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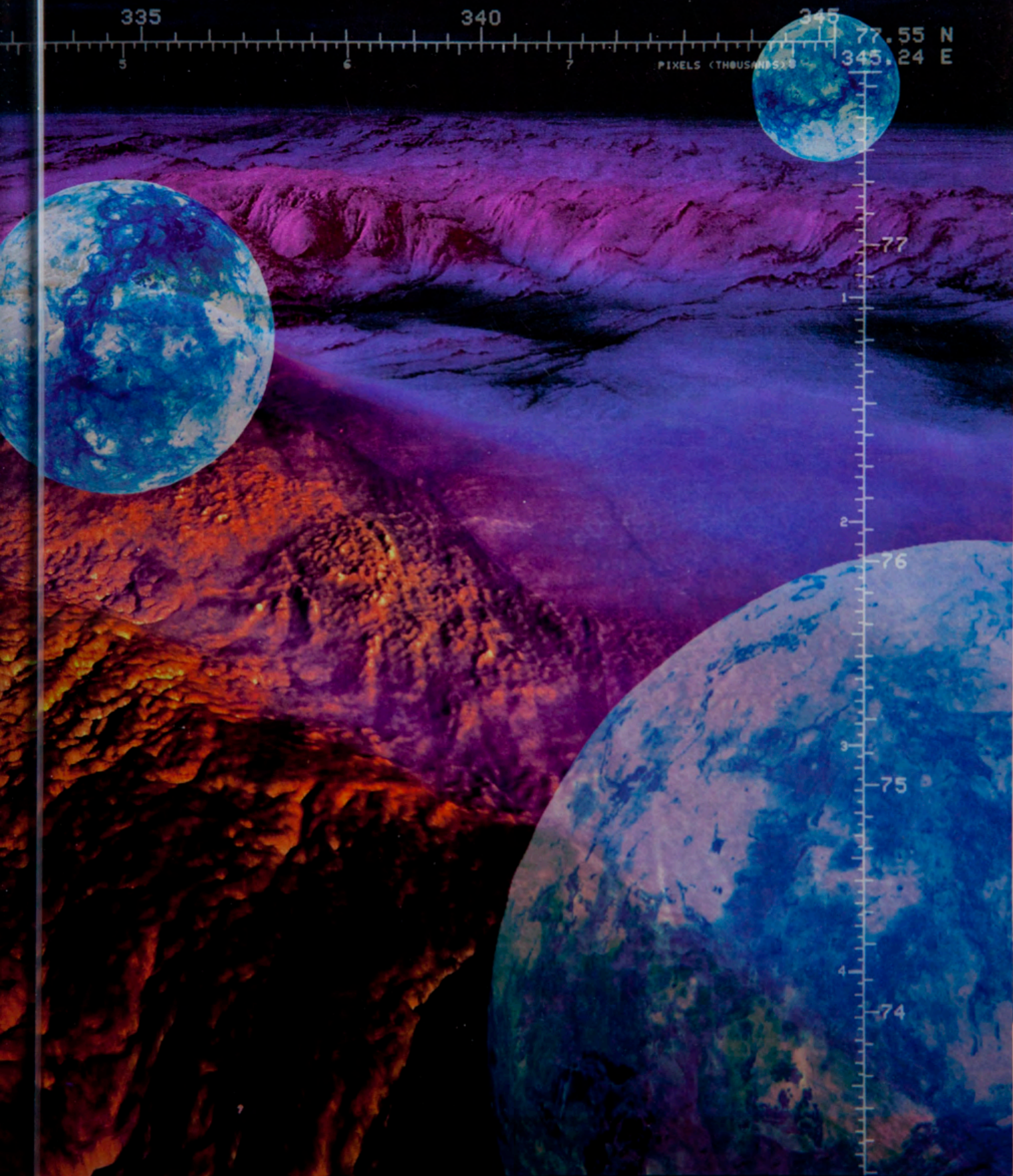
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SMU RESEARCH

SOUTHERN METHODIST UNIVERSITY

VOLUME 3 1996



Imparting knowledge to the next generation goes hand-in-hand with the pursuit of knowledge. Although teaching is the primary focus at Southern Methodist University, research plays a vital role in expanding students' understanding of their world and increasing faculty enlightenment to advance the academy. Therefore, SMU's doctoral programs in a selected number of disciplines help support the University's goals of teaching, research, and service.



The third volume of *SMU Research* illustrates how professors and students are helping the University to achieve its goals. It includes articles and vignettes about scholarly activities that present the breadth of interests among our faculty members. Several demonstrate the University's increasing partnerships with government agencies and private industry to support ongoing sponsored research projects. Vicki Hansen, associate professor of geological sciences, reaches out of this world in her work with NASA to study the surface of Venus. Much closer to home, Edward Smith, assistant professor of mechanical engineering, teams with Tyler Pipe to solve a problem with industrial waste.

Emphasis on the quality of undergraduate education and the professional growth of faculty members also are profiled. "The Competitive Edge" describes the extensive research experience that undergraduates gain through the Chemistry Department, a premier science department in SMU's Dedman College of Humanities and Sciences. You also can read about the SMU-sponsored research and travel grant program that helps younger faculty members in their professional growth and supports senior faculty in areas of scarce research funds.

In addition to the feature stories, you will find a report on sponsored research dollars recently awarded to the University. Sponsored research is a modest but indispensable activity in SMU academic life. One out of five faculty members across the University participate in this activity, and virtually all engineering and science faculty engage in sponsored research. Nearly \$8 million a year flow through the program, a rate that is double that of a decade earlier. The increase is a testimonial to the high quality of today's faculty and their growth in academic excellence over the past 10 years.

Faculty and student research requires financial support. The magnitude of such support varies, depending on the discipline. Public agencies and the private sector are generous in their research support of the University. On behalf of SMU and the constituent schools, I extend our gratitude to all donors for helping to enrich the academic life of this University, and I encourage your continued support in the future.

U. Narayan Bhat

U. Narayan Bhat

Dean, Research and Graduate Studies

SMU RESEARCH

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SOUTHERN METHODIST UNIVERSITY • VOLUME 3 1996

NOT OF THIS WORLD



COVER STORY

Geologist Vicki Hansen studies the surface of Venus to better understand terra firma. To help her visualize the planet's features, SMU computer scientist David Anderson has transformed raw data from the spacecraft *Magellan* into visual images on the computer, including the cover image of the mountains of Maxwell Montes, a region similar in altitude to the Himalayas. **10**

DEPARTMENTS

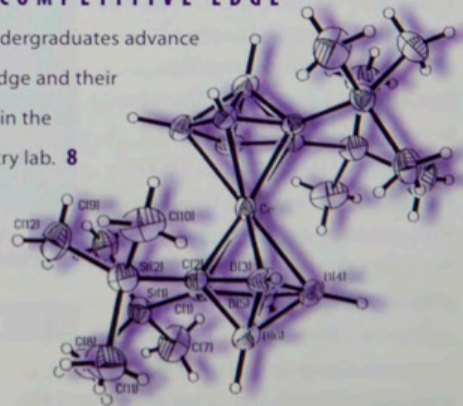
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THE COMPETITIVE EDGE

SMU undergraduates advance knowledge and their careers in the chemistry lab. **8**

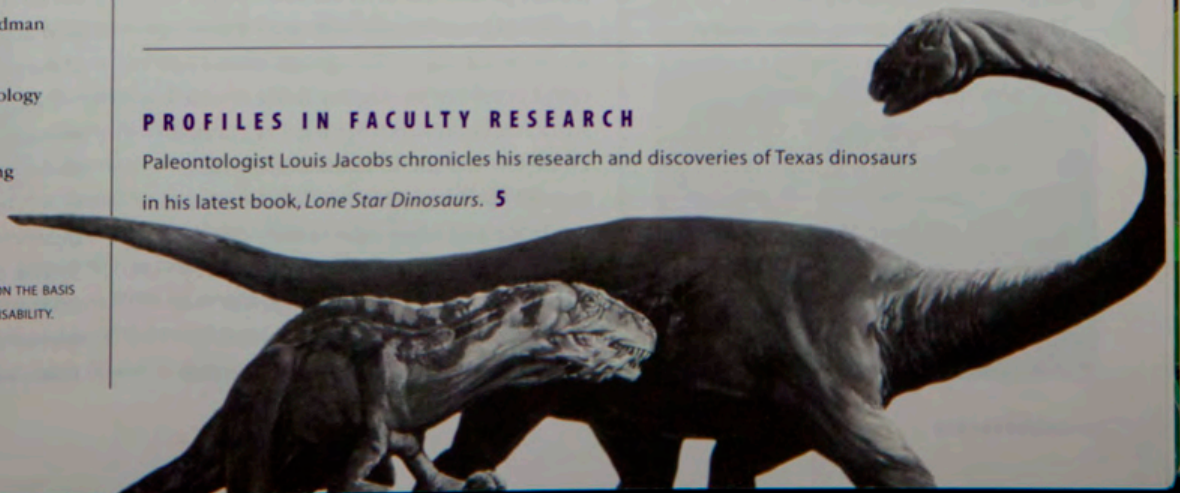


PUTTING WASTE TO WORK

Researcher uses industrial waste to cleanse contaminated water. **12**

PROFILES IN FACULTY RESEARCH

Paleontologist Louis Jacobs chronicles his research and discoveries of Texas dinosaurs in his latest book, *Lone Star Dinosaurs*. **5**



Research, and resulting publications, is essential to the academic reputation, not only of individual faculty members but also of a university. "The higher education community recognizes and encourages the significance of research credentials in a faculty member's professional development," says Narayan Bhat, dean of research and graduate studies at SMU.

Currently, junior and senior faculty members at SMU conduct research that spans the globe – from Eastern Europe to Tahiti – and probes the mysteries of the minute – from genetic factors underlying total cholesterol to the intricate workings of absorption systems.

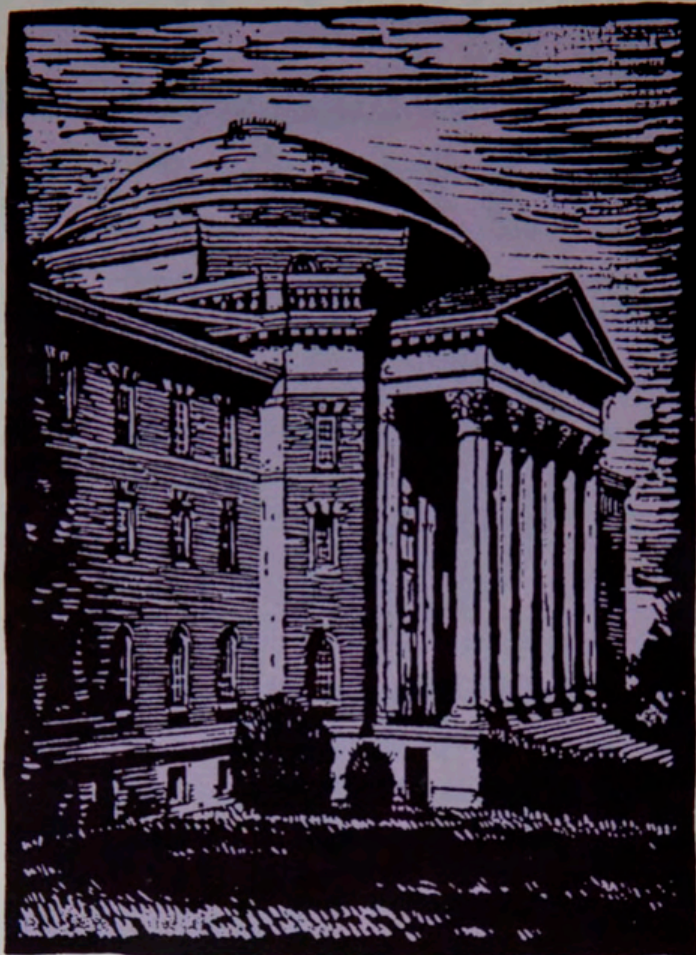
Ongoing research can be a costly enterprise, however. To provide financial support to active researchers, SMU created in the early 1980s the University Research Council, which comprises faculty members from all six schools and research administration. Since then, nearly \$1 million has been provided to support research by SMU faculty. In recent years, faculty research has been supported by endowment from the Fikes Foundation and annual gifts from the King Foundation.

During 1994-95, the University Research Council awarded research and travel grants totaling \$91,510 to 45 junior and senior faculty members. The grants enable them to conduct research that is not funded externally; to reduce expenses related to travel, equipment, supplies, and software; or to attend international conferences to support their professional development.

Through a travel grant, Associate Professor of History **James K. Hopkins** conducted research at the Russian Center for the Preservation and Study of Modern History Documents in Moscow. For his manuscript in progress, Hopkins researched materials on the Spanish Civil War that had disappeared from Spain in 1939 and had surfaced only recently in the Russian Center.

"I was the first historian to see the

RESEARCH ON THE HILLTOP



UNIVERSITY GRANTS CONTINUE RESEARCH

documents, and the material proved richer than I could ever have imagined," Hopkins says.

A research grant enabled Associate Professor of Art **Mary Vernon** to spend two weeks in Austin at Flatbed Press, a center for study in printmaking, working under master printer Kathryn Brimberry and producing four color etchings. "The works of art made during this collaboration I consider among my finest recent work," Vernon says. "My time at Flatbed Press allowed me to collaborate with a superb master printer and teacher. Her guidance and ideas significantly changed the way I work. It also allowed me to experiment with materials in a way that enlightened me, and will enlighten my students. Many technical and practical

things that were missing before now form a part of my pedagogical repertoire." (See Vernon's print on the inside back cover.)

With his grant, Assistant Professor of Statistical Science **Rudy Guerra** conducted preliminary research in conjunction with researchers at UT Southwestern Medical Center for the statistical modeling of quantitative traits thought to be influenced by a few major genes. "We found a few genes that can explain an appreciable fraction of variation in cholesterol levels among the general population. We're trying to elucidate the genetic factors underlying cholesterol, which is known to be associated with heart disease," Guerra says.

José Lage, the J. Lindsey Embrey Trustee Professor of Mechanical Engineering, had the opportunity to network with his colleagues worldwide when he traveled to Bucharest, Romania, and Florence, Italy, to participate in seminars and a symposium. At the first Bucharest Heat Transfer and Thermodynamics Workshop, Lage says, he was able "to strengthen my contacts with Romanian academicians. Romania has been a tremendous source of high-quality graduate students for the Mechanical

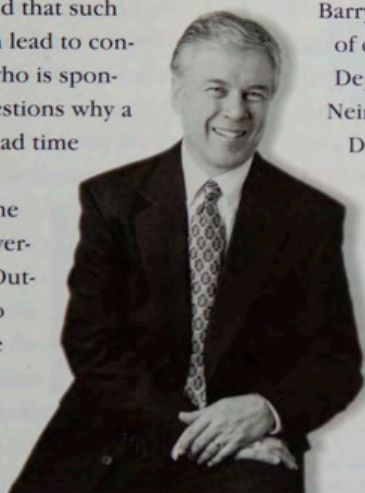
Engineering Department. The level of knowledge in basic sciences among these students is now recognized to be well above average." Lage attended the World Energy Research Symposium in Florence to broaden his research interests to energy systems, as well as present a paper on an inverse scheme to simulate a liquid film absorber, an essential component of absorption systems.

The University Research Council distributed the grants across disciplines, which included: humanities, 10; social sciences, 6; science and math, 8; engineering, 1; business, 8; arts, 8; theology, 1; and law, 3. The diversity of the recipients, Dean Bhat says, "is a good example of the intellectual inquiry and richness that is being fostered throughout the University." *

WHAT'S IN AN AD?

Thomas Barry, vice president for executive affairs and professor of marketing, Edwin C. Cox School of Business, has conducted research on issues ranging from children's television advertising to understanding the importance of cognitive age in marketing to elderly consumers. He currently is studying the use of comparative advertising, in which one brand of product uses one or more competitors' brands to compete itself. An example of a long-running comparison campaign would be the recent Pepsi vs. Coca-Cola ads aired on television. Barry has found that such comparison, at times, can lead to consumer confusion about who is sponsoring the ad, and he questions why a company would give any ad time to name a competitor.

He recently received The American Academy of Advertising's 1995 award for "Outstanding Contributions to Advertising Research." He also received the Cox School's Research Excellence Award, the Nicolas



Salgo Award for Teaching Excellence, and three University Outstanding Professor awards.

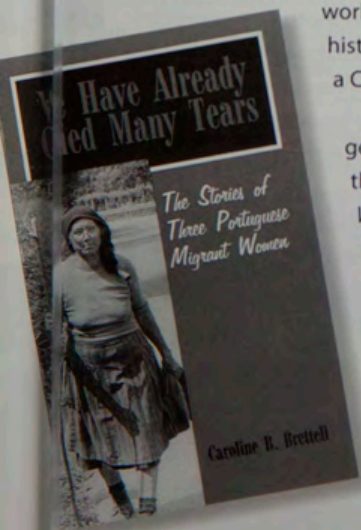
Barry has published more than 50 journal articles and presented papers at numerous conferences. He is one of the most frequent contributors to the three leading advertising journals – *Journal of Advertising*, *Journal of Advertising Research*, and *Journal of Current Issues and Research in Advertising*. He has authored textbooks in marketing and advertising management as well as several monographs and book reviews.

Barry has consulted for a variety of organizations including the Department of Defense, Hertz, Neiman-Marcus, Yamaha, AT&T, Dr Pepper, Cliff Notes, and several nonprofit groups. He serves on the boards of directors of Keystone Consolidated Inc. and the Southwestern Graduate School of Banking at SMU. He received his Ph.D. degree from the University of North Texas. •

WOMEN AND MIGRATION • **Caroline Brettell**, professor and chair, Department of Anthropology, is developing with **Dennis Cordell**, associate professor of history, a research project on the insertion of new immigrants into the Dallas economy and the city's new multicultural landscape. She is specifically interested in the question of ethnic entrepreneurship. She also is working on anthropological approaches to women's life history and biography, including a biography of her mother, a Canadian journalist.

Brettell has focused her research on and written about gender and health issues for migrant women, particularly those in Portugal. In 1986 she wrote *Men Who Migrate, Women Who Wait: Population and History in a Portuguese Parish*. She since has edited *When They Read What We Write: The Politics of Ethnography* and with Professor of Anthropology **Carolyn Sargent** *Gender in Cross-Cultural Perspective* and *Gender and Health: An International Perspective*. Brettell's 1982 book, *We Have Already Cried Many Tears: The Stories of Three Portuguese Migrant Women*, recently was reissued with a new introduction. She also has written numerous articles and contributed chapters to books.

In addition to teaching anthropology courses, Brettell directs SMU's Women's Studies Program from 1989-94. She is president-elect of the Society for the Anthropology of Europe and is a member of the Executive Committee of the Council for European Studies. She earned her Ph.D. from Brown University. •



EXPERTS AND VALUATION

Randolph Beatty, Distinguished Professor of Accounting, conducts research on expert reputation and the valuation of privately held firms. In "Investment Banking, Reputation, and the Underpricing of Initial Public Offerings," a paper co-authored with Jay R. Ritter, University of Illinois-Urbana, Beatty explains why first-day prices rise dramatically on stock trading for the first time in public markets.

Beatty recently initiated another research project with **Susan Riffe**, assistant professor of accounting, and **Rex Thompson**, Caruth Professor of Finance and chair of the Finance Department, Cox School of Business. They are investigating valuation models employed by expert witnesses in estate and gift tax valuation cases. Their preliminary results suggest that market experts employ models that produce biased estimates of market values for publicly traded firms, and propose alternative models that exhibit desirable statistical properties and dominate current methods used by valuation experts.

For the *Journal of Law and Economics* (fall 1996), Beatty is writing an article that discusses how lawyers, auditors, and underwriters are paid in order to understand the effect of differences in determining legal liability issues.

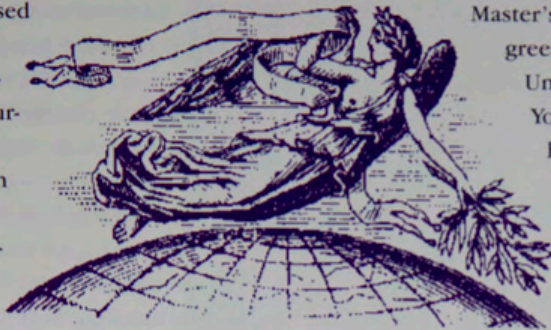
Beatty has written for numerous scholarly journals and conference proceedings. Before joining SMU in 1992, he taught at the Wharton School of the University of Pennsylvania and the Graduate School of Business at the University of Chicago. He is serving as chair of the SMU promotion and tenure committee and is a member of the American Accounting Association's Screening Committee. He earned his Master's and Ph.D. degrees in accounting from the University of Illinois. •



THE POLITICS OF ARMS CONTROL

Jim Brown, former professor of political science and the Ora Nixon Arnold Research Fellow in American Statesmanship and Diplomacy, and former director of the John Goodwin Tower Center for Political Studies, retired December 31 after 33 years at SMU. For the past six years, Brown organized and directed the Arms Control Conference, an SMU symposium funded by the Advanced Research Program Agency of the Department of Defense.

Brown has focused his research on arms control, military relations in Turkey and Greece, and NATO's role in the Middle East and the Mediterranean region. His books include



Delicately Poised Allies: Greece and Turkey, Challenges in Arms Control for the 1990s and *New Horizons and Challenges in Arms Control and Verification*. He also has published numerous articles in journals and made presentations at conferences worldwide.

Brown has served as special assistant to the deputy undersecretary of defense for planning and as foreign affairs adviser to the director of the U.S. Arms Control and Disarmament Agency. He received

Master's and Ph.D. degrees from the State University of New York at Buffalo. He has been listed among *Who's Who in the South and Southwest* since 1991. •

THE LEGAL OBLIGATION TO THE STUDENT ATHLETE

Timothy Davis, associate professor, School of Law, studies the relationship between universities and their athletic programs and student athletes. He has written extensively about racism, economical interests, and legal obligations arising from this relationship. His most recent publications include "A Model for Institutional Governance for Intercollegiate Athletics," *Wisconsin Law Review*, 1995, and "The Myth of the Superspade: The Persistence of Racism in College Athletics," *Fordham Urban Law Journal*, 1995. Another article, "College Athletics: Testing the Boundaries of Contract and Tort," will appear in the June 1996 *University of California-Davis Law Review*.

Davis has discussed the findings of his research in several recent forums. He presented "African-American Sport Experience" at the North American Society for the Sociology of

Sport Conference on Cultural Diversity and the Sport Experience in November 1995.

He also presented "Legal Obligations Arising Out of the University/Student-Athlete Relationship" at the DePaul University School of Law Seventh Annual Conference on Legal Issues in

Intercollegiate Athletics in October and "Racism and College-Athletics," Marquette University Law School, Lilli Foundation Lecture, in September.

In addition, Davis has been the recipient of SMU and national awards. He received the 1991 Don Smart Award for Directed Research and directed the research projects of six of the past eight winners of the Law Student Writing Competition, sponsored by the ABA Forum Committee on the Construction Industry. In 1994 he received the SMU Golden Mustang Award for excellence in teaching and curriculum development. •

TAKING EARTH'S TEMPERATURE

Henry L. Gray, Frensley Professor of Mathematics and Statistics; **Wayne A. Woodward**, professor of statistical science and chair of the Department of Statistical Science; and **Richard F. Gunst**, professor of statistical science, are developing ways to accurately measure and analyze the Earth's temperatures for global warming research. Their work on the project, "Statistical Examination of Climatological Data Relevant to Global Temperature Variation," is part of a grant sponsored by the Department of Energy. Their research has been detailed in several articles in the *Journal of Climate*, one of the premier scientific publications reporting on climate change.



GRAY



WOODWARD

Gray and Woodward lead a team of analysts who are developing new methodologies for properly analyzing global warming data. Their initial results, based on data alone, suggest that the "observed warming trend" may likely subside on its own in the future. They currently are researching the development of improved techniques for accurately detecting trends in data.



GUNST

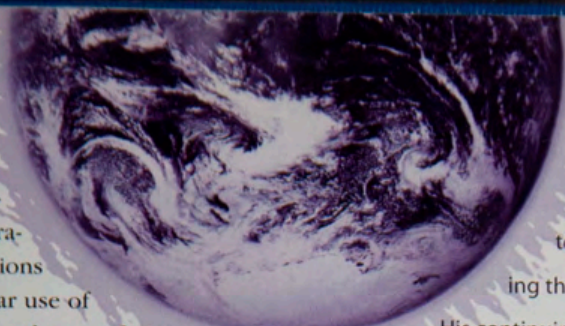
Gunst conducts research on developing an appropriate spatial statistical model of temperature data. His project is based on the uneven distribution of temperature reporting stations globally. Previous



MCCARTOR

studies demonstrate that stations in close proximity to one another report similar temperatures, but stations distant from one another report different temperatures. Therefore, the density of station coverage in different regions of the globe must be taken into consideration when computing global temperatures.

Gunn has determined that proper spatial modeling is needed to compute global temperatures from these stations and that the popular use of simple averages is inadequate for estimating global mean temperatures. His current work focuses on how the density of station coverage affects the uncertainty in estimates of global mean temperatures. Gra and Woodward, in conjunction with Professor of Physics **Gary D. McCartor**, also received two ARPA Research Contracts, "A Proposal on Statistical Methods for Describing the Performance of Existing and Proposed Processes for Association, Detection, Location, and Identifying Algorithms" and "The Development of New Statistical Methodology for Improved Monitoring of Nuclear Proliferation." Gunn, who was listed in the 1995 volume of *Who's Who in the World*, received the 1994 American Statistical Association Award for the Most Outstanding Statistical Application and the 1994 Frank Wilcoxon Award for the Best Practical Application Paper published in *Technometrics*. •

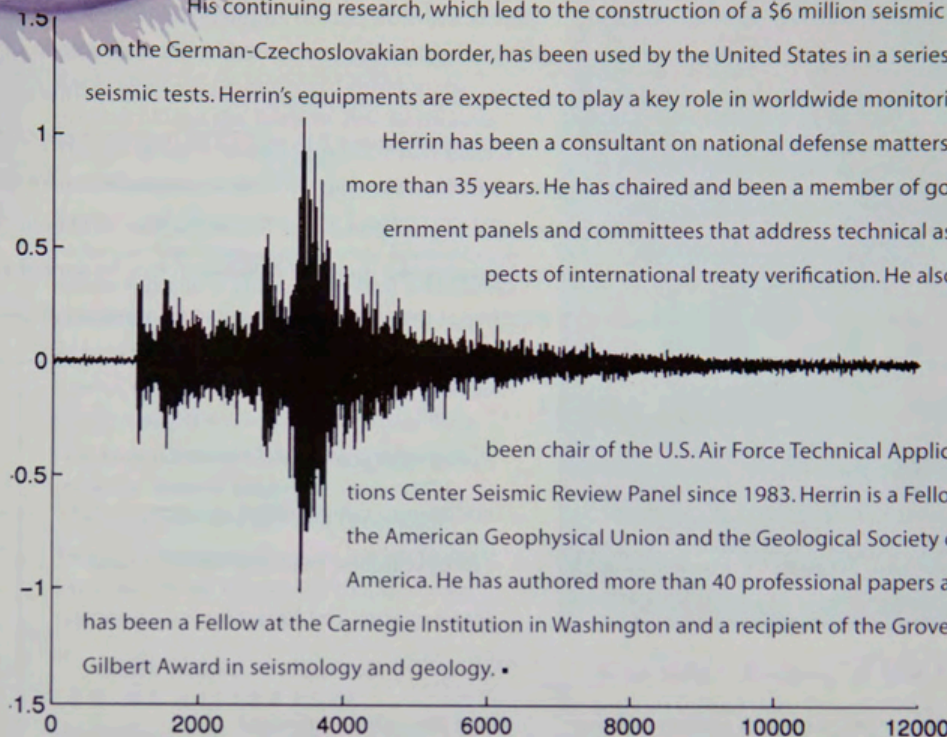


DETECTING EXPLOSIONS UNDERGROUND

Eugene Herrin, Shuler-Foscue Professor of Geological Sciences, Dedman College, is a pioneer in the development of seismic monitoring technology. He is developing systems for detecting and reporting the detonation of underground nuclear devices throughout the world.

His continuing research, which led to the construction of a \$6 million seismic array on the German-Czechoslovakian border, has been used by the United States in a series of seismic tests. Herrin's equipments are expected to play a key role in worldwide monitoring.

Herrin has been a consultant on national defense matters for more than 35 years. He has chaired and been a member of government panels and committees that address technical aspects of international treaty verification. He also has

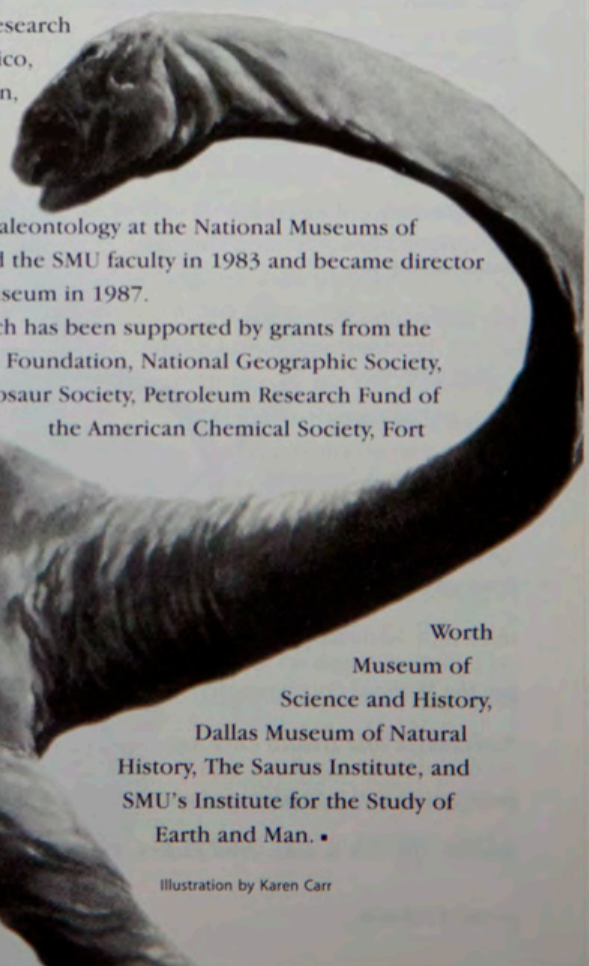


been chair of the U.S. Air Force Technical Applications Center Seismic Review Panel since 1983. Herrin is a Fellow of the American Geophysical Union and the Geological Society of America. He has authored more than 40 professional papers and has been a Fellow at the Carnegie Institution in Washington and a recipient of the Grove Karl Gilbert Award in seismology and geology. •

TRACING TEXAS DINOSAURS • **Louis Jacobs**, professor of geological sciences and director of SMU's Shuler Museum of Paleontology, recently published *Lone Star Dinosaurs*, a book about Texas dinosaurs that lived from about 220 million years ago until their extinction 66 million years ago. The Fort Worth Museum of Science and History, in conjunction with the Shuler Museum of Paleontology, is sponsoring a 3,000-square-foot exhibition of dinosaur fossils unearthed by Jacobs and others. The exhibition opened in Fort Worth and will travel to cities throughout Texas in 1996. From October through December, the exhibit will be at the Dallas Museum of Natural History. In addition to his Texas research, Jacobs has conducted

extensive field research in Pakistan, Mexico, Kenya, Cameroon, Malawi, and Yemen. He is former head of the Division of Paleontology at the National Museums of Kenya. He joined the SMU faculty in 1983 and became director of the Shuler Museum in 1987.

Jacobs' research has been supported by grants from the National Science Foundation, National Geographic Society, Dinosaur Society, Petroleum Research Fund of the American Chemical Society, Fort



Worth Museum of Science and History, Dallas Museum of Natural History, The Saurus Institute, and SMU's Institute for the Study of Earth and Man. •

Illustration by Karen Carr



WILLIAM C. MARTIN

RECORDING CHURCH HISTORY • James E. Kirby Jr., professor of church history, Perkins School of Theology, is working on a biography of William C. Martin ('21), who served as president of the National Council of Churches during the McCarthy era. Kirby is focusing his research on personal diaries kept by Martin from 1914 until his death in 1984.

In September Kirby submitted the manuscript for a new book about the history of Methodism in America. The book, *The Methodists*, is part of a larger series of religious study texts. He is the author of numerous articles that have appeared in professional and religious publications, including *Church History*, *Religion in Life*, and *Journal of Asian Studies*.

Kirby, who earned B.D. and S.T.M. degrees from SMU in 1957 and 1959, served as dean at the Drew School of Theology in Madison, New Jersey, from 1976-81. He then returned to his alma mater to serve as dean of the Perkins School of Theology and professor of church history. From 1994-95, following the death of A. Kenneth Pye, he served as SMU president *ad interim*. Kirby is an ordained member of the North Texas Annual Conference of the United Methodist Church. •

CONFRONTING ETHICAL ISSUES

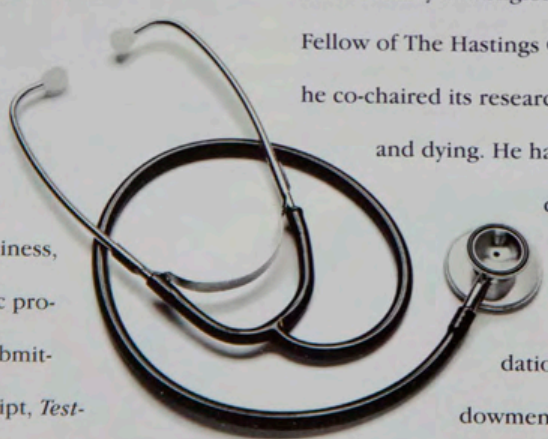
William May, the Cary M. Maguire University Professor of Ethics, is director of SMU's new Cary M. Maguire Center for Ethics and Public Responsibility. The center, which held its inaugural conference in February 1996, supports ethics teaching and research through community seminars, workshops, and publications. It also seeks to engage business, professional, civic, and church leaders in an ongoing dialogue concerning ethical issues facing the city and region.

May conducts research on ethics in the medical, business, legal, and academic professions. He has submitted a new manuscript, *Testing the Medical Covenant: Active Euthanasia and Health Care Reform*, for publication and is working on another manuscript, *The Beleaguered Rulers: The*

Public Obligation of the Professional. In addition to contributing chapters to dozens of volumes, May also wrote *A Catalogue of Sins*, *The Physician's Covenant: Images of the Healer in Medical Ethics*, and *The Patient's Ordeal*.

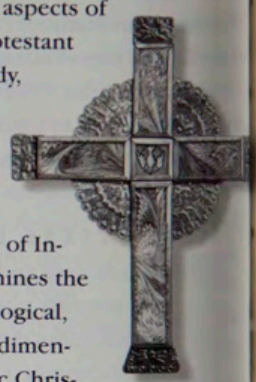
In fall 1995 May presented four lectures in Australia and one at Yale Divinity School.

May is a former president of the American Academy of Religion and a Founding Fellow of The Hastings Center, for which he co-chaired its research group on death and dying. He has received post-doctoral fellowships from the Danforth Foundation, the Lilly Endowment Inc., and the Guggenheim Foundation. He received the Outstanding Teaching Award from the American Academy of Religion in 1993. •



HISPANICS AND PROTESTANT TRADITIONS • **David Maldonado**, professor of church and society and associate dean for academic affairs, Perkins School of Theology, is directing a three-year study of various aspects of the Hispanic Protestant church. The study, which is funded by a \$242,325 grant from the Lily Endowment of Indianapolis, examines the historical, sociological, and theological dimensions of Hispanic Christianity within mainline Protestant traditions. Hispanic theologians and religion scholars from throughout the United States are engaged in the multidisciplinary research project. He also has studied the issues that are challenging the church as it learns to minister to an aging society.

Maldonado serves on the University Senate of the United Methodist Church and is on the executive council of La Asociacion Para la Educacion Teologica Hispana. His recent publications include "El Pueblo Latino and Its Identity," *Apuntes* (summer 1995), and "Religiosity and Religious Participation Among Hispanic Elderly," *Journal of Religious Gerontology* (1994). He earned his Master's and D.S.W. degrees in social work from the University of California-Berkeley. •



TECH TALK

Alan I. Moldovan, department chair and professor of Computer Science and Engineering, School of Engineering and Applied Science, conducts research in parallel processing, natural language understanding, and artificial intelligence. His work centers on teaching computers to understand, translate, and summarize natural language – the words written and spoken by humans, as opposed to computer programming languages. Before joining SMU, Moldovan was a faculty member at the University of Southern California. He spent a year as a program director of the National Science Foundation and served on several NSF panels. He also was a member of the Executive Committee of the International Initiative on Massively Parallel Computing Technologies, which helps to coordinate research efforts in the area of parallel processing applied to artificial intelligence in the United States and Japan. Moldovan originated and directed the Semantic Network Array Processor (SNAP) project, a massively parallel computer dedicated to natural language processing and other artificial intelligence applications. During his association with the project, he built a SNAP parallel computer prototype with 144 processors. Moldovan is the author of more than 100 research articles, book chapters, and a textbook, *Parallel Processing: From Applications to Systems* (1993). He received his Master's and Ph.D. degrees in electrical engineering and computer science from Columbia University. ■

THE SONG OF SARGON ■ **Simon Sargon**, associate professor of composition, theory, and vocal coaching, Meadows School of the Arts, recently published "Shema," a song cycle set to the poetry of Primo Levi. On October 22, 1995, "Shema" was performed as part of a concert series at the National Holocaust Museum in Washington, D.C.

Sargon also conducted a concert entitled "Judaic Musical Treasures" during the opening weekend of "From the Ends of the Earth," a Library of Congress Exhibit on Judaica at the Meadows Museum. The concert, which featured the 85-voice Temple Emanu-El Choir, benefited the Campus Jewish Network at SMU.

On October 25, in connection with the Judaica exhibit, Sargon collaborated with David Karp, chair of the keyboard division, to present "From the Ends of Two Keyboards." The program featured music for two pianos and four hands and included works written by Sargon and Karp especially for the occasion.

Sargon has composed a wide body of music, sacred and secular, orchestral and choral. His three-act opera, "Saul, King of Israel," was commissioned by the Meadows Foundation of Dallas. His "Symphony No. 1 Holocaust" was premiered by the Dallas Symphony in 1991. He has been director of music at Temple Emanu-El since 1974.

Sargon received the first Leon Rabin Award for Contributions to Jewish Culture from the Dallas chapter of the American Jewish Committee. ■



CAN WE DISCOURSE?

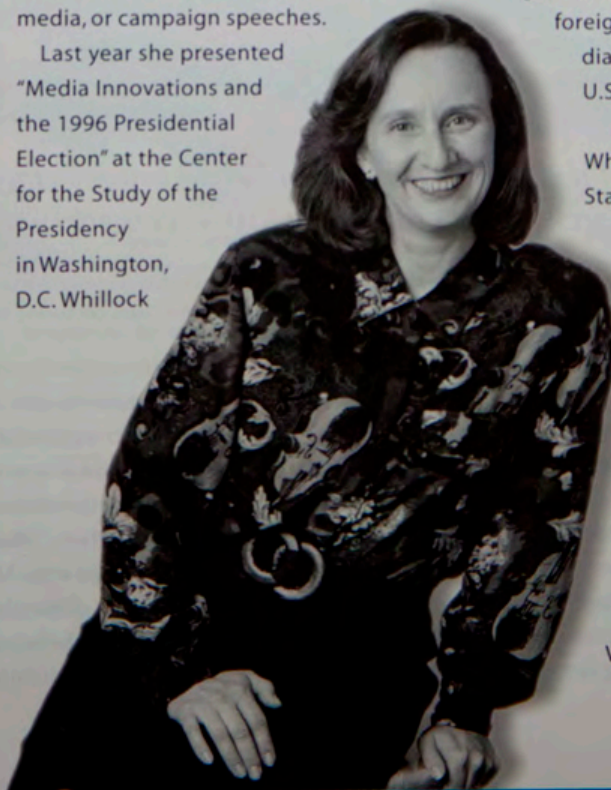
Rita Whillock, associate professor and chair of public relations, Center for Communication Arts, conducts research on how U.S. citizens and politicians engage in a national conversation about public policy through a variety of public persuasion venues such as direct mail, broadcast media, or campaign speeches.

Last year she presented "Media Innovations and the 1996 Presidential Election" at the Center for the Study of the Presidency in Washington, D.C. Whillock

recently co-edited *Hate Speech* (Sage: Newbury Park, CA, 1995) with **David Slayden**, assistant professor.

Whillock, 1995-96 president of the American Communication Association, received grants in 1994 from the SMU Research Council and Cambridge University to investigate the use of public relations agents by foreign governments to influence media, public opinion, and Congress on U.S. foreign policy issues.

Before joining SMU in 1991, Whillock taught at Stephen F. Austin State University and the University of Alabama-Huntsville. She serves on the editorial board of the *Southern Communication Journal* and is listed among *Who's Who of International Scholars*. She served as an invited critic for the Center for Presidential Studies Inaugural Conference sponsored by the Bush Presidential Library and Texas A&M University in 1995 and was a Cambridge Visiting Scholar in summer 1994. ■



As an undergraduate, Cheril Santini spent hours trying to synthesize new molecules in SMU's chemistry lab. Outside the lab she spent hours twisting and flipping in midair off 1-, 3-, and 10-meter diving boards. Both efforts gave Santini a competitive edge – the May 1995 graduate now practices her diving moves four hours a day at the SMU pool for the Olympic trials in June 1996 while working part time on graduate-level research in SMU's chemistry laboratory. One effort may lead to the Olympics, the other to a job with a major company or to graduate school.

SMU's Department of Chemistry offers undergraduates an opportunity to do more original research than they could at larger schools, where those without degrees often are relegated to menial research chores, says Chemistry chair and professor.

"Our small size helps us recruit students," Biehl says, "and the ones we get are outstanding. That they actually can start doing research in their first year is significant."

Biehl credits the honors program in chemistry with helping professors recruit several undergraduates into the lab, including senior Thomas Gray, who works in the labs of chemistry professors John Maguire and Narayan Hosmane.

SMU also provides \$50,000 in stipends to undergraduate re-

searchers each summer. The funds support at least 20 students who work full time in the summer and another 10 to 12 who work part time during the school year.

Santini, a President's Scholar who graduated with a 3.91 grade point average majoring in chemistry and German, began working in Professor Michael Lattman's laboratory at the suggestion of her first-year chemistry professor, John Maguire.

"When I first met with Dr. Lattman, he talked about his research in calixarenes," Santini recalls. He said, 'I'm not going to treat you as a plebian or someone just doing dirty work.' I had heard in high

school that if you ever got an opportunity to do research at college, it was doing the glassware – washing dishes."

But Lattman has treated her as a colleague, she says. "He is a mentor in every respect."

Lattman also remembers that first interview. "We talked, and she struck me as being very bright and enthusiastic, and perfect for the research lab." When Santini mentioned that her SMU diving team practices might present a problem, the Chemistry

Department arranged for her to work around her diving and academic commitments.

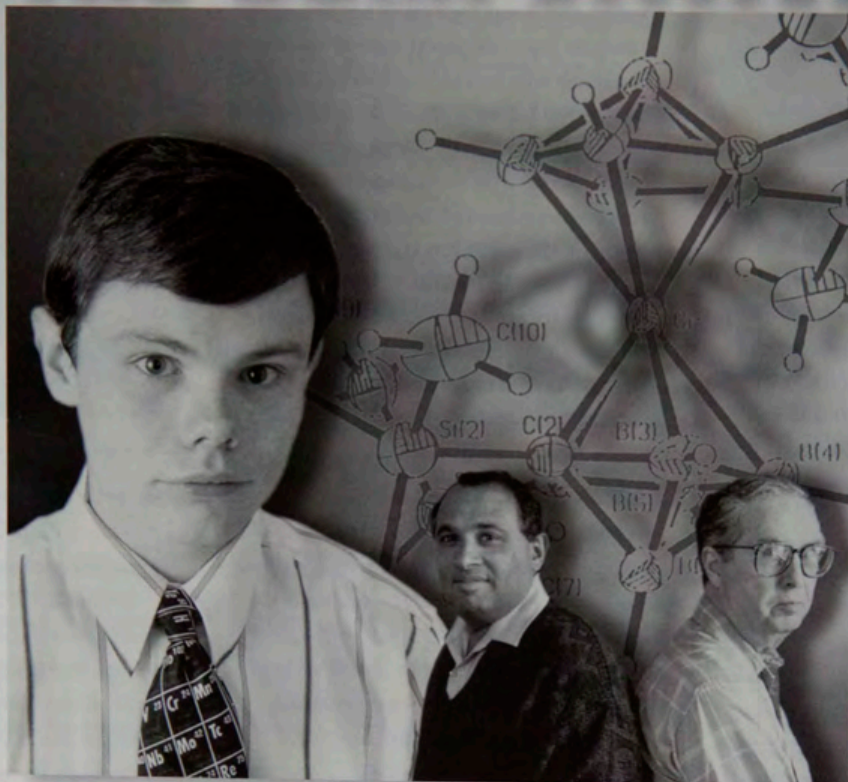
Now, as a postgraduate researcher on Lattman's staff, Santini is continuing research on basket-shaped molecules called calixarenes that have certain shape-selective properties, so only certain types of molecules fit inside the baskets. The molecules could be used as catalysts and selective binding agents. Some have affinities for heavy metals and may have environmental applications. European researchers have been trying to use calixarenes to remove radioactive metals from wastewater. Santini is trying to attach phosphorus to calixarenes. Her work is funded by a grant from DuPont, which wants to know if the molecules could improve the company's flame-retardant materials.

During his SMU career, Thomas Gray has co-authored four articles

in international journals and will be listed on at least six articles by the time he graduates in May.

"There are two general aspects of chemistry; you make compounds and determine their structures, and then you try to explain why the compounds could be made and why the structures are as they are," Maguire says. "Tom is heavily involved in both types of research. He has done some extensive synthesis work and also is doing theoretical calculations on the compounds he made and other compounds made in the group. So he's covering the broad aspect of chemistry and doing it very well."

THE COMPETITIVE



EDGE

SMU undergraduates advance knowledge and their careers in the chemistry lab ■ BY DEBORAH WORMSER

SMU senior Thomas Gray works with chemistry professors Narayan Hosmane and John Maguire on metallocarboranes, compounds that form three-dimensional cages containing boron.

Gray studies metallacarboranes, compounds that form three-dimensional cages containing boron, a nonmetallic chemical element occurring only in combination with other elements, such as with silicon and oxygen.

"Theoretically they are very interesting because they are electron-deficient compounds – there are not quite enough electrons to go around, so the bonding is unusual," Maguire says. Because boron can capture neutrons, the compounds could lead to a new approach to cancer therapy. The idea is to get boron-heavy compounds into the cancer cells, then irradiate the cells with neutrons. The release of the neutron energy would destroy the cancer cells.

Gray was surprised to find himself doing upper-level work as a freshman. "When I first got to the lab, it was a bit overwhelming; but it was a complete learning experience."

Gray's project required a high-vacuum line, which creates the airless, waterless environment necessary to work with chemicals that ignite upon exposure to air or water. Using the apparatus is painstaking work that most students do not encounter until their junior-year inorganic chemistry class.

His first paper was published when he was a sophomore. "It was a very unique satisfaction," says Gray, a Barry M. Goldwater scholar and a Harold Jeskey Scholar (Jeskey is the J.S. Lazenby Professor Emeritus of Chemistry). "My family was very proud."

Like the senior researchers in their labs, Santini and Gray participate in research group meetings and write articles. Gray presented a paper at a poster session of the American Chemical Society's national meeting this year.

SMU sends at least four students annually to the ACS national meeting, where they often deliver papers in the general session rather than the student meeting.

One of Lattman's former student researchers, Elizabeth Burns (87), delivered a paper at the ACS meeting in New York City when she was a junior. Lattman recalls that she was introduced as "Dr. Elizabeth Burns." She immediately corrected the speaker, who followed her talk by saying, "Judging from the quality of the previous presentation, my mistake is quite understandable." "Some of these students have been in the lab so long that it's hard to think of them as undergraduates," Maguire says. "They're my colleagues in the department. Some of them train the graduate

students and postdoctorals on certain lab procedures."

Biehl encourages faculty researchers to provide extra oversight of undergraduate projects. "You have to make sure that they are given the opportunity to have a successful project," Biehl says. "With the Master's students, you let them go. Their problems are harder and you expect them to work a year or two. With undergraduates, they have to do most of their research in the summer and you have to make sure they get results."

Associate Professor John Buynak has worked with undergraduates in his lab for 14 years. He found that several factors determine whether the relationship works. "For one thing, the expectations of both myself and the students have to be very realistic," Buynak says. "Students can't expect me to spend all my time teaching them. When

I'm in the classroom, I'm there for their benefit. But in research it's a 50-50 deal – the student putting in half and the professor putting in half. It may even be more student than professor in there. The student's effort is going to make it a success or failure."

Christa Carver, who in December received a Bachelor of Science degree in electrical engineering with a specialization in biomedical engineering, began working in Buynak's lab as a junior under a work-study program.

"She'll be the main author on the next paper I write," Buynak says. "She took over the project and decided she wanted to get the results. I didn't have to say anything to her. That's what you love to see happen."

Carver and Buynak are trying to block a bacterial enzyme called beta-lactamase that makes bacteria resist penicillin. They have developed a substance that works better in a lab dish than anything currently on the market, but they need to improve its ability to cross the bacteria's cell wall.

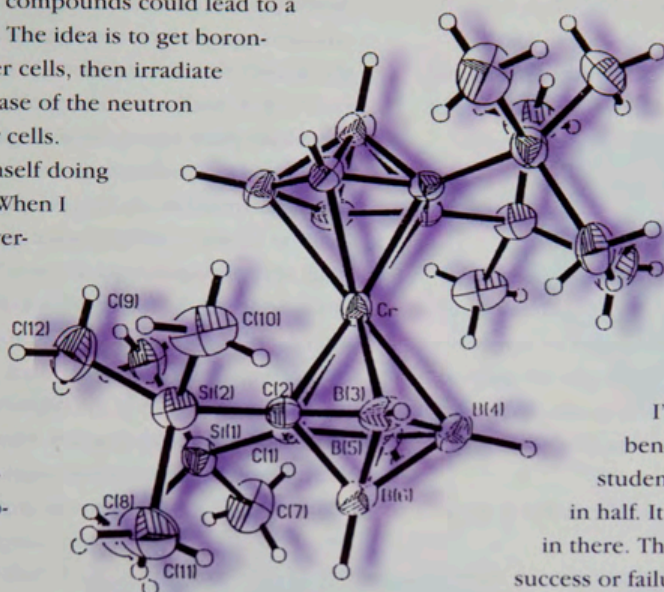
In addition, Carver discovered that one of the group's beta-lactamase inhibitors also inhibits elastase, a human enzyme that is overactive

in certain conditions such as emphysema. "I like to work on projects that could help people," Carver says, "especially with the onslaught of super-bugs. I feel that some of these beta-lactamase inhibitors could be out in the next 10 to 15 years."

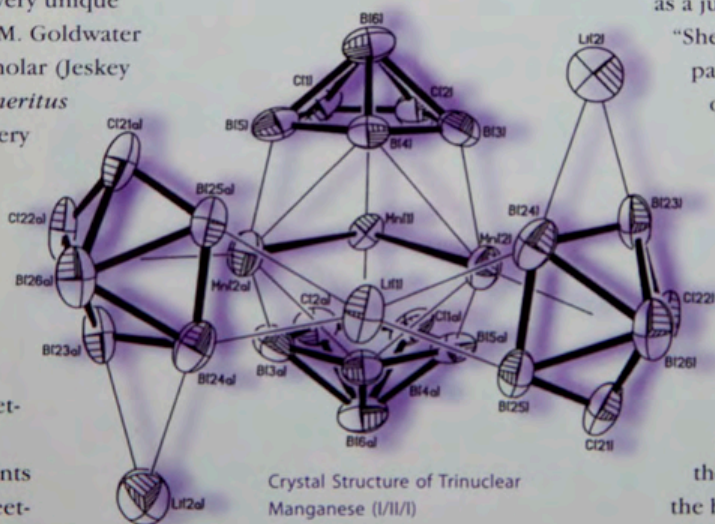
Research is an extension of SMU's undergraduate mission, Buynak says. "Students who do research tend to excel in the classroom because they are involved in what they read."

"When I see a line in a textbook, I think that was probably the

(Continued on page 18)



Crystal Structure of Chromium (IV) Complex



Crystal Structure of Trinuclear Manganese (I/II/I)

EXAMPLES OF METALLACARBORANES

NOT OF THIS WORLD

Geologist studies movements on Venus to understand terra firma • BY KATHLEEN TIBBETTS

Vicki Hansen's research may be out of this world, but its applications are down to Earth.

A structural geologist and associate professor in SMU's Dedman College of Humanities and Sciences, Hansen investigates problems in plate tectonics – the study of the uppermost layer of the Earth's crust, tens of kilometers thick, and how it deforms and recycles itself.

Her expertise in tectonic processes led to her role as an investigator on NASA's Venus probe project.

"I never saw myself as a planetary geologist; I've been kind of pulled into it," she says. But in 1991, when the *Magellan* spacecraft began sending Earth its stunning radar images of Venus' surface, former SMU geophysicist Roger Phillips sought her help to identify its geological features. Hansen became so excited by what she saw that she is working on her second grant project for NASA, with two more projects pending.

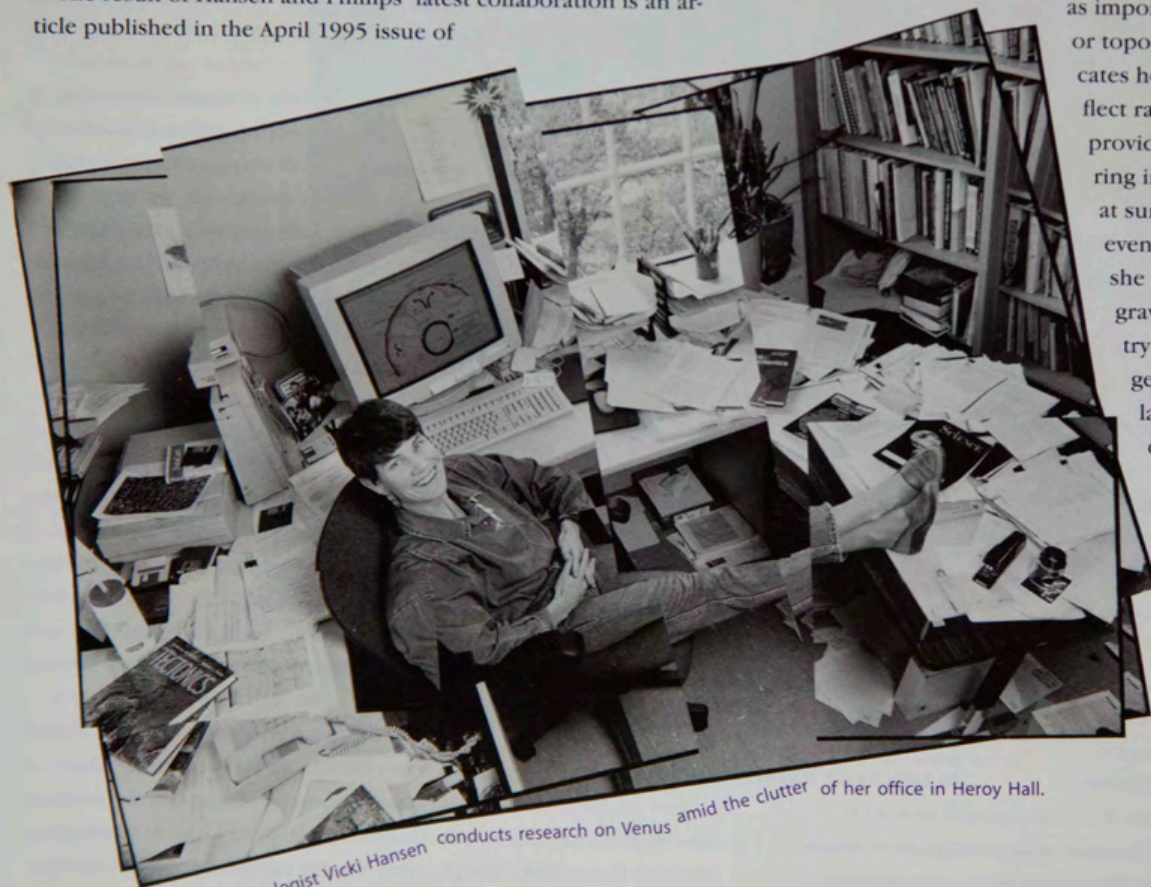
The result of Hansen and Phillips' latest collaboration is an article published in the April 1995 issue of

Geology, in which they present their theories on the geological processes that formed Venus' Ishtar Terra region. (Because Ishtar contains many of the most prominent topographic features on the planet, research on how these features were formed is considered key to understanding geologic processes on Venus.) Four years ago, prior to receiving *Magellan's* gravity data, Phillips speculated that hot-spot tectonics, an upwelling of hot mantle, had been instrumental in creating the high mountain belts clustered at Venus' northern pole. The Ishtar Terra region sits on a huge welt about four kilometers high on the planet's surface. Phillips then believed that the bulge was thermal, the result of an internal plume of heat striking the bottom of the planet's crust.

The *Magellan* researchers work with four separate data sets, the most glamorous being the high-resolution, black-and-white radar pictures that Hansen studies. "They're the part of the project that the public can relate to," she says. But the other data sets are just

as important scientifically – altimetry, or topography; emissivity, which indicates how well various surfaces reflect radar signals; and gravity, which provides clues about what is occurring in the planet's interior. "I look at surface deformations to see what events are required to cause them," she says. "And Roger says, 'The gravity is telling me this.' Then we try to put all those constraints together to form a model that relates all the observations to each other and presents a picture of how Ishtar may have formed."

Close examination of the radar pictures revealed that Venus' crust has contracted at the poles, crumpling up "like folds in a tablecloth," Hansen says. Even more important, a comparison of the data sets for the polar mountain ranges showed that the contours of the gravity and the topography seemed to match.



Geologist Vicki Hansen conducts research on Venus amid the clutter of her office in Heroy Hall.

V



E



"This shouldn't have happened if the upwelling theory were the case," Hansen says. "And if upwelling forces had been stretching the area, we should have seen radial fractures around it."

The investigators now believe that the lower part of the crust seems to be stacking itself up and thickening, probably due to a local thermal *downwelling* that is pulling the upper and lower crust material inward. Beneath the crust, mantle "residuum" material left over from the formation of new crust not only is pulling the crust downward, but also is acting as a cork pushing the surface upward – and is responsible for the bulge under Ishtar Terra. *Downwelling* in the mantle pulls the residuum, which pulls on the lower crust, causing it to thicken. As the lower crust stacks up, it bulges beneath the planet's upper surface and causes the bulged effect observed in the surface images, "like little kids crawling under a rug and rumpling it up," Hansen says.

"The first theory was completely wrong, and Roger was the first person to say so," Hansen says. "When we co-wrote the new paper, he just said, 'Toss that puppy out.'"

One of the most exciting aspects of the project, Hansen says, is that it "stretches my own mind in terms of how we look at Earth's problems. There are geologic events in the earlier history of Earth – three to two, even one billion years ago – that researchers are trying to explain with plate tectonics. A lot of the evidence just doesn't fit that model. But as a scientific community, we have a hard time imagining anything *other* than plate tectonics, because that model works so beautifully.

"The same thing happened on Venus at first," she adds. "Geologists were trying to cram the data into a plate tectonics model. It just isn't done, and that means we have to come up with something new. You're challenged with new ideas, and to apply those to Earth is really fun."

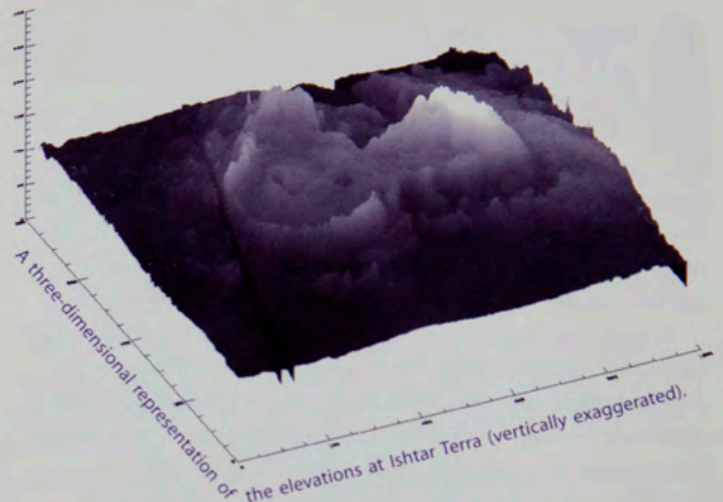
Hansen recently completed a 10-year project in Alaska's Yukon Territory that began with her Ph.D. dissertation at the University of California-Los Angeles. It involved studying the boundaries of different terrains, or the growth of continental crust through geologic time. By researching the flow patterns of younger (100 million- to 350 million-year-old) rock material relatively deep in the Earth's upper layer, Hansen is seeking insights into how the Earth's crust is mechanically assembled.

Earth and Venus at a global scale "are completely different from one another," Hansen says. "The *Magellan* mission brought that fully forward. Many people expected that we'd see features of plate tectonics on Venus, and no such features exist." Venus lost her water and atmosphere relatively early in her history and, as a result, has a much stronger crust than Earth. (Water, when combined with rock deep in the planet's crust, mechanically weakens the rock.) The evidence has led researchers to speculate that the mechanical strengths of their crusts may be the most fundamental difference between Earth and Venus, but that the interiors of the

two planets might have very similar types of heat-convection patterns.

Another major difference is in the layers themselves. One reason Earth's crust moves in shifting, colliding plates is its asthenosphere, a weak zone of low-viscosity rock between the crust (lithosphere) and the mantle. Venus has no such weak zone, so geological events in the mantle can have a greater direct impact upon the planet's surface.

Hansen and Phillips now have shifted their focus to other parts



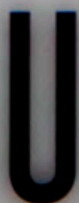
of Venus. A new puzzle has confronted the researchers: the discovery of several huge caldera (collapsed volcanoes) in the early stages of deformation within the Ishtar Terra region where Venus' residuum seems to be pulling.

"It's not an area that we'd typically think of as having a lot of volcanism," Hansen says. "These features are going to put some interesting constraints on our new geologic model. Now we have to wonder if the residuum, which is itself left over from melting, is melting again and forming these enormous volcanoes. There's nothing of comparable size on Earth, and there are about 10 of them in a line right through Ishtar Terra."

Even as the researchers postulate about downwelling at Venus' poles, they have observed a region of upwelling at its equator – dual phenomena that make the planet seem, geologically, like a bag with a snake in it. In the equatorial region, planetary material seems to be welling up in a long horizontal cylinder as if being plowed from the planet's mantle, not unlike the mid-ocean spreading centers on Earth.

"The planet seems to be under tension at the equatorial region, as if it's being pulled apart," Hansen says. "There is a lot of material coming up from depth, and big circular features called corona are forming there. So we're trying to understand what's going on at the surface and how that relates to these features."

The real answers, Hansen says, will come from the tough, (Continued on page 20)



PUTTING WASTE TO WORK

Researcher uses industrial waste to cleanse contaminated water ■ BY DEBORAH WORMSER

A mechanical engineering professor's casual observation may lead to a way of using one kind of industrial waste as a filter to remove heavy metals from water.

Ed Smith's work with Tyler Pipe exemplifies the increasing importance of public-private partnerships in university research as well as the benefits of such research for SMU students. His research grew out of Dean André Vacroux's creation in 1991 of the Master's program in hazardous and waste materials management in the School of Engineering and Applied Science.

To assess the region's environmental needs, SEAS administrators consulted scientists at the Environmental Protection Agency's regional office in Dallas. The EPA, in turn, created an internship for Smith, assistant professor of mechanical engineering, whose background is in environmental and civil engineering.

"It was a chance for me to learn more about the agency firsthand," Smith says. "I was trying to develop a protocol for EPA to help the *maquiladora* industries across the border in Mexico minimize waste generation to decrease disposal costs and liabilities."

Smith asked a colleague at the Texas Water Commission if he could accompany him on some of its waste minimization assessments at Texas plants. A visit to Tyler Pipe in Tyler, Texas, has kept Smith, several of his graduate students, and scientists at the large foundry busy for three years now.

During the state agency's assessment, Smith observed several different waste materials destined for the East Texas company's private landfill. Each year the foundry generates about 1,500 tons of shot blast fines, the nonhazardous waste from BB-size steel shot used to blast the rough edges off metal castings after they are removed from sand molds.

"Iron materials are used regularly in water and wastewater treatment," Smith says, although they are well-characterized iron-bearing chemicals rather than the type discarded by Tyler Pipe. "I asked for a sample to play around with in the lab; they gave me a container full."

In his lab, Smith prepared a solution containing the heavy metals lead and cadmium and ran it through the iron fines. He discovered that some of the dissolved heavy metals could be removed from the solution and concentrated on the surface of the iron shavings, a process called adsorption. Most adsorbents, such as activated carbon and ion-exchange resins, are very expensive. Iron shot blast fines are cheap, abundant, and available at companies

that produce metal parts for airplanes, automobiles, and other machinery.

Smith presented a proposal for systematic investigations to the company. Tyler Pipe Vice President/General Manager Dick Barnett (B.S.M.E. '62) was intrigued by the "potential of using a byproduct of our manufacturing process in a way that not only would recycle it, but also create a new product that would help clean up the environment," says Hardee Tapp, manager of technical services.

In 1993 the company provided \$44,000 in funding, renewable for three years, for the SMU research. Smith has since leveraged that support with \$400,000 in grants from the Texas Higher Education

Coordinating Board's Advanced Technology Program and EPA's Risk Reduction Laboratory in Cincinnati.

Last January, graduate student Afshin Amini began experiments to determine whether the iron fines could be cleansed and recycled after wastewater treatments – a process

called regeneration. The SMU researchers passed

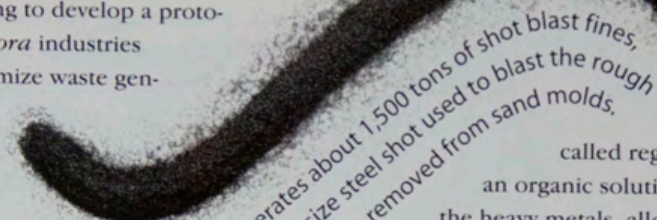
an organic solution through the iron fines to reabsorb the heavy metals, allowing them to use the iron fines for a second, third, and fourth time, Amini says. "Other people are using activated carbon for the same type of experiments. If we can achieve the same amount of adsorption with shot blast fines, that means our experiment is much cheaper and more practical. So far, the results look very good."

Smith presented his work, slated for publication in several scholarly journals, at the prestigious Purdue Industrial Waste and Water Environment conferences during 1995. SMU and Tyler Pipe also recently applied for a patent on the process, and bench tests are expected to begin this year at the company.

Tapp says the benefits to Tyler Pipe are "at least twofold. If we can find a marketable use for this material, we save landfill space. Plus, if we can sell it, we might generate a few dollars, which is the name of the game."

The foundry also could benefit directly from the filtering process because it creates wastewater laced with heavy metals when it melts down scrap iron, such as old car engines, to recycle into new pipe. "We want to be the greenest foundry in the United States, to recycle as much as we can, and to use as few resources as possible," Tapp says.

The research also has benefited SMU students – graduate and undergraduate students working on the project as well as dozens of others who have heard about the work during Smith's class lectures. "When I tell undergraduates about waste minimization, I have a firsthand example," he says.



Each year Tyler Pipe generates about 1,500 tons of shot blast fines, the nonhazardous waste from BB-size steel shot used to blast the rough edges off metal castings after they are removed from sand molds.

During 1994-95, Smith was one of numerous researchers throughout the University who received \$7.71 million in external funding. Of that total, \$700,497 (9 percent) came from industry, says Larry Smith, SMU's director of research administration. "Almost all of SMU's corporate support is in the School of Engineering and Applied Science, because those are the kind of projects that industry is interested in."

The amount of industry funding usually varies from 5 to 10 percent in any given year, and efforts are under way to expand it, Smith says. "You have to develop relationships with corporations. They have to see that it's in their interest to do that."

Good communication is critical to such partnerships. The University is making an effort to inform industry officials about the kind of work SMU scientists and engineers are doing. In addition, SMU researchers must ask what companies are doing to discover areas of mutual interest, Smith says. "For instance, if a researcher has a grant from a federal agency to do a project, there might be a corporation that would be interested in something very similar but from a different aspect."

SMU tries to facilitate such arrangements while ensuring they benefit the University. "If companies understand that universities are different from commercial entities, it can serve their long-term goals to support university research," says Larry Smith, who has worked for Sun Exploration and Production Company.

Any research also must support SMU's educational mission, and faculty members publish results of nearly all the research they do. University agreements give companies the right to review publications to ensure they do not divulge proprietary information. SMU also gives companies some rights to license any patents or to use the technologies, but the patent normally remains with SMU.

"Every proposal is written differently to fit the circumstances," Smith says. "In the case of Tyler Pipe, the company was co-inventor with Ed Smith."

Dean Vacroux predicts such industry-university research partnerships will become more common because they help industry remain competitive globally and they help universities continue research if government funding declines. "I think there is an appreciation both with industry and the University about the benefits of such a cooperation."

Such partnerships give industry a chance to do research with a longer-term emphasis, while giving the University's researchers an opportunity to study some timely, critical problems in need of solutions. It also helps students find jobs.

"The partnership allows the development of compacts between professors and students with their counterparts in industry," Vacroux says. "In some cases, students working on projects have ended up working with the industry sponsoring the research or in the same general field."

The Tyler Pipe project has been a learning experience for Ed Smith and his students. "I've found the industrial people very open to discussion," he says, "and I learned that it is best to approach industry with concrete project ideas."

Vacroux considers Smith's work with Tyler Pipe to be an outstanding example of industry-university partnerships.

"It was a very interesting project because of the nature of the problem they were working on," Vacroux says. "Obviously, in addition to Tyler Pipe and Dr. Smith, the state of Texas and the federal government thought the project was of interest. That type of cooperation is an example of the relationships that we want to develop with industry." •



In their lab, Mechanical Engineering Professor Ed Smith (left) and graduate student Afshin Amini are trying to determine whether shot blast fines can be cleansed and recycled after wastewater treatments.

SELECTED
FACULTY
 PUBLICATIONS

Various faculty members from SMU's six schools published the following articles and books in 1994-95.

Alan Albarran and **Don Umphrey**, Communication Arts, co-authored "Marketing Cable and Pay Cable Services: The Impact of Ethnicity, Viewing Motivations, and Program Types," *Journal of Media Economics* 7, (3), 1994, 47-58.

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Janis Bergman-Carton, Art History, *The Woman of Ideas in French Art, 1830-1848*, New Haven and London: Yale University Press, 1995.



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Alan Brown and **David Mitchell**, Psychology, "A re-evaluation of semantic versus nonsemantic processing in implicit memory," *Memory & Cognition*, 22, 1994, 533-541.

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Timothy Davis, Law, "The Myth of the Superspade: The Persistence of Racism in College Athletics," *22 Fordham Urban Law Journal* 615, 1995.

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David Goodson, Chemistry, co-authored "Dimensional Perturbation Theory for Weakly Bound Systems," *Physical Review A*, Vol. 51, January 1995, pp. R5-R8.

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Ruben Habito, Theology, "Zen and Human Existence," *The Many Faces of the Divine*, Vol. 2, 1995; "The Logic of Nonduality and Absolute Affirmation," *Japanese Journal of Religious Studies*, spring 1995.

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Professor of Anthropology Victoria Lockwood conducted research on the impact of capitalism on rural Tahitian women. Part of the study included the dedication of a traditional Tahitian crafthouse, built to market craft items made by local women, on Tubuai, French Polynesia.

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Choon Lee, Electrical Engineering, co-authored "Surface-mode Suppression in a Thick Microstrip



Antenna by Parasitic Elements," *Microwave and Optical Technology Letters*, Vol. 8, February 1995, 145-146.

Glenn Linden, History, *Desegregating Schools in Dallas, Four Decades in the Federal Courts*, Dallas: Three Forks Press, 1995.

Victoria S. Lockwood, Anthropology, "The Impact of Capitalism on Rural Tahitian Women: A Comparison of Three Islands," *Urban Anthropology and Studies of Cultural Systems and World Economic Development*, 23, (2), 1994, 73-96.

Machiko Matsui, Foreign Languages, "Women's Studies in Japan: Origin and Current Issues," *Initiatives*, 1995.

David J. Meltzer, Anthropology, co-authored "Geoarchaeology and Geochronology of the Miami (Clovis) Site on the Southern High Plains of Texas," *Quaternary Research*, 41, 1994, 234-244.

Dan Moldovan, Computers Science and Engineering, co-authored "A Marker-Passing Algorithm for Reference Resolution," *International Journal on Artificial Intelligence Tools*, Vol. 3, No. 2, June 1994, 209-232.

Charles J. Morris, Law, "A Blueprint for Reform of the National Labor Relations Act," 8 *Administrative Law Journal*, American University School of Law, October 1994.

Sukumaran Nair, Computer Science and Engineering, co-authored "SELAC-Statistical Error Location and Correction in Secondary Memory Systems," *Journal of Microcomputer Applications*, June 1994.

Osita Nwokah, Mechanical Engineering, co-authored "A model reference quantitative feedback design theory with application to turbomachinery," *International Journal of Robust and Nonlinear Control*, Vol. 4, 1994, 181-210.

Fred Olness, Physics, "Lepton Production of Heavy Quarks in the Fixed and Variable Flavor Schemes," *Physics Review*, D51, 1995, 4746-4755.

Tim Opler, Finance, co-authored "The Determinants of LBO Activity: Free Cash Flow vs. Financial Distress Costs," *Journal of Finance*, December 1993. ▶

Daniel Orlovsky, History, editor and contributor, *Beyond Soviet Studies*, Woodrow Wilson Center Press/Johns Hopkins University Press, 1995.



Larry Palmer, Music, fourth solo compact disc, "Larry Palmer/Bach/Harpsichord," Encore Performance Recordings, December 1994.

James Pennebaker, Psychology, co-authored "Expressive writing and coping with job loss," *Academy of Management Journal*, 37, 1994, 722-733.

Ed Poitras, Theology, "The Legacy of Henry G. Appenzeller," *International Bulletin of Missionary Research*, October 1994.

Robert Puelz, Finance, co-authored "Evidence on Adverse Selection: Equilibrium Signaling and Cross-Subsidization in the Insurance Market," *Journal of Political Economy*, April 1994, 104-125.

George W. Reddien, Mathematics, "On the stability of numerical methods at Hopf points using backward error analysis," *Computing*, Vol. 55, No. 2, 1995, 163-180.

Douglas Reinelt, Mathematics, "The primary and inverse instabilities of directional viscous fingering," *Journal of Fluid Mechanics I*, 280, 1995, 1-25.

Larry Ruben, Biological Sciences, co-authored "Protein translation elongation factor - 1α from *Trypanosoma brucei* binds calmodulin," *Journal of Biological Chemistry*, 269, 1994, 23,045-23,050.

C. Garth Sampson, Anthropology, co-authored "A naturalist's journey down the Seacow River valley in 1830," *The Naturalist* 38, (2), 8-16.

William R. Schucany, Statistical Science, "Adaptive Bandwidth Choice for Kernel Regression,"

Journal of the American Statistical Association, 90, 1995, 535-540.

Philip H. Solomon (deceased), Foreign Languages, co-edited *Céline and the Politics of Difference*, University Press of New England, 1995.

Willard Spiegelman, English, "Majestic Indolence: English Romantic Poetry and the Work of Art," Oxford University Press, 1995.

Mandyam D. Srinath, Electrical Engineering, co-authored *Introduction to Statistical Signal Processing with Applications*, Prentice-Hall, 1995.

Robert Stroker, Music, "A Comparison of Selected Areas of Thinking Styles Between Music Cooperating Teachers and Higher Education Music Methods Teachers," *Texas Music Education Research Journal*, 1994, 81-87.

William Taylor, History, "Colonial Religion and Quincentennial Metaphors: Mexican Santiagos and cristos de taua," *Willamette Journal of the Liberal Arts*, Supplemental Series, No. 6, 1994.

Marshall Terry, English, "Angels Prostate Fall: (Short Story)," *Southwest Review*, Spring/Summer 1995.

Rex Thompson and Gopalakrishnan Sharathchandra, Finance, "The Effect on Early Resolution of Uncertainty on the Valuation of Assets: A Dichotomy into Market and Non-market Information," *Review of Quantitative Finance and Accounting*, 1994.

Joseph B. Tyson, Religious Studies, "Jews and Judaism in Luke-Acts: Reading as a Godfearer," *New Testament Studies*, January 1995.

Roberto Vega, Physics, co-authored "Standard Model Decays of

Tau into Three Charged Leptons," *Physics Letters*, B338, 1994, 341-348.

James Ward, Theology, co-published *Preaching from the Prophets*, Abingdon Press, 1995.

David Weber, History, *Where Cultures Meet: Frontiers in Latin American History*, ed. with Jane M. Rausch, in the Jaguar Series on Latin America, William Beezley and Colin MacLachlan, eds, Wilmington, DE: Scholarly Resources, 1994.

Shlomo Weber, Economics, co-authored, "Limit Qualities and Entry Deterrence," *Rand Journal of Economics*, 26, 1995, 115-130.

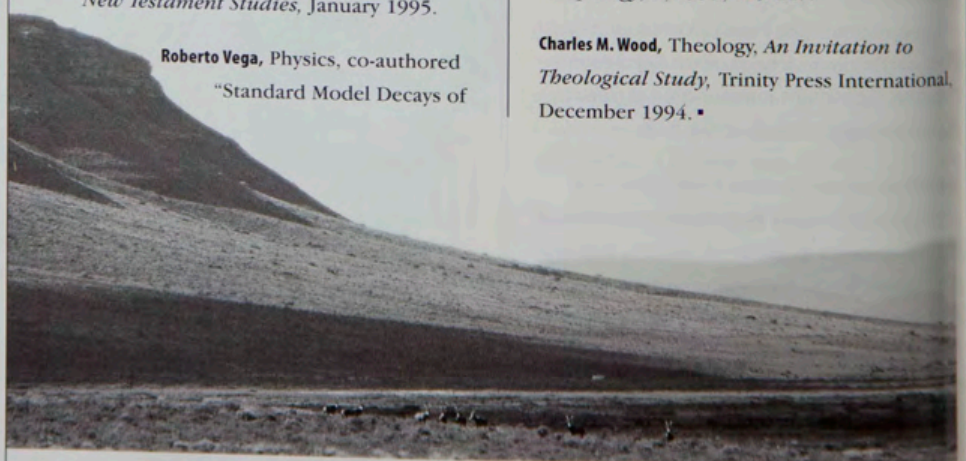
Stephen K. Wegren, Political Science, "Is Land Privatization Necessary in Russia?" and "Weapons of the Weak: Rural Responses to Urban Bias and Consequences for Land Reform in Russia," *The Soviet and Post-Soviet Review*, Vol. 21, Nos. 2-3, 1994, 137-47, 283-317.

Bonnie Wheeler, English, edited *Arthuriana*, quarterly of Arthurian literature and criticism of the International Arthurian Society-North American Branch.

Rita Kirk Whillock, Communication Arts, "Dream Believers: The Unifying Visions and Competing Values of Adherents of American Civil Religion," *Presidential Studies Quarterly*, 24, 1994, 375-388.

Ruth P. Wilson, Anthropology, co-authored "A Pile sort analysis of siSwati terms for acute respiratory infections," *Journal of Quantitative Anthropology*, 5, 1995, 129-147.

Charles M. Wood, Theology, *An Invitation to Theological Study*, Trinity Press International, December 1994. ■



The Seacow River valley

FACULTY

RECOGNITION

The following SMU faculty members were recognized for their teaching, scholarship, or research during 1994-95.

The **Department of Anthropology** placed in the top half — out of 69 programs — of a national ranking of research-doctorate programs by the National Research Council. SMU's department also was among three in the nation that were judged to have shown the greatest improvement during the five years covered by the survey. The National Research Council based its criterion, among other things, a program's effectiveness in educating research scholars and scientists and the scholarly quality of its faculty in both respects. SMU's Anthropology Ph.D. program scored high enough to earn the category of "strong" (second highest) on a scale that ranked programs from "marginal" to "distinguished."

Thomas Barry, Marketing and vice president for executive affairs, received the American Academy of Advertising's Outstanding Contribution to Advertising Research Award for 1995.

Edward Ehl, Chemistry, received the 1995 United Methodist Church Teacher/Scholar Award.

Clifton Black, Theology, was elected to the *Studiorum Novi Testamenti Societas*, an international society dedicated to the furtherance of New Testament research, at its 49th annual meeting at the University of Edinburgh in August 1994.

David H. Anke, Organizational Behavior and Business Policy and Dean of the Edwin L. Cox School of Business, has been named president-elect of the American Assembly of Collegiate Schools of Business.

Ellen T. Charry and **Rubin L.F. Habito**, Theology, have been named Henry Rouseell Fellows by the Association of Theological Schools in the United States and Canada. They

are among seven fellows awarded annually a sabbatical for research and publication.

Virginia Dupuy, Music/Voice, performed with the Buffalo Philharmonic at Artpark, June 1995, "An Evening at the Opera" with Grant Cooper conducting.



Virginia Dupuy

The faculty of the **Department of Economics** is ranked among the top 15 in the nation in terms of research productivity, according to a recent survey. The report, "Publication Productivity of Major 1992 Economics Departments in Mainstream Journals From 1987 to 1991," was issued by a research team at the University of Texas at Austin.

Victor Paul Furnish, Theology, was awarded an honorary Doctor of Humane Letters degree by Cornell College, Mount Vernon, Iowa, where he also delivered a convocation address.

Jack P. Holman, Mechanical Engineering, received the American Society for Engineering Education's Ralph Coats Roe Award at the society's conference in Anaheim, California, June 25-28, 1995.



Jack P. Holman

Gregory Hustis, Music/Horn, received the 1995 Distinguished Teaching Professorship at the degree-awarding ceremony for Meadows School of the Arts.

Blake Ives, Management Information Sciences, is senior editor for electronic production for the *Management Information Systems Quarterly*. He also has been appointed a doctoral consortium faculty member for the International Conference on Information Systems.



Blake Ives

Louis Jacobs, Geological Sciences, received the 1995 Alumni Association Award for Outstanding Service to Alumni.

Calvin Jillson, Political Science, was appointed to the Executive Council, 1994-98, of Pi Sigma Alpha, the National Political Science Honor Society.



Thomas Knock, History, has been named a Charles Warren Fellow at Harvard for the 1995-96 academic year.

Thomas Knock and **José Lage**, Mechanical Engineering, received the Outstanding Teaching Award for the ASEE's Gulf Southwest Section, which includes Texas, New Mexico, and Louisiana. He also won the 1995 Golden Mustang Award for his innovative teaching methods.



José Lage



Mick McGill

Mick McGill, Organizational Behavior and Business Policy, received a 1995 Authors' Award from the Godbey Lecture Series, which honors outstanding scholarly research, publications, and teaching. McGill also won the 1995 Alumni Association Award for Faculty Excellence.

Curtis W. McIntyre, Psychology, was honored at the annual convention of the Orton Dyslexia Society in Los Angeles for his service and dedication to children with learning disabilities.

Barbara Hill Moore, Music/Voice, recreated the role of Jenny in Gunter Kramer's production of "Die Dreigroschenoper" in Hamburg in summer 1994. She presented recitals in Saarbrücken, Nurnberg, Guttenberg, Hanover, Stuttgart, and Eutin, Germany.



Barbara Moore

Joseph J. Norton, Law, is editor-in-chief of a new journal, *NAFTA: Law and Business Review of the Americas*.

James Ode, Music, received the Alumni Achievement Award from Augustana College, Sioux Falls, South Dakota. He appeared as trumpet soloist twice during the ceremonies in the premiere performance of his work for solo trumpet, chorus, and keyboard, "Fanfare and Anthem on Our Way Rejoicing."

Daniel Orlovsky, History, has been named the George A. Bouhe Fellow in Russian Studies.

Robin Pinkley, Organizational Behavior and Business Policy, received the 1995 Golden Mustang Award for innovative teaching methods.

Robert Puelz, Finance/Insurance, has been awarded Best Research Paper of 1994 by the ▶

society of Insurance Research for his manuscript, "Evidence on Workers' Compensation Cost Containment."

The **Religious Studies Program** placed 16th out of 38 programs in a national ranking of research-doctorate programs by the National Research Council. The survey based its criteria on a program's effectiveness in educating research scholars and scientists and the scholarly quality of its faculty. SMU's Religious Studies Ph.D. program earned the category of "strong" (second highest) on a scale from "marginal" to "distinguished."

Simon Sargon, Music Composition, received the first Leon Rabin Award for Contributions to Jewish Culture.

Eduard Schmieder, Music/Violin, conducted the Tel Aviv Orchestra in November 1994; Mozartium Chamber Orchestra in Grand Hall-St. Petersburg in December 1994; I Musici de Prague in April 1995; and toured with the Paris Conservatory in March 1995.



Nina Schwartz

Nina Schwartz, English, received a 1995 Authors' Award from the Godbey Lecture Series, which honors outstanding scholarly research, publications, and teaching.

Martha Ann Selby, Religious Studies, received a senior research fellowship from the American Institute of Indian Studies to translate an eighth-century Prakrit anthology of couplets. She also has received a residency from the British Centre for Literary Translation, University of East Anglia, Norwich.

Tomasz Skwarnicki, Physics, invented a new method of analyzing new accelerator data to determine the rate of decay of a "b-quark" into an "s-quark" plus light. The American Institute of Physics selected the results of the analysis as one of the top two particle physics accomplishments of 1994.



John Slocum

John Slocum, Organizational Behavior and Business Policy, received a 1995 Authors' Award from the Godbey Lecture Series, which honors outstanding scholarly research, publications, and teaching.

C.W. Smith, English, received a 1995 Authors' Award from the Godbey Lecture Series, which honors outstanding scholarly research, publications, and teaching.

Raj S. Sohal, Biological Sciences, is the recipient of the 1995 Lifetime Achievement Award from the American Aging Association for his contributions to understanding the fundamental aspects of the biology of the aging process.

Marc Steinberg, Law, has been appointed Occasional Visiting Professorial Fellow at the University of London (Center for Commercial Law Studies-Business and Finance Law Unit).

The Competitive Edge

(Continued from page 9)

result of years of work, based on what I've seen in the lab," Santini says. "I have a greater appreciation for the advances in all of science."

If the Chemistry Department receives approval for its proposed doctoral program in chemistry, Biehl says, opportunities will increase for undergraduates to work with graduate students, "which will give them a better perspective about graduate-level work and perhaps encourage more students to pursue a Ph.D. in chemistry."

Both Santini and Gray think their lab experience will give them an edge getting into graduate school. Recent undergraduate researchers continued their studies at Harvard, Johns Hopkins, Stanford, and the Massachusetts Institute of Technology to earn their doctorates.

Burns, who now works at Eastman Kodak Company in Rochester, New York, says her undergraduate experience helped her get into graduate school at the California Institute of Technology. Her undergraduate research increased the breadth of her experience, she says, particularly because she worked with two professors in different areas.



Ryszard Stroynowski

Ryszard Stroynowski, Physics, was selected a Fellow of the American Physical Society Division of Particles and Fields in 1995.



Vigdor L. Teplitz

Vigdor L. Teplitz, Physics, was appointed to the U.S. Arms Control and Disarmament Agency's Science and Policy Advisory Committee.

Patricia K. Webb, Center for Teacher Preparation, received the Volunteer of the Year Award from the Japan-America Society of Dallas and Fort Worth for her presentations on Japanese culture to Dallas area school students. •

"I do occasionally reach back to techniques that I learned as an undergraduate," she says. "I did so just today, in fact. I remembered an experiment I had done with Dr. Hosmane. I would certainly recommend SMU's Chemistry Department to anybody."

Biehl believes directing research students

is teaching under ideal circumstances. "It's like the Oxford system. It's almost one-on-one if you're in the lab imparting the latest knowledge, and they're acquiring new information. It's a wonderful way to learn."

And it often pays off.

"One of my former students with a Bachelor's degree was hired at the Master's degree-level at Sandoz Laboratories in

New Jersey," Biehl says. "He got the job partly because he had eight publications as an undergraduate."

Undergraduate research also prepares for the challenges of life, no matter what career path students choose. "Even if they don't continue in chemistry, it's still a good experience," Biehl says. "If they can achieve their goals in the lab, they know that they can do it elsewhere. It's just a matter of taking that mental process and applying it to any other discipline."

Deborah Wormser is a Dallas free-lance writer.

"If they can achieve their goals in the lab, they know that they can do it elsewhere. It's just a matter of taking that mental process and applying it to any other discipline."

• Professor Ed Biehl

SPONSORED
RESEARCH
AWARDS

1994 - 95

During 1994-95 SMU received \$7,686,055 for direct and indirect costs of research and sponsored projects conducted by 82 faculty and staff members. The dollar value of awards increased slightly from the \$7,206,420 received in 1993-94, and the number of awards processed increased from 107 to 134.

Sources of the \$7,686,055 were federal government agencies, 82 awards, \$5,842,243 (76%); foundations, 25 awards, \$853,339 (11%); corporations, 19 awards, \$700,497 (9%); state and local government agencies, 4 awards, \$135,000 (1.8%); and other, 4 awards, \$154,912.

Dedman College was awarded \$4,684,082 in 77 awards: Division III, Natural Sciences, received \$4,279,132 in 58 awards; Division II, Social Sciences, \$342,922 in 15 awards; and Division I, Humanities, \$62,028 in four awards.

School of Engineering and Applied Science received \$2,506,183 in 46 awards during 1994-95 compared to \$1,788,643 in 1993-94. Meadows School of the Arts received \$109,562 in five awards, and Perkins School of Theology received \$277,839 in two awards. The School of Law received \$73,267 and Edwin L. Cox School of Business received \$31,123 in one award each. There were two other awards totaling \$999.

The following faculty members received \$100,000 or more in new funding:

David P. Anderson, Geological Sciences, \$276,999, The Regents of the University of California, "Single and Multiple Cylindrical Source Observations and Modeling for Mine Blast Characterization."

Rayne Cor-Butler and **Donald Butler**, Electrical Engineering, \$273,527, NSF, "Uncooled Infrared Detection with $YBa_2Cu_3O_x$ Thin Films;" \$49,455, "YBa₂Cu₃O_x Thin Film Bolometers for Room Temperature Infrared Detection;" \$10,000 Supplement.

Thomas Cui, Physics, \$132,500, Cornell University, "RII Project."

Margaret Hamham, Computer Science and Engineering, \$85,948, Department of Defense,

"SOMBRERO V, Massive Digital Data System;" and NSF, \$69,999, "In Memory Database Recovery Issues;" \$10,750, U.S.-Australia Cooperative Research, "Partition Checkpointing and Recovery for Distributed Databases."

David Goodson, Chemistry, \$100,300 and \$1,465, NSF, "Quantum Chemistry Without the Hartree-Fock and Born-Oppenheimer Approximations" and "Facilitation Award for Scientists and Engineers with Disabilities"; \$34,000 and \$32,000, Welch Foundation, "A Unified Approach to Molecular Structure and Molecular Vibrations."

Henry Gray, **Wayne Woodward**, and **Richard Gunst**, Statistical Science, \$194,000, Department of Energy, "Statistical Examination of Climatological Data Relevant to Global Temperature Variation" (year 2 of 2).

Henry Gray and **Gary McCartor**, Statistical Science, \$52,047, Advanced Research Projects Agency, "The Development of New Statistical Methodology for Improved Monitoring."

Eugene Herrin, Geological Sciences, \$600,000, Advanced Research Projects Agency, "TEXESS and LUXESS Arrays;" \$43,512, Science Applications International Corporation, "Pakistan Incremental Array Extension;" \$22,205, The Regents of the University of California, "Research and Development Support in Intermediate Scale Explosion Source Experiments: Los Alamos Explosions;" \$14,120, Sandia National Laboratories, "Borehole Plugging."

Eugene Herrin and **Christopher Hayward**, Geological Sciences, \$28,893 and \$28,619, Science Applications International Corporation, "Pakistan Incremental Funding."

Narayan Hosmane, Chemistry, \$72,000 and \$90,000, NSF, "Metallacarboranes: New Frontiers of Organometallics;" \$34,000 and \$32,000, Welch Foundation, "Metallacarboranes of the C₂B₄-Cage Systems."

Lorn Howard and **Milton Gosney**, Electrical Engineering, \$205,846, \$9,750, and \$35,751, NSF, "Development of a VLSI System for Improved Monitoring and Stimulating Action Potentials of Neuronal Networks."

Richard Jones, Biological Sciences, \$145,132, National Institutes of Health, "Completion of the Attrition of Justice in Rape/Sexual Assault Cases."

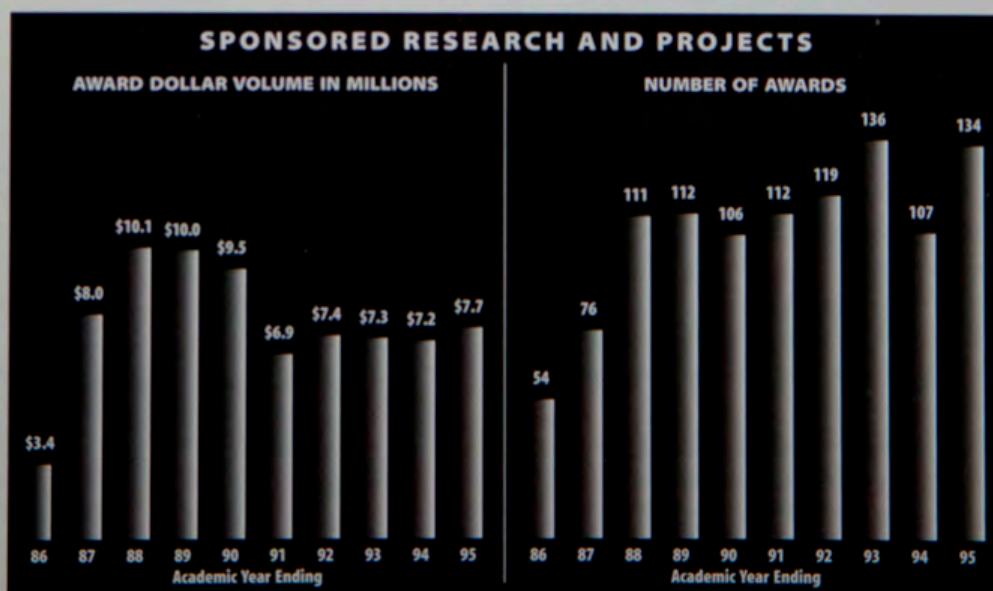
Jeffery Kennington, Computer Science and Engineering, \$88,189, U.S. Navy, "Real Time Optimization: Algorithms and Applications;" \$50,912, Battelle, "Development of Optimization Algorithms to Solve Navy Class Scheduling Problems."

David Maldonado, Theology, \$243,225, Lilly Endowment Inc., "Research on Hispanic Christianity within Mainline Protestant Traditions."

David Matula, Computer Science and Engineering, \$80,222 and \$29,508, Cyrix Corporation, "Design of a Next Generation Floating Point Unit for the X86 Architecture."

Bijan Mohraz, Mechanical Engineering, \$182,564, Department of Commerce, "IPA Agreement."

Sukumaran Nair, Computer Science and Engineering, \$110,000, BNR Inc., "Distributed Computing and PCS;" \$60,000, Northern Telecom, "Distributed Computing and PCS;" \$90,000, NSF, "Spectral-Based Numerical Methods for Combinational Logic Synthesis." ▶



Osita Nwokah, Mechanical Engineering, \$78,330, Southern University, "Unscheduled Full Envelope Multivariable Propulsion System Control."

Osita Nwokah, **Yildirim Hürmüzlü**, and **Bijan Mohraz**, Mechanical Engineering, \$24,760, Department of Commerce, "A Study of Active and Passive Structural Control Systems."

William Pulte, Anthropology, \$155,913, Department of Education, "Master's Program Leading to Endorsement in Bilingual Certification."

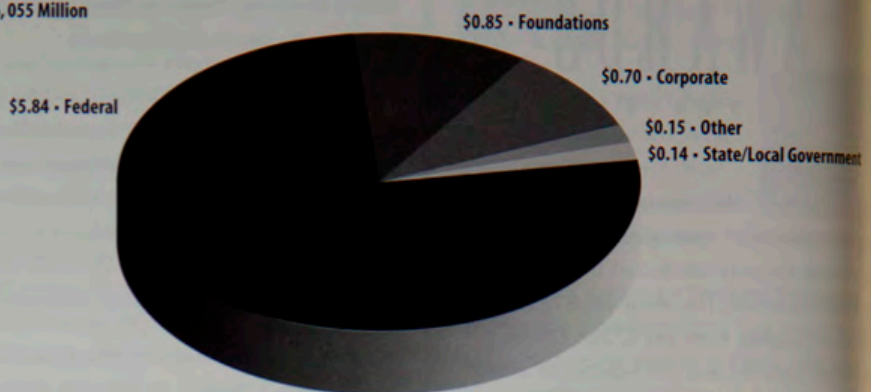
Lawrence Ruben, Biological Sciences, \$166,508, National Institutes of Health, "Calcium Pathways in African Trypanosomes."

Edward Smith, Mechanical Engineering, \$50,351, Environmental Protection Agency, "Removal of Heavy Metals from Aqueous-phase Industrial and Hazardous Wastes Using Waste Shot-Blast Fines;" \$37,557, Tyler Pipe, "Research with Waste Shot-Blast Fines from Cast-Iron Manufacturing Processes;" and \$24,000, Texas Higher Education Coordinating Board, "Supplement to Recycling and Application of Waste Shot-Blast Fines for Treatment of Industrial and Hazardous Wastes."

R.S. Sohal and **William Orr**, Biological Sciences, \$202,584, National Institutes of Health, "Antioxidant Enzymes and Aging in Transgenic *Drosophila*."

R.S. Sohal, Biological Sciences, \$144,187, NIH, "Cellular Aging and Oxygen Free Radicals;"

Total Funding
\$7,686,055 Million



and \$58,624, University of North Texas Health Science Center, "Neurobehavioral and Immunological Markers of Aging."

Ryszard Stroynowski, Physics, \$293,000, \$100,000, and \$25,630, Department of Energy, "Research in High Energy Physics - Theoretical and Experimental;" \$26,883, Jet Propulsion Laboratory, "Project Definition Study for the Velocity of Light Using ASST Facility at SSC Laboratory;" \$2,992, Jet Propulsion Laboratory, "Travel Support for The Light Retardation Experiments Project;" and \$2,195, JPL, "Travel PO."

Steven Vik, Biological Sciences, \$153,132, National Institutes of Health, "Structure-Function Studies of *E. coli* F₁F₀ ATPase" (year 7 of 7).

John Walther, Geological Sciences, \$105,000, \$95,000, and \$94,999, NSF, "Experimental and Theoretical Determination of Solubilities of Rock-forming Minerals."

Patty Wisian-Neilson, Chemistry, \$41,300, Texas Christian University, "Synthesis and Characterization of Poly (Alkyl/Arylphosphazenes and Their Derivatives);" \$34,000 and \$32,000, Welch Foundation, "Poly(alkyl/arylphosphazene) Copolymers;" and \$25,000, American Chemical Society, "Reactions of Low-Coordinate Phosphorus Compounds with New Phosphido-Bridged Diron Anions." •

Compiled by *Larry Smith*
Director of Research Administration

Not Of This World

(Continued from page 11)

time-consuming work of mapping Venus' surface in detail. That project will take years - there are nearly 300 CD-ROMs full of Venus data that show 98 percent of the planet's surface. And the best part, she adds, is that the data are available not only to NASA-supported scientists, but to high schools, computer enthusiasts, and the public for \$6 a CD.

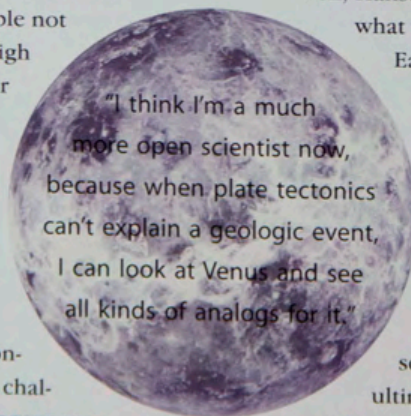
"Kids can pull up images on computers and map the planet, try to understand it, and postulate for themselves how it forms," Hansen says. "They can be as good at it as any geologist because they don't come encumbered with a lot of preconceived ideas."

Those preconceived ideas - the accumulated conventional wisdom of an entire field - are being challenged almost daily by discoveries from Venus, Hansen says. "When I came into this project, I had to be educated as to what the paradigms of planetary geophysics are. And a lot of people aren't

willing to let go of those. Roger is one who's saying that we've got to look at those principles every single day, because every day you might have to discard one of them. And he has no problem with that."

Rethinking Venus has led to some rethinking about Earth as well, Hansen says. "We've discovered that Ishtar is not at all what we'd expected, so that takes us back to places on Earth like the Himalayas. We've always made the assumption that the topography we see there has to do with the buoyancy of the material and isn't related to stress. But what if it *is* related to stress? That's now being questioned by people who've been working on Venus.

"I think I'm a much more open scientist now, because when plate tectonics can't explain a geologic event, I can look at Venus and see all kinds of analogs for it," she adds. "This is ultimately what all planetary geologists hope for. The whole purpose of the *Magellan* mission was to help us better understand Earth. I think that in the next five or 10 years we're going to see a real blending of these fields." •



MEADOWS

SCHOOL OF THE ARTS



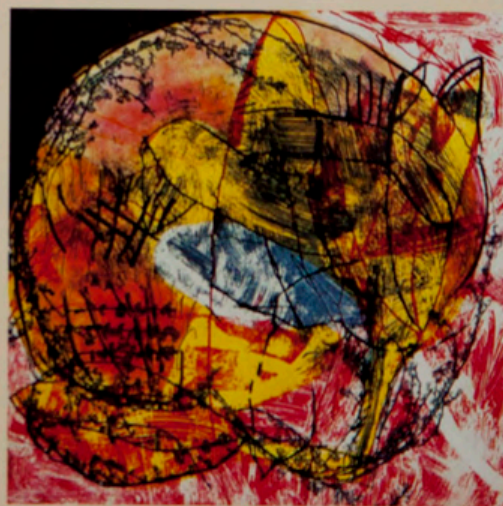
"Finsbury Park," oil on canvas, 72" x 96", 1995, Lynn Curtis



Detail of "Olive Pickers," Barnaby Fitzgerald



Ewers, porcelain, 1995, Peter Beasecker



"Milkweed," etching, 18" x 18", 1994, Mary Vernon



"Singing Tiso," plaster, straw, steel, 84" x 40" x 24",
Jay Sullivan

Faculty members of the Division of Art are all working artists who are active in the studio and who exhibit regularly. Art proceeds through thought, some theoretical, some empirical, within the process of making a work itself. Two questions dominate: What can be made now that is visually and physically compelling? and, What should be made – that we do not yet see? This is a visual process, image upon image, and highly open-ended, with few rules to follow. It is an attempt to make works that will disclose their meanings slowly, in complicity with the viewer, hopefully for a great deal of time. • Jay Sullivan, *Chair, Division of Art*

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