competitive Research.

Those NASA-funded programs, administered by Drs. Karen and Richard Hackney, laid the foundation for STARBASE, a NASA-funded program launched in the late 1990s.

STARBASE (Students Training for Achievement in Research Based on Analytical Space-science Experiences) has received attention for refurbishing and automating two telescopes, the 24-inch telescope at the Bell Observatory in Warren County and the 50-inch telescope at Kitt Peak National Observatory in Arizona, but the focus remains on training students to operate the telescopes by remote control from Western's campus.

"Our goal was never just to operate telescopes," Dr. Carini said. "Our goal was to operate telescopes to assist in the education of students."

Students like Noel Simms, Whitney Wills, Allen Glass, Earl Wood, Robert Zimmerman, and Charles Poteet are working alongside professional scientists and using equipment that is not available to undergraduates at most other schools.

"Most other schools have nothing like a high-tech robotic telescope," said Poteet, a Bowling Green junior.

Wills came to Western from Mount Sterling because of the 24-inch Bell Observatory telescope. "I knew I would get some sort of experience here," she said. "Most people don't get to see a telescope like this until graduate school."

In the past three years, Wills has become a trained telescope operator, gained experience in data reduction and analysis, and made presentations at national conferences. The hands-on research has prepared her for graduate school or for jobs at professional observatories.

"I've gotten a lot out of it. More than I thought I would," said Wills.

The telescope operators, who normally work one night a week from sunset until 2 a.m., depending on

As they develop knowledge and skills, students take ownership of projects, said Dr. Richard Gelderman. "By the time they graduate, they're not just seniors, they're our junior colleagues."



Charles Poteet, Noel Simms and Whitney Wills are students in Western's physics and astronomy program.

PHOTO BY SHERYL HAGAN-BOOTH

weather conditions, control the observatory and telescope from a lab in Thompson Complex. They follow an observation plan, take images, collect and analyze the data, and distribute the information to faculty or other researchers.

Glass, a sophomore from Metcalfe County, is excited that he's seeing objects, such as active galactic nuclei or quasars, that other people see only in books. "Whenever you stop and think about it, it's pretty cool," he said.

Dr. David Barnaby, research astronomer, has trained all the students who have become telescope operators. "This is professional astronomy, not amateur astronomy," he said. "This isn't a telescope you set up in your back yard." Western students are actively participating in research that leads to original results, he said.

"There's a real opportunity at Western to run a professional observatory," Dr. Barnaby said. "If you want a career in observational astronomy, it is an excellent opportunity. If you go on to graduate school or a job in astronomy, you've already learned what it takes to operate a research observatory. Most undergraduates can't get that opportunity."

In their research with Dr. Sergey Marchenko, students Wood and Zimmerman are getting an opportunity to participate in projects that involve international scientists and observatories from Canada, France, India, Great Britain, and Spain.

Dr. Marchenko's work has focused on very massive, very luminous, and very rare stars. His three most recent projects have involved binary stars, super giant stars, and dust-emitting Wolf-Rayet stars.

The projects have allowed his students to learn standard research processes and advance toward the non-standard processes and problems, said Dr. Marchenko, a visiting research professor. "If you're training in physics, astronomy, or basic sciences, you have to have good long-term research projects," he said. "It's just absolutely necessary. It sets the students in the right direction."

By their second year of participation in the research program, the students are given more freedom on the projects to develop their creativity and inventiveness, Dr. Marchenko said. "We're training the best minds. It is a must to involve those minds and engage them with active research projects."

In the summer of 2003, Wood and Zimmerman worked on a technique to detect the Wolf-Rayet stars that are producing dust. Of 227 Wolf-Rayet stars known in the galaxy, only thirty produce dust. "That's a pretty small percentage in a galaxy of a billion stars," said Wood, a senior from Simpson County.

For the project, Wood wrote a computer program that reduces the data from 10,000 stars to the few needed for research. Wood and Zimmerman then plot the data to identify the dust-producing stars. Dr. Marchenko said the results of the project have the potential to provide a better understanding of the early universe.

Zimmerman said the students also benefit from the research. "When we're applying to graduate school, the research we've done looks good on an application," the Owensboro junior said.

Their names have even appeared in research abstracts for scientific journals. "Just the fact that you did something for a paper in a scientific journal is pretty nice," Wood said. "It feels like you're doing something different from the classroom experience."

As they develop knowledge and skills, students take ownership of projects, said Dr. Richard Gelderman, associate professor. "By the time they graduate, they're not just seniors, they're our junior colleagues," Dr. Gelderman said.

For example, the telescope operators are responsible for the telescope and equipment, and for making the correct observations. They also get to experience the frustrations of equipment failures or weather problems. "Our students are getting experiences that other schools aren't providing," Dr. Carini said.

If students don't attend graduate school or stay in science, they can use the knowledge and experience in industry, the military, or business, Dr. Marchenko said, because science trains students to solve problems. "A good understanding of science is something that they'll carry through life," he said.



PHOTO COURTESY OF NASA

NASA's Hubble Space Telescope captures various stages of the life cycle of stars in one single view. To the upper left of center is an evolved blue supergiant. Near the center is a so-called starburst cluster dominated by young, hot Wolf-Rayet stars and early O-type stars. Dark clouds at the upper right are so-called Bok globules, which are probably in an earlier stage of star formation.

“There’s a real opportunity at Western to run a professional observatory... If you want a career in observational astronomy, it is an excellent opportunity. If you go on to graduate school or a job in astronomy, you’ve already learned what it takes to operate a research observatory.”



Through STARBASE and other initiatives, Western’s Department of Physics and Astronomy is making sure students of all ages gain a better understanding of science.

“Astronomy opens the door to science,” Dr. Gelderman said. “Astronomy can excite younger students and show them science can be fun and it has applications in physics and chemistry.”

Western’s astronomy group provides workshops for elementary, middle, and high school teachers. Faculty and students make presentations to K-12 classrooms. Public viewing nights, such as last fall’s close encounter with Mars, bring community members to campus.

Educational and entertaining presentations at the Hardin Planetarium attract astronomy classes, other WKU students (3,700 last year), the general public (more than 2,000 last year), and K-12 students (more than 4,500).

“The planetarium serves an important role in enhancing the education of K-12 students in the state,” said Dr. Roger Scott, planetarium director.

But the astronomy group’s education mission is reaching far beyond Kentucky. STARBASE could develop an international outreach, even beyond a network of telescopes around the globe, thanks to the program’s “long history of involvement of students in astronomy,” Dr. Charles McGruder said.

In 2003, Dr. McGruder, the William McCormack Professor in Physics, was invited to participate in telescope and educational projects in South Africa and Rwanda. Like STARBASE at Western, the Rwandan telescope project would provide students with opportunities for hands-on research. “I think it is very interesting that our first telescope outside the United States may be in a developing nation where we can make an impact far beyond science,” Dr. McGruder said.

That impact is already happening on Western’s campus. “Astronomy has always been a passion of mine,” Poteet said. “I never had the opportunities until I came to Western. A big part that contributes to my passion is the faculty here. They get you involved and they keep you involved.”

The family-atmosphere of the small department provides support in challenging times, Simms said. “I started at the bottom and am working my way up,” she said. Simms is determined to succeed in astrophysics, a field with few African American females. “I would tell young students to always follow your heart.”

Simms often thinks of her late grandmother who sparked her interest in astronomy. “You can’t stop,” she said. “It would be easy to throw in the towel, and I’ve had a hard time getting here, but I finally made it.”

Like the other students in the physics and astronomy program, Simms and Wills are determined to succeed, but they face the additional challenges of being women in a field traditionally dominated by men. Thanks to the hands-on experience gained at Western, they have become role models for girls who are interested in science.

Whitney Wills explains, “I tell girls — and boys — all the time that science isn’t hard if you apply yourself!”

A Musical Spirit

BY CAROL CUMMINGS

SYLVIA KERSENBAUM STARTED PLAYING THE PIANO AT AGE FOUR — BEFORE SHE COULD READ AND BEFORE HER FEET REACHED THE PEDALS ON THE PIANO. WHAT FOLLOWED FROM THAT POINT FORWARD HAS BEEN A REMARKABLE HISTORY THAT HAS LEFT A LEGACY OF STUDENTS AND ENRICHING PERFORMANCES, INCLUDING TWENTY-SEVEN YEARS AT WESTERN KENTUCKY UNIVERSITY.

Kersenbaum was born in Buenos Aires, Argentina, and became an American citizen in 2001. Her mother played the piano and the violin, and she was Kersenbaum's first teacher. Kersenbaum later became a pupil of

renowned teacher Vincenzo Scarmuzza.

"When I was a small child, there was no television and very few radios in homes," she said. "Almost every home had a piano; it was part of the furniture."

"My mother started teaching me in earnest when she saw I could play by ear," Kersenbaum remembered. "I started to improvise and write music and was able to pick up tunes from what I heard on the radio. I have a picture in my mind of being five years old and having my mother hold up the telephone so a friend could hear me play 'La Paloma.'"

Kersenbaum has enjoyed a long and successful career thus far. She holds degrees in performance, pedagogy, and composition from the National Conservatory in Buenos Aires, and Artists Diplomas from both the Academy of Santa Cecilia in Rome and the Academia Chigiana in Siena. She has appeared in recitals and as soloist with orchestras throughout Europe, the Far East, and North and South America — orchestras such as the London Symphony, Royal Philharmonic, Munchen Philharmonisch, Bayerische Staatskapelle, Orchestre de la Suisse Romande, the

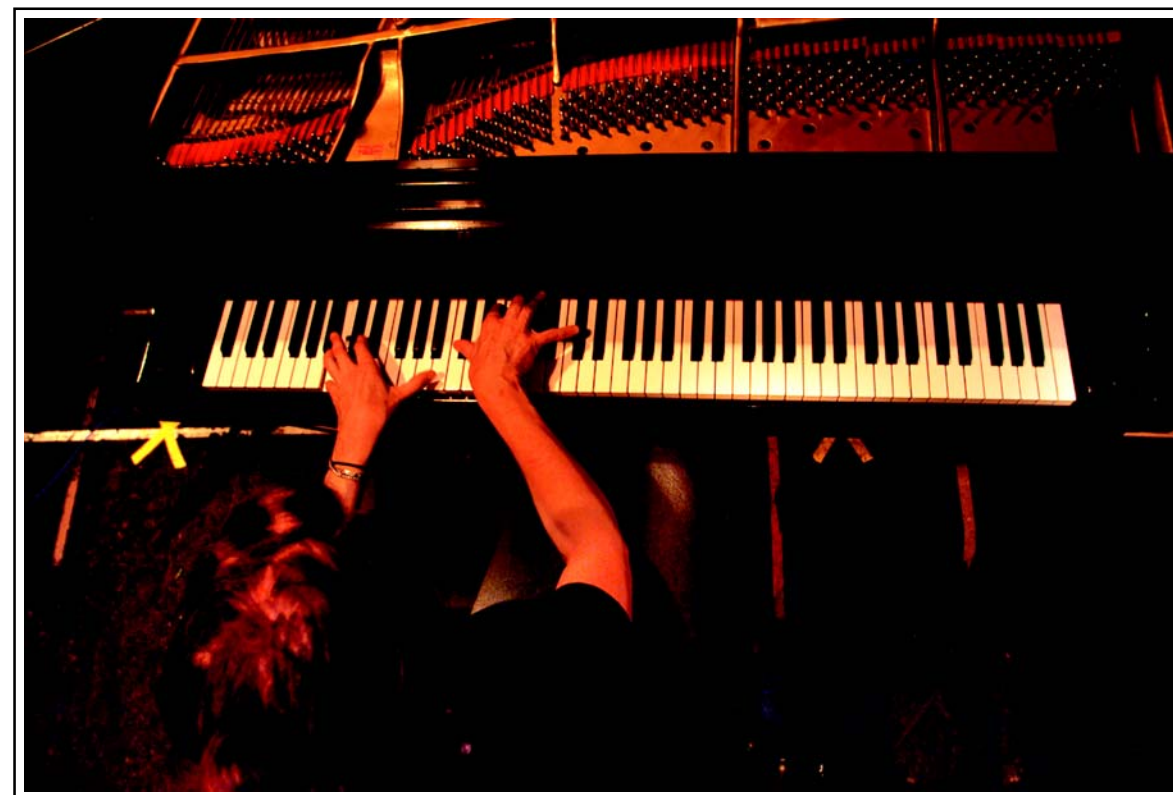


PHOTO BY SHERYL HAGAN-BOOTH

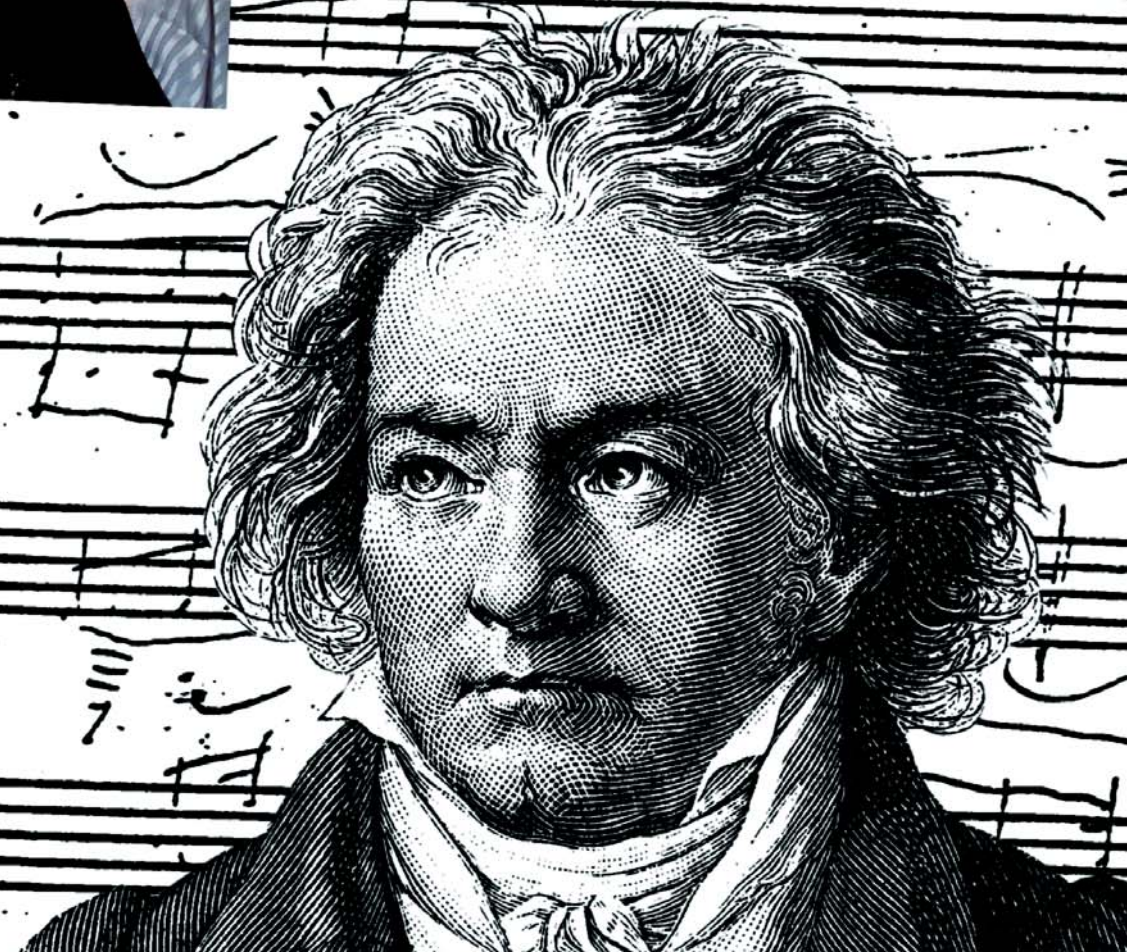
ILLUSTRATION BY SIGURDUR OSKAR LARIUS BRAGAÖSSON

PHOTO BY SHERYL HAGAN-BOOTH

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Dr. Sylvia Kersenbaum



San Francisco Symphony, and the Louisville Orchestra. Her recordings for the EMI-Angel label have won major international press acclaim.

She is in the midst of an exciting project in which she will perform the entire group of thirty-two piano sonatas by Beethoven in a series of concerts that will run through the spring of 2004. The concerts are being recorded, and CDs will be made available. All proceeds from these concerts will go to support the Sylvia Kersenbaum Scholarship for Western music students, which was established by the Delta Omicron musical fraternity in April 2002.

Having one musician present all of these sonatas is a rare occurrence. Should one perform them all back-to-back, it would take an entire day, non-stop, to get through all thirty-two.

"This cycle is so special," she explained with feeling. "It is a journey which dates from 1795 to 1822 — a full three-quarters of Beethoven's life. This was a very rich period in history, and lots of things were happening. Working through this music is like going through a diary."

All thirty-two of his sonatas are equally good, and each has stood the test of time, Kersenbaum said. "Beethoven was writing so much ahead of his time, and he was not comprehended in the beginning," she said. "It is unreal how critics and teachers did not understand him, but he wanted to break from the traditional classical form, and he did." Many scholars credit Beethoven's work as beginning the romantic era of music, she said.



PHOTO BY SHERYL HAGAN-BOOTH

In a series of nine concerts, Sylvia Kersenbaum has performed all of Beethoven's thirty-two piano sonatas to benefit the Sylvia Kersenbaum Scholarship for music students.

"It is interesting how many of my students choose pieces composed by Beethoven," Kersenbaum mused. "There is a rebelliousness in his music and personality that is close to young people, and they seem to love to perform his compositions."

Working with countless students has been one of the most rewarding parts of Kersenbaum's career. "I enjoy the variety that comes from the one-on-one situation," she said. "Absolutely everyone is different, and you have to continuously revise, review, and adapt your teaching technique. You must always slightly change some of the repertoire without ignoring the basics and the classics. The nicest part of teaching is when you

know someone who studied with you years ago has made it in some way."

Another rewarding experience has come through her work with Edgar A. Poe's "Masque of the Red Death." Kersenbaum wrote music to tell this compelling story, and it premiered as a ballet at WKU in October 2001. "I was so pleased when it was finally ready for performance. The premier was the happiest day of my life. I hope we can do it again."

Although Kersenbaum has been a part of WKU's music faculty for some twenty-seven years, she does not intend to retire anytime soon. "There is so much left to do," she exclaimed, ticking off a list of challenging projects. "I would like to compile a volume of Latin American piano music, with both teaching

and performing material. I am still working on refining the 'Masque' project, and a second group of choral pieces are in the process of being printed. I also love the study of philosophy and would like to take more courses in this area."

Kersenbaum still allows herself the occasional days off from the all-consuming practice schedule. "If I cannot have a few days off, it is not worth it," she laughed. "Music is more than just mastering a technique; it is inside you."

In a fitting parallel, Beethoven would certainly have agreed. He once wrote, "Music is the soil in that the spirit lives, thinks, and invents." For twenty-seven years, she has kept that spirit alive at WKU.

RESEARCH BRIEFS

Physics Reform

Dr. Scott Bonham of the Department of Physics and Astronomy was funded for \$144,063 to complete a physics reform project to change classroom techniques to improve web-based homework. The project is entitled "Curriculum Reform Incorporating Drawings and Graphs," and Dr. Bonham will create a set of flexible, modular Java applets for drawing simple graphs and diagrams. These self-graded applets will enable him to use new classes of exercises. Applets are small programs that run inside a web browser, usually written in the Java programming language.

The project will be completed under Dr. Bonham's direction with undergraduate students. Three undergraduates are working with

Dr. Bonham on this project, and one of them gave a presentation relating to the programs at a national meeting this summer.

The new exercises created by Dr. Bonham and his students will use the applets to accompany standard intro-



Scott Bonham

PHOTO BY SHERYL HAGAN-BOOTH

ductory physics curriculum with a widely used web homework system and HTML pages. The team will also investigate usage patterns, sources of difficulties, and effectiveness with assessment. He will disseminate progress via the Internet, web-based homework systems, conference presentations, and workshops.

One of the most positive outcomes of this project will be its transference to other academic disciplines such as mathematics, chemistry, engineering, and any courses where graphs, vectors, tables, and equations are used. Instructors who teach in traditional lecture formats may be able to incorporate more research-based methods and activities in their classrooms.

For further information about this project please take

a look at the Physics Applets for Drawing Web site, <http://physics.wku.edu/PAD>, where there are a number of examples of the applets and screens of several presentations about them. These applets currently are being used to enhance Bonham's course, College Physics I.

Water Quality

Over the past five years the Technical Assistance Center for Water Quality, one of WKU's applied research centers, has provided assistance to small water agencies in the region to improve water quality. The project is funded for nearly \$500,000 per year under the Safe Drinking Water Act of 1996 and the Environmental Protection Agency.

Through the cooperation of Technical Assistance Centers (TACs),

Dr. Andrew Ernest, Associate Dean of the Ogden College of Science and Engineering, heads the project. A team of WKU scientists, state agencies, and community experts assists him. This team works to provide capacity development for public small water systems. WKU's TAC provides technical assistance, managerial and financial training, and a source water protection program. The TAC integrates these tasks by providing information technology and education assistance.



Andrew Ernest



The major outcome is the protection of public health at a savings to our communities.

The WKU TAC will continue to offer small drinking water systems help in developing technical capacities, reducing source water contaminant risks, and providing free managerial training to system managers. Moreover, the team will disseminate results at the national level by presenting information at forums specific to small water systems and their needs. Thus far, the project has shown results through the increased technical expertise of small water system managers, advancing source water protections, and building partnerships. The results are transferable to other systems throughout the nation through the seven other TACs in the United States. This effort has enabled the WKU TAC to develop a source water protection clearinghouse for educational materials and technical assistance to serve local, regional, and national levels.

Reading First

Dr. Sherry Powers, Interim Head of the Department of Special Instructional Programs in the College of Education and Behavioral Sciences, has been awarded a grant of \$112,137 by the Kentucky Department of Education to support a Reading First Coach. Under Dr. Powers' supervision, the coach will provide consultative services, professional development, and technical assistance to school districts. The project will also strengthen and enhance pre-service courses for students preparing to teach kindergarten through third grade.

Dr. Powers will relate closely to the coach by observing the coach's activities in graduate classes, during consultation with reading professors, and while attending department meetings focused on reading curriculum.

The reading coach will have opportunities to improve skills in the five essential components of reading: phonemic awareness, phonics, vocabulary, fluency, and comprehension. The coach will work with diverse learners to apply current theory and best practices, and also to assess instruction.

The coach will be the liaison among the Kentucky Department of Education, public universities, local school districts, and other partner agencies. In this role the coach will supervise the implementation of reading programs and assess student progress. The coach will be able to assist schools in providing intensive assistance to targeted students. The coach will bring scientifically based reading research programs and professional development activities to the participating schools.

This activity will enable the gathering of data and the subsequent preparation and delivery of reports to the Kentucky Department of Education that will result in stronger reading programs.

This action research project will improve early reading achievement



Sherry Powers

and the confidence of beginning students experiencing reading problems. As a result of discovering reading problems in the early grades, student learning will improve, and the public school experience will be rewarding to many more students than before the project began.

Rural Health

Staci Simpson, Director of the Institute for Rural Health Development and Research in the College of Health and Human Services, has been awarded a \$385,000 grant from the U.S. Department of Health and Human Services, Health Resources and Services Administration to improve rural health care. The project will continue to improve existing health care services to rural Kentuckians in the Barren River District. Via a mobile unit, students from the College of Health and Human Services provide preventive health and dental services. Collaborative partners include the Barren River District Health Department, Bowling Green-Warren County Primary Care Center, Commonwealth Health Corporation, and Southcentral Area Health Education Center.

The primary focus of the project is to provide screening services such as cholesterol, blood pressure, diabetes, oral cancer and dental screenings, as well as health promotion and health education activities that focus on changing behaviors regarding tobacco use, alcohol and drug use, weight control, and fitness. In addition, a school-based dental sealant program enables second and seventh graders in public schools, within six Barren River Area District counties, to receive dental screenings and sealants. Working closely with faculty and department heads, Beth Whitfield, the Mobile Health Unit Coordinator oversees daily scheduling and outings. Since November 2001, the mobile unit has made 197 outings and served over 7,000 patients.

Special efforts are being made to reach uninsured,

underserved people at no charge to them. A project enhancement is the Hazardous Emergency Awareness Training (HEAT) unit capable of providing both emergency response and community awareness training in rural areas, as well as mandated industrial worker health and safety training. Under the direction of Dr. Rod Handy, this very timely initiative has measurable, cost-effective outcomes, and will strengthen public health.

This project shows WKU's close connections to the community with the affirmation that a healthier community strengthens lifelong learning and a positive environment for residents of the region.



Staci Simpson

