

# Perspectives



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## Message from President Kirk Schulz and Vice President for Research Ron Trewyn



Kansas State University's growing national reputation in animal health and animal infectious diseases acts as a magnet drawing national research centers to Manhattan, Kan.

For proof that Kansas State University is a leader in animal health, just look at the national research centers that have come to Manhattan because of the university's expertise.

Most recently Manhattan has seen the start of construction of the National Bio and Agro-Defense Facility, a national center for animal health; the relocation of ABADRU, which moved from Wyoming and studies arthropod-borne animal diseases; and the establishment of CEEZAD, a U.S. Department of Homeland Security center that focuses on emerging and zoonotic diseases. Two of these three centers are located on the Kansas State University campus.

All of these are here because of the expertise we currently have, as well as our plans for growing this area aggressively in the future.

Kansas State University wants to be a global leader in animal health. As we move forward, one consideration is in what areas can the university play a major role not just in Kansas, but also in the Midwest, across the United States and around the world.

Our strength in this area will help build up the animal health corridor that stretches from Columbia, Mo., to Manhattan. We want to make sure we are a solid anchor tenant of this exciting enterprise that in the next decades will rival areas like the research triangle in North Carolina and Silicon Valley in California.

The study of animal infectious diseases is clearly one of the areas in which we will continue to excel. Our particular expertise is in zoonotic diseases — those spread between animals and humans — and emerging disease threats. We support Kansas Gov. Sam Brownback's desire to have a nationally recognized veterinary medicine school in the state and are working toward making our superb College of Veterinary Medicine even better.



The Biosecurity Research Institute here on campus at Pat Roberts Hall gives us the kind of facility we need to do these things aggressively. As we hire more faculty and build on the expertise we currently have, the university will continue to be a national and emerging leader in this area. As we guide the university toward the ambitious goal of becoming a top 50 public research university by 2025, we are attracting even more such accomplished researchers.

Stephen Higgs recently has taken the helm of the Biosecurity Research Institute at Kansas State University. Higgs is an internationally known expert on infectious diseases transmitted by mosquitoes or ticks that carry disease-causing microorganisms from one host to another. He also has expertise in vaccine evaluation. Most recently he was a professor in the department of pathology and director of the biosafety level-3 insectary at the University of Texas Medical Branch in Galveston.

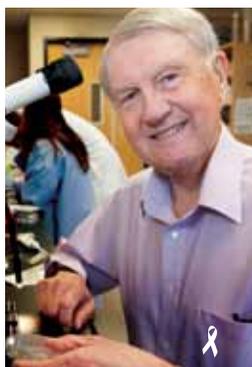
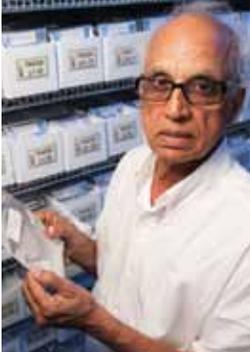
We hope you will take a moment to glance at other research and scholarship going on at Kansas State University.

A handwritten signature in black ink, appearing to read "Kirk Schulz".

A handwritten signature in black ink, appearing to read "Ron Trewyn".



Use your smartphone with the QR code to view a video message on this topic. In fact, wherever you see a QR code, there will be a video associated with the story. Or visit [k-state.edu/perspectives](http://k-state.edu/perspectives) to see all additional video content.



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Front cover: University Distinguished Professors champion excellence at Kansas State University. Look for the UDP medallion throughout this issue.

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## A mecca for wheat genetics: Kansas State University center mapping wheat genome

As a top producer of wheat in the United States, Kansas is a leader in many areas of the wheat industry, particularly in innovation and research.

That's where Kansas State University's Wheat Genetic and Genomic Resources Center fits in. In fact, the highly integrated research center in Throckmorton Hall on campus is a world leader in wheat genetic research and development.

The center was created in 1979; the Kansas Board of Regents designated it as a center of excellence in 1984.

"This center was created to discover fundamental knowledge about wheat genetics and also develop genetic resources which can be used to make new wheat varieties," said Bikram Gill, university distinguished professor of plant pathology and the center's founder and project leader.

"Because of this long-term mission, this center was created so that scientists with diverse expertise and affiliation could work in one place on different aspects of wheat genetics research."

Collaboration is paramount for one of the center's most important tasks: mapping the wheat genome. Wheat has one of the largest genomes among crop plants and genome-sequencing methods can't be used. To simplify the process, special genetic stocks provided by the Wheat Genetic and Genomic Resources Center were used to "divide and conquer" the wheat genome into 21 chromosomes, which were assigned to many

institutes around the world. Currently, the center has responsibility for four of the 21 wheat chromosomes.

"We are the largest contributor to this effort in the world," said Sunish Sehgal, research associate in plant pathology.

Gill is helping to lead these efforts as co-chair of the International Wheat Genome Sequencing Consortium.

The core mission of Kansas State University's center is to maintain an extensive seed and genome bank, which currently has around 14,000 wild wheat species strains and around 100,000 genetic stocks. The collection is special because it is a one-stop shop for wild species, genetic stocks and genomic resources.

"Pretty much anyone who is doing wheat genetic research is getting their genetic stocks from us," Gill said.

While Throckmorton Hall boasts countless laboratories to conduct research, the center has several other sites. Research is primarily conducted in the greenhouses adjacent to Throckmorton Hall. The center also has a field nursery outside of Manhattan in the Rocky Ford area near Tuttle Creek Reservoir.

Because every country can maintain individual ownership of wheat germplasm — the collection of genetic resources — it can create issues in advancing scientific research. The center's genetic materials and improved germplasm are made freely available for

promoting wheat genetics and improved wheat research. Gill has traveled extensively to promote the benefits of germplasm research.

"The strength of the center is that we have the germplasm," Gill said. "At the same time, many Kansas State and United States Department of Agriculture scientists are working on different aspects of wheat research."

The spirit of international exchange also extends to personnel. Since the center's inception, it has welcomed scientists, professors, students and others from many different countries. After these people have returned to their home countries, a variety of collaborations with the center have resulted.

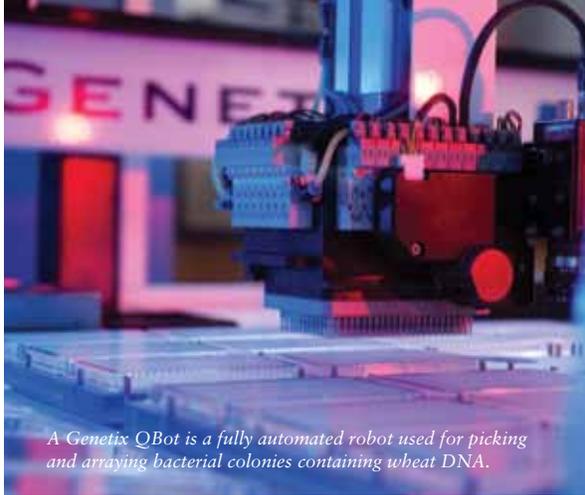
Current research has a diverse scope. But one project is easy to relate to stomachs worldwide. The center is working on the development of functional food.

"People as consumers are more interested in not only getting calories from food but getting health benefits as well," Gill said.

The center's many efforts and projects have led to its top-notch reputation.

"Our center has been described as a mecca for wheat genetics," Gill said. "We have excellent facilities, some of the best in the country. Many scientists want to come and work here."

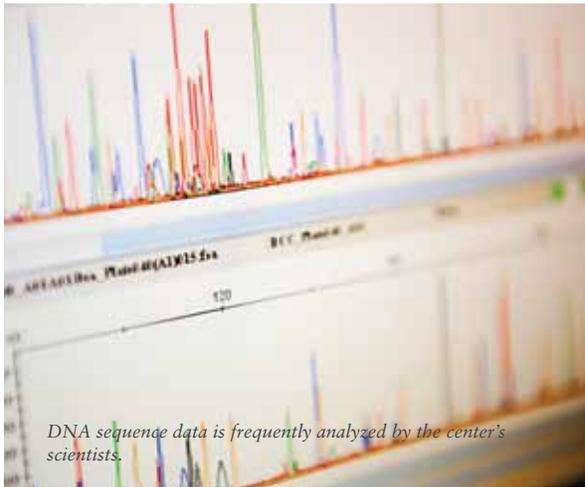
*By Tyler Sharp, Communications and Marketing*



*A Genetix QBot is a fully automated robot used for picking and arraying bacterial colonies containing wheat DNA.*



*Bacterial colonies are kept in libraries in a freezer at -70 degrees Celsius.*



*DNA sequence data is frequently analyzed by the center's scientists.*



*The QBot picks up bacterial colonies.*



*Samples are loaded for the QBot.*



*Wheat under grow lights in the center's greenhouses.*



*Wheat field near Norton, Kan.*



*Harvesting wheat in the center's greenhouses.*



# Earth's grasslands laboratory

Researchers unlock the secrets of nature at the Konza

An endless sea of grass in the Flint Hills of northeastern Kansas serves as a laboratory to uncover the mysteries of the environment. Experiments by Kansas State University researchers at the Konza Prairie Biological Station help provide a better understanding of global issues like climate change, water quality and land conservation.

The Konza Prairie Biological Station spans about 8,600 acres, with 93 percent of the prairie having never been plowed. It was first developed as an ecological research site in 1971 under the leadership of the late Lloyd Hulbert, a biology professor at Kansas State University. The Nature Conservancy and Kansas State University own the station, while the university's Division of Biology manages it. National Geographic magazine has called the Konza "the nation's last great expanse of tallgrass prairie."

Five University Distinguished Professors study temperate grasslands, one of the most endangered ecosystems in the world. The researchers include biology professors John Blair, Tony Joern, Walter Dodds and David Hartnett, and agronomy professor Chuck Rice.

"We each bring different perspectives and expertise to a project," Blair said. "Having all of us collaborate on grasslands research means that we have the most comprehensive grasslands program around."

The professors are some of the world's most renowned ecological scientists and include a member of a research group that won the Nobel Peace Prize.

"Here at Kansas State University you don't study just your little piece of the puzzle," Joern said. "You get to see what other people are doing and put your own work into the context of a bigger story."



**John Blair**

**Areas of study:** Terrestrial ecosystem ecology and grassland ecosystems.

**Kudos:** He leads the National Science Foundation-funded Long-Term Ecological Research program at Kansas State's Konza Prairie Biological Station.

**Why it matters:** Understanding grassland dynamics helps to develop management practices to conserve grasslands and provide insight to global climate change.

**Quotable:** "Scientific discovery ultimately enriches all of our lives whether the results are immediately applicable or not. I think one of the things that's happened in science in general, that is good and bad, is that everybody focuses on what are the short-term human benefits that will be derived from scientific discovery: How will this make my life better tomorrow? What we do is directly relevant to making human lives better, but there's also a lot of value in scientific discovery because it's important to understand how the universe and nature work — to advance ecological theory."



**Walter Dodds**

**Areas of study:** Nitrogen contamination in stream waters, and the effects of stream drying and flooding on habitat and species.

**Kudos:** He is the coordinator of aquatic and hydrological research at the Konza Prairie Biological Station and a co-principal investigator on the Long Term Ecological Research Grant.

**Why it matters:** Clean streams and rivers are indispensable resources because everyone is dependent on them for drinking, recreation, irrigation, industry and fishing. Dodds' research provides better understanding into how water quality can be improved.

**Quotable:** "Freshwaters provide valuable ecosystem goods and services that have a positive monetary effect on citizens. Clean water is a valuable resource that we want now and to preserve for the future. The goal of my research is to understand how we can harmonize the human relationship to our environment to maximize benefits provided by freshwaters."



**David Hartnett**

**Areas of study:** North American and African grasslands, with an emphasis on plant population biology, plant-herbivore interactions and symbiotic relationships between plants and fungi.

**Kudos:** He has conducted ecological research at the Konza Prairie since 1986 and in southern Africa since 2000.

**Why it matters:** Rules for managing grasslands in the Konza Prairie of Kansas need to be tested throughout the world to see if the methods can help preserve other grasslands.

**Quotable:** "The invasion of grasslands by woody plants and exotic plants is a key issue in North America, particularly in the Flint Hills. That's one of the key conservation issues in our grasslands here in Kansas. Over the past several decades the number of shrubs and trees has been increasing while the aerial coverage of grasslands has been decreasing."



**Tony Joern**

**Areas of study:** Grassland ecology, plant-herbivore interactions, insect population and community ecology, and insect and plant interactions.

**Kudos:** At the Institute for Grassland Studies Joern contributes to one of the leading grassland research programs in the country.

**Why it matters:** Understanding grassland dynamics and herbivores like cattle, bison and grasshoppers helps develop management practices to conserve grasslands.

**Quotable:** "Grazing animals are a major driving force for grasslands all over the world, but how they actually use space and their effects on other species is poorly understood. Understanding how bison and cattle select areas to graze on native grasslands will provide new management opportunities for grassland conservation efforts, as well as develop better basic ecological understanding of alternate grazing options for grassland managers interested in promoting grassland function and biodiversity."



**Chuck Rice**

**Areas of study:** Soil microbiology, soil and global climate change, and carbon sequestration.

**Kudos:** He was a member of the United Nations' Intergovernmental Panel on Climate Change that received the Nobel Peace Prize in 2007.

**Why it matters:** Soil takes in carbon dioxide from the air, but soil microorganisms release carbon as the Earth warms. Carbon sequestration can mitigate greenhouse gases.

**Quotable:** "I try to explain climate change, but some people are convinced and set in their ways and believe that climate change is not happening or is a natural phenomenon. I do my best to show people the evidence, provide the interpretation and the science, and suggest ways to help reduce the impact."

## By the numbers

**30<sup>+</sup>** Years of research and data

**1,300<sup>+</sup>** Publications

**210<sup>+</sup>** Student dissertations

**8,600** Acres

**10** Miles from campus

**1971** Year founded



# Unlocking the genetic secrets of arthropods



How one professor's work to decode insect physiology could improve human health and welfare



*Michael Kanost*

It's difficult to find much unused table space in Michael Kanost's office. The university distinguished professor and head of the department of biochemistry has nearly all of it claimed by stacks of folders and papers containing published and pending journal articles, grant proposals, project notes, research data — and jars filled with hundreds of live beetles.

It's an odd, somewhat startling combination to new visitors. But to Kanost, paperwork and bugs go together like peanut butter and jelly.

"I've always liked insects, and right now in my laboratory we're working on three different insect-biochemistry projects," said Kanost, who navigates the desk space with the expertise and finesse of a skilled musician whose fingers know every inch of the instrument.

A fellow of the American Association for the Advancement of Science, Kanost has helped uncover answers to questions about insects' biochemistry that have eluded scientists since the 1940s.

In 2005 Kanost was a member of a small research team that discovered that silencing the enzyme laccase-2 in a beetle prevents cuticle tanning, the process of hardening and pigmenting the insect's exoskeleton. A hardened exoskeleton keeps insects safe from chemical and biological injuries. Weakening it opens up the possibilities for pesticides. Understanding the exoskeleton's chemistry may also help develop ideas and methods for future synthesis of durable and lightweight materials for aircrafts, prosthetics and military armor.

Kanost took over the lead administrative duties in the department of biochemistry nine years ago when he was promoted to department head. The role requires him to know about the projects his colleagues, postdocs and graduate students in the department are working on, as well as manage the department's teaching, budget and personnel. Though these responsibilities leave little time to do experiments, Kanost leads three entomology-focused biochemistry projects that range from the immune system to metabolism. As the principal investigator, he contributes to formulating experiments, data analysis and serving as the lead author on many of the journal articles published on their findings.

Kanost began taking an interest in science in grade school, but he wasn't introduced to entomology, the study of insects, until he attended Colorado State University. What followed has been an intellectual pursuit that's spanned more than 30 years.

"Insects are really interesting because there's so much variety that occurs in this huge group of animals," he said. "Ultimately we want to understand them better."

Understanding this physiology could lead to advances in human health and welfare — including controlling diseases, curbing insect-caused crop loss and developing new durable, lighter-weight medical equipment and prosthetics.

The longest running of the three projects investigates insect immunity.

“Ordinarily an insect’s immune system would kill an invading microorganism,” Kanost said. “But under the right circumstances diseases can avoid or disrupt the insect’s immune response.”

To circumvent this ability to fight disease, Kanost and the others are looking at how the biochemical and cellular processes trigger an insect’s immune system response to pathogens and parasites. Work centers around proteins in the insects’ blood that participate in the immune system, giving insects protection against diseases. Once this process can be understood, it could allow scientists to develop an insecticide that targets an insect’s immune system rather than the central nervous system, Kanost said. In turn, this would make insects, like the malaria-carrying mosquito *Anopheles gambiae*, susceptible to the very diseases they transmit.

Most of the experiments for this immunity project use the tobacco hornworm, *Manduca sexta*. The large caterpillar provides good amounts of blood for biochemical analysis. A collaboration with Baylor Human Genome Sequence Center at Baylor College of Medicine is using DNA collected at Kansas State University to sequence the caterpillar’s genome.

“We’re very excited to help lead the sequencing of the *Manduca* genome, which will be extremely important for identifying genes of interest for future studies,” Kanost said. “This caterpillar is a model insect species for many projects in insect biology all over the world, especially for neurobiology. Obtaining its genome sequence will be immensely beneficial for understanding many facets of insect molecular science.”

Another project continues the study of exoskeleton and cuticle formation. The current focus, however, is on the biochemistry of cuticle protein cross-linking, which is responsible for the unique physical properties of insect exoskeletons.

“The exoskeleton of an insect has different properties depending on what stage of development the insect is in and what part of the body it is,” Kanost said. “For example, a caterpillar has a soft, flexible cuticle. Beetles have a mostly hard, stiff cuticle — except for some

regions that are more soft and flexible, such as the hinges between the connections, which are between the body segments.”

As a way to study the different cuticles that arise from protein cross-linking, the team is examining the wings of *Tribolium castaneum*, or the red flour beetle. Beetles are unique in that they have a modified wing that acts as a hard outer shell, covering the more typical insect wing set that’s used for flight.

Because the *Tribolium castaneum* genome has been sequenced, all of the insect’s genes are known. This allows researchers to predict which ones are responsible for making cuticle proteins. Testing for the right genes involves microarray experiments, which provide information about the messenger RNA expression for all of the genes. Proteomics are then used to identify all of the proteins present in samples taken. The combination of experiments tells researchers which cuticle protein genes are made in which part of the insect’s body, narrowing the search.

More recently the researchers started a third project that looks at insects’ metabolic uptake of iron. Copper-containing oxidase enzymes are the focal point for the study. These enzymes are thought to be connected with iron storage and transport throughout the insect’s body. This may be particularly important in mosquitoes, which have to deal with large amounts of iron in their system after they feed on blood.

Kanost has helped secure nearly \$16 million in funding – and on \$9.8 million of that total he served as the principal investigator. He has brought grants from the National Institutes of Health, National Science Foundation and U.S. Department of Agriculture, among others. Today the Kanost lab is regarded as one of the premier laboratories conducting research on insect immunity.

“I’m proud to lead a very talented group of undergraduate and graduate students, postdoctoral research associates and research assistant professors in my laboratory,” Kanost said. “The hard work and creativity of this team make it possible to push for exciting new knowledge in insect biochemistry. For our group, making discoveries about how insects work is a great joy.”

Understanding the complexities of an insect’s physiology at the molecular level is only one of Michael Kanost’s passions carried over from childhood. The other is music.

For nearly 40 years Kanost has played the cello, joining and performing in orchestras throughout his college and postdoc days. Four years ago he joined the Salina, Kan., Symphony. And while music and biochemistry seem polar opposites, Kanost said the two are harmonious interests.

“Right now I don’t do any experiments myself because of my administrative responsibilities. But I do talk to postdocs and students about their experiments and data, and I help them organize that information and also give ideas for experiments,” Kanost said. “So we sort of help each other out and make it a team effort. That’s really important for many of these larger projects.”

Similarly, performing in a symphony requires each section to build upon and play off arrangements of other sections. When in sync, something much larger is accomplished.

“I also think both help with concentration,” Kanost said. “In orchestra there are some long pieces, sometimes lasting 30 minutes or more. And in science there are times when it requires long periods of focus. That’s especially true when carrying out complex experiments and writing grant proposals. I think the stimulation that I get from both is beneficial to being able to think about each subject differently.”

But as fulfilling as the cello is, Kanost said it’s hard to envision what he would do if he weren’t in biochemistry.

“I’m glad I have science in my life because I know I’m not good enough to make a living as a musician. I’d be starving,” Kanost said and chuckled.



# From Bangalore to bovine

How pathogens and playoffs bind two lifelong friends



**V**eterinary school in India brought them together, research and teaching brought them to Kansas, and a passion for football brings them even closer.

M.M. Chengappa and T.G. Nagaraja are best friends who met more than 40 years ago in India. They're both diplomats of the American College of Veterinary Microbiologists and university distinguished professors of microbiology in the department of diagnostic medicine and pathobiology at Kansas State University's College of Veterinary Medicine.

They work together to develop patents and collaborate on research projects, and they attend Kansas State football games together on weekends. Their most prominent collaboration includes development of a vaccine that could save cattle producers millions of dollars every year.

**"I would say our friendship comes first, and our professional relationship as collaborators and researchers comes second," Nagaraja said.**

## A promising patent

As researchers, the two together, with the help of graduate students, developed a vaccine that could save Kansas beef producers millions of dollars every year. The vaccine, for which they received a patent, prevents liver abscesses in cattle — a problem that affects 20 percent to 40 percent of high grain-fed feedlot cattle in the United States.

In cattle that are fed grain, microorganisms in the rumen — the first compartment of the complex stomach of cattle — digest the grain and produce acid. Excessive acidity damages the lining of the stomach wall, and bacteria from the stomach pass through the wall, end up in the bloodstream, and eventually get trapped in the liver to cause abscesses.

Animals that have abscessed livers don't

perform as well as cattle with healthy livers because they eat less and gain less weight.

The patent would save up to \$65 dollars per head by eliminating liver condemnation and alleviating the negative impact on productivity of cattle that have this disease. It would only be given once instead of the current daily doses of antibiotics that are mixed in feed, which can lead to bacterial resistance.

Chengappa and Nagaraja hope their vaccine will become commercially successful. More than 20 years of collaborative research at the College of Veterinary Medicine made the vaccine possible. Together, they have five U.S. patents on this subject.

**"Research is like a puzzle that you try to solve," Nagaraja said. "When you try to find an answer to one question, you actually raise more questions that lead to more experiments and testing."**

## Safe food for all

The studies on microorganisms in the gastrointestinal tract of cattle led Kansas State University researchers to further study food-borne pathogens in cattle like *E. coli* O157:H7.

"Some of our primary research interests are to study and understand the pathogenesis of important infectious diseases of animals, particularly cattle, and to develop strategies to protect animals from these diseases," Chengappa said.

A small minority of cattle carries *E. coli* O157:H7 in the gastrointestinal tract by the time they go to slaughter. The organism causes no problems in the cattle, but it does get on their hides, the major source of *E. coli* in beef carcasses at the time of slaughter.

"To me, *E. coli* O157 is an important food-borne pathogen because it affects thousands of people every year, sometimes

fatally," Nagaraja said. "Children are particularly vulnerable. Many children who are exposed to it develop kidney failure and complications, forcing them to be on dialysis for the rest of their lives."

Nagaraja contributed to a finding that cattle fed a diet that includes the by-product distiller's grain have higher levels of *E. coli* O157. After starch from corn is removed to make ethanol, distiller's grain is left, which is a valuable feed commodity for cattle.

## The beginning

Chengappa and Nagaraja first met in veterinary school in Bangalore, India, in 1965. They both attended veterinary school after deciding not to become medical doctors. Their friendship blossomed five years later when they began their graduate programs in veterinary microbiology.

"If I had gone to medical school, I would be practicing in India and would have never bothered to come to the United States," Chengappa said. "Coming here opened up so many opportunities for me."

After earning degrees in India, their professors encouraged them to continue their research in America. Nagaraja earned a doctorate in microbiology from Kansas State University, where he stayed after graduation as a faculty member.

"My original plan was to go back to India after earning my doctorate, but that soon changed," he said. "Once I adapted and discovered the facilities, opportunities and support here at Kansas State, I knew this would be the ideal place to continue my research."

Chengappa, meanwhile, earned a doctorate from Michigan State University and became an associate professor and head of the department of microbiology at Murray State University in Kentucky.

The friends kept in touch and saw each other at conferences and scientific meetings. They finally reunited for good in 1988 when Chengappa accepted a position at Kansas State University.



### A strong friendship

Chengappa and Nagaraja's friendship goes beyond the lecture halls and laboratories inside the College of Veterinary Medicine. They tailgate outside of Bill Snyder Football Stadium before cheering on the Wildcats on Saturdays during the fall. They watch the Super Bowl together every year, travel to India together on occasion, and their families celebrate Christmas and Thanksgiving together.

Trust and mutual respect, they say, keep their friendship strong.

"I can't explain it, but we have worked together for decades and never had any difficulty, no red-hot arguments," Nagaraja said. "Sure, we disagree on a lot of issues, but we just agree to disagree and don't dwell on too many negatives."

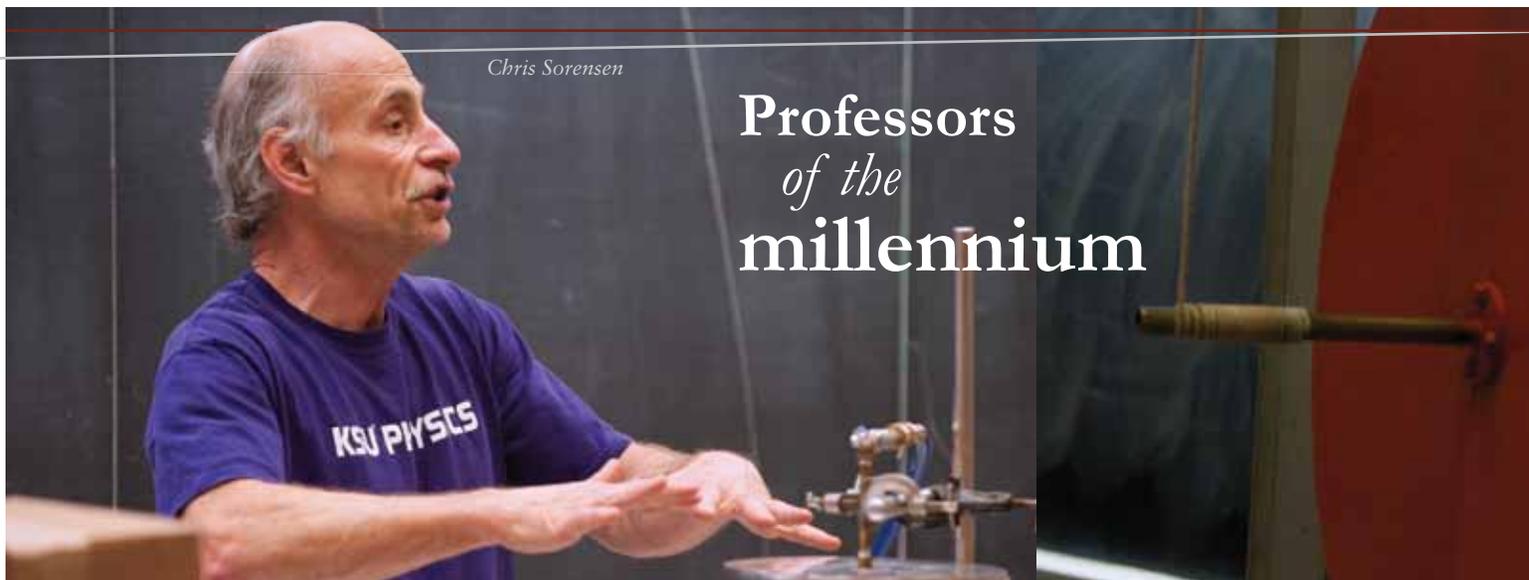
Their friendship also unites their families.

"Since we don't have other family members here in the United States, we've become like each other's family in a way," Chengappa said. "I would do anything for T.G.'s family, and I know he would do the same for my family."

Research and teaching, however, continue to bring them together.

"Kansas State University is the ideal place to do animal research, particularly on beef cattle with so many resources and so much expertise available here," Nagaraja said. "There is no better place with this kind of support, interest and expertise, and our research in a small way has a direct impact on the Kansas economy."





Chris Sorensen

## Professors of the millennium

It's impossible for Chris Sorensen to speak without demonstrating.

He reaches for a jar of silica and shakes ("if it wiggles like Santa's belly, it's jelly"), he throws erasers across the room to demonstrate the transfer of energy, and he leaps up to grab a yellowing "For Better or for Worse" comic strip from his office door.

Sorensen, Cortelyou-Rust university distinguished professor of physics and 2007 CASE/Carnegie U.S. Professor of the Year, reads from the strip: "The way I see it, a teacher's got to be an entertainer, you gotta have expression. Be excited about your subject. If you sound bored, they'll be bored. Move around the room, explain stuff clearly — imaginatively, with a sense of humor."

This is his teaching philosophy.

In an effort to dispel the monotony in lecture halls across the country, Sorensen and other Kansas State University professors are working diligently to keep their students enthralled — a growing challenge thanks to high-speed Internet and smartphones.

"Doing is so important. I'd love to do so many things that are more doing-oriented than sitting- or listening-oriented," Sorensen said. "But even if the poor kids are sitting and listening, I like to at least get out amongst them — like the cartoon says — you gotta walk around and get expressive."

### Embracing technology

Michael Wesch, associate professor of cultural anthropology, is leading a teaching revolution. In 2007, Wesch's Introduction to Cultural Anthropology class put together a video called "Visions of Students Today," challenging the way large, introductory courses are taught in the United States. More than 4 million people have viewed it on YouTube.

The findings were eye-opening but not surprising: classes are too big, students are anonymous and standard chalkboard-and-PowerPoint teaching is not engaging.

But this was four years ago, a time when most students didn't

have BlackBerrys, iPhones or Androids giving them instant access to the universe. In 2011, college students are more wired than ever with 63 percent of them owning Internet-capable handheld devices, according to a recent study by the UCLA Higher Education Institute.

Wesch, 2008 CASE/Carnegie U.S. Professor of the Year, envisions a world where students can harness the power of Internet, computer and smartphone technology to learn more efficiently. He was recently named the 2011-2012 Coffman Chair for Distinguished Teaching Scholars, where he'll work with faculty to incorporate new media into their teaching.

Think of it this way, Wesch said. What if we had this device just 30 years ago? We would see it as much more than just a device for connecting to friends via phone, email or Facebook, he believes. It would instead be used as a base for entire curricula, to reign in the power of the world's largest database of information — the World Wide Web — all right from the palm of our students' hands.

"We've collectively built, as a humanity, the world's greatest collaboration machine and put the power of collaboration through this machine into the hands of all of our students here at Kansas State University — not to mention, 2 billion other people — and we see it as a distraction device," he said.

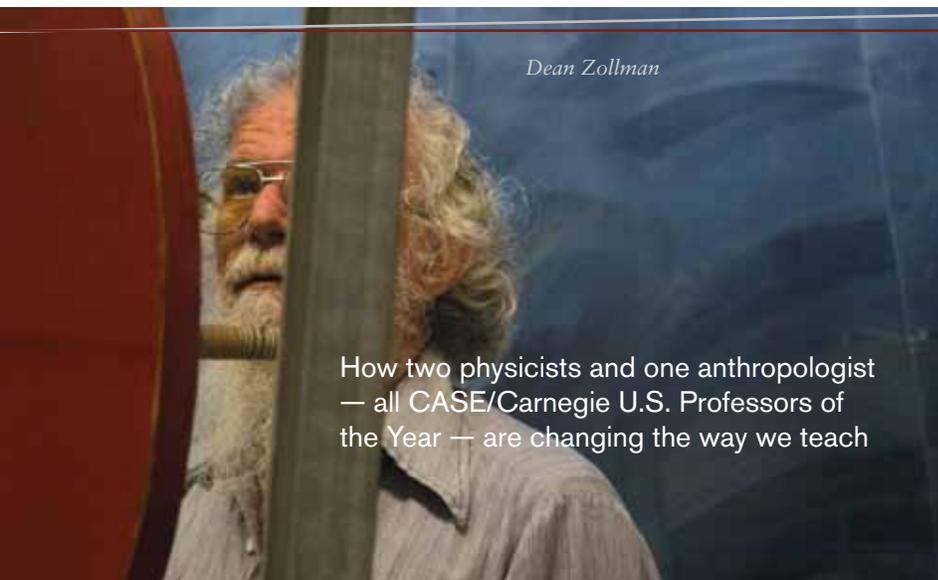
We should not do away with large lectures, Wesch said, but it's time to re-examine teaching methods.

"We have great lecturers on this campus who can transform a student in a single hour, if not in 15 minutes," he said. "But I do think that all of us, faculty and students, need to recognize that this environment asks us to take charge of our own learning."

### Teaching to learn

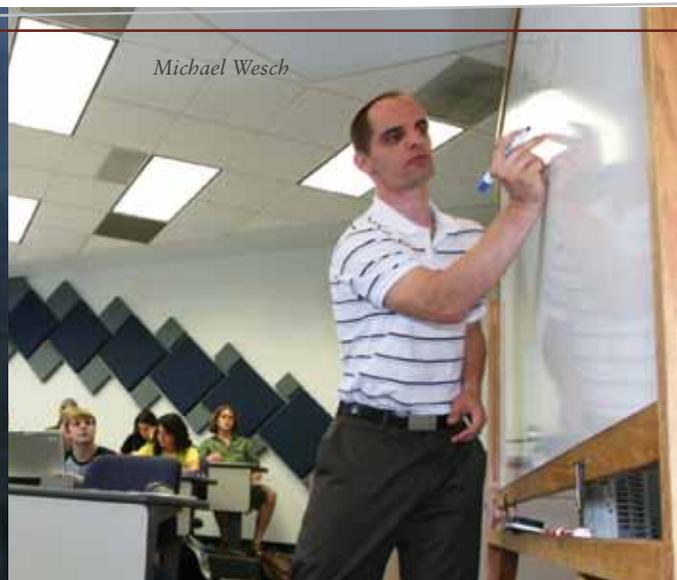
But distractions or not, Dean Zollman, university distinguished professor of physics, believes, simply, if the students aren't engaged, they're not going to learn.

"It doesn't sink in very well if they're not actively involved



Dean Zollman

How two physicists and one anthropologist — all CASE/Carnegie U.S. Professors of the Year — are changing the way we teach



Michael Wesch

in what they're doing. If physics is just this thing that they do when they're in Cardwell Hall, they haven't learned very much," Zollman said. "But if when they put on their seat belt in the car and understand the reason in terms of the laws of physics, then they are starting to learn something."

To better serve their students, these professors welcome the opportunity to teach undergraduate courses — they learn to be better teachers by teaching.

Zollman, former physics department head and Kansas State University's very first U.S. Professor of the Year in 1996, has been with the university since 1970. In his four decades here, he's proud to report that even while growing more dedicated to research, Kansas State University's physics faculty has maintained an equally strong commitment to its teaching program. Zollman got his Kansas State start teaching introductory physics courses, which he thought would be a walk in the park, but he ended up learning valuable lessons himself.

"Teaching students who have a limited background in science and math is the best way to understand anything," Zollman said. "Students at that level ask really good, hard questions — and they don't even know they're doing it! I think that as you get socialized into the physics community you learn what questions can't be answered. But they haven't had that socialization so they're going to ask questions that just bring you to a stop, despite being asked in a naïve way."

The secret to teaching undergraduates is to let the students — no matter how many — know that you're on their side, according to the three teachers. Undergraduate teaching is not something these three Professors of the Year take lightly. There will always be grants to apply for and endless research to generate, but the students are at the core of it all.

"An extremely important thing is to let the students know that you really care about them, and that's not a phony statement," Sorensen said. "Tell them that you expect them to work hard, but

that you're going to work just as hard trying to teach it. Show that you care about their well-being and if someone is having a hard time, you hold their hand and you talk to them — it's important."

### Strength in numbers

Wesch believes that large undergraduate lectures offer a wealth of learning opportunities.

"This is a time where we have 200 to 400 people together, isn't that exciting? Let's see what kind of potential we can find when we bring all these people together with a common cause," Wesch said.

In fact, he is putting together a new version of 2007's "Vision of Students Today" and gathering video contributions from his students and people all over the Internet. Unsurprisingly, the results are similar — students feel confined with no room to explore, discouraged from speaking, and uninspired by traditional teaching methods. "I learn by living," one student writes on her bathroom mirror.

Wesch wants to take these life experiences and have students interact with and educate each other. He is continually thrilled watching his students evolve, and in turn, he evolves with them.

"How do you connect with people? How do you share with people? How do people get stuck and how do you get them unstuck? You face all the most important challenges of being human and then you share those challenges with a large diversity of people," Wesch said. "You're also seeing them struggle through new ways of overcoming those challenges. It's an amazing thing to be a part of."

By Rachel Skybetter, Communications and Marketing



All it takes is a simple walk across the Kansas State University campus to notice the obvious: Kansas wind is an abundant — and powerful — natural resource.

A collaborative group of Kansas State University researchers is looking at ways to channel this valuable natural resource and prevent major power outages.

The project involves four Kansas State University women — three professors and one doctoral student — and several other researchers. The three professors are Noel Schulz, Paslay professor of electrical and computer engineering and the university's first lady, and Caterina Scoglio and Ruth Douglas Miller, who are both associate professors of electrical and computer engineering. Sakshi Pahwa, doctoral student in electrical and computer engineering, India, has worked with all three professors on her master's project and current doctoral project.

"It's been a great combination of talent in multiple areas," Schulz said. "That's really where the exciting research and solutions are — in the interdisciplinary areas."

The researchers are looking at how to use distributed energy sources, such as wind turbines, to avoid cascading failures in power grids. A cascading failure occurs when an interconnected part of a power system fails and then triggers successive parts to fail, often leading to a widespread power failure. One of the most famous cascading failures

was the Northeast Blackout of 2003, a power outage that affected 55 million people in the United States and Canada.

"Many of these cases involve very complex systems that have a communication network on top that can be very vulnerable," Scoglio said. "That means if something goes wrong, these failures can spread and become very dangerous."

To prevent these cascading failures, the researchers are investigating a technique called islanding, which restricts or "islands" a power system fault to a small area. Islanding prevents a power failure from spreading.

"That disconnected portion can then be powered using renewable or distributed energy sources, such as wind turbines or solar panels, while the remaining parts are still being powered by conventional sources," Pahwa said.

That's where the Kansas wind fits in: It can provide the renewable energy that could power the disconnected portion of the network.

"We use electrical power everywhere," Schulz said. "We need to set up power systems that are reliable so that when that wind is blowing, we can use that power, but when the wind isn't blowing, they're still stable systems."

#### Support from industry

The power grid research has been funded by the Kansas State University Electrical Power Affiliates Program, a partnership

with four companies that supports student research programs. The companies are Westar Energy, Burns and McDonnell, Nebraska Public Power District and Omaha Public Power District.

"Because of the support from these companies we're able to really look at problems, perform in-depth work with industry and get real data," said Schulz, who is the director of the Electrical Power Affiliates Program.

Through the program, students such as Pahwa can work with these industry partners to address real problems and create solutions.

"I think that innovation, coming from research and support from companies, such as those that are part of our Electrical Power Affiliates Program, can really bring the country back to a better economic situation," Scoglio said. "Innovation creates jobs and can really improve the whole nation."

Scoglio, along with Don Gruenbacher, associate professor and head of the department of electrical and computer engineering, direct the Sunflower Networking Group, a student research team that works in networking and related areas. The team currently has 10 members, including Pahwa.

Scoglio and Pahwa started the cascading failure project when Pahwa was a master's student. As they began studying complex network systems, they turned to Schulz, a power grid expert. They also collaborated with power systems expert Anil Pahwa, professor of electrical and computer engineering, and Shelli Starrett, associate professor of electrical and computer engineering.

Where the wind blows,  
power is restored

Researchers look at preventing major power failures with Kansas wind energy



Pahwa's completed master's project, "Distributed Sources and Islanding to Mitigate Cascading Failures in Power Grid Networks," was a winner at the Capitol Graduate Research Summit in Topeka, Kan., earlier this year.

Pahwa is continuing her doctoral research under Scoglio and Miller. The researchers want to improve their islanding techniques and they are incorporating real data from wind turbines.

### Wind for schools

For data collecting and testing purposes, the researchers have used two sets of wind turbines: the four wind turbines at the newly opened Riley County Public Works Facility and Kansas State University's wind turbine north of campus.

The Riley County wind turbines were installed for the Resourceful Kansas project, a cooperative effort between Miller, Scoglio, Riley County and the Kansas City-based consulting firm GBA. The project has been funded by the U.S. Department of Energy. Two Kansas State University students are also involved: Handuwala Dulan Weerasinghe, doctoral student in electrical and computer engineering, Sri Lanka, and Kellen Manning, senior in electrical engineering, Olathe.

The university turbine near the intersection of Denison and Kimball Avenues was installed through Wind for Schools, a project led by Miller as director of the Kansas Wind Application Center. Wind for Schools is a Department of Energy-funded effort that helps rural schools put up small wind turbines.

"Wind Powering America, the DOE initiative that began Wind for Schools, started by picking states with good wind resources but poor wind development," Miller said. "The project is meant to encourage wind industry growth as well as its acceptance and work force development. It can encourage students' interest in wind at an early age so they may study it in school and eventually work in the wind industry."

Kansas is one of 11 states to participate in the program, which has placed 13 wind turbines in Kansas communities, including Solomon, Colby, Greenbush and Concordia.

Miller sees the program as beneficial in two ways. It educates children, teachers and the surrounding community because the schools commit to including the turbines in their curricula. Secondly, Miller's Kansas State University students benefit because they help provide the initial groundwork, such as cost and input energy, for the turbines.

"The program helps give younger students the option of working close to home when they finish school," Miller said. "You can bring rural development into the state through wind energy."

### Kansas State University a leader

While the wind energy research is important in the power industry, its influence reaches further. It makes Kansas State University a leader for the Renewable Energy Standards Act, which was signed in 2009 and requires major Kansas utilities to generate about 10 percent of their power from renewable sources by 2011 and 20 percent by 2020.

"This project benefits the state because it reduces carbon emissions through renewable energy," Pahwa said. "It's a good opportunity to create jobs, and renewable energy incorporation also supports conventional sources so we don't need to import fuels from other countries."

But equally important is that the project shows how the university's research can make the power grid even smarter, Schulz said. While other schools have moved away from projects in the power area, Kansas State University has maintained its strong power emphasis, putting the university in a good position to continue research opportunities.

"This is a great example of how our land grant mission and how working with engineering is helping to make not only the state of Kansas better, but also to make our power grid more secure and help our national infrastructure," Schulz said.

# BRIDGING THE PACIFIC



A decades-long mentorship is helping two Kansas State University professors improve American and Chinese animal health



Jishu Shi's office is filled with memories of his time as a student at Kansas State University. On the wall hang plaques for five patents that he and mentor Frank Blecha, university distinguished professor of immunophysiology, received from research during Shi's time as a doctoral student nearly 20 years ago.

Across the hall is Shi's research laboratory — the same laboratory where he spent many hours as a student researching molecular and cell biology. Even Shi's office, which previously belonged to one of his graduate supervisory committee members, shows how his career has come full circle. Shi is now a Kansas State University associate professor of anatomy and physiology.

"Returning to Kansas State University has really been a homecoming for me," Shi said. "This is the first place where I did my studies. My family is here."

Among his university family is Blecha, both a mentor and friend. The two met when Shi left Beijing in 1992 to study under Blecha as a doctoral student in immunology. Although Shi would go on to work in industry and at other universities, Blecha — the head of the department of anatomy and physiology — would eventually bring Shi back to Kansas State University in 2008, but this time for a faculty position.

"I recruited him back because I knew what he would be able to do," Blecha said. "I knew of his intellect, initiative and work ethic. In a relatively short amount of time, he has accomplished a lot."

One of Shi's accomplishments is co-founding the U.S.-China Center for Animal Health with Blecha and other Kansas State University and local leaders. But also significant are Shi's successes as teacher, researcher and mentor — roles that he says he learned from Blecha.

"Dr. Blecha is a really good mentor and a good friend," Shi said. "I am so lucky that he was my adviser when I came here, and I'm happy that we can continue to work together."

## Kansas State University across the ocean

Now as colleagues, one way that Shi and Blecha work together is through the Kansas State University-based U.S.-China center, an international animal health partnership.

For Shi, the center is a way to help students, animal health businesses and veterinarians in the United States, his current home, and in China, his home country.

"As an educational institution we can train leaders for the future animal health industry and government," Shi said. "In turn, I think this can put Kansas State University and the state of Kansas in a better position to compete in the Chinese market. We can also create jobs and economic opportunities for the state of Kansas."

The idea for the center began in December 2009 when Shi represented Kansas State University at a Midwest China Hub Commission meeting in St. Louis. The commission was looking for ways to export Midwest goods and services to China, which gave Shi an idea: Kansas State University could "export" its animal health educational services overseas.

And so the U.S.-China Center for Animal Health was born.

In the early months of 2010, Shi and Blecha developed the center with several local, regional and Chinese animal health leaders: Ralph Richardson, dean of the College of Veterinary Medicine; Dan Richardson, CEO of Kansas State University Olathe; members of the Kansas Department of Commerce; and Zhongqiu Zhang, director general of the Bureau of Veterinary Services with the Chinese Ministry of Agriculture. The leaders created three missions for the center: improve the veterinary training system in China, establish Chinese continuing education programs and help U.S. companies market their products in China.

"By developing these missions Kansas State University can use its animal health expertise to address industry needs in China," Ralph Richardson said. "At the same time, the center will strengthen the university's reputation as an international research university and will create tremendous educational and industrial opportunities for our students and faculty."

As both a Chinese native and a Kansas State University faculty member, Shi became the natural choice for the director of the center.

"Jishu's passion for the center and his knowledge of both systems — the Chinese agricultural veterinary system and the U.S. regulatory system — have made him a perfect fit," Blecha said. "The center wouldn't exist without Jishu. He is the driving force behind it."

China needs improved animal health and veterinary education, Shi said, because the country's veterinary education methods lack the regulation found in American doctor of veterinary medicine training. Although China has 1 million veterinarians, any student who graduates from a Chinese college — whether a three-year, four-year or five-year program — with an animal health degree can call himself or herself a veterinarian.

The Chinese Veterinary Medical Association, known as CVMA, has asked for Kansas State University's help in developing an accreditation system similar to that in the United States because of the university's strength in the doctor of veterinary medicine curriculum, infectious disease research, animal vaccine and drug development, and animal health work force training.

Five other American universities with doctor of veterinary medicine programs — the University of Missouri, Oklahoma State University, University of California Davis, the University of Minnesota and Iowa State University — have partnered with Kansas State University to train and educate Chinese veterinary medicine students. Beginning in fall 2012, each university will accept two Chinese students to study veterinary medicine. The Chinese government has agreed to provide \$7 million in total support for these students' education.

"We are trying to educate 50 Chinese students in 10 years," Shi said.

## Kansas State University Olathe: The perfect meeting ground

Given its close proximity to Kansas City International Airport, Kansas State University Olathe — the university's newest campus, which opened in April — provides an ideal facility for university-led training classes for Chinese veterinary practitioners. Such

## Parents' week for undergraduate Chinese students

Because he was once an international student at Kansas State University, Jishu Shi knows the challenges of studying at a school on the other side of the world. That prompted him to start a parents' week for the more than 800 undergraduate Chinese students who attend the university.

"During the week, parents see the university and understand how their children live," Shi said. "When the parents go back to China, they will have a mental picture in their head and it will make them more comfortable to have their child attending school in America. The week can also be a recruitment tool that helps the university and local businesses."

The first parents' week will take place in November and is a collaboration among Shi, the office of student life, the office of international programs and the Division of Continuing Education. Shi has a \$5,000 grant from Manhattan Knowledge Based Economic Development to support establishing the week.

training programs can generate revenue for the university and in turn, Kansas State University faculty and veterinary medicine students can travel to China to establish a continuing education center. This international interaction will open the doors for American students to work in China, Shi said, and builds the university's presence overseas.

"I see this as a really good opportunity to educate the future Chinese leaders of animal health education, industry and government," Shi said. "Just think if all of these leaders are Kansas State University alumni — that will be beneficial for the university and the state of Kansas in the future."

Kansas State University Olathe also provides a way for Kansas City-based businesses to reach out to China. The center already has two Kansas City-based animal companies as institutional members: Ceva Biomune, an animal health company, and Shor-Line, which manufactures animal care equipment.

"The whole idea is to be able to help small to midsize Kansas companies market their products and services to China," Blecha said.

At the Olathe campus, Shi has a new office and an 800-square-foot laboratory, which were some of the first spaces to open at the new campus.

"With the office and laboratory space we can create all kinds of interactions between Chinese and U.S.

companies," Shi said. "But we can also do developmental work with U.S. companies that are interested in marketing and registering more products in China. We will work with them to co-develop or evaluate products and find business partners for them in China.

"We're also in active negotiation with several Chinese animal health companies that want to establish their research and development divisions in Kansas," Shi said. "More jobs will be created in Kansas and more animal health products will be exported to China from Kansas."

### International education and research

As a graduate of both the Chinese and American veterinary education systems, Shi understands the importance of educational and business opportunities between the countries.

Shi received his master's degree at the Chinese Academy of Agricultural Sciences and his doctor of veterinary medicine training from China Agricultural University in Beijing. While a Kansas State University doctoral student, Shi worked with Blecha on a U.S.

Department of Agriculture project that looked at antimicrobial peptides, which are produced by the body to calm

infections and kill bacteria. Together, their research appeared in the Proceedings of the National Academy of Sciences of the United States of America and the U.S. Patent and Trademark Office awarded them five patents.

"You always look for a student who is able to act and think more like a scientific investigator,"

Blecha said. "Jishu was one who always — even from the very beginning — would take the initiative to ask questions and find answers. He came up with great ideas and that's what you want to see — a student who can develop and think on their own."

Shi's time working in the lab as a doctoral student influences much of his current work. Amid directing the China center, he still finds time to teach physiology to first-year veterinary medicine students and work on three major research projects.

Shi's current projects and collaboration include:

- A project to develop a vaccine for porcine reproductive and respiratory syndrome virus, or PRRSV.
- A project that looks at human inflammatory diseases. The research may lead to a developmental drug for human inflammatory bowel disease.
- A collaborative project supported by \$375,000 in National Institutes of Health, Center of Biomedical Research Excellence (COBRE) funding. Shi and Kansas State University professors Lei Wang and Deryl Troyer are looking at how cancerous stem cells develop and potentially cause cancer relapse.

"I think translational science is very important and my research programs focus on developing a product or discovering something that can be used to make a product for animals or for humans," Shi said. "That's the passion of my research — I want to see the usefulness of our work."

But Shi also has a passion for bridging the gap between the U.S. and China, and his efforts make him an educator who will continue to influence the animal health industry and train its next generation of leaders.

"While we train students and expand their knowledge, it's also important for them to have a larger perspective of the world," Shi said. "I want our students to know that we are here to prepare them to compete and succeed globally in all aspects of the animal health profession, including clinical practice, education, biomedical research, industry, public health and governmental services."



Jishu Shi



Frank Blecha

By Jennifer Tidball, Communications and Marketing



Rob Denell

# Fruitful results

Survivor fights cancer  
with insects



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## *Rob Denell thought he was done with cancer after his wife beat the disease.*

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No more chemotherapy by his wife's side. No more long drives to hospitals. He was about to say goodbye to cancer.

It turns out it was just the beginning chapter of a troublesome-yet-fruitful relationship with the disease. It's a relationship that involves insects, Kansas State University's Johnson Center for Basic Cancer Research and a battle with cancer.

### Insects and cancer

Denell, a university distinguished professor of biology, primarily studies insects such as fruit flies. The creatures are linked to cancer research.

Denell conducts genetic, developmental and molecular research on insects and primarily studies the genetic control of early embryonic organization. The genes he studies in insects are shared with humans and can reveal the origins of some cancers.

When some genes are activated at inappropriate locations and times in insects, they change the structure of insects. An antenna can take the place of a leg, for example. The same rules apply to cancer in humans: Changes in genes can lead to cancer. Studying insects has the potential to detail the human development process and how cancer forms.

"For both ethical and scientific reasons, insects offer powerful experimental approaches not possible in humans," Denell said. "History strongly supports the view that such insect studies can give key information about humans."

### Cancer research center

Denell has studied insects as an affiliate researcher for Kansas State University's cancer research center since it opened in 1980. He became the director in 2003 after he survived a bout with cancer, the second-leading cause of death in the United States and the No. 1 cause in Kansas.

Kansas State University's Johnson Center for Basic Cancer Research supports research, education and outreach to fight cancer. Some 70 faculty researchers affiliated with the center represent 13 departments in five colleges.

Researchers primarily study molecules, organisms and cells that can help the fight against cancer by understanding the basic components of life.

"Our strength is basic research, which provides the foundation for more focused investigations into new approaches to preventive medicine, diagnosis and treatment," Denell said. "You have to have basic research before you can have treatments and cures."

Since the center's opening in 1980, researchers have brought in more than \$40 million in active extramural funding, which translates to a regional economic impact of \$60 million.

The center also provides undergraduates with financial support to conduct real laboratory research and has supported the work of more than 800 undergraduates and their faculty mentors. The university's cancer research center works closely with other Kansas research institutions to advance its basic research to clinical trials, including the University of Kansas Cancer Center.

### 'The panic button'

A personal struggle with cancer pushed Denell to become the cancer research center's director. He found a lump on his neck in 2001.

"I knew then it was time to push the panic button," he said.

Denell saw a doctor to get a biopsy and test his skin tissue for cancer. He waited weeks to hear the results.

"That time between thinking you might have cancer and knowing you actually do is the worst time," Denell said. "You're left adrift. You have no idea what will happen."

Denell was diagnosed with nasopharyngeal cancer in the upper part of his throat behind his nose. His lymph node enlarged in his neck to capture cells released from the tumor.

Denell's wife had just battled and survived breast cancer. The couple often drove back and forth from their home in Manhattan, Kan., to the University of Kansas Medical Center in Kansas City, Kan., for her chemotherapy.

This time Denell had to take a break from his teaching and research. He started treatment at the University of Nebraska Medical Center in Omaha. The debilitating treatment of radiation and chemotherapy took nine months, during part of which Denell was bedridden, and he could eat or swallow only with great difficulty.

Denell is now cancer free. His chances of recurrence are low, but he fears another tumor caused by radiation could develop. Denell still suffers from the side effects of radiation such as poor salivary function, low blood pressure and loss of sensation in his fingers. He has trouble hearing and gets dizzy if he stands too quickly.

"I don't complain because I'm just happy to be here," he said. "The treatment was worth it."

### Future discoveries

The fight against cancer will progress rapidly in the next few decades, Denell said, thanks to genetic research and nanotechnology. A nanometer is one-billionth of a meter.

Nanotechnology is expected to lead to better treatment and earlier diagnosis because it could aid in the delivery of drugs or imaging of cancer tumors. This is an area of active research at Kansas State University.

A group of researchers in the College of Veterinary Medicine led by Deryl Troyer, a professor of anatomy and physiology and cancer research center affiliate, is studying stem cells that come from the interior of the umbilical cord. The stem cells have the ability to reduce the size of tumors. The stem cells could deliver nanoparticles to tumors that would allow researchers to take images of the tumor, treat the tumor, and monitor the effect of chemotherapy and other kinds of treatment.

"This is the most exciting time ever in cancer research," Denell said. "I feel so privileged I'm at Kansas State University, where we remain dedicated to cancer outreach and basic cancer research. As a cancer survivor, it's my personal mission to help coordinate research that eventually enhances diagnosis and treatment of these life-threatening diseases."





## Professor's work a patented success

In the 16 years Xiuzhi “Susan” Sun has been at Kansas State University, she’s made a patent-worthy discovery nearly every year.

Sun is a university distinguished professor in grain science and industry and is an internationally recognized expert in bio-based materials — specifically in soy polymer structure, synthesis and adhesion. Her focus is on how various plant and grain molecules — like proteins, lipids and sugars — can be used to create bio-based materials that are safer, more durable and environmentally friendly.

Currently Sun’s work has been granted eight patents, with six more pending.

The most recent patent covers a peptide-based adhesive that could be used in outer space, as its stickiness increases in drier environments. This ability means it could be ideal for affixing a heat-resistant tile to a spacecraft or a space station.

Some of her other patents cover edible and biodegradable feed packaging materials; an apparatus to form these packaging materials; a soy-based, formaldehyde-free adhesive that’s water resistant; and high strength degradable plastics from the reactive blending of starch and poly(lactic acid).

But Sun’s discoveries don’t stop there. Her latest has potential human health applications, including repairing and replacing whole tissues.

By introducing a calcium ion to a protein molecule, Sun and her colleagues found that the molecules form a thermostable, water-based colloidal gel, called a hydrogel. The interaction between the calcium ions and protein molecules creates tiny, cross-linking fine fibers with a nano scale diameter — around 10 nanometers. The resulting material has a consistency similar to jelly, even though it’s nearly 100 percent water.

This novel hydrogel has unusual properties, including a rapid-recovery property, Sun said. Shaking it transforms the hydrogel into hundreds of colorless micro gels with a Newtonian flow. Though these micro gels aren’t a liquid, they behave like water. After about 10 seconds, the liquid-like substance reforms into a hydrogel due to its rheological properties. Having rheological properties allows the material to be deformed into micro gels and back into a hydrogel with the shake of the hand.

“This discovery has great potential for drug delivery and 3-D cell growth for tissue engineering,” Sun said. “Potentially, it could lead to repairing or replacing bone, cartilage, blood vessels and skin.”

Based on published information, this is currently the only protein-binding calcium that’s led to a hydrogel, as well as the fastest rapid-recovery speed and the smallest molecular weight.

Sun’s work has also led to developing a novel soy oil-based resin that can be used for transparent duct and packing tapes.

“I have always felt so rewarded if any of the technologies developed from my laboratory have commercial values that improve our environment and make the world a better place,” said Sun, who was inspired by stories about famous scientists like Sir Isaac Newton during her teenage years.

Sun established and leads the Bio Materials and Technology Laboratory and is co-director and founder of the Center for Biobased Polymers By Design.

# The ultimate collaboration

World-class researchers come in pa

When Philip Nel and Karin Westman married in 1997, they created a fusion of their respective fields — his in children’s literature, hers in 20th century and contemporary British literature. It was also in 1997 that British author J.K. Rowling did the same thing, but in a much bigger way. It was called Harry Potter.

The couple pored over the books together, ordering the U.K versions off the Internet, because they were not available yet in the United States.

“I read the first book to us. We read them all aloud,” said Nel, professor of English and director of the children’s literature graduate program. “It’s fun: you get to do accents.”

“And Phil is pretty good at doing the accents,” added Westman, associate professor and head of the department of English.

They are Kansas State University’s own Harry Potter experts and have been since Nel created one of the most in-demand classes on campus, “Harry Potter’s Library: J.K. Rowling, Texts and Contexts” in 2002. His book, “J.K. Rowling’s Harry Potter Novels: A Reader’s Guide,” was published in 2001.

As the class and series grew, Westman also began teaching it, as did Naomi Wood, another associate professor of English. The course has become a collaborative effort and is responsible for drawing a diverse group of students to the university’s English department, regarded as one of the top departments in the nation for children’s literature.

“Both the fans and the students who haven’t had much experience with Harry Potter leave with an increased appreciation for the complexity of the series,” Westman said. “And the fans who know the books well are able to hear other perspectives because the class attracts students from across the university. The conversations we have are fun and interesting because of those different points of view.”

The class delves far beyond the compelling tale of a boy wizard and his loyal companions as they prepare to fight the ultimate battle between good and evil. Nel and Westman examine influences on Rowling’s series, analyze its cultural subtexts, and study the rabid, worldwide “fan-demonium” that has exploded since Harry Potter first appeared on the scene.

Nothing is childish about the way the pair and their students care about Harry Potter. The series’ power lies in its ability to captivate audiences of all ages.

“Books that become classics are those that are embraced by adults as well as children,” Nel said. “Harry Potter is a classic because it’s a fantasy, but it’s also very steeped in realism, and it’s a mystery. It alters the genre, and not that this combination hasn’t been done before, but Rowling was able to do that in a way that felt new and changed the game.”

Westman is putting the finishing touches on her book, “J.K. Rowling’s Library: Harry Potter in Context,” which examines Rowling’s favorite authors and influences, from Jane Austen to Roddy Doyle. Westman began offering an additional Harry Potter class, a graduate seminar, called “Harry Potter and Literary History” in fall 2010.

It’s important, they both agree, to consider the series as much more than children’s literature. The fact that millions of people — adults and children alike — have been swept away by Rowling’s vivid world is a testament to her storytelling ability.

“The power of literature is to create something that’s so believable,” Westman said. “Rowling herself has said that the power to imagine and sympathize with others is one of the most important qualities of human experience.”

Philip Nel and Karin Westman





Harald Prins and Bunny McBride

Harald Prins and Bunny McBride met because of Arctic Inuit, bonded over learning about Kalahari Bushmen and moved in together because of Mi'kmaq Indians. For more than 30 years, their love story has been defined by their studies in cultural anthropology.

Prins, a university distinguished professor of anthropology, and McBride, a writer and adjunct lecturer of anthropology, have found great success in their careers. But it wasn't always like that.

Rewind to 1981. McBride, living in Maine, heard about a position to conduct native rights research for an impoverished landless Mi'kmaq community near the Canadian border. She passed the news on to Prins, a Dutchman who had just completed fieldwork in the Argentine pampas. Until then, the couple had commuted great distances to see each other.

"Either she would have to move to Europe or I would have to live in North America," said Prins, who had returned to his homeland at the time. "We couldn't live in the middle of the ocean."

So they shared the position. For \$80 each per week they drove four hours to and from their 18th-century home to work part time at the Indian headquarters in an old schoolhouse. At night, they'd collapse on a foam mattress on top of a desk. But it was worth it, McBride explained, because they got to make a difference: Their research resulted in a

federal law that granted the tribe health, housing and education benefits, plus 5,000 acres of their ancestral lands.

"I only came to Maine for Bunny," Prins recalled. "It was hardly a career move. The belt tightened enormously, but that was the price we paid for our love relationship to deepen."

Because McBride came from art and journalism and Prins was a foreign scholar, they occasionally butted heads about research and writing styles but eventually came to realize that they could learn a lot from each other.

"We agreed that I would teach Harald everything I knew about writing and he would help me with anthropology," McBride said. "We've become pretty darn good at taking criticism from each other, although it's not 100 percent of the time."

While in Maine, McBride continued freelancing, frequently traveling to Africa. Picking up various teaching jobs at places such as Bowdoin College in Brunswick, Maine, Prins realized he missed the career he had left behind in Europe — and that if he wanted to re-enter academia in a new country, he needed to focus on getting published. So he wrote nonstop, giving up most of his normal social life.

"It wasn't fun," Prins said. "There were 1,001 nights in our marriage where Bunny went to bed without me because I was plowing through."

Since 1990, when Prins accepted a position at Kansas State University, the duo has made their home nestled in the hills next to Tuttle Creek Lake.

"He moved across the ocean for me, so it was my turn to move to the Plains for him," McBride said.

They're currently working on several projects together, including constant revisions of their textbook — the most widely used one in their discipline — and various museum exhibits.

Their next book, "From Indian Island to Omaha Beach: The Story of Charles Shay, Penobscot Indian War Hero," is due out this fall. Shay, a tribesman they befriended in Maine, survived D-Day, a German POW camp, the Korean War and a stint in the Pacific where atomic bombs were tested. In 2007 he was knighted into the Legion of Honour by French President Nicolas Sarkozy, the country's highest decoration for foreigners.

This book is an example of the couple finally perfecting their technique after decades of working together.

"Bunny takes the lead on some chapters, I take the lead on other chapters, and ultimately, when you read it, it's going to be hard to figure out whose voice is whose," Prins said. "We lose track over who did what, when and where because this book is a true collaboration."

## Afterwords



For **Elizabeth Dodd**, writing comes naturally — literally.

Dodd, a university distinguished professor of English and director of Kansas State University's creative writing program, examines human relationships with the natural world. This summer she co-led an interdisciplinary study-abroad trip to Brazil with Marcellus Caldas, assistant professor of geography, and Martha Smith Caldas, instructor of biology. There the students combined studies in geology, biology and creative writing to explore environmental

sustainability in the heart of one of the world's most diverse ecosystems.

"They get to use their whole minds. Creative use of language and artistic self-expression are points of emphasis, but in their essays they'll also be exploring the academic work that they do in geology and biology," Dodd said before the trip.

Since joining the Kansas State University faculty in 1989, she has proudly watched the creative writing program expand. One area in particular has really taken off: creative nonfiction.

"It's a popular genre. In our workshop, I've had graduate students from other departments alongside our own English majors and master's students," Dodd said. "Creative nonfiction is a terrific course to teach because of the breadth of interest and experience the students bring to the classroom."

Dodd spoke at the Association for the Study of Literature and Environment's June conference at Indiana University in Bloomington. Her book, "In the Mind's Eye: Essays across the Animate World," won the association's Best Creative Book Award in 2009. She is also spending the summer putting the finishing touches on her next book of creative nonfiction, due out in 2012.



**David Littrell's** passion for music is infectious, whether talking about the musicals of Rodgers and Hammerstein or describing a recent performing tour of Ireland.

It is because of this passion that Littrell, university distinguished professor of music, was named the 2007 Kansas Professor of the Year by the Carnegie Foundation for the Advancement of Teaching. And it is this passion for music that keeps him educating students of all ages.

Littrell just finished teaching four summer camps in June. Littrell is conductor of the Kansas State University orchestra and led the group on a 10-day tour of Ireland during spring break.

Earlier this year the Kansas State University Orchestra performed with the rock group Kansas on campus to the thrill of many orchestra members and their parents, Littrell said. The orchestra accompanied the band on a number of arrangements, including big hits such as "Dust in the Wind" and "Carry on Wayward Son."

"Kansas knows its stuff," Littrell said. "They are great musicians who are well-trained and fluent in the craftsmanship of the music."

Additionally, Littrell's Gold Orchestra was one of eight orchestras selected to perform for the Midwest Clinic, an international band and orchestra conference in Chicago in December 2010. The orchestra will travel to Memphis and Nashville, Tenn., in June 2012 to perform and visit music attractions in the area.