BAYLOR

research 04

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FEATURES

EXTRAS

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Baylor Research is published annually by the Baylor University Office of the Vice Provost for Research to provide alumni, faculty, staff, supporters and friends with a sampling of the many research and scholarly activities conducted at Baylor. This issue was published in December 2003.

For additional information about projects reported in this issue, contact Truell Hyde, Vice Provost for Research. It is produced by the Baylor University Office of Public Relations. POSTMASTER: Send address changes to Baylor Research, Office of the Vice Provost for Research, Baylor University, PO Box 97310, Waco, TX 76798-7310. For further information visit our website at http://www.baylor.edu/research.

We are surrounded by the sociological phenomena of an information age, or as James Billington, our Librarian of Congress, prefers to call it, an "info-glut culture." Billington goes on to ask "with all our access to knowledge, are we becoming any wiser?" All too often, students and faculty at universities across the world take on the cloak of Oxford's gargoyle in grief, hands across his eyes and inscribed with the words — **The more I study the more I know. The more I know the more I forget. The more I forget the less I know. So why study?**

> So why study? Why conduct research?

Many of the answers at Baylor are the same as those at any other research university. Scholarship, research, collaboration and innovation have long informed the academic life within the halls of her schools and colleges. From interdisciplinary studies looking at new methods for treating cancer to scholarship into the history of the English language, research at Baylor pushes back the boundaries of knowledge and is making a difference in today's world. Collaboration with colleagues around the world is commonplace, and cutting edge research contributes daily to the academic vitality of the classroom. Thinking through a problem and asking the questions necessary to arrive at a reasonable conclusion is a skill students learn through their involvement in research, one they must have to address the intricate issues they face in an ever-changing world.

However, this is not the only (or even most important) reason research is vital to Baylor. The call for Baylor to become one of the great Christian universities (as recently issued in Baylor 2012, Baylor's ten-year vision) is a call to academic excellence. A cornerstone of this charge to become a "city on a hill" is research.

The idea of a Christian university and the resulting accompanying tension between faith and intellect is nothing new to the academy. C.S. Lewis, who fought for the restoration of a vital Christian voice in the highest levels of academic life, went straight to the heart of the matter when he said in *The Weight of Glory*:

"If all the world were Christian, it might not matter if all the world were uneducated. But, as it is, a cultural life will exist outside the Church whether it exists inside or not. To be ignorant and simple now — not to be able to meet the enemies on their own ground — would be to throw down our weapons, and to betray our uneducated brethren who have, under God, no defense but us against the intellectual attacks of the heathen. Good philosophy must exist, if for no other reason, because bad philosophy needs to be answered. The cool intellect must work not only against cool intellect on the other side, but against the muddy heathen mysticisms which deny intellect altogether. . . . [T]he scholar has lived in many times and is therefore in some degree immune from the great cataract of nonsense that pours from the press and the microphone of his own age."

DR TRUELL HYDE

I welcome you to the inaugural issue of Baylor's research magazine. In these pages, you will learn more about the exciting contributions Baylor students and faculty are making toward the fulfillment of the 2012 Vision. You'll also find that the merging of faith and intellect is already well underway within laboratories and offices across the campus. Please feel free to contact me to learn more or visit Baylor's Research Web site at www.baylor.edu/research. I look forward to sharing with you in the coming years all that is happening on the research front within the Baylor academe.

RESEARCH

> AT BAYLOR

BY JUDY LONG

BAYLOR UNIVERSITY'S COMMITMENT TO ENHANCING AND EXPANDING ITS RESEARCH PROGRAM BECAME EVIDENT WITH THE LAUNCH OF BAYLOR 2012, THE UNIVERSITY'S 10-YEAR VISION. WITHIN THE FIRST YEAR AFTER THE LAUNCH, THE UNIVERSITY AGGRESSIVELY UNDERTOOK STRENGTHENING THE CAMPUS' COMPUTER NETWORK INFRASTRUCTURE, BEGAN CONSTRUCTION OF A LANDMARK SCIENCE BUILDING AND FOCUSED ON HIRING TOP RESEARCHERS AND THE BRIGHTEST SCHOLARS FROM AROUND THE WORLD.

"Infrastructure is the most overlooked aspect of building an effective research-teaching program," provost and vice president for academic affairs David L. Jeffrey says. "But to be effective — indeed, even to obtain credibility from external granting agencies — we are obliged to show that we both have it and have planned for its future development wisely."

INCREASING RESEARCH CAPABILITIES

Two significant granting organizations, the state-operated Telecommunications Infrastructure Fund (TIF) and the National Science Foundation (NSF), have provided funding to upgrade campus computer and networking capabilities. TIF awarded four grants to Baylor totaling more than $2 million, which dramatically impacted campus communications in the past year. A prestigious National Science Foundation grant received in January 2003 for $175,000 advanced leading-edge network capability on campus.

The TIF grants allowed campus upgrades of library computer services, expansion of instructional offerings, improvement of networking services and enhanced access to online information resources. The addition of a wireless computer networking system now provides wireless laptop access to the Internet in every academic and residential building on campus.

The NSF funds support Internet2 capability. Internet2 is a private consortium of more than 200 U.S. universities — including Baylor — that works with government and industry to develop innovative network capability on campuses. The group also provides the newest technological advances applicable to the Internet for the national research community and broader Internet use.

The NSF supports Internet2 goals to ensure the Internet of the future develops into a reliable and secure medium for information sharing and to foster partnerships among academia, industry and government.

THE NEW WORLD-CLASS BAYLOR SCIENCES BUILDING WILL HOST A FULL COMPLEMENT OF NATURAL SCIENCE TEACHING, RESEARCH AND EXPERIMENTATION ON CAMPUS. THE $103 MILLION, 500,000 SQUARE-FOOT FACILITY WILL BE COMPLETED BY FALL 2004.

Vice Provost for Research Truell Hyde said the grant gives Baylor the opportunity to pursue exciting avenues in research, such as grid computing, real-time video transfer and other enhanced research and teaching capabilities.

"This is an aspect of developing the research and teaching infrastructure to move toward the top-tier direction. We have identified more than 40 faculty members who presently have a need for this capability on campus. Some of these faculty members currently run their research elsewhere because they can't download their data here," Hyde said.

The University also is acquiring a 128-node computer, which along with Internet2, enhances collaborative research opportunities with other universities and national super-computing facilities. The expansion provides Baylor with other high band-width connectivity options, including high-quality video-conferencing.

The 128-node computer, which will be installed in the next year, is an integral component to improving campus networking and research capabilities. The computer will be installed in office space under construction at the corner of University Parks Drive and Dutton Avenue.

A primary application of these powerful research tools will be in the undergraduate teaching arena, a University focus that is at the heart of Baylor's mission. The same technology supporting high-end physics research will render possible virtual tours of national museums, new partnerships with undergraduate programs worldwide, and access to resources and experiences previously separated from Baylor students by travel distance and time.

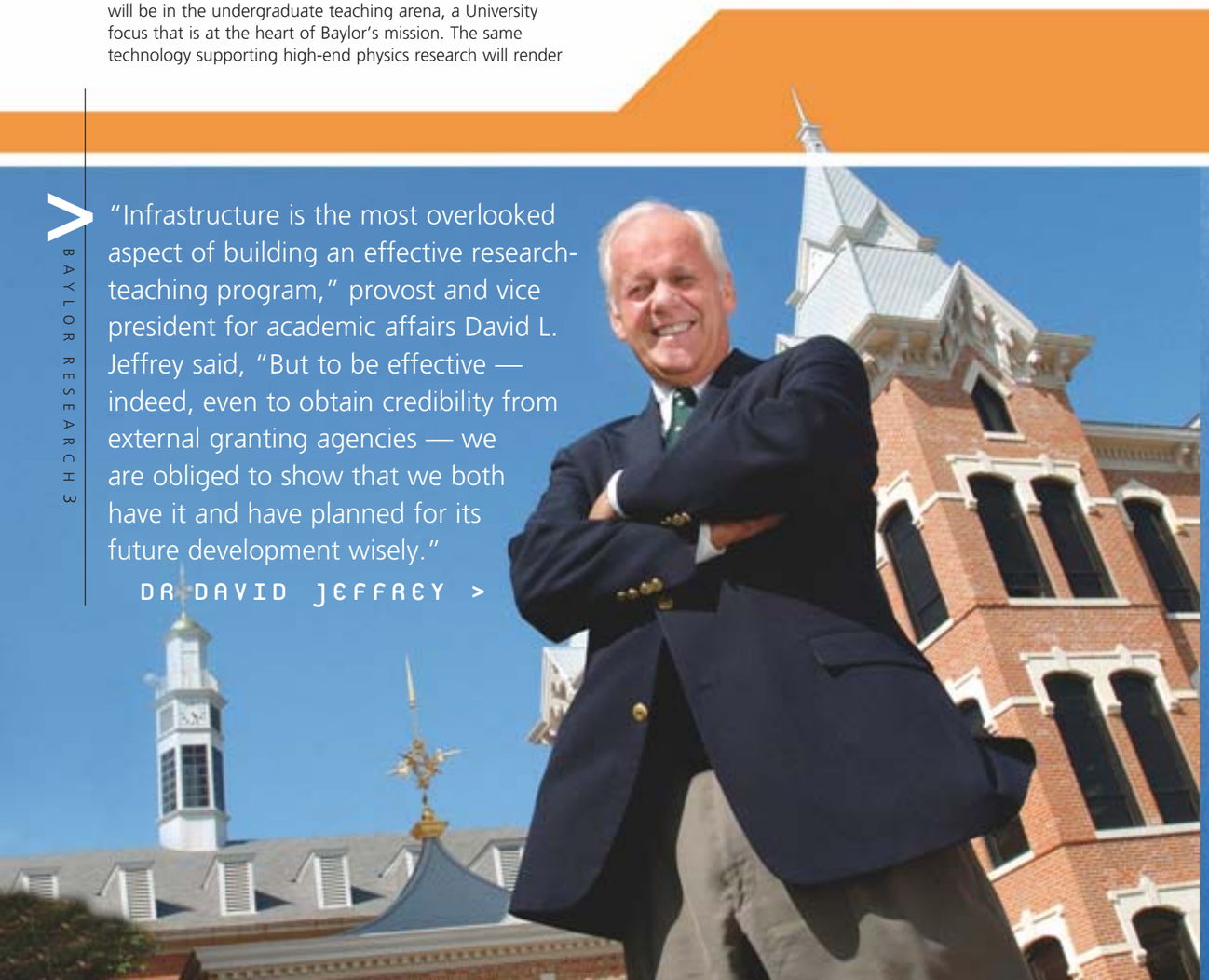
The most visible step toward pioneering research is the construction of the four-story, 500,000-square-foot Baylor Sciences Building, the largest building project ever undertaken by the University. Completion of the $103 million building is slated for Fall 2004.

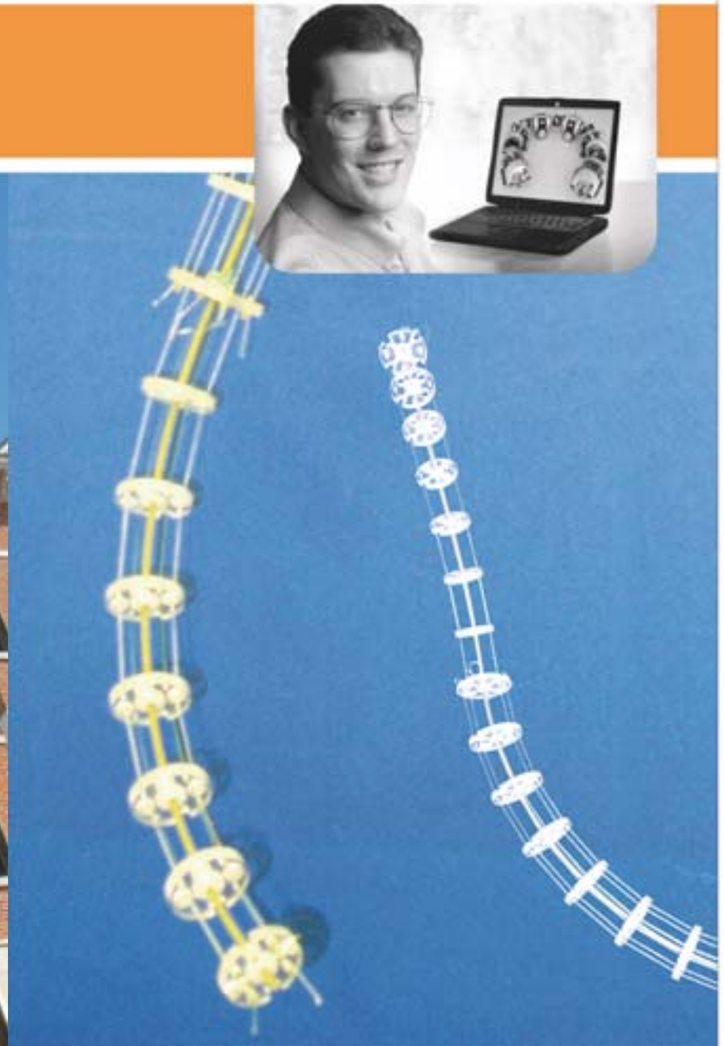
The structure will have three research wings housing the life and physical sciences (chemistry and biochemistry, physics, geology, biology, psychology and neuroscience) and interdisciplinary science centers. The middle wing will be devoted to interdisciplinary collaboration.

Dr. Benjamin A. Pierce, professor of biology and associate dean for sciences during the planning stage of the building, said the Baylor Sciences Building will focus on four major themes: multidisciplinary science, collaboration, discovery and flexibility. "This building will create a new culture of science at Baylor. What's happening in science is occurring at the boundaries between the disciplines," Pierce said.

"Infrastructure is the most overlooked aspect of building an effective research-teaching program," provost and vice president for academic affairs David L. Jeffrey said, "But to be effective — indeed, even to obtain credibility from external granting agencies — we are obliged to show that we both have it and have planned for its future development wisely."

DR DAVID JEFFREY >





NEW RESEARCHERS > ON CAMPUS

THE FOCUS OF RESEARCH ENHANCEMENTS — SUCH AS COMPUTER UPGRADES, NETWORK EXPANSION OR ADDITIONAL FUNDS FOR FACULTY HIRING — IS TO PROVIDE A RICH ENVIRONMENT FOR RESEARCHING SCHOLARS. THE UNIVERSITY HAS COMMITTED UNDER BAYLOR 2012 TO HIRE WELL-KNOWN RESEARCHERS FROM ALL OVER THE WORLD TO JOIN BAYLOR'S CURRENT ASSEMBLAGE OF EXCELLENT RESEARCHERS.

"Iron sharpens iron," says the proverb, and observers should expect to see the sparks fly as new minds rub shoulders with Baylor's veteran researchers. "Our recently hired faculty members are doing research on the sustainability of wetlands, the development of robots for disabling land mines, and the First Great Awakening, to name only a few topics," said Vice Provost for Faculty Development Michael Beaty. "Combining passions for both teaching and research, the new faculty members are making their mark in the classroom and in their disciplines. We are pleased and fortunate to have such outstanding individuals join our University."

A sampling of these exceptional new hires includes Ian Gravagne in engineering, Klaus Kirsten in mathematics, Melanie McEwen in nursing, DeAnna Toten Beard in theater arts, and Jo-Ann Tsang in psychology and neuroscience.

> **Ian Gravagne**, assistant professor of engineering, received his bachelor of science from Rice University, and his master's and doctorate from Clemson University, finishing in 2002. His resume already reveals several conference publications and articles in peer-reviewed journals.

Gravagne's research focuses on robotics and mechatronics. He is trained as an electrical engineer, but his research takes him into the fields of mechanical and electrical engineering, computer science and mathematics.

A primary research interest of Gravagne's is "soft robots," a significant advance beyond the stiff, heavy machines most people imagine when they think of a robot. Soft robots are flexible, "or have so many joints they seem flexible," Gravagne says; and they can be activated by small motors, fiber composites, shape memory alloys and gel polymer muscles. This idea is inspired by elephant trunks, octopus tentacles and caterpillars, he adds. A current project of Gravagne's involves designing a soft robot with the capability to detect land mines.

Since arriving at Baylor, Gravagne and John Davis in mathematics have begun collaboration, along with doctoral student Jeff Dachuna, "to see what applicability time-scale calculus has to various engineering problems where discrete and continuous phenomena coexist," Gravagne says. "It is a cutting-edge interdisciplinary exploration of exactly the type that I think Baylor is trying to foster."

A primary research interest of Gravagne's is **"soft robots,"** a significant advance beyond the stiff, heavy machines most people imagine when they think of a robot. Soft robots are **flexible, "or have so many joints they seem flexible."**

"Generically, physicists need mathematics to formulate questions and also to answer questions."

> **Klaus Kirsten**, associate professor of mathematics, received his bachelor's, master's and doctoral degrees from the University of Kaiserslautern, Germany. His doctoral work is in theoretical physics, specializing in quantum field theory, string theory and spectral theory.

"Generically, physicists need mathematics to formulate questions and also to answer questions. If the needed mathematics is not available, (some) physicists turn into mathematicians and develop whatever is necessary to progress in answering 'their' questions. This is what happened and continues to happen to me," Kirsten says. "The methods I have developed raised the interest of mathematicians because their approach and my approach were complementary. I had a physicist's education and so simply had a different viewpoint, which sometimes is very fruitful."

Kirsten taught as a visiting professor at the University of Trento in Italy, then went on to serve as an Alexander von Humboldt Fellow at the University of Barcelona in Spain, after which he conducted research at the University of Leipzig in Germany and at the University of Manchester in England. He also received visiting appointments at the University of La Plata in Argentina and the University of Naples in Italy. Since 2001, Kirsten has been a postdoctoral associate at the Max Planck Institute for Mathematics in the Sciences in Leipzig, Germany.

With two books to his credit, ***Spectral Functions in Mathematics*** and ***Physics and the forthcoming Spectral Geometry of Physics***, Kirsten also has written 80 peer-reviewed articles and is involved in six current research projects.

> **DeAnna Toten Beard**, assistant professor of theater arts, received her bachelor's degree from Mary Washington College, a master's from the State University of New York, and her doctorate from Indiana University, Bloomington in 2001. She came to Baylor from the University of North Carolina, Wilmington, where she served as a visiting professor of theater history.

Toten Beard wanted to be able to write in both artistic and research venues, so she decided to do doctoral work in theater history after receiving her master of fine arts degree. She specializes in dramaturgy — the study of how a play script works — which qualifies her to collaborate in production with directors and playwrights on genres of literature, history of certain kinds of plays, and dramatic structure.

She has published in ***On-Stage Studies***, a theater journal, and has written a book chapter for the upcoming ***Blackwell's Guide to Modern American Drama***, among other publications.Toten Beard's research focus is early 20th century drama and theatrical modernism, particularly American Expressionism. "My next research topic will be the experimental plays of Theodore Dreiser," a writer known for his novels more than his plays, she says. Baylor theatergoers should look for next fall's adaptation of Marlowe's Doctor Faustus, a project Toten Beard is working on with Steven Pounders in the theater department.

"My next research topic will be the experimental plays of Theodore Dreiser."

"As a child I always wanted to take care of kids with cuts and scrapes and injured animals. For as long as I can remember, I wanted to be a nurse. It's where my interests and my gifts are."

> **Melanie McEwen**, associate professor of nursing, received her bachelor's degree at the University of Texas at Austin, her master's from Louisiana State University Medical Center at New Orleans and her doctorate from Texas Woman's University in 1990.

McEwen has written several nursing textbooks including ***Community-Based Nursing*** and an instructor's manual for the text. She is co-editor of Theoretical Basis for Nursing, in addition to writing 10 chapters of the book and co-edited the 3rd edition of ***Community Health Nursing: Promoting the Health of Populations***. She also has written numerous articles for reviewed journals and is seeking funding to develop a master's of nursing education track. She also assisted nursing professor Frances Strodtbeck in writing a $1 million grant for development of a case management program for children with developmental problems.

McEwen considers nursing her calling. "As a child I always wanted to take care of kids with cuts and scrapes and injured animals. For as long as I can remember, I wanted to be a nurse. It's where my interests and my gifts are," she says.

McEwen's research interests include pediatric immunization policy and asthma, and other health issues for school children. For her next research topic, she would like to look at the disparity of diagnoses of attention deficit-hyperactive disorder (ADHD) between economically disadvantaged and other children. The disorder is diagnosed more frequently among children from higher socio-economic groups, and McEwen suspects disadvantaged ADHD children have been overlooked in diagnosis and treatment.

> **Jo-Ann Tsang**, assistant professor of psychology and neuroscience, received her bachelor's degree from University of California, Berkeley, and her master's and doctorate from University of Kansas in 2000.

Her articles have appeared in ***The Journal of Personality and Social Psychology, Review of General Psychology, European Journal of Social Psychology, Sex Roles, and Handbook of Positive Psychology***, in addition to forthcoming chapters in the ***Journal of Social Issues and The Psychology of Gratitude***.

Tsang's research interests include moral rationalization and moral motivation, forgiveness, gratitude, and the psychology of religion.

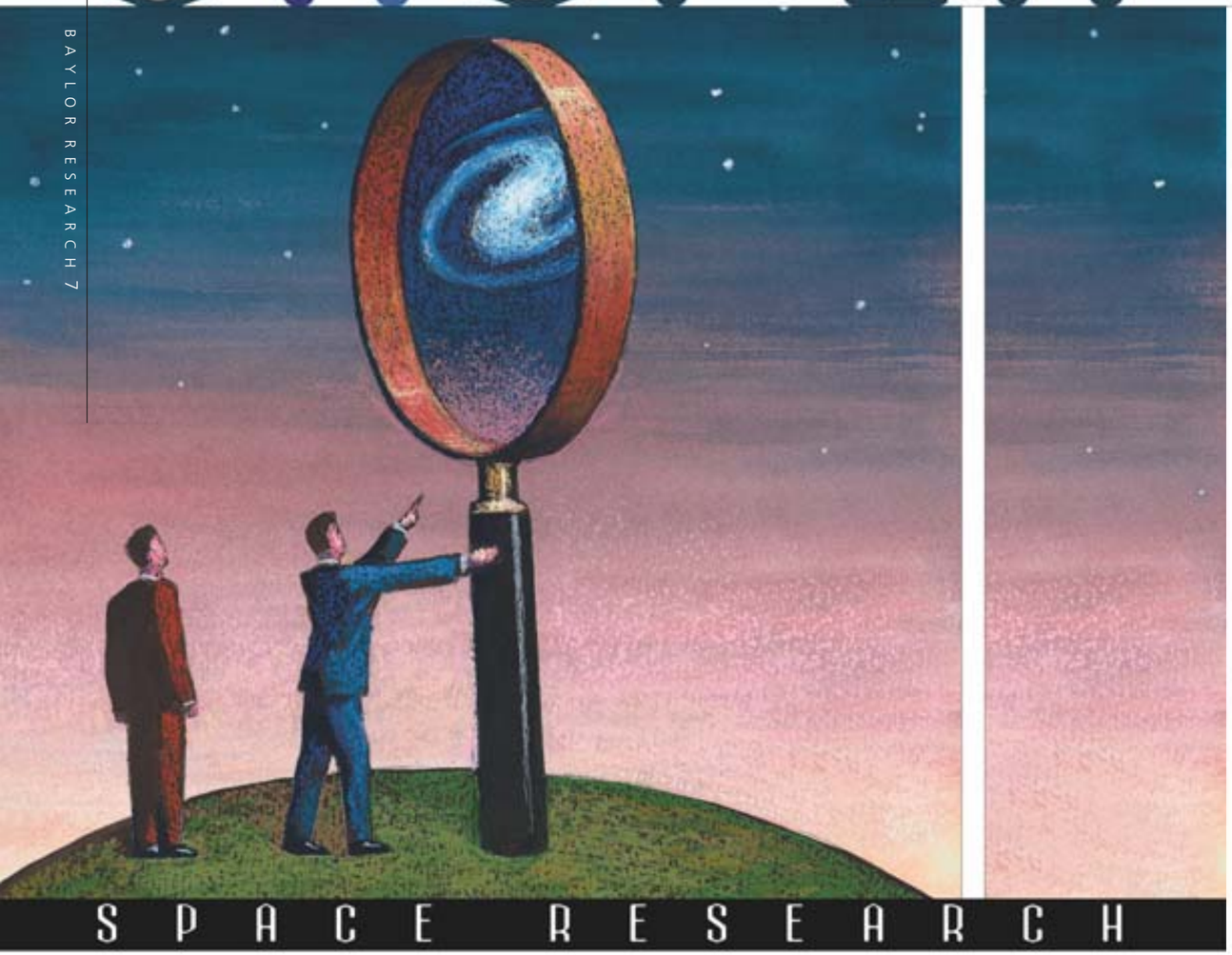
She was awarded the Howard Baumgartel Peace and Justice Award for Thesis/Dissertation Research at the University of Kansas. The dissertation studied changes in moral emotions by having subjects read an essay about people who suffer from hunger in other parts of the world, then looking to see if the essay influenced moral emotions and moral behavior.

"Since I'm a social psychologist, I was interested in studying religion, and religion naturally leads to the study of morality," Tsang says.

She is working on a project that looks at gratitude, observing behavioral reactions of the subjects when someone does them a favor. She also is engaged in a collaborative project with a colleague at Southern Methodist University studying gratitude in school-age children.

"Since I'm a social psychologist, I was interested in studying religion, and religion naturally leads to the study of morality."

CASPER



MIX WORLD-CLASS, FRONTIER-LEVEL SCIENTIFIC RESEARCH, CUTTING-EDGE TECHNICAL AND EXPERIMENTAL RESOURCES, A COLLABORATIVE TEAM APPROACH THAT VALUES THE CONTRIBUTIONS OF EVERYONE AND AN OUTREACH INITIATIVE THAT TAKES PHYSICS AND SCIENCE TO STUDENTS OF ALL AGES — AND YOU HAVE CASPER, SOMETHING FRIENDLY, EXCITING AND EVEN INFECTIOUS.

BY MAGGIE RICHARDSON

AND THAT SUITS DR. TRUELL HYDE JUST FINE. The vice provost for research, Hyde is the catalyst behind CASPER — the Center for Astrophysics, Space Physics and Engineering Research — which in four short years has grown from nothing into a research, education, and outreach paradigm unlike any other in the country. A partnership between Baylor University and Texas State Technical College/Waco, CASPER includes two theoretical research groups at Baylor, an experimental lab at TSTC and an intensive educational outreach program that brings students and educators onto both campuses as well as develops curricula for public school science courses.

A Baylor physics professor since 1988, Hyde had been doing theoretical physics research for years but lacked an experimental facility. He knew that neighboring Texas State Technical College/Waco offered cutting-edge technical programs, whose teachers had experience in Los Alamos, Livermore, and other leading scientific labs.

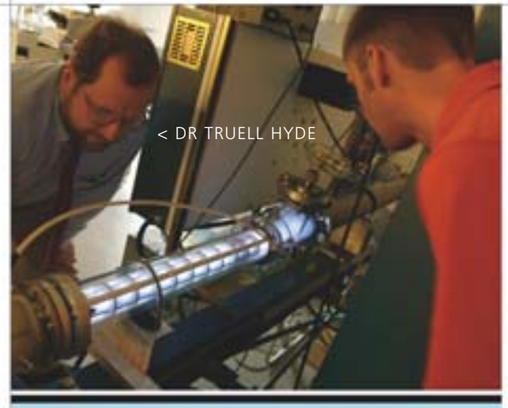
"I thought there had to be a way to meld what Baylor had with what TSTC had," Hyde said. The opportunity presented itself when TSTC opened a new automotive lab, vacating a 5,000-square-foot facility. Hyde saw it as an ideal location for an experimental lab that could be supported by the TSTC's technical programs and began working toward a partnership between the two institutions.

"Once we forged a deal between Baylor and TSTC, everything just fell together," Hyde said. "We really hit a cosmic wave of interest and research and were able to get funding that allowed us to hire some outstanding people."

About $250,000 went into renovations at the TSTC lab, where air conditioning, fiber optics, a DC power supply from the Super Colider and other features were added. The facility now houses CASPER's Hypervelocity Impacts and Dusty Plasmas Lab and the Space Science Lab, where researchers create laboratory simulations of dusty plasmas, develop prototype designs of dust particle accelerators, and provide real-world support for the theoretical research groups. One of TSTC's faculty members works full time at the experimental lab, with technical support provided by TSTC technical students and graduates.

"Baylor is the only university in the world I know of that has this type of environment," Hyde said. "It gives great mentorship and internship opportunities for both TSTC and Baylor students."

"Our research covers from the beginning of time to the latest space and theoretical plasma information," Hyde said. CASPER's two theoretical groups, located on the Baylor campus, are involved in dozens of research projects covering a range of issues. Among them are dusty plasmas and super strings—two breaking topics on the horizon.



< DR TRUELL HYDE

The Astrophysics and Space Science Theory Group conducts research in a variety of areas and includes graduate and undergraduate students along with Baylor professors and research scientists. One of the most exciting concepts under investigation, Hyde said, involves complex dusty plasmas, a relatively new topic discovered in 1994 at the Max Planck Institute for Extraterrestrial Physics.

"That's when things began to happen," Hyde said. A complex dusty plasma is a completely new state of matter that can change from solid to liquid to gas. Researchers have learned that such plasmas can also contain particles — dubbed dust — that were once thought to be contaminants but can actually become embedded within the plasma itself. Researchers are excited because the resulting complex plasma, which is easy to control, allows them to study interesting phenomena such as phase changes.

"Dusty plasma research is more widespread now, but Baylor has been at the forefront of it all," Hyde said. "It's pure physics that brings a confluence of types of research into play." Semiconductor people are enthusiastic because a method for decreasing the contaminants created by the plasma etch process can be built into the chip, reducing or even eliminating contamination, improving chip production, and cutting costs. Industries ranging from space exploration to communication to commerce could also benefit from findings, which may lead to the next generation of semiconductor chips.

Through the Early Universe Cosmology and Strings Group (EUCOS), Baylor also leads the way in string theory research, one of the most exciting and fast-paced research topics in physics today.

"Acceptance of super string theory within the elementary particle physics community began about 20 years ago. Over the last two decades it has become one of the most active areas in theoretical physics," said Dr. Gerald Cleaver, who came to Baylor in 2001. He was attracted to Baylor by the opportunity to simultaneously do front-line research, teach students at all levels, and design a science and theology course for Baylor's Honors College. At Baylor, Cleaver has continued to explore some of the most fundamental questions about the physical universe as part of the worldwide attempt to find Albert Einstein's long-sought "Theory of Everything" through string theory.

"It's amazing how quickly string research at Baylor has grown," Cleaver said. "In a short time we have become one of the leaders in string model building. Baylor is the only university listed in the National Science Foundation registry as offering a summer program in string research for undergraduates."

Two graduate students have joined EUCOS and have begun their research in strings, while another graduate student will be initiating his research this summer. A fourth student is entering the graduate program this fall with the intent to join EUCOS for his research, after having attended last summer's undergraduate program in strings. A high school student who attended Baylor's recent Spring Premiere has expressed similar hopes of participating in Baylor's string program.

Faculty membership in EUCOS is also growing. Dr. Tibra Ali, a recent Ph.D. graduate from Cambridge, has started a three year postdoctoral position in EUCOS, while a professor from the State University of Rio De Janeiro is likely joining EUCOS this fall.

"Super-string theory suggests that there is but one fundamental particle, a string of energy, and one fundamental force, gravity," Cleaver said. Physicists are discovering that what once appeared to be different particles, such as leptons, quarks and photons, are really only different vibration modes of a single type of string of energy, similar to the way a range of notes can be produced by a single violin string.

While string theory simplifies some aspects of the universe, scientists also are finding that the universe is far more complicated than the long-accepted four-dimensional model, Cleaver said.

"We are learning that there is much more to our universe than we can see or imagine. We thought the universe had only four dimensions-height, width, depth, and time," he said, "but string theory indicates there are actually seven more dimensions we didn't know about."

At the time of the Big Bang, the three known spatial dimensions grew very large, very quickly, but the rest stayed very small and compactified. Cleaver and his fellow EUCOS-CASPER researchers and students are constructing string models that will predict the arrangements of the seven compactified dimensions.

"Our research focus has been the analysis of our three most successful string models," Cleaver said. "One of the three models reveals an arrangement of the compactified directions that produces exactly the known particles in nature and nothing more. This is the first string model that doesn't contain particles we know don't exist. This model demonstrates that string theory can, indeed, offer viable solutions.

"If one or more of the compact seven dimensions were changed, even slightly, in length or direction, life as we know it could not exist," Cleaver said. "String theory, I believe, illustrates God's blueprints for the universe — the beauty and order and the resulting complexity that allows for life."

Educational programs are perhaps the most exciting components of CASPER, said Hyde, who discovered his passion for science in the third grade. A full range of educational outreach activities bring elementary, middle and high school students, as well as their teachers into the exciting world of science. High school and college students participate in research teams, joined by public school teachers who take the excitement back to their home classrooms. The Physics Circus, held each April on the TSTC campus, introduces students from the Waco area to physics in a theatre-like atmosphere that's "purely wild science," Hyde said.

But it is the interdisciplinary approach that brings together math, technology, physics, and other disciplines into a team setting that Hyde finds most enjoyable.

"One of most unique things about CASPER is that we always have students of all levels involved in every part of every activity, at every level," Hyde said. Undergraduate, graduate, and sometimes post-doctorate students work alongside senior research scientists, teachers, technicians, and sometimes high school students in classrooms, seminars, and even research labs. Allowing that kind of access to labs is something unique among research universities.

"Very few universities are bringing students into the labs," he said, "and Baylor is doing it most successfully. We think it's an important part of giving our students the opportunity for a well-rounded education and opportunities they wouldn't otherwise get."

"At CASPER, we have a full pipeline path that can take students as young as kindergarten and as far along as post-doctoral fellows," Hyde said, "and keep them involved in real research, real learning in a team environment. Our emphasis is on the students and what's good for them."

If you would like to see a 30-second commercial about this research, please visit: http://www.baylor.edu/research/

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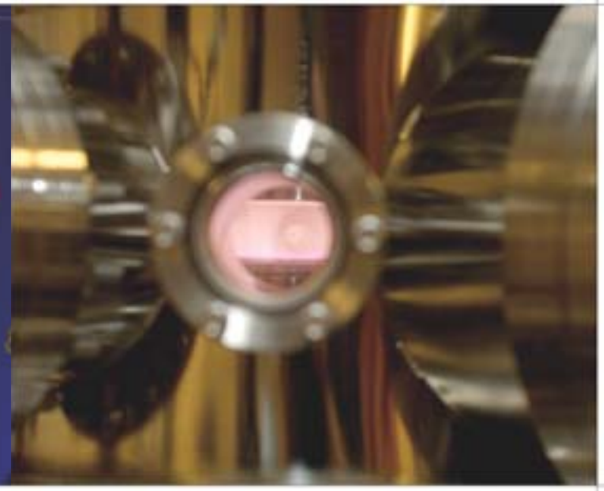
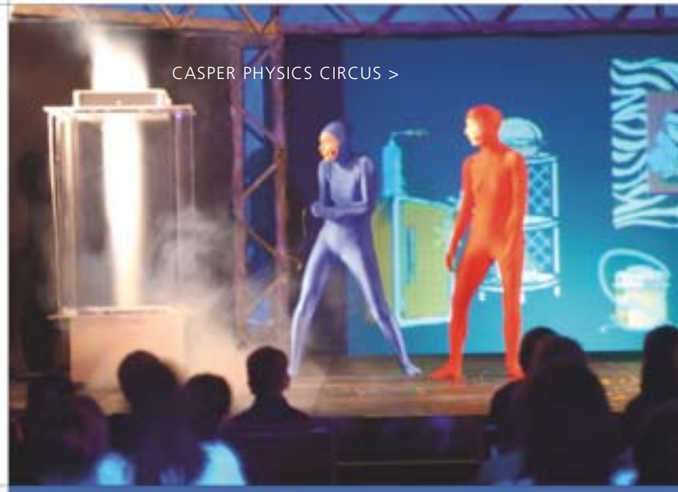
DR GERALD CLEAVER >





CASPER PHYSICS CIRCUS >

AT CASPER, WE HAVE A FULL PIPELINE PATH THAT CAN TAKE STUDENTS AS YOUNG AS KINDERGARTEN AND > AS FAR ALONG AS POST-DOCTORAL RESEARCH

BODY MECHANICS

DR RICHARD B. KREIDER

IN EARLY SUMMER 2002, THE MOST TECHNOLOGICALLY ADVANCED MATERIAL IN ROOM 122 OF REBA MARRS MCLEAN GYMNASIUM WAS LIKELY THE CLIMBING WALL OR THE CAMPING GEAR STORED UPSTAIRS. BY THE NEXT SPRING, BAYLOR UNIVERSITY HEALTH, HUMAN PERFORMANCE AND RECREATION RESEARCHERS WERE UTILIZING THIS SPACE FOR SOPHISTICATED TESTS OF WOMEN'S AEROBIC CAPACITY AND RESTING METABOLISM FOR A WEIGHT LOSS STUDY.

BY MARLA PIERSON LESTER

Cycling equipment was set for a final series of sprinting tests that would provide information about whether ribose increased the performance of a select group of male cyclists and triathletes. Lab workers were busy scheduling slots for a slate of supplement studies about to be underway.

AND THIS IS JUST THE BEGINNING. A few feet down the hall in department chairman Richard B. Kreider's office is other research that will begin as soon as the details are hammered out. In his head — and likely on the desks of companies who know Kreider's work — are countless other studies.

Kreider arrived at Baylor in June 2002 as the new chair of the Department of Health, Human Performance and Recreation — bringing his renowned Exercise, Sport and Nutrition Laboratory with him from the University of Memphis, along with a lab coordinator and graduate assistants, a wide reputation for research in this area and a number of studies. "With Kreider, you know he's headed in a direction. You have somebody that has vision and is going to openly pursue that vision," said Truell Hyde, vice provost for research.

The department has obtained $1.2 million in grant funding since June 2002. When new faculty members are added and the Ph.D. program is fully underway, Kreider expects that number to increase to $3 to $5 million per year. "It's apparent he's moving the department forward, and that he's moving it forward rapidly," Hyde said.

By September 2002 — three or four months ahead of schedule — the lab was fully supporting itself with outside funding paying salaries for about 30 students and staff.

The lab is in the midst of a large Curves International weight loss study, research that examines the Curves exercise regimen for women and measures its effect. In addition to physiological factors involved in developing an exercise and health routine, questions measure the program's impact on body image and self-esteem. Other studies test the claims of a weight loss supplement of green tea and caffeine,

trace the effect of ribose on cyclists, and explore the effects of different supplements meant to build muscle and optimize performance. These and other studies in the works demonstrate the advantages of the international network of clients and fellow scholars that Kreider had developed over the years and brought with him to Baylor.

"It's just a win-win for everybody," Kreider said. "We're integrating faculty here into that research program. We have a lot of faculty now getting into position to be very productive."

He is stretching outside the department for collaborators as well, examining how engineering, nursing and statistics students can benefit from having access to the lab's clinical trials. "You get an active research team, and everybody builds off that," Kreider said.

Reputation is, in a way, the fuel for this engine. Kreider, who is currently president of the American Society of Exercise Physiologists, is well-known enough that people regularly ask him to collaborate on their studies. Companies contact him to do studies for them.

"A lot of people come to us, and we just can't do as many studies as we'd like to do without more people," Kreider said. That's where graduate programs come in. A doctoral program in exercise, nutrition and preventive health is in the works, and two new master's programs are being developed, one in sports nutrition and one in athletic training. "We think we can have a real good niche in these two programs," Kreider said.

Hyde noted how even as the lab was being established, Kreider had already started working through the masses of paperwork for these new programs.

The two aims — more research and additional degree programs — are enmeshed both for Kreider and Baylor.

With more graduate students, what Hyde calls the "lifeblood of research," the department has the capacity to do additional studies. The fact that the lab has so much active research enhances students' degrees and makes their experience at Baylor much more profitable.

Hyde stresses that while it was essential to Kreider to have a Ph.D. program, it was important to Baylor to integrate students into this cutting edge research.

"I'M EXCITED. I'M AT A CHRISTIAN UNIVERSITY. I CAN TRAIN PEOPLE

"We certainly don't want to have an opportunity of this magnitude and not offer it to our students," Hyde said.

Already undergraduates and graduate students are working in the lab. By having it on campus, they have access to equipment and testing procedures that were not done at Baylor before. "When they go out to internships or jobs, these are skills they need to have," Kreider said.

Before Kreider came, professors in the department were working in cycling research, with health impact studies involving cancer patients and kidney patients and in some biomedical and psychological areas.

Yet the department had few resources set up to pursue outside grant funding and less equipment to do that research. In addition to the equipment and studies that Kreider brings to Baylor, he has also provided faculty members with examples of proposals, templates for them and information about funding sources, not to mention a passion for research and going after outside funding.

He notes the $100,000 the health faculty had collaborated on by mid-spring and said he's seeing more and more faculty in line for productive research.

"It's exciting to see the interest and activity and publications just within a short period of time," Kreider said. That bustle is the pace of academia today. Where college professors would once do one project from beginning to end, often over the span of years instead of months, this new model is more about teamwork, and it runs much, much faster. Now, Kreider said, the roles in research are most often split between researchers and sometimes between institutions, with, for instance, Baylor gathering data and taking blood samples but another institution analyzing them.

"It enhances research capabilities. It provides greater expertise. It really increases productivity," Kreider said. "We publish a lot because we have a lot of people working on studies." This push falls right in line with Baylor 2012, the school's 10-year Vision, and indeed that was what brought Kreider to Baylor from the University of Memphis.

"I'd been recruited by a number of schools. Memphis was a great school," he said. He ran across fliers for the position opening at Baylor but thought little of it.

"WE PUBLISH A LOT BECAUSE WE HAVE A LOT OF PEOPLE WORKING ON STUDIES." THIS PUSH FALLS RIGHT IN LINE WITH BAYLOR 2012, THE SCHOOL'S 10-YEAR VISION, AND INDEED THAT WAS WHAT BROUGHT KREIDER TO BAYLOR FROM THE UNIVERSITY OF MEMPHIS.

"It wasn't until I read the Baylor 2012 Vision that I was interested at all," Kreider said. Baylor University moved his entire lab to Waco. They listened when he proposed the Ph.D. program and the two additional master's programs.

"I'm excited. I'm at a Christian university. I can train people to be good scholars but also to be good people," Kreider said. The possibilities for research are an integral part of his message.

Kreider, who played football at Virginia's Liberty University, was studying to be a strength training coach when he went to graduate school at the University of Southern Mississippi. "I made the decision I could probably make a bigger impact if I'm doing research and educating," Kreider said. The Exercise, Sport and Nutrition Lab he brought to Baylor focuses on the role of exercise and nutrition on health, performance, disease and rehabilitation. His team oversees weight-loss studies and supplement studies that look at potential products and ingredients that would build the body. Yet the repercussions go far beyond trimming pounds or making athletes more buff.

"We look at both exercise and health, but there's also usually a medical application we're interested in," Kreider said. For example, a supplement or program that aids a weight lifter in gaining muscle mass may give researchers clues as to what will help rebuild muscle mass in patients who have lost it due to illness or other health problems.

"Doing it in healthy populations will give us the baseline to apply these to people with a disease," Kreider said.

TO BE GOOD SCHOLARS BUT ALSO TO BE GOOD PEOPLE."

Companies give financial support for the lab to study their products, but Kreider sees his role really as a consumer watchdog for products that are often already on or soon to be on the market. "We need to really look at whether they work. Most of the things we've studied haven't worked," Kreider said. Kreider is often found weighing in on the latest trends in health, exercise and nutrition with news outlets from major magazines to CNN. The lab's position papers, particularly on Ephedra, have gone all over the world.

"We want to do the original research to advance the science, but we think it's extremely important to be available to the media to interpret the science," Kreider said.

And that is another way of spreading Baylor's name and the reputation of the program, Kreider said. Often, he has found people read about it in a major publication, and they want to come be part of it.

"We had 10 people just yesterday interested in our Ph.D. program," Kreider said. People are calling from across the United States and from abroad. "They know this is where the core research is being done." Kreider's vision for the department is expansive. He dreams of a sports medicine facility so the department can do more orthopedic research and work in balance, gait and biomechanics. He would like to have an exercise rehab area to do training onsite instead of at the Student Life Center, a fitness evaluation center that gives students the chance to work with assessment tools and also to gain more information about their own health. Then there are the graduate programs and the constant stream of studies. Kreider speaks excitedly of a push for the FDA to establish regional sites to do supplement research, his hopes for more health and disease intervention studies within the department.

"He likes to keep things moving," said Chris Rasmussen, the lab's research coordinator who came with Kreider to Baylor from the University of Memphis. "He always has his finger on the fast-forward button."

If you would like to see a 30-second commercial about this research, please visit: http://www.baylor.edu/research/

DR KEVIN PINNEY >

STARVING TUMORS

A 20-MEMBER BAYLOR UNIVERSITY RESEARCH TEAM IS WORKING WITH A SMALL BIOPHARMACEUTICAL DISCOVERY AND DEVELOPMENT COMPANY IN WATERTOWN, MASS., ON A CANCER DRUG THAT WORKS BY STARVING TUMORS.

BY BARBARA ELMORE

By this time next year, the drug could move into clinical trials with cancer patients.

The compound is called OXi-6197, named for the Massachusetts company, OXiGENE, that specializes in the study of vascular targeting agents, or drugs that attack the blood supply of solid tumors, such as breast and thyroid tumors. The number 6197 is the company's internal code for the drug.

OXi-6197 is in pre-clinical trials at the National Cancer Institute (NCI). The drug already has been tested in vitro, or in human cancer cells in culture. The results were promising, said Dr. Kevin G. Pinney, whose team at Baylor developed the compound. After in vitro studies, the compound began extensive in vivo testing (in a mouse model.) Pending the outcome of these on-going studies, the NCI will make a decision about how or whether to continue experimenting.

OXiGENE is conducting its own pre-clinical tests on a second Baylor compound, OXi-8007.

Working with researchers worldwide, Pinney and his team of students and other faculty began studying vascular targeting agents, or VTAs, in 1996. The saga of how the Baylor team got to this point is connected to another VTA, combretastatin A4P, developed at the Arizona State University and also licensed by OXiGENE. CA-4P, as it is known, is under study in three concurrent human trials for cancer and will also be used in a trial on patients suffering from macular degeneration, which can cause blindness.

About 10 years ago, Pinney wrote to the developer of CA-4P, Professor George R. Pettit at Arizona State, seeking to collaborate. "I needed someone to help with the biological side of what we were doing because we did not have a cell-line facility here at that time," Pinney said. "I had followed his work for a long time."

Pettit agreed to joint efforts, and since then he has screened many of Baylor's compounds. In the mid-'90s, when OXiGENE licensed his compounds, Pettit told the company about the work of Pinney, an associate professor in Baylor's Department of Chemistry & Biochemistry. In addition, Dr. Robert Kane at Baylor was working with Oxigene at that time on a separate research project, and so OXiGENE already had some familiarity with Baylor. An OXiGENE executive visited Baylor, and Pinney gave him a presentation. The happy result for Baylor was extensive research funding from OXiGENE, which works with universities for pre-clinical and early clinical development, then partners with large pharmaceutical companies for more development and marketing.

"OXiGENE has also funded our research program for four years — the whole program, not just the compound," Pinney said. "It's one of the best success stories between industry and academics that there is.

"In 1999, OXiGENE licensed all of my patents in this area and paid Baylor back for all the patent costs," he said. The company paid a licensing fee to Baylor and took over all the future patent costs — a significant expense. Most importantly, the company provided research support for Pinney's group. Last year, it supported six faculty members, all around the central theme of vascular targeting.

Vascular targeting starves tumors by removing their blood supply. Conventional chemotherapy treatments commonly used to fight cancer cells tend to be highly toxic to healthy cells as well as cancerous ones, so researchers continue to seek drugs that might be more effective at targeting the tumor only. Although none of the VTAs is to the point of receiving FDA approval, researchers are optimistic because OXiGENE is moving rapidly ahead.

"We are the company that really started focusing on this area," said Dai Chaplin, OXiGENE's chief scientific officer. "That's our entire focus. This area is very exciting in terms of this development, and other companies are now interested. While we're always looking out for other areas, we are focused on making vascular targeting a successful area for drug development."

With only 10 employees, OXiGENE outsources all of its work to universities, and all of its drug development is focused on collaboration. That's what makes Baylor's discovery so valuable, Chaplin said.

"OXi-6197 is a second generation VTA, CA4P being the first. That drug is now in a Phase II clinical trial in advanced thyroid cancer," said Scott Young, OXiGENE's VP of Clinical and Regulatory Affairs. "Two other clinical trials are ongoing, one using CA4P with radiation and the other with carboplatin, a commonly used chemotherapy drug. Three CA4P Phase I clinical trials are over. One of the people treated in Phase I, a patient with aggressive anaplastic thyroid cancer, is 'alive and well' more than three years after receiving CA4P treatment and several other patients experience significant periods of stable disease," noted Young. "We are very encouraged by our Phase I data and the preclinical results using CA4P in combination with other treatment modalities."

>HOW DO VTAs WORK?

"Tumor cells are very clever and when they get to a certain size, they realize they need more nutrients," Pinney said. "They're very good at sending out signals that say, 'Hey, blood vessels, grow here.' "

VTAs work by changing the shape of endothelial cells lining the vessel from flat to round. The endothelial cells in essence swell up, blocking the blood supply to a malignant tumor. Deprived of oxygen and other nutrients, the tumor cannot grow. "If blood flow is blocked long enough, you get necrotic events," Pinney said. "The tumor will eventually die and the body will remove this dead tissue through a variety of mechanisms."

The second generation of VTAs, like OXi-6197, impairs the vascular structure at the center of the tumor and has the goal of occluding vessels on the periphery of it.

Researchers don't know why the compound works in such a targeted way, Pinney said. But they believe that once the drug is close to the tumor, a biological mechanism generates the parent drug. The parent drug binds to a protein called tubulin, the protein with which Pinney and his team have been working.

Tubulin forms the structure of cells and keeps them from collapsing. It plays a key role in mitosis, or cellular division, Pinney noted; and for many years, traditional anti-cancer drugs have targeted tubulin by disrupting it. That, however, targets healthy cells along with cancerous ones.

"We go back a step," Pinney said. "What people realize when they try to figure out how these VTAs work is that the effect is seen within 15 to 20 minutes upon systemic administration of the drug. That can't be based on a cellular division mechanism, which takes several days."

His team studied molecular recognition, or why molecules bind specifically to the same site. OXi-6197 came out of the group's basic research program of studying molecular recognition for tubulin.

Although his research group has made hundreds of compounds, very few have shown such promising biological efficacy. Only two, OXi-6197 and OXi-8007, have emerged to date.

"It's exciting when we get a compound that performs the way we want it to, but our basic program is trying to understand how these molecules interact with proteins and enzymes. So I have to remind my students that even the compounds that are not active are as valuable to us as the ones that are. They tell us something about what works and what doesn't work in terms of this molecular recognition event."

The business strategy of OXiGENE is to license compounds from academic institutions such as Baylor, then to take them through early-stage clinical trials. If the drugs look promising at that point, the company negotiates agreements with pharmaceutical companies to complete development of the drugs, then market and manufacture them.

This maximizes the small company's flexibility in the fast-changing field of biotechnology. It also leads to a faster and more efficient drug development cycle while minimizing the cost. Since the cost of getting one compound from conception to the FDA approval point is about $700 million, drug development is big business.

In addition to Baylor and Arizona State, OXiGENE supports academic partnerships with the University of Florida and the University of Lund in Sweden. Without OXiGENE's support, it would have been financially challenging for Baylor to have been able to pursue the patents very far, Pinney said.

"Baylor was very wise and very generous to initially fund the patents, but it couldn't have filed them internationally. They wouldn't have taken on that cost without a partner. And if one of these compounds actually gets FDA approval, it will probably be one of the very few real research collaborations between academics and industry that's resulted in an FDA-approved product. Very often, companies will license from universities, but then they don't continue financial support. They just take the compound and work with it in their own labs. So OXiGENE is very unique in that sense."

In late March, OXiGENE announced that it had won the U.S. patent for its method of treating vascular diseases. OXiGENE has filed 13 U.S. patent applications and many foreign patent applications for VTAs.

While the use of VTAs to treat cancer is clearly one of its most exciting applications, the treatments also have shown promising results in treating retinal disorders such as macular degeneration, a disease in which blood vessels grow where they're not supposed to.

CA4P is showing that it can shut down these vessels that shouldn't be there. The Foundation Fighting Blindness, Inc., a charitable eye research organization, has agreed to fund a clinical trial to evaluate CA4P in patients with wet age-related macular degeneration, a condition characterized by abnormal growth of blood vessels. The National Institutes of Health will take the compound into human clinical trials. "This clinical study represents a new direction in treating ocular disease and a new potential therapeutic area for the use of VTAs," commented Young.

Pinney has a BA degree in chemistry from Ohio Wesleyan University and a BS in chemical engineering from the University of Illinois at Urbana-Champaign. He was getting that second bachelor's degree when he decided to study organic chemistry, too. "So I was a first-year graduate student in chemistry and a senior in chemical engineering at the same time." He received his Ph.D. in organic chemistry, then received a post-doctoral fellowship from the National Institutes of Health and studied at the University of South Carolina in Columbia.

Although he thought about becoming a medical doctor, **he felt research held tremendous promise in terms of providing our future treatment agents for human diseases.** "I thought the better way to do that, personally, was through synthetic organic chemistry. You have the ability of designing new molecules and creating them."

He wanted a place to begin his own academic career, a place he could teach and do research. Baylor's resources, environment and mission drew him, as did the chance to make a difference in treating cancer patients.

"Cancer is an international scourge," he said. "Many fantastic people are working on it and have worked on it for many years, but it seemed like an area where one could make some contribution."

If you would like to see a 30-second commercial about this research, please visit: http://www.baylor.edu/research/

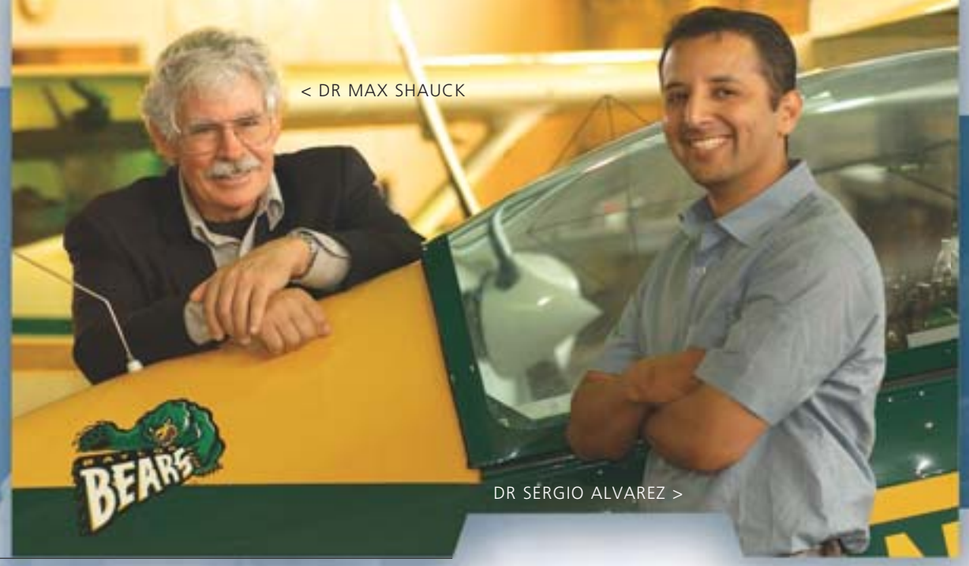
A — A model of a precursor to OXi-8007

B — Graduate student Raj Tanpure and undergraduate student Michael Stewart in Dr. Pinney's lab.

C — Fluorescence microscopy depicting cellular structure after treatment with CA4P. Courtesy of Dr. Chris Kearney

D — A depiction of tumor vascular shutdown induced by OXi-6197 (courtesy of Oxigene, Inc.)

MAX SHAUCK AND HIS PLANES



< DR MAX SHAUCK

DR SERGIO ALVAREZ >

left: **Institute for Air Science Director Max Shauck and student Sergio Alvarez cover a broad spectrum of air research including studying various fuels to levels of pollution. They are shown here with the Pitts Special S-2B, which is used to conduct fuels research and has flown in airshows across the globe.**

right: **Sergio Alvarez explains how the Twin Otter de Havilland's instrumentation measures real-time sulfate in the air while conducting the Institute's visibility studies.**

RESEARCH AIMS FOR THE SKIES AT THE INSTITUTE FOR AIR SCIENCE, WHERE STUDENTS OF FLYING, THEIR PROFESSOR MAX SHAUCK, AND OTHER FACULTY AND STAFF ARE TESTING THE AIR FOR CONTAMINANTS.

But don't think of white-coated scientists peering into microscopes or swirling the contents inside test tubes. Think instead of researchers suspended above a busy highway, wearing oxygen masks as protection against heavily polluted air as they sample air with a variety of onboard instrumentation linked with computers and data loggers.

"There's a growing need all over the world to find out what's going on with air pollution, and the aircraft is by far the best way to do that," said Shauck, director of the Institute for Air Science. "You can analyze the air quality, follow it as it moves, and you can get three-dimensional pictures of it. It's a dynamic process."

Since 1997, the department has had an ongoing contract with the Texas Commission for Environmental Quality (TCEQ) to use Baylor's specially fitted Twin Otter aircraft to collect air samples. Shauck, a veteran air sampler from the '70s, and his crew are among an elite group of people who perform air quality testing for a number of public and private groups. The TCEQ is one of their main clients.

Fliers under Shauck's guidance are often following two research tracks, studying air pollution as well as renewable fuels. "Right now, with the two converging, our thrust is to develop what we call a small sampling airplane, miniaturizing the instrumentation and using ethanol, a renewable fuel, as the power for the aircraft," Shauck said.

The Institute's Twin Otter, with an ability to fly slowly, was one of six research aircraft used in the Texas 2000 Air Quality Study, in which the TCEQ joined with more than 40 institutions to monitor air quality. The National Oceanic & Atmospheric Administration, the Department of Energy, and NASA provided the other aircraft. The study was designed to enlighten officials about air quality in the Houston-Galveston area and East Texas. It lasted a month and involved more than 150 scientists and engineers.

Currently, Baylor is providing follow-up data for that study. But the information provided by airplane-collected data already has resulted in legislation requiring that areas with poor air quality must have additives in the gasoline.

Airborne research requires that the pilots and instrumentation experts prepare the plane for three hours before a two-to-four-hour flight. If they're scheduled to fly at 6 a.m., which is not an unusual time, they will be prepping the plane by 3. Once under way, Shauck is often flying the plane with student Sergio Alvarez operating the instruments.

"This year we mainly focused on Houston and Beaumont," Alvarez said. "Our objective is to do an emissions inventory of reactive hydrocarbons. We are trying to quantify how many of these compounds are coming out of refineries."

The crew also does emissions inventories on automobiles in the Houston area to find out how much pollution they contribute. To collect samples, the pilot flies low, traveling upwind and downwind over major highways during peak traffic.

The Houston-Galveston area, one of four urban regions in Texas that does not meet federal standards for ozone, is home to many polluters: heavy traffic, refineries, ships and power plants. All contribute to what Shauck calls the "witches' brew" that people are breathing. Although regulations are in place to limit the pollutants that industry can spew into the air, "the more data in place, the better, to make the case that industry and stakeholders comply with the regulations," Alvarez said.

The other three non-compliant areas are Dallas-Fort Worth, Beaumont-Port Arthur, and El Paso. But Shauck said the Houston area probably has the dirtiest air in the United States.

"It's very, very dirty air. Because you have the water there, you have the land-seabreeze effect. In the morning, the proximity of the water causes the air to go out. Then in the afternoon, the land heating changes and (the air) comes in. So you get a double whammy. You get all the pollution from Houston moving out over the water. It heats up and gets in this witches' brew of oxides of nitrogen and hydrocarbons."

Next the air moves over and picks up more chemicals from Texas City and Galveston and the cars and the refineries.

Then it moves back into Houston, where pollution has reached more than 200 parts per billion, Shauck said. "Back when I started doing air pollution sampling, the 'never exceed level' was 80 parts per billion. It's not healthy," he said flatly.

While Shauck flies the plane, perhaps doing a spiral or a traverse over the water, Alvarez is monitoring a computer that shows the gases they are measuring. He is also keeping track of another instrument that measures particles in the air.

While measuring pollution over a highway, the crew goes upwind and downwind of the highway to see whether there is a difference on the two sides of the highway. "We are looking at nitrogen and oxide combos, and also carbon monoxide," Alvarez said. "In addition, we take these canisters where we trap the air and send it to a lab so they can run the gas through a mass spectrometer and test for hydrocarbons."

The Twin Otter might carry 20 to 30 canisters. "You open them up and it takes five to 10 seconds to collect the air," said Alvarez. But the pilot may make several passes over the same area at different altitudes to get the necessary samples. "We do it until we can no longer measure. That's determined by the limitations of our instruments," Alvarez said.

BAYLOR'S INSTITUTE FOR AIR SCIENCE HAS GROWN FROM FOUR STUDENTS (IN 1991) TO ALMOST 100 (IN 2002). LAST YEAR IT GARNERED $1.6 MILLION IN RESEARCH GRANTS. While pollution studies are a major focus, it also studies renewable fuels in aviation, both for jets and piston engines. "We develop those fuels, test the aircraft, develop the modifications, and do certification documents for the FAA," said Shauck, tapping a thick stack of papers on his desk. "It's kind of a joke in aviation these days that when the paperwork equals the weight of the airplane, you're allowed to fly."

Pilot Grazia Zanin, Shauck's wife, locates the public and private contracts that keep the researchers in the air. The institute recently monitored air quality in Canada for URS Corporation, a company that develops and improves transportation systems and infrastructure while keeping an eye on the environment.

"My role is to write proposals, present proposals, assess feasibility, organize everything, prepare before and oversee during, and make sure of final delivery," said Zanin, the director of research.

Born in Italy, Zanin has been flying since 1980. She was studying geology in her native country when she met Shauck. She had obtained her pilot's license in Fort Worth and was commuting to Italy for her last year of geology courses when he asked her to make a now-historic Trans-Atlantic flight in 1989 in an ethanol-powered aircraft. The couple successfully flew 6,000 miles. "It was always my idea to be involved in the environment," Zanin said. She got her degree in earth sciences at Baylor and is enrolled in the master's program in environmental sciences.

Alvarez, 29, graduated in May with a degree in aviation sciences. The son of migrant workers, he is the first in his family to finish college. Although it took him longer to get his degree than it does some students, he is a pilot with more than 500 hours. "Flying is expensive and I had this opportunity to work for Baylor," he said. "This involves flying and doing research."

He wanted to be a flight surgeon before discovering, while vying for a pilot's slot in ROTC, that he had a high-frequency hearing loss. He learned about the aviation sciences program and has been working there ever since.

"I really enjoy what I am doing. The value is when we go out and collect the data, we know we are making an impact to improve air quality in general. We have direct influence on people's lives to improve the air that they are breathing."

Baylor also fits into Alvarez's plans after graduation. He wants to go abroad for a semester, then attend graduate school at Baylor. His unusual experience as both pilot and researcher puts him in the position to work in many places, said Shauck.

"Sergio's work is recognized in the United States in all the agencies that do sampling with aircraft," he said. "He taught himself about instruments. He spends all his time validating data or working on instruments."

Such recognition is not unusual in a department where top students tend to get involved in research. The program offers a heavy concentration in science aimed at using the aircraft as a scientific tool. This means students like Alvarez can go into many fields. "They have a good background in atmospheric physics, atmospheric chemistry, instrumentation," Shauck said. They also can fly non-standard patterns in high-density areas. They must do this safely, while keeping in mind meteorology, chemistry and diplomacy with air traffic controllers.

Shauck, who grew up in Ohio, has been flying since he was 11 and was a fighter pilot in the Navy. While teaching theoretical math at Yale, he got a call from NASA asking if he would be interested in becoming an astronaut.

"I told them 'no' like a fool, then I started thinking about it and called them back. They said, 'Since you turned us down, we've had 11,000 applicants. Now you're just one in a queue.' "

He doesn't regret the course he chose. "What Grazia and I have done is more important than anything I could have done (there). But it would have been fun," he said with a grin.

He adds: "The fighter pilot is told the airplane is a weapon, and that's all it is. I like to think of this as a little bit higher calling — using the airplane as a scientific tool."

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BY BARBARA ELMORE

< DR ROBERT DOYLE

BY BARBARA ELMORE

WETLAND WARRIORS

BY SPRING NEXT YEAR, A 190-ACRE LAKE WACO WETLAND TEEMING WITH DIVERSE PLANT AND ANIMAL LIFE COULD BE THE SITE OF CLASSES FOR STUDENTS OF ROBERT DOYLE, A WETLAND SCIENTIST IN THE DEPARTMENT OF BIOLOGY. MEANWHILE, A COMPREHENSIVE EVALUATION OF THE LAKE WILL PROVIDE BAYLOR SCIENTISTS AND STUDENTS WITH A LIVING LAB AND THE CITY OF WACO WITH IMPORTANT INFORMATION FOR MANAGING ITS WATER SUPPLY FOR YEARS TO COME.

The wetland classroom will be part of a 5,000-square-foot visitors center, which might be ready for classes as early as this fall. The wetland, which was an option city officials chose to replace wildlife habitat acreage that will be flooded when the lake is raised seven feet, should be completely planted by next spring.

This partnership between Baylor University and the City of Waco can trace its origins to a relationship partially forged in the unlikely setting of bar ditches and ponds. This is the second wetland project that Doyle and Tom Conry of Waco's Water Utilities Department have worked on together. A Houston wetland they helped build has provided some of the plants for the local wetland. The two met through mutual friends and have known each other for a number of years.

Although they are of like mind on the importance of the local wetland, they have different interests in the results. Doyle sees it as a research tool and as a resource for countries that don't have the water purifying infrastructure the United States enjoys. Conry, program manager for production quality control programs in Waco's water department, is interested in lake management strategies.

Doyle's interest in biology and in providing aid to poor countries has roots in his childhood, when he lived 1,000 miles up the Amazon River, near the city of Manaus, Brazil, as the son of Baptist missionaries.

"My father was a church planter, involved in starting and developing churches and programs. I was educated in the Brazilian school system, and other than getting homeschooled in English grammar and U.S. history in the evenings, my life was not all that different from the others I went to school with," Doyle said.

In that lush setting, his interest in nature developed early. He nurtured macaws and monkeys as pets. But science made its most important mark on him during a visit by Dr. Ghillean Prance of the New York Botanical Gardens. Prance traveled to the Amazon to identify plants from the rain forest. Young Robert Doyle, about 11, was hooked.

"He and his family lived there for several years," he said of the taxonomist. "My parents helped them set up house and learn how to boil the water and all the things you have to do to run a home in the tropics. As a thank-you to them, he took me out on an expedition."

When young Doyle returned from the trip, he said, "When I grow up, I'm going to be one of those. My parents always talked about their call to missions. I've always thought that was my call to science."

Additionally, he said, Prance "was a very strong believer and so my first image was of a terrific, world-renowned scientist who was a very vocal believer. So on this whole issue of science and religion, I always wondered what the fuss was about. I didn't know there was a fuss."

From those roots, Doyle received his B.S. and M.S. from Baylor, where he trained under Dr. Owen Lind, and later trained as a wetland scientist, doing research for his doctorate on the Amazon floodplain. He also worked with the Army Corps of Engineers as a wetland scientist,

Only about $2,000 of the $300,000 wetland budget had gone to buy plants by spring 2003, Conry said. "Everything else is harvested locally, from bar ditches, Waco Creek, and some below Lake Whitney."

More than 90 percent of the first plants survived, he said, because of gentle treatment that included putting plants back into their natural environment only 48 hours after harvesting them. "In essence, they don't even realize they've been moved."

The kinds of creatures they are luring into the Waco marsh has everything from scaly skin to feathers and webbed feet, noted Doyle. "We are encouraging amphibians, frogs, salamanders. There is a global decline in them, probably pollution-related. Duck habitat is also a big issue. And there are the less well-known organisms and migrating birds."

Conry said the city could have planted new trees to replace the bottomland hardwoods, or forest, that will be lost once the lake is raised. But officials chose a wetland because of its ability to improve water quality and its unique features for this area — large size, public access and educational opportunities.

Based on 40 years of data on river flow, the wetland's diverse plant and other life will purify 20 percent of the average annual inflow from the Bosque River, which dumps pollution into the lake from dairies upstream. Because this area of Texas has both wet and dry years, that percentage will vary from year to year, said Conry. In wet years, the percentage drops. In dry years, it could increase to 40 to 50 percent.

Of three major items that come through the wetlands — suspended solids, nutrients and phosphorus — Doyle said the wetland will do a good job removing solids for a "very long time" and an "OK" job of removing nutrients, to the extent they are associated with solids. Phosphorus, however, is of "the most concern and is the least well-removed in the long term," he said.

Although this wetland won't handle enough of Lake Waco to make

MORE THAN 90 PERCENT OF THE FIRST PLANTS SURVIVED <

and took a faculty position at University of North Texas in the same capacity. When he discovered Baylor was doing "exciting things" with water research, he arrived on campus in the fall of 2001.

Much of his excitement revolves around the 190-acre Lake Waco wetland, which volunteers started planting in October 2001. Because diversity of plant life is important to attract diverse animal life, Doyle created a species list that includes Bulrush, softrush, cattails, spikerush, nutgrass, duck potato, pickerelweed, burhead, water lilies, and several submerged species.

"We spent a lot of effort planting the first eight acres so that those plants could get established," Dr. Doyle noted. "We got plants from wherever we could find them. We went to bar ditches, drainage ditches. That was real hard because you had to find the plants. It's easier now," he said, as new plants can come from the established species planted on the first eight acres.

a large difference in water purity, said Doyle, the concept has great potential. "If we begin to manage our water so that we deliberately divert it through wetlands, that has the potential for long-term benefits. This one wetland, while it's a great start, is not a solution to the Bosque River problem. By itself, it's not going to make a big difference on the overall quality of the lake."

But perhaps another water research partnership between Baylor and the city will. Called the Center for Reservoir and Aquatic Systems Research (CRASR), it involves a collaboration between the two entities to collect huge amounts of information about the lake. The city is funding about $2 million worth of projects involving samples that Baylor will analyze.

"It will be comprehensive," said Conry, ticking off experiments on the lake's depth and scope, wind and heat dynamics, in addition to its chemistry. The city will also collect biological data so that aquatic and transitional plants and insects can be studied.

Sampling has already begun to give analysts a snapshot of the lake before it is raised. It will continue for three years after, Conry said. "Baylor is doing a Geographic Information System and computer modeling at CAGSR," he said, referring to the University's Center for Applied Geographic and Spatial Research.

The project will be finished in 2007, and he will be looking for management strategies that will protect the lake.

Conry, who obtained both bachelor's and master's degrees from Baylor, also is interested in expanding the symbiotic relationship between the city and the University. "We've had intensive sampling events. The students need it, to see how it works in the field. The city has needs and it's a natural fit to talk to the experts at Baylor University. Other entities will come to Baylor because it already has a mechanism in place. This is unique in Texas — it's completely open, it has public access, and it's a living laboratory."

Doyle is excited about potential worldwide applications for the wetland. "This is a low-tech way of better handling the environment. Developing countries will never have the kind of water treatment systems we have. There's just not the money for the infrastructure. So in places like Brazil or Mexico, encouraging wetlands instead of avoiding them will help us with water management in developing countries.

"One of the reasons I came to Baylor was that it was easier to imagine getting back and doing this kind of work in developing countries. Baylor has a mission view of the world religiously, and I feel that just as strongly. I have a unique background that gives me insight to Brazil and Latin cultures and training that's harder to come by there. So going back to Brazil and to Mexico and encouraging good stewardship of natural resources is part of the attraction of coming to Baylor."

If you would like to see a 30-second commercial about this research, please visit: http://www.baylor.edu/research

book reviews

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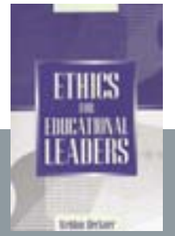
4 

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1 VALUE BASED MANAGEMENT:
The Corporate Response to the Shareholder Revolution

Harvard Business School Press
> John D. Martin and J. William Petty

Why do some firms create extraordinary value for shareholders, while others destroy it? A powerful suite of value based management tools can make the difference.

The corporate world's most significant and effective response to the shareholder revolt, value based management (VBM) allows financial managers to plan, monitor, and control a firm's operations in ways that enhance shareholder value. This timely book — based on the authors' research and on an extensive study of firms that have successfully implemented VBM systems — provides the first objective, field-tested synthesis of the most popular models in use today: the free cash flow method, the economic value added/market value added (EVA/MVA) method, and the cash flow return on investment approach (CFROI). Pointing to the lessons learned by VBM adopters in a wide variety of industries, the authors outline the advantages and disadvantages of each model, and guide managers in selecting, implementing, and operating one that best fits their organization.

At its essence, value based management involves transforming behavior in a way that encourages employees to think and act like owners. Laying the foundation for building a capital-market-focused measurement and reward system that ties employee-level performance to owner-level rewards, this book will help today's leaders establish a continuous cycle of value creation that benefits all stakeholders of a company.

Petty is professor of finance and the W.W. Caruth Chairholder of Entrepreneurship at Baylor University. His research interests include valuation and acquisitions of privately held companies, the financing of entrepreneurial firms, and shareholder value-based management.

Martin came to Baylor in 1998 from the University of Texas at Austin where he taught for 18 years and was the Margaret and Eugene McDermott Centennial Professor of Finance. He has published widely in both academic and professional journals.

2 THE POWER OF GOOD DEEDS:
Privileged Women and the Social Reproduction of the Upper Class

Rowman & Littlefield
> Diana Kendall

The Power of Good Deeds presents the personal narratives of elite women as they describe their views on philanthropy, the need for exclusivity in their volunteer organizations, their childhood and college years experiences in prestigious schools and sororities, and the upper-class rituals in which they are involved. Also included are sociological conclusions about class and social power derived from those narratives.

Kendall's research was conducted in order to find out how elite women use social power — not only to benefit less-fortunate people but also to benefit themselves and their families. The study included the integrated use of participant observation, interviews, and content analysis that draws upon materials from biographies and journalists' reports. The participant observation portion of the study took place in at gala benefits, monthly meetings of leagues and guilds and their boards of trustees, and parties and social gatherings in private residences and elite clubs. Interviews were conducted with women in upper-class organizations, and more than 225 members of one organization responded to a questionnaire that examined the women's views on organizational power, socialization of children, and their reasons for participation in elite volunteer organizations. This research allowed the author unprecedented access to elite women across racial and ethnic categories in several Texas cities.

Kendall (Ph.D., University of Texas at Austin) is associate professor of sociology at Baylor University. Her research and teaching interests include social theory and race, class, and gender.

3 TEXAS ADMINISTRATIVE PRACTICE AND PROCEDURE

Lexis Law Publishing (2003)
> Ron Beal

This treatise is a thorough analysis of all procedural and legal issues in Texas Administrative law. Since the adoption of the Texas Administrative Procedure Act in 1976 (APA), administrative law in Texas has been characterized by an explosion of "new law" and inconsistent judicial decisions. This treatise is a comprehensive reference on all relevant case law decisions since the beginning of Texas jurisprudence and it demystifies this large and confusing body of case law in light of the major changes made by the Texas APA. Updated yearly since its initial publication in 1997, it offers up-to-date information and authoritative analysis. Thus, the treatise is a rich resource of case law decisions for the practitioner as well as an authoritative source for issues that remain undetermined or that involve conflicting judicial decisions.

The treatise covers and examines the delegation doctrine, rulemaking procedures, and the legal challenges that may be made, procedural, legal and constitutional, to the adoption of a rule. All issues related to the contested case hearing process at the pre-hearing, hearing, post-hearing and judicial review stages are thoroughly analyzed. The scope of agency adjudicative power, the impact of constitutional due process on agency decision making, and the judicial scope of review of agency action are set forth in detail. In addition, ad hoc adjudication, declaratory judgment actions, and the Texas Open Meetings Act are reviewed in light of judicial decisions interpreting the same. Finally, the treatise covers administrative action by local governmental bodies not subject to the Texas APA.

Beal has taught at Baylor Law School for 20 years. He teaches three administrative law courses and is a consultant to top law firms in the state regarding administrative law litigation.

4 ETHICS FOR EDUCATIONAL LEADERS

Allyn and Bacon (June 2003)
> Weldon Beckner

This book was written to help meet the need to develop educational leaders who are more than efficient, leaders who effectively serve the educational and developmental needs of children and youth. These leaders face daily a multitude of demands and challenges requiring many kinds of decisions that at times have no good solution available. Every option has one or more negative aspects. Making the best decisions in these kinds of situations must involve more than following policies, rules or accepted practices. Other considerations, typically involving ethical concepts, must be included in the decision-making process if the best interests of the students, the school and the society are to be well served.

The basic purpose of this text is to take what we can glean from the study of philosophy and ethics and find a way to apply the best thinking from those fields and other related fields of study to the everyday world of teaching earning, and educational leadership.

Beckner has been a professor of educational administration at Baylor since 1995. His major professional interests include educational leadership, organizational development, ethics in educational leadership and rural education. He served as vice president of academic and student services at Wayland Baptist from 1993-1995 and professor and department chair at Texas Tech from 1965-1993.

5 COMPONENT-LEVEL PROGRAMMING

Prentice Hall (2003)
> Peter Maurer

There are many books that show how to use components, but this text covers the "other side" of component-based development — the development of the components themselves. The development of new components is based on a new theory of how to subdivide components into categories. This division into categories simplifies the task of creating new, component-based programs from specifications. In component-based design it is necessary to subdivide a program into several different components, plus a substantial amount of glue logic. Until now, no formal methodologies have been developed for doing this. This book shows how to use categorization as a tool for partitioning subtasks between components and glue logic. It shows how to assign tasks to components, some of which will be custom built, and some of which will be off-the-shelf parts. A substantial portion of the book is devoted to design methodologies for each component category. Each category and how it relates to others is explained in detail, as well as design methodology and sample applications for the category.

The reader is lead through the principles of component-level design one step at a time.

Maurer has been an associate professor of computer science at Baylor since 2002. He came to Baylor from the University of South Florida. His research interests include component-level programming, web-based applications, object oriented programming, and rapid prototyping.

6 CRIMEN Y PODER EN LA NARRATIVA CHILENA CONTEMPORÁNEA
(Crime and Power in the Contemporary Chilean Narrative)

Mosquito Editores, Santiago, Chile (2002)
> Guillermo García-Corales and Mirian Pino

Crime and Power in the Contemporary Chilean Narrative presents an analysis of the Chilean narrative of the last 20 years with a focus on the detective novel. The analytical framework of this study is based on cultural criticism, an approach developed by critics such as Raymond L. Williams, Fredrick Jameson, Pierre Bourdieu, and Michel Foucault. After offering a panoramic view of 40 novels belonging to the detective genre, this work focuses on an in-depth study of six of the police novels by Ramón Díaz Eterovic (1956), the most outstanding writer of this genre in Chile. The book provides critical elements to advance the research of the new detective genre in Latin America, which is experiencing considerable growth. Furthermore, this study opens significant analytical and ideological pathways to advance academic investigation of the Chilean narrative as a whole published since the middle of the Chilean dictatorship period (1982) until the 12th year of the democratic reconstitution (2002).

Research for this book was conducted by reading 50 Chilean novels by the "Generation of the 80s," reviewing sources dealing with contemporary Chilean narrative, gathering in Chile crucial information about the new generation of Chilean writers, participating in national and international literary events dealing with issues closely related to this project and conducting personal interviews with prominent Chilean writers.

García-Corales, of Chile, is an associate professor of Spanish at Baylor, where he has taught for 11 years. He received his BA in education and Spanish from the University of Notre Dame, his MA in Latin American literature from Notre Dame and his Ph.D. in Latin American literature from the University of Colorado at Boulder. Pino, of Argentina, is a professor of Latin American literature at the University of Córdoba in Argentina.

Vice Provost for Research Colloquium Series

Each year, world-renowned scholars from a variety of disciplines gather at Baylor University to present their latest research to students and professors at the Vice Provost for Research Office Colloquium Series.

In April 2003, the Colloquium Series featured **Doug Axe, a research scientist at the Babraham Institute in Cambridge in the United Kingdom**. Axe expanded ideas on "Probing the Relationship between Sequence and Function in Enzymes: A New Picture in Sequence Space." Genomic sequencing projects and high-throughput structure determination are leading to rapid expansion of the known repertoire of these units, each with its own characteristic three-dimensional fold. Axe explained that despite their number and central importance to life, the processes by which new domains originate remain obscure. Key insights into this have been obtained by experimentally probing the functional constraints on the sequence of a suitable test domain. The results provide a new picture of sequence space with some surprising properties which Axe discussed.

Also in April, **Apostolos Karafillis** spoke on "Development of Sheet Metal Forming Processes: Modeling Methods, Defect Prediction and Manufacturing Process Design Procedures." Karafillis explained that the sheet metal forming processes enable the manufacture of complicated three-dimensional parts at a low cost; however, a long lead time is usually associated with the introduction of these products. Karafillis explained that one of the main reasons for the long lead time is the use of multiple tryouts that are performed to ensure that the produced part is free of manufacturing defects (e.g. tearing or wrinkling) and meets the shape fidelity that is required by design. Karafillis gave examples of these procedures, demonstrating the effectiveness of the presented approach.

In January 2003, **Heinz von Seggern of the Darmstadt University of Technology in Germany** spoke on "Charge Transport in Organic Semiconductors." Strongly influenced by the presence of electronic traps, these natural electronic systems have transport mechanisms and trap states which determine the workings of organic light emitting diodes (OLEDs) and organic-field-effect transistors (OFETs). In explaining the way organisms produce luminescence, he discussed the measurements known as fractional glow or TSC as well as optically stimulated luminescence (OSL), which are utilized to determine the density of occupied states (DOOS) in various organic "small molecule" and polymeric semiconductors. Von Seggern talked about the differences between trap filling during electrical and optical loading of small-molecule and polymer devices and speculated on transport pathways in organic semiconductors.

Earlier in November, 2002, the series featured **Adam Holzman, a professional classical guitarist from the University of Texas at Austin**. Holzman played with excellence in the recital hosted by the Vice Provost for Research.

Then, in September 2002, the Vice Provost for Research along with several other campus departments and institutes honored the memory of **Paul Dirac, one of the greatest physicists of the 20th century**, with a discussion of the current state of theoretical physics. Scholars such as **Sir Roger Penrose of Oxford University** spoke at the Dirac Centenary Conference. Speaking on "Why We Need a New Quantum Mechanics," Sir Penrose offered to his audience mathematical equations, which he described as "something beautiful," "something mysterious" and "something paradoxical." He also displayed his drawings of possible models of the universe's origins according to Einstein's theory of relativity.

Revering quantum theory as one of the supreme achievements of the 20th century, Penrose said that resolving its seemingly paradoxical difficulties will require changing the theory in accordance with Einstein's general theory of relativity. In the Conference Lecture titled "The Cosmological Constant: Has Dirac's Large-Number Hypothesis Returned in a New Form?" Penrose talked of recent observations indicating that a cosmological constant might be required in Einstein's equation.

Penrose is the Emeritus Rouse Ball Professor of Mathematics at the University of Oxford and Francis and Helen Pentz Distinguished Professor of Physics and Mathematics at Penn State University. Born in the United Kingdom in 1931, he was awarded a bachelor's degree at University College in London and a Ph.D. at St John's College in Cambridge. He held several posts in the UK and United States, particularly at Birkbeck College in London. He was elected a Fellow of the Royal Society of London in 1972 and a Foreign Associate of the United States National Academy of Sciences in 1998. He has received a number of prizes and awards including the 1988 Wolf Prize (which he shared with Stephen Hawking for their understanding of the universe), the Dannie Heinemann Prize, the Royal Society Royal Medal, the Dirac Medal, and the Albert Einstein prize. His 1989 book The Emperor's New Mind became a bestseller and won the 1990 (now Rhone-Poulenc) Science Book Prize.

Penrose has research interests in many aspects of geometry and has made contributions to the theory of non-periodic tilings, to general relativity theory, and to the foundations of quantum theory. He has also contributed to the science of consciousness. His main research program is to develop the theory of twistors, which he originated more than 30 years ago as an attempt to unite Einstein's general theory of relativity with quantum mechanics. In 1994 he was knighted for his services to science.

Also in 2002, the Colloquium series presented **M.A. Shea and D.F. Smart — CSPAR, University of Alabama in Huntsville, Alabama and Emeritus, Air Force Research Laboratory at Hanscom AFB in Massachusetts** — who presented, "Space Weather: From Modern Technological Effects to Archaeological Studies." The term "Space Weather," they said, has been popularly used to describe solar influences on the earth, which are becoming increasingly apparent as technology progresses. Shea and Smart gave an example of a solar X-ray event in 1984 that seriously interfered with high frequency communications with Air Force One when traveling between Hawaii and China.

Other examples included an unexpected geomagnetically-induced surge on an electric power grid in Canada in 1989 that led to a blackout in Quebec lasting several hours. They said that solar protons can cause single event upsets in sensitive electronic components, while increases in radiation can come from extremely large solar proton events. Though records of such events are limited to the past 60 years, Shea and Smart believe that nitrates deposited in polar ice can extend our knowledge of extremely large events to include those occurring thousands of years ago. Their seminar presented an overview of solar activity and its influence at the earth, including known effects, speculative effects, and even effects on sporting events.

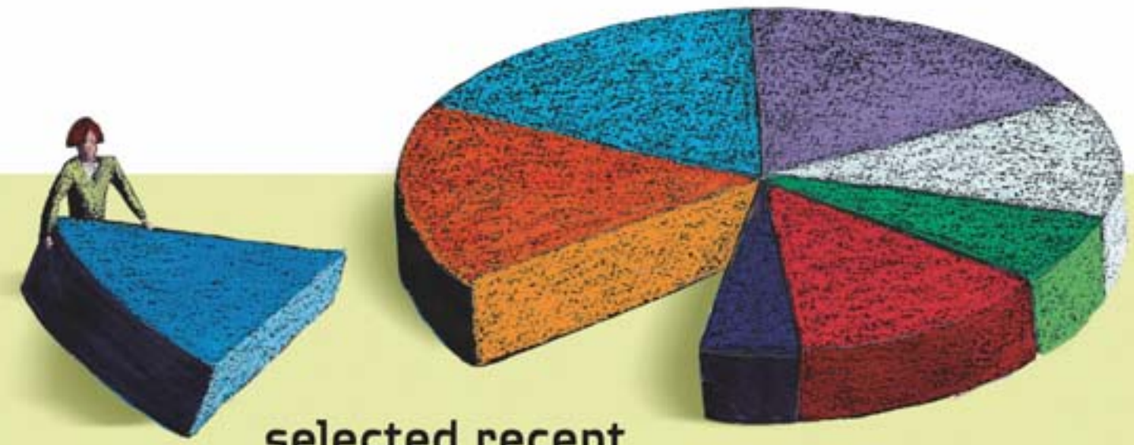
pictured above: SIR ROGER PENROSE OF OXFORD UNIVERSITY

> Graduate Degrees at Baylor

Accounting — MAcc, MAcc/BBA, MAcc/JD
Advanced Neonatal Nursing — MSN
Advanced Nursing Leadership — MSN
American Studies — MA
Biology — MA, MS, PhD
Biomedical Studies — MS, PhD
Business Administration — MBA, MBA/JD
Business Administration in International Management — MBI
Business Administration/Information Systems — MBA/MIS
Chemistry — MS, PhD
Church Music — MM, MM/MDiv
Church-State Studies — MA, PhD
Clinical Psychology — PsyD
Communication Sciences and Disorders — MA, MSCS
Communication Studies — MA
Composition — MM
Computer Science — MS
Conducting — MM
Curriculum and Instruction — EdD, MA, MSE
Directing — MFA
Earth Sciences — MA
Economics — MSE
Educational Administration — EdD, MSE
Educational Psychology — MA, MSE, PhD
English — MA, PhD
Environmental Biology — MS
Environmental Studies — MES, MS
Family Nurse Practitioner — MSN
Geology — MS, PhD
Health Care Administration, Fort Sam Houston — MHA
Health, Human Performance, and Recreation — MSE
History — MA
Information Systems — MSIS
Information Systems Management — MBA
International Economics — MA, MS
International Journalism — MIJ
International Management — MIM
International Relations — MA
Journalism — MA
Limnology — MSL
Mathematics — MS, PhD
Museum Studies — MA
Music Education — MM
Music History and Literature — MM
Music Theory — MM
Neuroscience — PhD
Performance — MM
Philosophy — MA, PhD
Physical Therapy, Brooke Army Medical Center — DScPT
Physical Therapy, Fort Sam Houston — MPT, DPT
Physical Therapy, West Point — DScPT
Physics — MA, MS, PhD
Piano Accompanying — MM
Piano Pedagogy and Performance — MM
Political Science — MA
Public Policy and Administration — MPPA, MPPA/JD
Religion — MA, PhD
Social Work — MSW, MSW/MDiv
Sociology — MA, PhD
Spanish — MA
Statistics — MA, PhD
Taxation — MTax, BBA/MTax, MTax/JD

> University Research Centers and Institutes

Center for American & Jewish Studies
Center for Analytical Spectroscopy
Center for Applied Geographic and Spatial Research
Center for Astrophysics, Space Physics & Engineering Research (CASPER)
Center for Business and Economic Research
Center for Christian Ethics
Center for Community Research & Development
Center for Drug Discovery
Center for Family & Community Ministries
Center for International Education
Center for Ministry Effectiveness
Allbritton Art Institute
Institute for Air Science
Institute of Archeology
Institute of Biblical & Related Languages
Institute of Biomedical Studies
Institute for Faith & Learning
Institute for Oral History
Institute for Statistics
Institute for Technology Innovation Management
J. M. Dawson Institute of Church-State Studies



selected recent project grants and contracts of Baylor faculty members:

Truell W. Hyde, Vice Provost for Research > $45,000; Research Experiences for Undergraduates and Teachers-REU Site; National Science Foundation, additional funding to existing grant

F. Gordon A. Stone, Chemistry and Biochemistry > $52,000; Synthesis, Structure and Reactivity of Transition Metal Complexes; The Robert A. Welch Foundation

Kevin G. Pinney, Chemistry and Biochemistry > $150,000; Molecular Recognition of Tubulin by New Classes of Affinity Probes and Polymerization Inhibitors; The Robert A. Welch Foundation

G. Peter van Walsum, Environment Studies > $50,000; Vision Grant: Uniting Students from Baylor and Area High Schools to Improve Water Quality in Central Texas; 3M Foundation

Lisa Taylor, Nursing > $247,955; Basic Nurse Education and Practice Program, Year 1; U.S. Department of Health and Human Services, Health Resources and Services Administration

Robert Doyle, **Rene Massengale**, and **Joseph White**, Biology, and **Bruce Byars** and **Lisa Zygo**, Center for Applied Geographic and Spatial Research > $103,874 for Phase I of a project involving water quality of Lake Waco, from ENSR Corp. through the City of Waco

John A. Dunbar and **Peter M. Allen**, Geology > $204,862; Variable Frequency Acoustic Profiling for Sediment Surveys of Flood Control Reservoirs; U.S. Department of Agriculture

Susan Johnsen, Education > $284,355; TxBESS-Phase III; U.S. Department of Education through Educational Service Center Region 12

Dennis Myers and**d Helen Harris**, Social Work > $60,000; Geriatric Enrichment in Social Work Education; Council on Social Work Education

Marianna A. Busch, **Charles M. Garner**, **Stephen L. Gipson**, **Robert R. Kane**, **Kevin K. Klausmeyer**, **Carlos E. Manzanares**, **Kevin G. Pinney**, and **F. Gordon A. Stone**, Chemistry and Biochemistry > $502,000 for individual grants from the Robert A. Welch Foundation in support of basic chemical research

John Dunbar, Geology > $140,000; 3-Dimensional Modeling of Geologic Structures; Shell International E&P, Inc.

Steven R. Eisenbarth, **Ben Kelley**, **Leigh Ann Marshall**, Engineering > $20,527; Launching the Texas Engineering Education Pipeline: Deploying the Infinity Project Statewide; Texas Higher Education Coordinating Board

Diana Garland, **Rob Rogers** and **Gaynor Yancy**, Social Work > $2,030,000; Best Practices for the Faith and Service Technical Education Network; Pew Charitable Trusts through the National Crime Prevention Council

Rebecca Sharpless, Oral History > $119,222; Learning from Experience: Accounts and Documents from Population Pioneers; William & Flora Hewlett Foundation through the University of New Mexico

Trena Wilkerson, Curriculum and Instruction > $79,000; Problem Solving for the 21st Century 2002-03; Texas Higher Education Coordinating Board-Eisenhower Professional Development Program

Mary Margaret Shoaf, Mathematics > $79,000; Rethinking Middle School Math: Proportional and Algebraic Reasoning; Texas Higher Education Coordinating Board-Eisenhower Professional Development Program

> For additional information about the above partial listing of Baylor faculty project grants and contracts, contact the Office of Sponsored Programs and Contracts, Gary E. Carter, director; the Office of Foundation Development, Cynthia J. Dougherty, director; or Truell Hyde, vice provost for research.