1-1-1994

SMU Research, Volume 2

Office of Public Affairs

SMU RESEARCH

SOUTHERN METHODIST UNIVERSITY

VOLUME 2 1994

SMU RESEARCH magazine is in its second year. The first volume was well received and has helped open a window on research being conducted at Southern Methodist University. This volume introduces 10 faculty members and describes their achievements. It also provides a glimpse of graduate student research by describing the work of one student from each program in various departments.

SMU offers graduate research programs only in certain disciplines. Of the six schools – Dedman College of Humanities and Sciences, Meadows School of the Arts, the School of Engineering and Applied Science, Edwin L. Cox School of Business, the School of Law, and Perkins School of Theology – the last three are primarily professional schools. Doctoral programs are concentrated in the sciences, social sciences, and engineering. In the humanities, the doctorate is offered in religious studies and the Master's degree in art history, English, and history. Also at the Master's level are programs in the fine arts and communication arts. Despite the limited number of doctoral programs, most faculty members actively conduct research at SMU. The following pages provide ample evidence of their productivity.

A high point of 1994 was the $10 million gift to SMU from William C. Clements Jr., former SMU trustee and Texas governor, to establish a Ph.D. program in history and a Center for Southwest Studies. This gift recognizes the faculty strength in that department.

SMU Research will be distributed to alumni and friends who value research in a university. They have supported faculty and student research over the years. On behalf of the University, I extend our appreciation for their generosity and look forward to their continued support in the future.

U. Narayan Bhat

Dean, Research and Graduate Studies

SMU RESEARCH

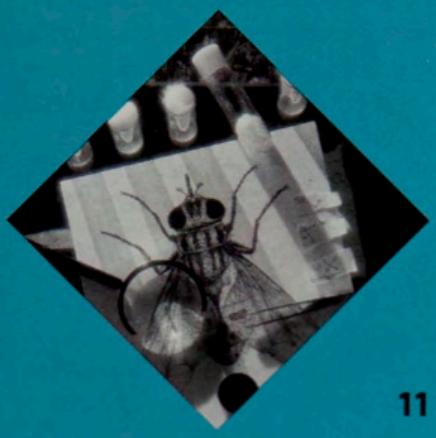
SOUTHERN METHODIST UNIVERSITY
VOLUME 2 1994

COVER STORY

DISCOVERING THE MYSTERIES OF AGING IN THE FRUIT FLY

Experiments on genetically engineered fruit flies have led two SMU biology professors to discover what they believe is a fundamental cause of aging.

Cover photo illustration by Paul Talley



11

MONITORING TREMORS IN THE NUCLEAR AGE

Through his research in seismology, Geology Professor Eugene T. Herrin has placed SMU on the map of world politics in an era of peace after the breakup of the Soviet Union. 5

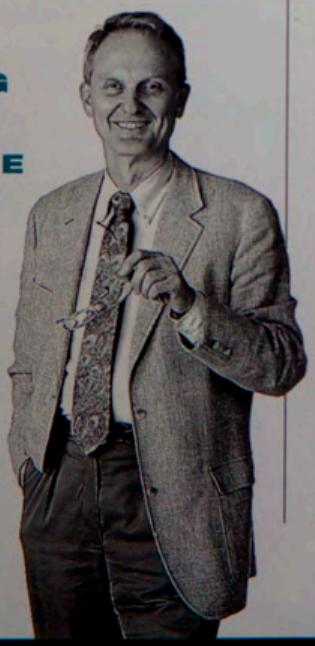
TEACHING THE LANGUAGE OF DANCE

In Meadows School of the Arts, Dance Chair Jill Beck is teaching students how to read and write dance.

2

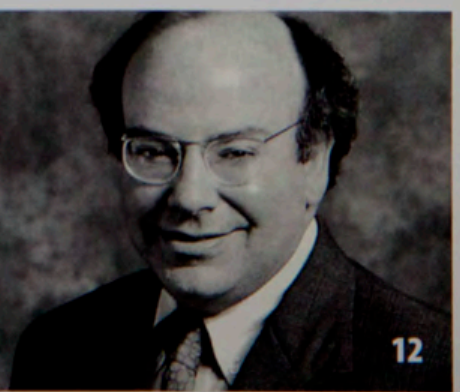
TEACHING ETHICS TO FUTURE LEADERS

Professor William May helps students understand their roles and obligations as good citizens in all aspects of society 10



OBSERVING THE REGULATORS

Foreign companies interested in offering their securities for sale in the United States increasingly are seeking guidance from American securities law experts such as Marc Steinberg.



12

DEPARTMENTS

FEATURES

TEACHING THE LANGUAGE OF DANCE

BY ALI JONES

Throughout the history of dance, its language largely has been unwritten. Imitation was the traditional way to teach and learn it. Jill Beck, chair of the Dance Division in Meadows School of the Arts, envisions dance education differently. At SMU, she is returning to the basics by teaching her students how to *read* and *write* dance.

Beck is helping to revolutionize dance instruction by using a system of symbols called Labanotation. The system enables choreographers, dancers, and teachers to record in precise terms the body's movement, direction, timing, dynamics, levels of action, placement, and rhythm. With Labanotation, dance finally has a written language that is accurate and comprehensive, Beck says.

"Labanotation can accelerate dance learning. My hope is that 20 years from now, we will have not only skilled, but literate dancers."

Like music notation, Labanotation consists of a staff and symbols. The staff is read vertically, from bottom up. The symbols convey their meaning through their length, shape, shading, and place in the staff.

The implications of Labanotation are immense for dancers, choreographers, critics, and dance historians, Beck says. "Choreographers will be able to write their dance scores. Dances will be reproduced as they were conceived, rather than as they are remembered by dancers.

"Dancers will be able to read choreography and develop a performance interpretation," she adds. "They discover dance in the choreographer's own hand, rather than through a director's interpretation. The combined physical and intellectual understanding of technique should make them better performing artists."

And on the practical side, dancers and directors will not have to spend as much time in rehearsal, making the production more economical.

Beck offered the first Labanotation class at SMU in the fall semester. Using support from her students and colleagues, she hopes to create a library of notated dances that can serve as a resource for colleges and universities nationwide. With a grant from the Office of the Provost, she has begun notation work on Michele Fokine's 1910 ballet "Carnaval."

To gain perspective on the early 20th-century choreographer's technique, Beck pores over written records and photographs, watches videotape recordings of the ballet's performance, and interviews dancers who performed with Fokine. She hopes to stage it at SMU, just as she did with Nijinsky's "Apres-Midi d'un Faune" in 1989 with the Juilliard Dance Ensemble.

Under another grant from the Department of Education, Beck is directing an SMU project for Texas schools that will use the dance styles of different countries to teach social studies.

"Dancing is a technique of doing – a physical discipline," Beck says. "Labanotation has made dance an intellectual discipline as well. It has opened avenues for research and scholarship that strengthens dance's rightful place in a university."

Beck also advocates the use of instructional technology in teaching dance. With Dennis Bowers and Robert Beck in the Meadows School, she is creating a multimedia interface that combines video, graphics, audio, text, and interactive capabilities to enhance the learning experience.

"This is the future," Beck says. "Because Labanotation provides a written record of dance, it will enable us to study classical dances and dances from different countries. It also will allow us to record previously unrecorded dances. Its possibilities are endless."

Before joining SMU in 1993, Beck was chair of Connecticut College's Department of Dance, a member of The Juilliard School's faculty, and a consultant to The Hartford Ballet. She has co-directed numerous projects on dance history curriculum and has received grants from the National Endowment for the Arts, the Connecticut Council on the Arts, The National Endowment for the Humanities, and Connecticut Humanities Council.

Beck's recent staging and choreography credits include Off-Broadway productions of "Love's Labour Lost" and "Death and the Maiden." She holds a doctorate in theater history and criticism from The City University of New York (CUNY); Master's degrees from CUNY and McGill University; and a Bachelor of Arts degree from Clark University. ▪

JILL BECK

Silencing Electronic Noise

n old expression says, "If life gives you lemons, make lemonade," and Zeynep Çelik-Butler has incorporated that philosophy into her research. She is finding ways to use one of electronic technology's most annoying problems – low-frequency noise – to provide important data about the performance of solid-state electronic devices.

Working under a three-year grant from the National Science Foundation, Çelik-Butler is measuring low-frequency noise in the devices' metallization – the thin metal lines on a printed circuit board that conduct electricity to its components. Over time, failures occur in these boards because of electromigration, or the shifting of the metal layer's component atoms caused by electrical current.

"You want to predict that a device will last 10 years," says Çelik-Butler, associate professor of electrical engineering in the School of Engineering and Applied Science. "But at the same time, you can't actually operate it in a lab for 10 years just to be positive." Her research demonstrates that the amount of noise produced in a device corresponds to the amount of electromigration taking place – meaning that the noise measurement can be used to predict the devices' reliability. That data also may be used to determine which materials provide the greatest reliability in electronic devices.

Çelik-Butler's research in the measurement and characterization of electronic noise can be traced to her graduate studies at the University of Rochester, New York. As a predoctoral fellow in programs sponsored by IBM and Eastman Kodak, she wrote her Ph.D. dissertation on low-frequency noise in semiconductor devices. She has written or co-written more than 40 journal articles and conference papers since 1985.

After joining SEAS as an assistant professor in 1987, Çelik-Butler established herself through her research. In 1990 she was named the first recipient of the J. Lindsay Embrey Trustee Professorship in Electrical Engineering. That three-year professorship and a corresponding one in mechanical engineering were endowed by Dallas civil engineer Embrey ('45, '47) to support junior SEAS faculty members who have demonstrated outstanding potential in teaching and research.

Çelik-Butler also maintains a long-standing interest in electronic imaging technology. As an undergraduate at Bogazici University in Istanbul, she wrote her Bachelor's thesis on the design and implementation of a video motion detection system. At SMU, she is participating in research to help create a new generation of infrared imaging devices.

Most infrared-detection research has been supported by the U.S. Army's night-vision projects, which have produced such high-resolution infrared cameras as those used during the Persian Gulf War. But with the recent decline in defense-related orders, the companies that developed the technology are hoping to convert to commercial use.

Çelik-Butler's research, which she is conducting with her husband, Associate Professor of Electrical Engineering Donald Butler, is geared toward making infrared technology affordable for consumer applications. Some U.S. auto manufacturers are interested in installing night-vision devices in their high-end luxury cars, an idea that brings the cost issue into sharp focus. For such a venture to be successful, the biggest factor will be the price of the finished product. Simply put, "you cannot build a $20,000 camera and put it in a $50,000 car," Çelik-Butler says.

Most state-of-the-art infrared cameras require cooling, "and when I say cooling, I don't mean down to 0 degrees Celsius," Çelik-Butler says. "I mean *real* cooling – to the temperature of liquid nitrogen – to 77 Kelvin. And that's costly." To eliminate that expense, the researchers are trying to find reliable materials that work at room temperature and still are sensitive enough to do the job. The Butlers' calculations show that infrared devices built around thermal-detective, or bolometric, substances could achieve a level of sensitivity within striking distance of the ultrasensitive photon detectors currently in military use.

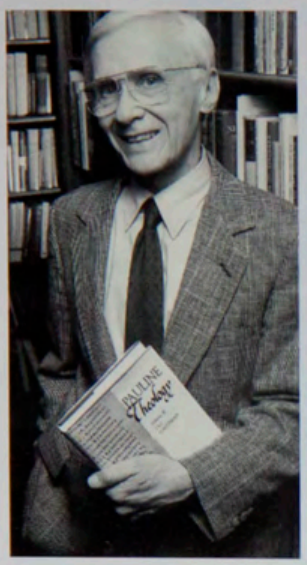
Unlike photon detectors, which isolate an electrical image of the object in view, bolometric detectors "sense the *temperature* of what they're staring at," she says. "And because infrared is basically heat anyway, [these materials] can map that out quite effectively."

It will be at least a decade, however, before these new-generation infrared cameras hit the consumer marketplace, Çelik-Butler says. Some promising thermal-detective materials are incompatible with the silicon technology used to process the electronic signals, and research into overcoming those difficulties has just begun. But when the technology does arrive, she says, "it should be inexpensive, reproducible, and it should work well." ▪

Zeynep Çelik-Butler

By Kathleen Tibbetts

CLARIFYING THE THEOLOGY OF PAUL



VICTOR PAUL FURNISH

by Lori Johnson

Christians relying on the Bible for easy answers to social conflicts should not look to Victor Furnish for support. Furnish, University Distinguished Professor of New Testament at Perkins School of Theology, has spent 35 years studying theology and ethics of the New Testament, and more particularly the letters and thoughts of Paul. Through his scholarship, he has concluded that those who accept the Bible as Scripture can find within it much wisdom and guidance for living in today's world, but cannot find specific answers for every modern situation.

"The New Testament and Paul are about what it means to *be* a Christian, and that is what endures. But what biblical writers identify as specific Christian actions constantly must undergo reassessment and sometimes revision," he says.

A prime example of such reassessment – and one for which Furnish's perspective as a biblical scholar often has been sought – is the issue of homosexuality and the Judeo-Christian response to it. For the past 20 years, he has been one of the most prominent voices arguing that churches and society need to reconsider and revise their pronouncements about homosexuality. Furnish believes that based on the current body of knowledge about sexual orientation, people of faith should no longer issue wholesale condemnations of homosexual practice.

Those who disagree with Furnish often cite Bible verses that condemn homosexuality; others might be tempted to find contradictory passages to refute them. But Furnish compares such reactions with using the Bible as a munitions dump, as both sides search for scriptural "missiles" to hurl at those with whom they disagree.

"I have argued that the specific moral teachings of the Bible are so particular to their own times and places – that they are so profoundly culturally conditioned – that they must not be ripped out of that context and simply applied to our own," Furnish says. "Our own times require our own cultural understanding of homosexuality, and this applies to any other question of social ethics that you want to mention, from international relationships to family life."

Furnish calls this the "Law of Diminishing Relevancy," although his students have dubbed it "Furnish's Law." The idea is that the more specifically appropriate or relevant something is to one situation, the less relevant it is to others. For example, Paul's advice to the Christians of Rome about paying their taxes to the government and his appeal to a Christian slave-owner on behalf of one of his slaves address the economic and social institutions of the early Roman Empire, and neither can be applied directly to life in late 20th-century America.

Furnish hardly rejects the Bible as the basis for Christian and Jewish moral life, however. "What is distinctive and enduring about the Bible for Christians and Jews is the understanding of God and human existence. That is what nurtures and shapes the identities of the believing communities," he says.

Furnish has been studying the works of Paul since he was a doctoral student at Yale University. He believes the apostle's letters reveal that Paul's understanding of how Christians should live out their faith in the world was shaped by the central theological idea that we live our lives out of the unconditional grace of God. This contrasts with the conception, once widely held, that Paul's emphasis on the unconditional love of God removed any conceivable theological basis for morally responsible conduct.

"Paul believed that to live with God's grace requires living out God's grace in our lives in concrete ways," Furnish says.

Furnish is writing a book on the theology of Paul's first letter to the Corinthians and is editing a 20-volume Bible commentary series for Abingdon Press. He served as president of the Society of Biblical Literature in 1993. His presidential address, which was published in the *Journal of Biblical Literature,* was titled "On Putting Paul in His Place." In August he received the Alumni Award for Faculty Excellence and the 1993-94 University Scholar/Teacher of the Year Award, which was established by the Division of Higher Education of the United Methodist Church. •

By Gary Shultz

EUGENE HERRIN

MONITORING TREMORS IN THE NUCLEAR AGE

ata emerging from a seismic station near the sleepy little town of Lajitas, Texas, is providing bold answers that are being heard around the world. Through his research in seismology, Eugene T. Herrin, Shuler-Foscue Professor of Geological Sciences, has placed SMU on the map of world politics and peace in an era after the breakup of the Soviet Union.

Th project combines the use of seismic principles with the techn logy of high-speed computers and satellite data transmission. s purpose relates to the sometimes shaky but perennial worl nope for an end to the buildup of nuclear arms.

Sin e 1981 SMU has operated a seismic station near Lajitas to supp t research at its Institute for the Study of Earth and Man (ISEM on campus. Now the station houses a sophisticated monitorin system that alerts scientists to the possibility of underground nucle weapons testing anywhere in the world.

Art cially intelligent computers enable the monitoring system to distin uish between seismic activity caused by an underground nucle detonation and that which is caused by other sources such as ea nquakes. The system mimics the way trained seismologists decic the importance and meaning of even the most subtle of seism signals – but faster and at a lower cost.

Th system's computers automatically analyze the ground motion c used by nuclear explosions, or other seismic events, recorde by earthquake-sensing devices called seismometers that are c able of detecting motions smaller than atoms. The computer isolate ground motions most likely made by nuclear explosions rom the constant stream of background noise and transmit the in ormation almost instantaneously to a human analyst for final etermination on the cause of the disturbance.

"Th goal is to get to the point that the systems send you what you w nt to see, not every single seismic event," Herrin says. "The globa monitoring system would have to maintain a huge staff to analy all the unsorted data coming in rom the stations, and the time nd expense would be prohibiti . An automated, intelligent stem is the answer."

Th multinational Group of Scien fic Experts is refining the techn logy and procedures that will ake possible accurate moni ring of worldwide seismic t ts. The GSE is the branch of the J.N. Council on Disarmament sponsible for developing techn logy to detect and verify seismic events such as nuclear explosions. It also provides seismic data to political agencies that enforce nuclear test-ban and verification treaties.

The monitoring system being developed by Herrin and SMU colleagues, if eventually adopted by the U.N., could make it much more difficult for nations to cheat on the provisions of a treaty to prohibit nuclear explosions. "People wanting to disguise their nuclear weapons experiments can attempt to conceal the acts by coupling the explosions with an earthquake, timing them to coincide with a mining operation's chemical explosions, or trying to prevent detection by exploding the devices in a large cavern in which air will absorb much of the explosive force," Herrin says.

"We can tell if a blast is nuclear, however, by the seismic signal it gives off," Herrin adds. "Because nuclear explosions spread outward from a single point like an expanding balloon, they make high frequency compressional waves similar to sound waves. Earthquakes occur when two walls of rock tear past each other like ripping fabric, emitting low-frequency shear waves along the tear. It's easy to differentiate between nuclear blasts and earthquakes at relatively large magnitudes. When the nuclear explosions are small, particularly below 10 kilotons, identifying them becomes more difficult. Cheating is more likely to occur with explosions below 10 kilotons, creating ground motion easier to hide within natural earthquakes and large industrial explosions."

Since 1987 Herrin and SMU have received about $14 million in contracts from the Advanced Research Projects Agency to develop and refine the prototype system and to help devise and install a joint SMU-German advanced seismic array in Bavaria. Herrin shared management responsibilities for the Bavarian project with professor Hans-Peter Harjes of Ruhr-Universität Bochum in Germany.

The Bavarian array's function is comparable to seismic sonograms imaging the Earth, thus enabling analysts to distinguish between seismic activity relating to nuclear tests, chemical explosions, and earthquakes. Two similar arrays are operating in Norway. An array in Germany, which transmits data via satellite to Bochum, Norway, and Washington, D.C., enhances analysts' abilities to study seismic events originating in Europe and Asia. •

SELECTED FACULTY BOOKS

Various faculty members from SMU's six schools published the following books in 1993-94.

William J. Abraham, Theology, *The Art of Evangelism: Evangelism Carefully Crafted into the Life of the Local Church,* Cliff College Publishing Company, 1993.

Jouette McCurdy Bassler, Theology, served as New Testament editor of *The Harper Collins Study Bible*, Harper Collins Publishing, 1993.

Ravi Batra, Economics, *The World Great Depression: 1995-2010*, Sogo Hore (in Japanese), 1994.

Robert J. Beck, Dance, with Denis Wood, *Home Rules*, Johns Hopkins Press, 1994.

Herman Bierens, Economics, *Topics in Advanced Econometrics: Estimation, Testing, and Specification of Cross-Section and Time Series Model*, Cambridge University Press, 1994.

C. Clifton Black, Theology, *Mark: Images of an Apostolic Interpreter,* a volume in the series of *Studies on Personalities of the New Testament*, University of South Carolina Press, 1994.

Caroline B. Brettell and **Carolyn Sargent,** Anthropology, eds., *Gender in Cross-Cultural Perspective,* Prentice-Hall, 1993.

Caroline B. Brettell, Anthropology, *When They Read What We Write: The Politics of Ethnography,* Bergin and Garvey, 1993.

James Brown, Political Science, *Challenges in Arms Control for the 1990s,* VU University Press, Amsterdam, 1993; and *New Horizons and Challenges in Arms Control and Verification,* VU University Press, 1994.

William B. Brueggeman, Real Estate, *Real Estate Finance,* Richard D. Irwin Inc., 1993.

Dennis Cordell, History, and Joel Gregory (eds.), *African Population and Capitalism,* The University of Wisconsin Press, 1994.

Ronald L. Davis, History, *The Glamour Factory,* Southern Methodist University Press, 1993.

James Early, English, *Colonial Architecture of Mexico*, University of New Mexico Press, 1994.

G.A. Evans and **J.M. Hammer,** Engineering, eds., *Surface Emitting Semiconductor Lasers and Arrays*, Academic Press, 1993.

Danna Nolan Fewell, Theology, *Gender, Power, and Promise: The Subject of the Bible's First Story,* a monograph co-authored with David Gunn, Abingdon Press, 1993; *Reading Between Texts: Inter-textuality and the Hebrew Bible,* Westminster/John Knox, 1993.

David A. Freidel, Anthropology, *Maya Cosmos, Three Thousand Years on the Shaman's Path,* William Morrow & Co., 1993.

Victor Paul Furnish, Theology, *Jesus According to Paul,* Cambridge University Press, 1993.

Elbert B. Greynolds, Accounting, *Financial Modeling Using Lotus 1-2-3: Structured Macro Programming for Business,* Wordware Publishing, 1993; *Student Manual for Lotus 1-2-3 Advanced Worksheet for Strategic Marketing: Cases and Comments,* 6th ed., Allyn & Bacon, 1993; and *Instructor's Manual for Lotus 1-2-3 Advanced Worksheet for Strategic Marketing: Cases and Comments,* 6th ed., Allyn & Bacon, 1993.

Randall Griffin, Art History, *Thomas Ansbutz: Artist and Teacher,* Heckscher Museum with the University of Washington Press, 1994.

Eric B. Hall, Engineering, *Counterexamples in Probability and Real Analysis*, with Gary L. Wise, Oxford University Press, 1993.

George Hempel, Finance, *Bank Management: Text & Cases,* 4th ed., Wiley & Sons, 1994.

Sam Holland, Music, *Teaching Toward Tomorrow: A Music Teacher's Primer for Using Electronic Keyboards, Computers and MIDI in the Studio,* Debut Music Systems, 1994.

Dennis S. Ippolito, Political Science, *Blunting The Sword: Budget Policy and the Future of Defense,* National Defense University Press, 1994.

Roger A. Kerin, Marketing, *Marketing,* 4th ed., Richard D. Irwin, 1994, and *Marketing w Practyce* (co-authors: K. Przybytowski, S. Hartley, and W. Rudelius), Warsaw School of Economics Polish-American Center for Economics and Management, 1994. He also co-authored *Strategic Marketing Problems: Cases and Comments,* 6th ed. Allyn & Bacon, 1993.

Kathy LaTour, Communication Arts, *The Breast Cancer Companion,* William Morrow and Company Inc., 1993.

Victoria S. Lockwood, Anthropology, *Contemporary Pacific Societies: Studies in Development and Change,* with T. Harding and B. Wallace, Prentice-Hall, 1993; *Tahitian Transformation: Gender and Capitalist Development in a Rural Society,* Lynn Rienner, 1993.

John S. Lowe, Law, co-authored *International Petroleum Transactions,* Rocky Mountain Mineral Law Foundation.

Luigi Manzetti, Political Science, *Institutions, Parties, and Distributional Coalitions and Argentine Politics,* University of Pittsburgh Press, 1993; *Political Forces in Argentina,* 3rd ed., with P. Snow, Praeger, 1993.

Richard O. Mason, Management Information Sciences (with Rowe, Dickel, Mann, and Mockler).

rate *Management,* 4th ed., Addison-Wesley, 993; d *Framebreak: The Radical Redesign f Ame can Business,* Josey-Bass Publishers, 994.

ichael cGill and **John W. Slocum Jr.,** Organizational ehavi and Business Policy, *The Smarter rgan ation,* John Wiley & Sons Inc., 1994.

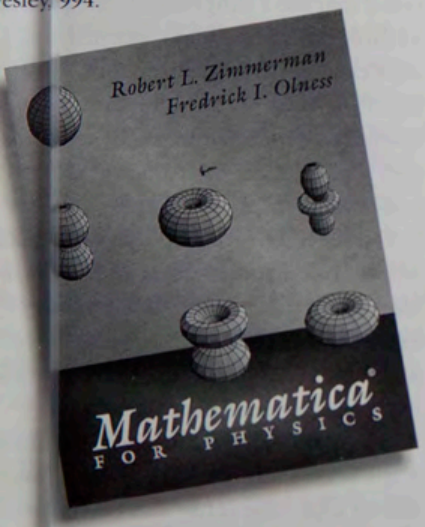
ephen Nally, English, *Child in Amber,* Univer- ty of assachusetts Press, 1993.

avid J. tzer, Anthropology, *Search for the First meric s,* Smithsonian Books, Washington nd St. emy's Inc., 1993.

ck Mye English, *Blindsided,* David R. odine 1993.

astair cross, Philosophy, edited with Bonnie teinbo k, *Killing and Letting Die,* second diton, ordham University Press, 1994.

ederick Olness, Physics, *Mathematica for Phys- s* (wi Robert L. Zimmerman), Addison- esley, 994.



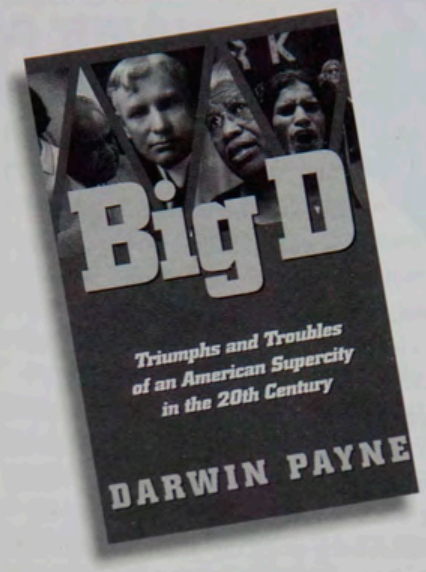
rwin P e, Communication Arts, *Big D: Tri- mphs nd Troubles of an American Supercity the th Century,* Three Forks Press, 1994.

urence rrine and **Thomas R. Arp,** English, *Story nd St cture,* 8th ed., with *Instructor's anua* Harcourt Brace, 1993; *Literature: ructu , Sound, and Sense,* 6th ed., and *struc r's Manual,* Harcourt Brace, 1993.

ne Prie Foreign Languages and Literatures, *iguel ngel Asturia's Archaeology of Return,* mbri e University Press, 1993.

rjorie cter-Smith, Theology (with Janet Wil- n), *W nen at Worship: Interpretations of rth erican Diversity,* Westminster/John ox P ss, 1993.

Robert W. Rasberry, Organizational Behavior and Business Policy (with L. LeMoine), *Effective Managerial Communications,* 2nd ed., Wadsworth, 1994; and (with J. Penrose and R. Myers) *Advanced Business Communications,* 2nd ed., Wadsworth, 1993.



Nina Schwartz, English, *Dead Fathers: The Logic of Transference in Modern Narrative,* University of Michigan Press, 1994.

Philip Seib, Communication Arts, *Rush Hour: Talk Radio, Politics, and the Rise of Rush Limbaugh,* Summit Group, 1993; and *Campaigns and Conscience: The Ethics of Political Journalism,* Praeger, 1994.

Lawrence F. Shampine, Mathematics, *Numerical Solution of Ordinary Differential Equations,* Chapman & Hall, 1994.

Stephen H.A. Shepherd, English, *Middle English Romances: A Norton Critical Edition,* W.W. Norton & Co., 1994.

Jyotsna Singh, English, *The Weyward Sisters: Shakespeare and Feminist Politics* (with Dympna Callaghan and Louanne Helius), Blackwell, Oxford, 1994.

John W. Slocum Jr., Organizational Behavior and Business Policy, the 6th edition of *Organizational Behavior* in a French translation – *Management Des Organisations,* targeted for four-year college institutions in French-speaking countries.

Daniel Slottje, Economics, *Some New Methods for Measuring and Describing Economic Inequality* (with R.L. Basmann and K.J. Hays), JAI Press, 1994; and *Crisis on the Rio Grande: Economic Development on the Mexico-Texas Border* (with D. Betts), Westview Press, 1994.

C.W. Smith, English, *Letters From The Horse Latitudes,* Texas Christian University Press, 1994.

Marion G. Sobol, Management Information Sciences, a Korean translation of *Shaping the Corporate Image: An Analytical Guide for Executive Decision Makers,* Quorum Books; and (with M. Starr), *Introduction to Statistics for Executives,* McGraw-Hill, 1993.

William Taylor and Frank Pease, History, *Violence and Resistance in the Americas: Native Americans and the Legacy of Conquest,* Smithsonian Institution Press, 1993.

John E. Ubelaker, Biological Sciences, *Stedman's A.S.P. Parasite Names,* Williams & Wilkins, 1993.

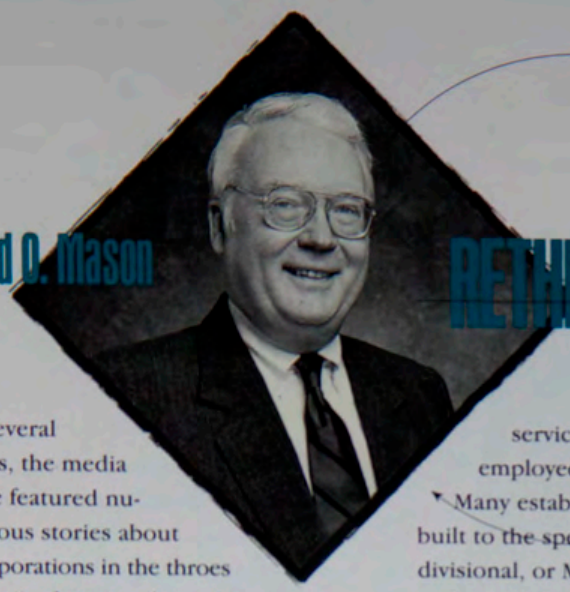
David J. Weber and Jane M. Rausch, History, *Where Cultures Meet,* Scholarly Resources Inc., 1994.

Fred Wendorf and **Angela Close,** Anthropology, *Egypt During the Last Interglacial: The Middle Paleolithic of Bir Tarfawi and Bir Sahara East,* Plenum Press, 1993.

Bonnie Wheeler, English, *Feminea Medievalia I: Representations of the Feminine in the Middle Ages,* Academia Books, Cambridge, 1993.

R. Hal Williams, History, *America Past and Present,* 4th ed., Harper Collins, 1994.

Charles M. Wood, Theology, *The Formation of Christian Understanding: Theological Hermeneutics,* 2nd ed., Trinity Press, 1993. ▪



Richard O. Mason

RETHINKING THE CORPORATE STRUCTURE

by Kathleen Tibbetts

For several years, the media have featured numerous stories about giant corporations in the throes of traumatic change – downsizing, divestiture,dispersal, and other drastic-sounding measures intended to cut their costs or improve their profits.

Richard O. Mason believes that unless these companies make fundamental reassessments of their very structures, such measures are partial solutions at best. He explains why in *Framebreak*, a book whose thesis is summed up in its subtitle: "The Radical Redesign of American Business."

The book is based on research by Mason, the Carr P. Collins Distinguished Professor of Management Information Sciences in the Edwin L. Cox School of Business, and fellow authors Ian I. Mitroff of the University of Southern California and Christine M. Pearson of the University of North Carolina-Chapel Hill.

"The things we've learned suggest that modern businesses must totally rethink their values, the way they're organized, and the way they operate," Mason says.

Mason, who joined SMU in 1985, often has shared his expertise with numerous companies and government agencies. He received his B.S. degree in business and technology from Oregon State University and his Ph.D. in business administration from the University of California-Berkeley. He previously has taught at the University of Arizona, USC, and UCLA.

Through their research and consultation, the authors "found several companies doing things that we believe are on the leading edge." In *Framebreak*, they envision a 12-step program for a new business structure based on total quality management, ethics, social and environmental service, and the recognition of employees as whole human beings.

Many established companies were built to the specifications of the multi-divisional, or M-form, organization, the authors state. This system establishes separate divisions for each major function of the organization (such as manufacturing, marketing, or research and development). It worked well during the early part of the century, when the M-form's hallmarks – mass production, mass marketing, and mass distribution – were values with which a company could thrive and expand.

Today, the M-form organization is losing its effectiveness as product life cycles are shortened by rapid innovation and as computer manufacturing makes it possible to create increasingly specialized goods for targeted markets. On top of that, the M-form's compartmentalized structure makes it difficult, if not impossible, to adapt to the cross-disciplinary relationships that are necessary to deal with the new realities of the marketplace.

Building a new organization should be a company-wide effort, and all of its critical functions must become part of everyone's job. To this end, the authors have identified four major functions that "framebreak" organizations require.

One is a "knowledge and inquiry center" designed to gather all the intellectual assets of the organization. The next function is a "recovery center" for human resources. "When an organization goes through crises, its people become disoriented, unmotivated, burned out," Mason says. A human resource recovery center should deal with these issues in such a way that employees stay healthy enough to contribute fully to the organization.

Next, "we think there's a need for spiritual rebirth and a continual rethinking of how an organization contributes to the rest of the world," Mason says. *Framebreak* proposes to make social service and spirituality central elements of a company's structure and defines organizational spirituality as "a recognition that there is a connection between one's every-day affairs or business and humanity's problems."

One company that has done this is CIBA-GEIGY, a multinational pharmaceutical concern. The company's officers decided that their drugs should be available to those who need them, not just those who can afford them. Therefore, CIBA-GEIGY sells its products in Africa even though its profit margin on these sales is only 1 to 2 percent, an amount substantially below the usual return.

The last element, Mason says, is to build world-class manufacturing and service by identifying the company's main areas of expertise and establishing relationships with other companies worldwide for tasks that could be done better elsewhere.

One major obstacle to decentralization is the vested interest in the old systems, Mason says – the sense that even if something doesn't quite work, it's still safer to do things the way they've always been done. In fact, Mason agrees with that caution up to a point because, he says, the next trap is to go too far too fast. "That's what is happening in the former Soviet Union – they've uprooted everything, probably too quickly in some areas."

The benefits also are clear. "Many organizations tend to reduce their overall costs because they can eliminate divisions, or levels of management, or handle more activity with less," Mason says. "They also need to be innovative, almost by definition. These companies make mistakes, but they're continually trying new ideas. And everyone is part of the process." ▪

For 30 years, as computer companies large and small have competed to make their products ster, ore powerful, and less expensive, iscus ons about microchip design and omp er arithmetic nearly always in- ude e name of David Matula.

The MU professor of computer science nd e ineering has made numerous con- ibuti ns in areas such as floating-point rithm tic, numeric data representation, nd th way computers multiply, divide, nd fi re square roots with such alterna- ve da representation. Matula's achieve- ents nclude six U.S. patents on arith- etic omputer chip design and over 30 ublis ed articles on computer arithmetic. e cr its his opportunities for hardware mple entation to a willing corporate pons and a university that recognizes echn ogical innovation as a companion o bas research.

"By aving faculty members who fill pecifi research needs – research at the orefr t of theories for specialized tech- olog s – SMU actually is helping the omm nity as well as itself," Matula says.

Cyri Corporation of Richardson, Texas, a pr e example of the community enefi ng from Matula's basic research in rithm tic algorithms and mathematical nctio computation on computers. Cyrix as fo nded in 1988 by two former Texas stru ents employees hoping to carve nich in the rapidly expanding field of dvan d computer components.

The orporation asked Matula to con- lt fo an elite team charged with devel- ping faster, more advanced computer rithm ic processing unit than was avail- ble fo the mass market of business and ome ffice PCs. The development team tegr ed several of Matula's basic arith- etic gorithms into the hardware chip. he C ix group also included Mathemat- s Pr ssor Warren Ferguson, who "skill- lly t nsferred more complex function alua ons such as those for logarithm d tr onometric functions into hard- ware-encoded sequences of the newly designed basic arithmetic operations," Matula says.

In a year and a half, the collaboration produced a chip that industry tests confirmed far outpaced the arithmetic performance of marketing giant Intel Corporation of Santa Clara, California. (Intel had produced the first industry-standard math co-processing unit in the early 1980s – protecting its complex innovation with a patent.) The resulting arithmetic chip was faster and more efficient than previously imagined for the vast, low-cost personal-computing market, effectively transforming the market.

For Matula, it had been an opportunity to test his theories regarding algorithms and computer mathematics. For Cyrix, it meant $25 million in revenue only one year after the introduction of the new FasMath processor – a figure that grew to $60 million the next year, which since has more than tripled.

His experiences with Cyrix have added to his own knowledge of computer systems and the way they crunch numbers, Matula says, as well as to the real-world knowledge of graduate students in his algorithm engineering and computer arithmetic classes. "The work (with Cyrix) provided a state-of-the-art implementation lab, because they asked me to develop new ideas that would be collaboratively advanced from paper designs to algorithms on silicon."

More recently, Matula and SMU have encountered another side effect from his consulting experience — the potential benefits derived from intellectual property and patent laws.

"Through my work with Cyrix, I've had to learn a lot about patents," Matula says. "The law says you can patent a process, like a chemistry, for example. You also can patent a procedure, but not a law of nature like Einstein's theory of relativity, $E = mc^2$. But in the case of a mathematical algorithm, it's very hard to get a patent. It is challenging to teach the patent examiner a new procedure for computing a result in contrast to a non-patentable formula such as quotient = dividend/divisor." Matula also notes that his service to industry has provided him invaluable experience in his current role as a member of SMU's Intellectual Property Committee. "I am committed to having this committee chart a path for a future significant source of University income through patent royalties," he says.

Matula, who joined SMU's School of Engineering and Applied Science in 1974 as then chair of the Computer Science and Operations Research Department, received a Bachelor of Science degree in 1959 from Washington University in St. Louis. He received his Ph.D. at the University of California-Berkeley in 1966 and returned to Washington University to teach computer science. He is a founding editor of *Random Structures and Algorithms*, and recently served on the editorial boards of *Transactions on Computers* for the Institute of Electrical and Electronics Engineers (IEEE) and the *Journal on Computing* of the Operations Research Society. ▪

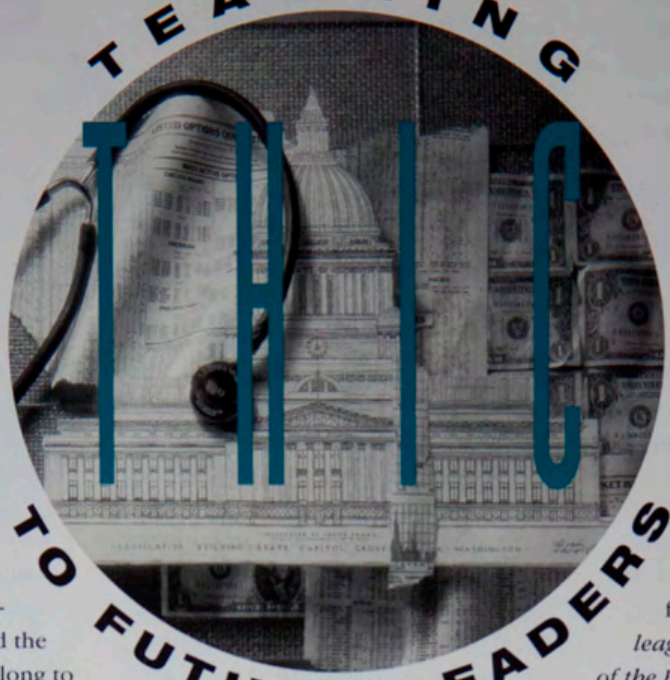
AVID MATULA

e: x p a n d i n g

orporate technology

BY JOHN P. CHURCHILL

TEACHING ETHICS TO FUTURE LEADERS



WILLIAM MAY

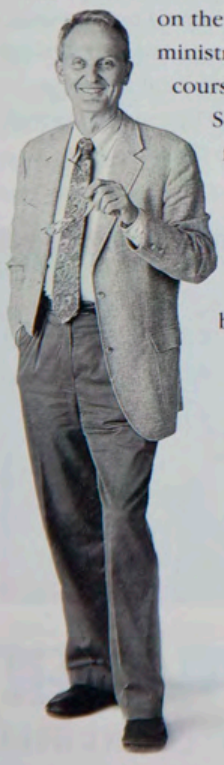
BY KIM GUSTAFSON

Forty million people, one-sixth of the U.S. population, are excluded from health care insurance. Another 40 million Americans are underinsured. For William F. May, the Cary M. Maguire University Professor of Ethics, the statistics not only reflect a flawed American health care system, but also present an ethical problem.

"When we exclude people from health care, they suffer a triple deprivation – the misery of illness, the desperation of little or no treatment, and the cruel proof that they do not really belong to the community," May says. "We make them strangers in their own land."

Last year, May served as a member of the Work Group on Ethical Foundations for the Clinton Task Force on National Health Care Reform. He has written widely on health care as an obligation of society to its citizens, calling it a "fundamental good." Because health care is a fundamental good, he says, the American system must offer universal access, be fair and just, be of good quality, and be responsive to choice. "Healthy children, the people's health, and therefore health care, are part of a nation's covenant with its future."

May, SMU's first University-wide endowed chair, also focuses on the ethics of other fields such as business, the ministry, the law, and the academy. He has taught courses in Dedman College of Humanities and Sciences and all professional schools, except for the School of Engineering and Applied Science, where he has occasionally lectured.



"Corporate Ethics and Social Responsibility," which May taught with other professors, discussed the role of ethics in business. When the course was first offered in 1987, May said, "People sometimes get so busy striving for their personal goals that they don't think about their responsibility to the public. Yet their decisions as business leaders have huge impacts on our common life." The important role of ethics in business and the professional's moral obligation to the community will be explored in May's fourth book, tentatively titled *The Beleaguered Rulers: The Public Obligation of the Professional.*

When May came to SMU from Georgetown University's Kennedy Institute of Ethics in 1985, he had published *The Physicians Covenant: Images of the Healer in Medical Ethics*. Since then, he has written extensively on medical ethics and published another related book, *The Patient's Ordeal.* Unlike other books that focus on the ethical quandaries faced by medical professionals, *The Patient's Ordeal* focuses on problems confronting patients and their families. *The Hastings Center Report,* considered the leading journal in medical ethics, has reprinted an excerpt of this book from a chapter, "The Molested." The journal also recognized May when it asked six leaders in biomedical ethics to choose an article that had the greatest personal impact on them; two chose an article that May had written.

May's expertise has been utilized by SMU both in and out of the classroom. For instance, May was a visible force on campus when the football program received the death penalty in 1986. He opened an SMU town meeting to discuss possibilities for student athletics and the University's moral obligations. At that time, May told a writer for *D Magazine*, "I have never seen a university go through as profound a soul-searching or a university so determined to write a new chapter in its history."

May, an ordained Presbyterian minister and former chair of the Program in the Study of Religion at Indiana University, also has taught and written extensively on ethics in religion. His articles discuss clergy ethics, theological education, and theological perspectives on medicine and other professional areas. He also has served as president of the American Academy of Religion and is a Founding Fellow of the Hastings Center, where he has co-chaired its research group on death and dying. ▪

DISCOVERING THE MYSTERIES OF AGING IN THE FRUIT FLY

BY GARY SHULTZ

iol y professors R.S. "Raj" Sohal an William C. Orr have discovered wh they believe is a fundamental cau of aging in air-breathing or- anisn . Their discovery ultimately ay le l to increased longevity for nima

"We ave confirmed the validity of majc theory of aging – that oxida- ve st ss is an underlying cause of ging," ohal says.

Soh s and Orr's findings, based n exp riments with genetically engi- eered ruit flies, appeared in February 994 i *Science* magazine, a weekly eer-r iew journal published by the meri n Association for the Advance- ent Science. The scientists' research as be n funded by nearly $2 million in rants om the National Institutes of ealth National Institute on Aging.

This eory of aging, first proposed in 956, ggests that when oxygen is used y cell it produces harmful free radicals mol ules containing unpaired elec- ons. rganisms, from the smallest in- ects t humans, possess defenses known s anti idants that protect them against dical Stress occurs when there are ore r dicals than antioxidants.

The eory also suggests that the nor- al le l of antioxidants in cells is not ffici t to counteract the radicals. As a sult, ome of the radicals escape elimi- ation y antioxidants and sometimes ause reparable damage to cells. The mour of permanent damage increases ver ti e and undercuts the organism's reng and vitality. Although this theory n the ause of aging has had strong in- itive ppeal, until now it lacked sub- antiv evidence to support it.

Soh and Orr, faculty members in the epar ent of Biological Sciences in edm College of Humanities and Sci- nces, ave focused their attention on the nzym superoxide dismutase and catalase. These are the two antioxidants that serve as air-breathing organisms' primary defense against free radicals, and therefore, aging.

The two enzymes work together to break down the radicals into water and oxygen, thus reducing the potential for cell damage. With more of the two antioxidant enzymes, the cell's defense increases against the aging process.

"We increased the fruit flies' defense mechanisms by increasing their production of superoxide dismutase and catalase," Orr says. "This was achieved by introducing extra copies of these genes into embryos by microinjection. When we engineered flies that produced extra amounts of only one of the enzymes, it had no effect on their life span. But flies that produced extra amounts of both enzymes lived one-third longer."

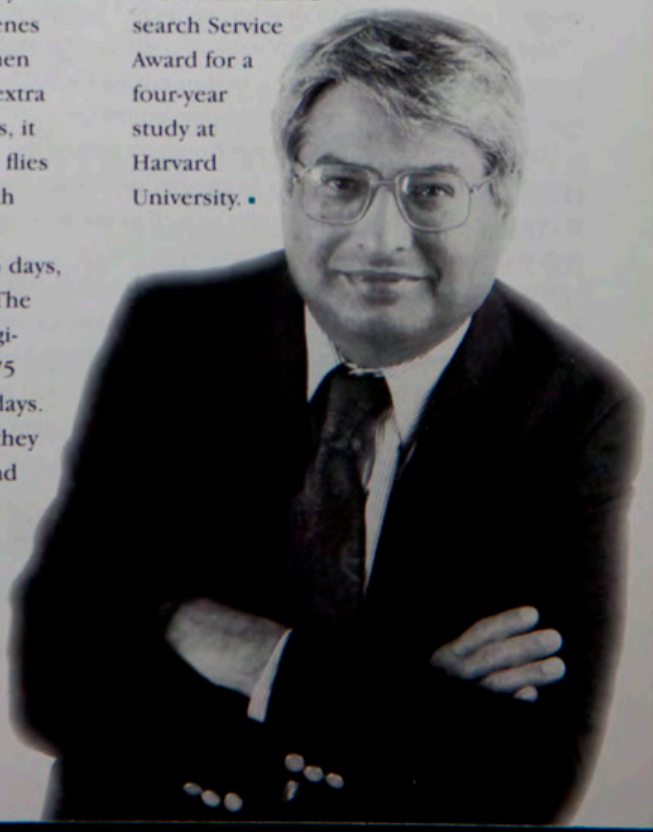
The fruit fly lives an average of 54 days, but can survive as long as 71 days. The life span of fruit flies genetically engineered by Orr and Sohal averaged 75 days, and some lived as long as 95 days. The flies not only lived longer, but they were in better physical condition and retained their vigor longer, the researchers say.

"The anti-oxidant defenses work the same way in all air-breathing species, so it is reasonable to expect that a similar approach in mammals would have a similar result," Sohal says. "However, this genetic engineering procedure will only benefit the unborn. It cannot be performed on animals that are already alive, because it involves the addition of genes during the early embryonic period."

The long-term implications of the research include the possibility of producing livestock and pets that would live longer. The researchers rule out using their findings to increase longevity in humans because of ethical considerations and current limitations in genetic engineering.

Sohal has been a member of the SMU biology faculty since 1969 and also has been a senior guest scientist with the Institute of Physiological Chemistry at the University of Dusseldorf and a visiting professor in the Department of Pathology at Linkoping University.

Before joining the SMU faculty in 1986, Orr received a post-doctoral fellowship from the American Cancer Society and a National Research Service Award for a four-year study at Harvard University. ▪



RAJ SOHAL

OBSERVING THE REGULATORS

by Kara Kunkel

Sixty-five years after the historic stock market crash that set off the Great Depression, trade in securities such as stocks and bonds is healthier than ever in the United States.

Fortunes are made and lost by investors every day, but overall the U.S. capital markets are believed to be the safest in the world, largely because of regulatory laws enacted during the Depression, says Marc I. Steinberg, Rupert and Lillian Radford Professor of Law at SMU.

For this reason, foreign companies are increasingly interested in offering their securities for sale in the United States, and other nations trying to establish capital markets seek guidance from American securities law experts such as Steinberg.

Steinberg, who joined SMU in 1989, has traveled worldwide in the past several years to share his expertise with lawyers, bankers, regulators, students, and scholars. He recently spoke to a group of international lawyers at the International Development Law Institute in Rome about international securities laws. Previous lectures took him to the University of Konstanz in Germany; the University of Sydney and University of Melbourne in Australia; Victoria University in New Zealand; Hong Kong Polytechnic University; and an international taxation institute in Taipei, Taiwan.

"Even countries that one would think would not have capital markets are interested in developing them," Steinberg says.

And with the growing emphasis on creating a true global economy, businesses are interested in raising capital both inside and outside the borders of their home countries.

"If you can interest individuals from one part of the world in providing capital to industries in another part of the world, you're going to enable those companies as well as the affected countries and economies to grow," Steinberg says.

When this type of activity flourishes, it could contribute to a better quality of life in underdeveloped nations, he says.

The key, of course, is ensuring that the stocks and bonds being bought and sold have merit and the potential for fraud is minimized. U.S. securities laws are considered the most stringent in the world, but also the most fair, says Steinberg, who was a lawyer for the U.S. Securities and Exchange Commission (SEC) from 1978-82.

The SEC is an independent agency of the U.S. government that was created in 1934 to protect investors in securities. It requires disclosures of the structure of companies and registration of stocks and bonds that are publicly traded. The SEC hears complaints, initiates investigations, oversees brokerage firms, and has broad powers to penalize fraud.

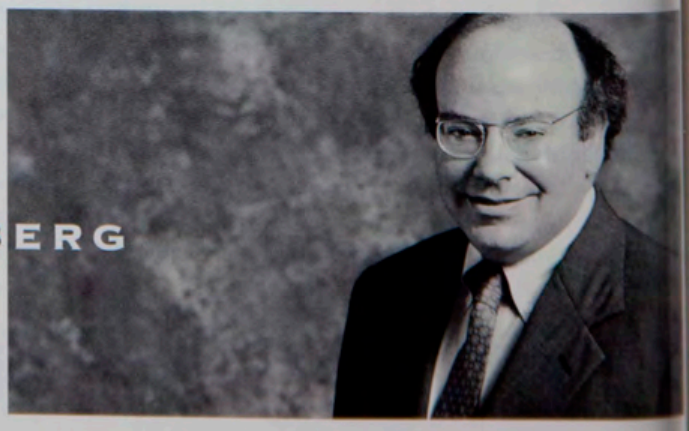
"The degree of protection is significant, but critics might ask whether it is at its maximum," Steinberg says.

Some regulations today are less stringent than those of 10 to 2 years ago because the government wanted to make it easier for small businesses to raise capital. This philosophy has created some reduction in regulation that might decrease protection for investors.

And changing the regulations is a delicate balancing act, Steinberg says. "A reduction in regulation may make it more difficult to detect fraud. Easing the rules can make it easier for companies to raise capital, but sufficient protection must remain in place to maintain investors' confidence."

In addition to teaching in the areas of corporate and securities law at SMU, Steinberg is the author of nine books and textbooks and approximately 100 scholarly articles.

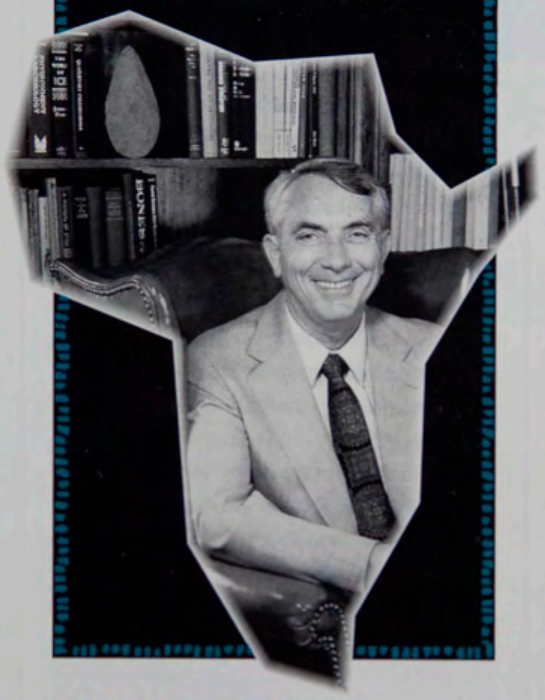
His books include *Securities Regulation: Liabilities and Remedies*; *Corporate and Securities Malpractice*; and *Securities Practice: Federal and State Enforcement*. He is editor-in-chief of *The Securities Regulation Law Journal* and a member of advisory boards to other journals such as *The Journal of Corporation Law*, *The International Lawyer*, and *The Delaware Journal of Corporate Law*. He also is an adviser to the Mead Data Central/Lexis Federal Securities Law Library. ▪



MARK I. STEINBERG

LOOKING FOR THE STONES AND BONES OF AFRICAN PREHISTORY

BY SUSAN WHITE



FRED WENDORF

he Sahara Desert is the hottest and driest place on the planet, and yet archaeologist Fred Wendorf as re rned to it like a homing pigeon for nore an 30 years to seek 20th-century nwer to ancient questions. Wendorf, lende son-Morrison Professor of Prehis- ory in Dedman College of Humanities nd Sc nces, explores the lives and cul- ures people living thousands of years go in rid Northeast Africa. At 70, he ontin es to toil and labor in the field, ursu g what he calls the "stones and ones side of archaeology.

For s findings and continuing research, Vende f was elected in 1987 to the pres- igiou National Academy of Sciences. In 993 served as honorary chair of the onfer nce, "Thirty Years of International Coope ation on the Geology of Egypt and Relate Sciences: An International Con- erenc on the Studies and Achievements n Ge sciences in Egypt," organized by he Ge logical Survey of Egypt Ministry of Petrol m and Mineral Resources.

Wen orf began his career in 1950 while vorki on a Ph.D. at Harvard University, vhen was asked to direct a salvage rchae logy project along a pipeline in New M xico and Arizona. (Salvage ar- haeol gists rescue antiquities from areas hat m be destroyed.) His work became he m del for the national program for ighw salvage archaeology. Later, he artici ated in the discovery and excava- ion o he "Midland Man" in Texas, gen- rally garded as the oldest human re- mains the New World. In the mid-1950s, Vende f directed the excavation of Fort urgw n, which became SMU's research acility ear Taos, as well as Pot Creek ueble located on the fort's property.

His sociation with Egypt began in 962, hen he was named director of the ombi ed Prehistoric Expedition. Wendorf rgani ed the expedition to salvage ubia artifacts from sites that would be estro ed after the building of the New igh D m and the flooding of Lake Nasser n Egy and the Sudan that year. The sal- age o eration turned into a long-term nd fr tful effort to study what once had been considered an archaeological backwater. Today, he continues to serve as the director of the expedition, which is jointly sponsored by SMU, the Polish Academy of Sciences, and the Geological Survey of Egypt.

Wendorf and his research team are currently excavating stone-filled mounds in search of human burials at a 6,500-year-old site in the eastern Sahara to determine how complex societies began and developed in this arid region. He also is planning to submit a proposal to the Egyptian government to begin excavation and salvage operations in the Sinai, where the government plans to clear 450,000 acres of land for farming and residential uses.

Wendorf also is completing a book about a major find in 1992 – the discovery of precursors to African agriculture in an 8,000-year-old settlement near Abu Simbel in southernmost Egypt. About 40 varieties of fruits, nuts, tubers, and seeds, including sorghum and millet, were recovered from houses and storage pits in one of the driest areas of the Sahara Desert.

The find is significant because of the variety of food gathered and stored at the settlement, Wendorf says. This type of activity is similar to that exhibited by other societies on the verge of making the transition from a hunter-gatherer to an agricultural society. Particularly important is the discovery of sorghum seeds. Although the seeds are morphologically wild, an examination of their lipids through infrared spectroscopic analysis revealed they resemble domesticated varieties.

"It may be that we have found the first steps toward domestication of African plants," Wendorf says. Evidence at the site could refute the belief that agricultural methods were introduced to Africa from elsewhere and indicates that sorghum may have been domesticated 5,000 years earlier than originally believed, he adds. Before the discovery, the earliest evidence of domesticated sorghum in Africa was only 3,000 years old.

In addition to his field work, Wendorf's scholarly achievements include the publication of more than 100 articles and 30 books. His latest book is *Egypt During the Last Interglacial: The Middle Paleolithic of Bir Tarfawi and Bir Sahara East* (Plenum Press, 1993), which he co-authored with Romauld Schild of the Polish Academy of Sciences and Angela Close, a former SMU anthropologist now at Ohio State University.

Wendorf considers the digs valuable for their contributions to archaeology and for the experiences he can bring back to the classroom to show students the practical applications of their course readings. "By being active researchers we stay on top of our profession." ▪

GRADUATE STUDENT PROFILES

The Doctor of Philosophy degree is offered by the departments of Anthropology, Biological Sciences, Economics, Geological Sciences, Mathematics, Physics, Psychology, and Statistical Science in Dedman College of Humanities and Sciences; Computer Science and Engineering, Electrical Engineering, and Mechanical Engineering in the School of Engineering and Applied Science; and the Graduate Program of Religious Studies.

Following are excerpts from research conducted by 17 graduate students during 1993-94 at SMU.

Alireza Abaye, Electrical Engineering, Ph.D. student advised by Associate Professor Alireza Khotanzad, is working on the dissertation "Electricity Usage Forecasting by Artificial Neural Networks." Forecast of future electricity usage by an electric utility has a significant impact on the efficiency of that utility's operation. Accurate forecasts with lead times ranging from one hour to several days potentially can save thousands of dollars for a utility through numerous methods, including reduced generator start-ups and spinning reserves.

In this research supported by the Electric Power Research Institute (EPRI), a novel forecaster based on artificial neural network (ANN) technology has been developed. An attractive property of an ANN is its function-estimation capability that enables it to model complex functions through a process of learning from examples, called training. This property is used to model complex relationships that exist between future demands and climatic factors such as temperature and humidity as well as the previous trend of demand. The developed forecaster has been implemented at more than 20 electric utilities nationwide. It has performed extraordinarily well with average errors of around 2 percent for one-day-ahead and below 3 percent for two-to-five-day-ahead predictions. With EPRI's support, this forecaster soon will be developed into a production-grade commercial product.

Brian Bachmann, Chemistry, supervised by Associate Professor John Buynak, recently competed against graduate and doctoral students in a regional contest held in Fort Worth by the American Chemical Society. He won second place for his research project, which examines the many ways bacteria can become resistant to antibiotics. Probably the most important way is the production of enzymes that intercept and destroy the antibiotic before it can do its job. These enzymes, collectively known as b-lactamases, cleave the carbon-nitrogen bond in the b-lactam ring present in antibiotics such as penicillins, cephalasporins, monolactams, and carbanpenems. Once the b-lactam ring is opened, the antibiotic is no longer effective. The strategy is to produce compounds that inactivate the enzymes. Such compounds are known as b-lactamase inhibitors.

Dr. Buynak conceived of incorporating an allene into a b-lactam to produce an enzyme inhibitor. They then synthesized this new class of inhibitors, which they call the 7-Vinylidene cephems. Kinetic evaluation of these compounds reveals that some are more potent than several commercial inhibitors. This research demands a mastery of synthetic organic chemistry, identification techniques, and knowledge of protein science and enzyme kinetics.

Steven D. Balsley, Geological Sciences, is a teaching assistant and an associate researcher for SMU's Stable Isotope Laboratory. He has several publications to his credit. He provides the following account of his dissertation research:

"In the geological past, large, long-lived continental volcanic centers commonly generated cataclysmic eruptions ($>10^2$ km^3; 400x greater than the 1980 Mount St. Helens' eruption), that imply the existence of very large upper crustal magma chambers. The deposits from such large eruptions preserve the instantaneous characteristics of crustal magma chambers. However, small-scale, post-cataclysmic eruptions ($<10^2$ km^3) often record magmatic evolution over a short time period, and thus provide a means of understanding rates of magmatic evolution and supply. Do post-cataclysmic eruptions reflect the continued evolution of a single, large crustal magma chamber that is tapped by multiple vents, or new pulses of magma emplaced into separate, discrete chambers? A sequence of small-volume (25-50 km^3; >100x Mount St. Helens), post-cataclysmic volcanic deposits that erupted 29 million years ago in the San Juan Mountains in southeastern Colorado contains strongly heterogeneous, quenched magma compositions that can have originated only from multiple, independent magma chambers. From these new data, emplacement, differentiation, and crystallization of magma bodies occur in the upper crust over rapid geologic timescales (1,000-10,000 years). These results have implications for volcanic hazard assessment in large, active volcanic centers such as Yellowstone National Park (United States), Taupo (New Zealand), and the Phlegrean Fields (Italy)."

Professor of Mechanical Engineering Paul Packman shows students how to apply theories on dynamics and control in the laboratory.

Sarmila Basu, Economics, who joined the Ph.D. program in 1992, primarily conducts research in macroeconomics and international economics. Under Assistant Professor Nathan S. Balke, she is working on a dissertation on the causes and nature of international business cycles. The Department of Economics recently awarded Basu the Summerfield G. Roberts Foundation Dissertation Fellowship to help support her research.

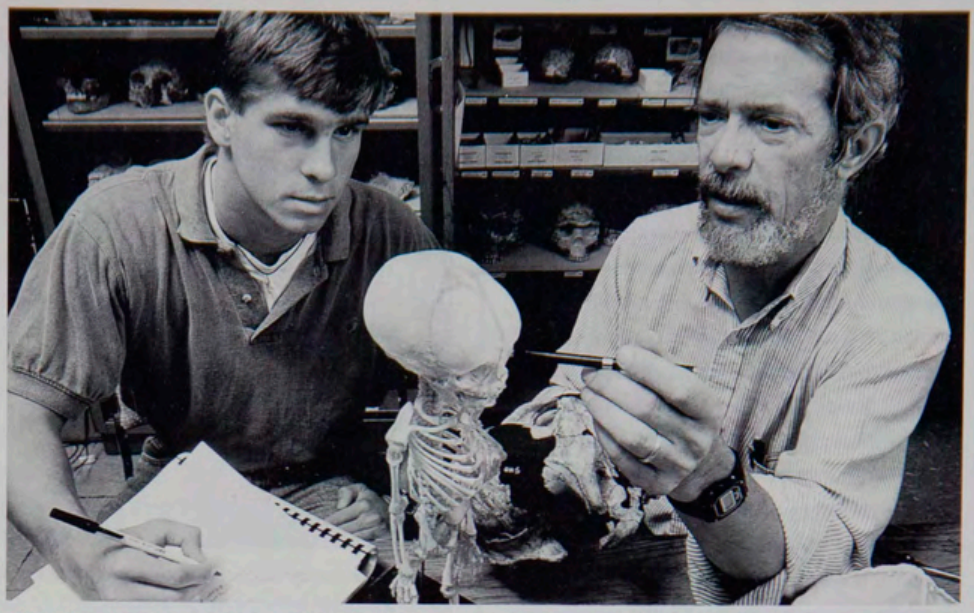
The first part of Basu's dissertation investigates the role of home production in explaining cyclical fluctuations of aggregate consumption, national income, and trade balances in the member countries of the Organization for Economic Cooperation and Development (OECD). According to Basu, "The part played by non-market household production was largely ignored in the standard business cycle models. The term household production refers to work we do at home, like child care, mowing the lawn, etc. Though for the most part these are not included in the accounting of Gross National Product (GNP), they are by no means unimportant. According to the Michigan Time Use Survey, average married couples in the

Unite States spend 33 percent of their discretiona time working for wages in the market secto nd 28 percent on non-wage household produ ion." Basu plans to examine how house old production affects the business cycle ictuations.

In t second part, Basu is studying the role of no raded goods in explaining business cycles n an open economy. "Traditionally the const ction industry, utilities, etc., are considered t be part of the non-traded sector. The cyclic fluctuations affect traded and nontrade goods sectors differently. Also for trade goods, cyclical fluctuations get propagated om one country to another very quick When actual cyclical fluctuations in OECD ountries are studied, economists have found ross-country correlation of consumption is ow and that of output is high. The existing odels fail to capture this behavior of outpu und consumption." Basu wants to discover hether including non-traded goods explicitl elps to solve this problem.

Yuan ong Chen, Computer Science and Engineerir who in 1993 earned his Ph.D. under the di ction of Associate Professor Murat M. Tanik, a post-doctoral fellow at SMU. His research nterests include software metrics, software r use, user interface, and software engineerir In a dissertation titled "A Quantitative Softw e Reuse Framework," Chen used an axiom ic approach to study the nature of software m trics. Based on this axiomatic framework, e extended the study to the issues in quanti tive reuse. He published his results in focuse IEEE conferences and other journals. Guide by his theoretical results, Dr. Chen propo d a software reuse model, CASOR, which ands for *CA*se-driven *SO*ftware *R*euse. The m del utilizes the concepts from the traditional rogramming by example" in artificial ntelli nce and "component-based reuse" and compo ent composition from software engineerin It is expected that his results will be used i ractice for the development of cost-effecti and reliable software. Chen has author l seven technical papers and three propo ls. One of the proposals, "A Test Data Driven euse Approach for Software Development," as been accepted by the U.S. Army o exp re the automatic reuse of components y util ng test data.

Jane erman Hansen, Psychology, received her M.A. in sychology from SMU in 1989. She oined ersonnel Decisions Inc., where she pplie ner knowledge of psychology to the business world. In 1992 she returned to SMU to pursue a Ph.D. in experimental social psychology. Her research involves nonverbal correlates of leadership emergence in small groups. Hansen reported on some of her collaborative work on nonverbal behavior at the 1994 meeting of the Midwestern Psychological Association in Chicago and at the Texas Conference on Social Psychology in El Paso. A report of this work, co-authored with Associate Professor Diane Berry and graduate students Jo Meier and Julie Pester of the Psychology Department, will appear in an upcoming issue of the *Journal of Nonverbal Behavior.*



SMU offers Master's and Ph.D. degrees in anthropology with specialties in archaeology, ethnology, and medical anthropology. In the laboratory, Professor of Anthropology Ron Wetherington points out aspects of evolutionary theories.

Rose Jones, Anthropology, went to St. Lucia, a small island in the eastern Caribbean, in 1989 to conduct research on gender and sexuality for her doctorate. She recounts part of her experience:

"As I settled into the rhythm of island life, I came like all members of St. Lucian society to have an ascribed and socially sanctioned identity. In the village where I lived, I became known as *'un'ti madame'* or 'the little woman.' Although I was told that I was 'little woman' because my 'breasts so small,' 'little woman' was actually a euphemism for expressing my perceived social and reproductive status. Because I did not have any biological children, a deviant role for women, but because I was legally married, an indicator of high status, the ambiguous title of 'little woman' was bestowed upon me.

"Following this lead, I discovered that St. Lucians routinely categorize individuals by collectively assessing their perceived social, economic, sexual, and reproductive roles. They relegate men and women to such categories because of their understanding of the ways in which gender roles and relations are intended to transpire. Heterosexual relations are predicated on prescripts of gender interdependency. Men and woman generate and secure economic resources through each other by forming and sustaining sexual and reproductive alliances. The research that I conducted illustrates how critical it is that researchers establish a culturally relativistic understanding of sex and sexuality, one within the context of the gender system.

"Having recently completed my Ph.D., I plan to use the data and insights I gained in St. Lucia to promote a scholarship that is not only cognizant of women, but also sensitive to cultural diversity. Such an approach will positively alter research on a wide array of sexual issues, including HIV/AIDS."

Kiran Jit Kaur, Biological Sciences, entered the Ph.D. program in 1987 after earning a B.A. degree in biology from Blackburn College and an M.S. degree in biochemistry from the University of Kentucky. She was an author on eight articles published in a variety of journals. Kaur, who earned her Ph.D. in May 1994, is continuing her research on cellular signaling in the unicellular algae, Chlamydamonas, as a post-doctoral fellow at the University of Texas Southwestern Medical School. ▸

Kaur's dissertation examined the mechanisms by which the pathogenic protozoan, *Trypanosoma brucei*, regulates its complex life cycle. She tested the hypothesis that calcium signals were utilized by *T. brucei* to coordinate life cycle events by demonstrating that trypanosomes contain proteins that are capable of changing their activity in response to calcium. Calmodulin is a calcium-binding protein that regulates a wide range of cellular activities in mammalian cells. Kaur used a combination of anion exchange and affinity chromatography to purify a subset of calmodulin-binding proteins (CaMBPs) from *T. brucei*. Monoclonal antibodies were raised against the complement of CaMBPs, and a hybridoma was obtained that recognized a 53 kDa CaMBP. Immunoblots were used to verify that the 53 kDa protein interacted with calmodulin in a calcium-sensitive manner. The antibodies were used to screen a cDNA library of *T. brucei*, and a cDNA was obtained that encoded a protein with 81 percent identity to elongation factor-1 alpha (EF-1 alpha). Chemically derivatized calmodulin was used to demonstrate that EF-1 alpha from the mammalian host also bound to calmodulin. Kaur's research has broad impact because she is the first person to prepare monoclonal antibodies against EF-1 alpha, and this reagent is proving useful to a number of laboratories. Kaur also is the first researcher to demonstrate a direct interaction between calmodulin and components of the protein synthesis machinery.

Melanie McGarrahan, English, plans to enter a Ph.D. program in English when she completes requirements for the M.A. An honors graduate of Baylor University with a major in foreign service, McGarrahan worked as a legal assistant and office manager for a Dallas attorney before deciding to pursue a career in teaching English at the college level. SMU's Master's program in English provides students such as McGarrahan with an opportunity to enhance their academic preparation and credentials for admission to a nationally recognized Ph.D. program. McGarrahan has served as editorial assistant to Associate Professor Bonnie Wheeler, editor of *The Journal of Arthurian Interpretation*. As a Teaching Fellow, McGarrahan will teach one section of composition each semester, as well as add to the interpretation of Arthurian materials in her Master's thesis.

In the Electrical Engineering laboratory, a student uses an ultrasonic bonder to attach wires, smaller in diameter than a hair, to contact pads on an integrated circuit (IC) chip for characterization.

Graduate students in the radio/television program become familiar with the many facets of field production and post-production in a laboratory in the Center for Communication Arts.

James McMillin, History, a second-year graduate student under the direction of Professor David Weber, is researching the late 19th- and early 20th-century Borderlands and Mexico. His thesis explores the changing relationship of American Methodist missionaries and the people of Mexico. Specifically, he examines the missionaries' views of the Mexican people. For the period 1830-1860, McMillin has determined that the missionaries held the same ethnocentric notions as the majority of white Americans – that the Mexican people were a "deficient" race, with their culture offering proof of their inherent deficiency. By the 1880s, however, documents such as the annual conference reports of Methodist missionaries, autobiographies, and personal correspondence suggest that this view had changed. The missionaries eventually regarded Mexicans as worthy of proselytizing, and itinerant networks of Methodist societies and churches were established. Upon his graduation, McMillin began work in the doctoral program at Duke University. Studying under the direction of Peter Wood, a renowned American historian, McMillin plans to explore the Mexican view of the missionaries for his dissertation.

James W. Miller, Statistical Science, is a Ph.D. student and recipient of the 1993 George Pólya Award for a paper he co-authored, "A Random Ladder Game: Permutations, Eigenvalues, and Convergence of Markov Chains," that was published in *College Mathematics Journal*. Miller's abstract for his dissertation on the topic "Forecasting with Fractionally Differenced Time Series Models" summarizes his current research: "Long-memory time series models are statistical models for data measured over time, in which the correlation between variables separated by large time intervals remains non-negligible for very large lags. These models have applications in many areas of the natural sciences and economics. One of the most significant of these models is based on fractional differencing. We examine five procedures for forecasting based on the fractional models that have been proposed in recent literature. We compare and contrast these procedures with respect to their asymptotic behavior and the mean squared errors. We place special emphasis on best linear predictors, deriving the forecast function explicitly in this case, making it possible to compute forecasts without using computationally intensive recursive procedures. Finally, we show how these procedures can be extended to forecast non-stationary fractional processes and more general processes, that model both long- and short-memory effects simultaneously."

Augustyn Ortynski, Computer Science and Engineering, received a Ph.D. degree in Mathematics from Adam Mickiewicz University in Poland in 1979. He also taught and conducted research at the university's Institute of Mathematics. In 1986 he received the Banach Award from the Polish Academy of Sciences for his work in functional analysis. In 1989 he entered SMU's Ph.D. program in Operations Research. Since 1991 he has worked under the supervision of Assistant Professor Yanjun Zhang on parallel computation and optimization problems. He defended his dissertation on "Implementation and Analysis of Parallel Backtrack Search" in May 1994 and graduated in August. Last summer he continued his work on parallel computation using CM-5 and Gray T3D machines.

Don T. Smith, Religious Studies, is researching the religious thought of 17th-century philoso-

ner Jo n Locke. Locke's contributions to the evelop ent of modern philosophy has long en re gnized. His religious writings, however, ha received relatively little attention, d the asic patterns of his religious and eolog al views remain largely unexplored. nith's search is centered on Locke's *The easona leness of Christianity* and on the ntrov sy that it engendered. His work is pport l by SMU's special collections of th- ar 18th-century English publications at pro de the materials necessary to trace e back round of Locke's work and the impact tha e had on British religious culture. nith's search will contribute significantly to new a essment of Locke's importance as ne of t key figures who set Protestant ought n the course that it would follow for ost of e modern era. Smith's adviser is Professor o Theology William S. Babcock.

Tracy C ns Standley, Communication Arts, aduat with her Master's degree in August. e con icted research on an audience's perived e ects of the media as part of her thesis r an M.. degree in television/radio under dviser an Albarran. She compared the difference be een how an audience perceives the fects o elevision on other people and on itlf. Ge rally, previous research has found at me ers of an audience believe that her pe ple are greatly affected by television, t that ey are not. Standley questioned why audi ce believes this and attempted to d a th retical base for this phenomenon. e is at nding the University of Alabama on a search ssistantship to work on her doctore in m s communications.

Michael omas, Art History, earned an M.A. dee wit an emphasis in Etruscan art and a cond ncentration in MesoAmerican art d arch ology. He earned a B.A. degree at Duke University. Thomas has begun work on a Ph.D. at the University of Texas at Austin studying the iconography of sexuality in Roman art while pursuing his interest in MesoAmerican iconography. At SMU Thomas worked as an assistant curator for an exhibition of John Michel Baskiat's works at the Dallas Museum of Art, for which he wrote the brochure. He also spent two summers excavating with Professor Gregory Warden in Tuscany and participated in the Maya Glyph Seminars at the University of Texas. His M.A. thesis, "Sexuality and Regeneration in the Tomb of the Bulls: Rites of Passage in Archaic Tomb Painting," examines the problematic "erotic" scene in the Etruscan Tomb of the Bulls at Tarquinia. It categorizes iconographic scenes of sexuality in Etruscan art, considering the influence of Greek art, especially painted vases. It explains some scenes of sexuality in Etruscan tomb painting as representative of the roles that are inherent within sexual acts, particularly the roles of the dominant and the submissive; and it proposes that the "erotic" scene in the Tomb of the Bulls represents, at least thematically, a Dionysian ritual that metaphorically represents the passage into the afterlife and the regeneration of the deceased.

Igor Volobouev, Physics, a second-year graduate student, studies properties of the heavy lepton tau using the CLEO detector at the Cornell Electron Positron Storage Ring. Tau is one of the fundamental particles of matter that is very heavy, has a short lifetime, and decays into many different objects. The properties of tau and its decay rates are predicted by present-day theory with a very high precision, and an observation of any deviation from the expectations would indicate existence of a new physics process that has been unsuspected until now. Volobouev searched for such unexpected decays of the tau lepton into three charged particles among the high statistics data collected by CLEO. The search confirmed that if new types of forces and elementary interactions exist, they must occur only at very high energies not accessible at present-day accelerators. The results of Volobouev's study were presented at the 1994 meeting of the American Physical Society in Washington, D.C., and have been submitted for publication in *Physical Review Letters*.

Ana Witt, Mathematics, completed her Ph.D. in May 1994 and joined Austin Peay State University (Clarksville, Tennessee) as an assistant professor of mathematics. Her research focused on the topic that phenomena in science and engineering that evolve in time are modeled by differential equations. Numerical methods are used to study the models when the equations are too complicated to analyze. There are powerful, general-purpose codes available for the numerical solution of ordinary differential equations. They simulate the continuous time evolution of a model by producing approximate solutions at discrete times. As they advance from an approximation at one instant to the next, they estimate the error of the step to gain some confidence in the numerical solution. With an estimate of the error, it is possible to control the error by adapting appropriately the same step. In addition to improving the reliability of the simulation, this often reduces the cost substantially. One part of the research by Witt and her adviser, Professor Lawrence F. Shampine, provides a deeper understanding about why controlling the error makes popular codes respond in a satisfactory way when presented problems for which they are not intended. Another justifies a scheme for adapting the time step used by physical scientists and provides the understanding needed for its effective use. •

ut 9,0 undergraduate, graduate, and professional students attend Southern Methodist University, located on 163 acres in a park-like suburban setting y five les north of downtown Dallas. Area industry and business provide numerous opportunities for graduates.

FACULTY

RECOGNITION

The following SMU faculty members were recognized for their teaching, scholarship, or research during 1993-94.

Alan Albarran, Communication Arts, was elected president of the Texas Association of Broadcast Educators and chair of the Mass Communication Division of the Southern States Communication Association.

Jouette Bassler

Jouette McCurdy Bassler, Theology, was named editor-elect of *The Journal of Biblical Literature* at the annual meeting of the Society of Biblical Literature in November 1993 and assumed duties as editor in January 1995.

Randolph P. Beatty, Accounting, was cited by *Business Week* magazine as being recognized by M.B.A. students as one of the 12 best teachers in business education nationwide.

Randolph Beatty

Patricia Davis, Theology, received the Sam Taylor Fellowship and Perkins Scholarly Outreach Award for work on the spirituality of adolescent girls.

Timothy Davis

Timothy Davis, Law, received the 1994 Golden Mustang Award, which recognizes outstanding faculty members involved in curriculum for instructional development.

Maurice Elton, French, was promoted to the rank of Officer, the Second Level of the Order of La Legion Violette, France's most prestigious award for service to French education.

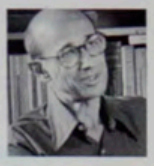
Danna Fewell

Danna Nolan Fewell, Theology, received the Junior Scholar Research Award from the Southwest Commission on Religious Studies in 1993 and the Lilly Endowment Faculty Outreach Award at SMU in 1992.

David Freidel, Anthropology; **Louis Jacobs,** Geological Sciences; and **Alan Bromberg,** Law, were honored for their outstanding research, publications, and teaching at the 1994 Authors' Award Luncheon in April. The awards are sponsored by the Godbey Lecture Series (formerly University Lecture Series) of Dedman College of Humanities and Sciences. Freidel, who conducts archaeological excavations at Mayan sites in the Yucatan, Mexico, is co-author with Linda Schele and Joy Parker of *Maya Cosmos: Three Thousand Years on the Shaman's Path*, William Morrow and Co. Inc., 1993. In this book, they examine the cosmological roots of Mayan culture. Jacobs is the author of *Quest for the African Dinosaurs: Ancient Roots of the Modern World*, Villard Books, 1993, in which he chronicles his field work in the Republic of Malawi. Jacobs also is director of SMU's Shuler Museum of Paleontology. Bromberg has written extensively about partnership law, including the most recent books, volumes III and IV of *Bromberg and Ribstein on Partnership Law*, Little, Brown, and Co., 1994. These volumes are the first comprehensive exploration of the law of limited partnerships.

David Freidel

Louis Jacobs



Alan Bromberg

Victor Paul Furnish, Theology, received the 1993-94 University Scholar/Teacher of the Year Award from the Division of Higher Education of the United Methodist Church, and the 1994 Alumni Award for Faculty Excellence.

Richard F. Gunst, Statistics, received the 1994 American Statistical Association Award for the Most Outstanding Statistical Application. The same article received the Wilcoxon Award from *Technometrics*.

Richard Gunst

Narayan Hosmane, Chemistry, is the recipient of the 1994 Mother India International Award, given by the NRI Institute of India to honor Indian achievers.

Robert Van Kemper, Anthropology, was named editor of the journal *Human Organization*.

Jose L. Lage, Mechanical Engineering, received the 1994 Outstanding Research Award from Sigma Xi – The Scientific Research Society – for his contributions to the field of transport phenomena in porous media.

David T. Lei, Organizational Behavior and Business Policy, has received the Strategic Management Prize from *The Long Range Planning Journal* for his article, "Offensive and Defensives Uses of Alliances," as the best article published during 1993.

David McHam, Communication Arts, was named the 1994 Distinguished Teacher by Meadows School of the Arts and the nation's Outstanding Journalism Professor by the Society of Professional Journalists.

Montie Monzingo, Mathematics, was named the 1994 Distinguished Teacher by the Texas Section of the Mathematical Association of America.

Jack Myers, English, won the Natalie Ornish Poetry Award, in Memory of Wayne Gard, for his book, *Blindsided*.

Simon Sargon, Music, received the 1994-95 ASCAP Award, given by the American Society of Composers, Authors, and Publishers. He also won first prize in the 1993 NATS Song Competition for his composition of *Waves of the Sea*, a cycle of six songs set to works of Irish poets.

Willard Spiegelman, English, received a 1994 fellowship from the John Simon Guggenheim Memorial Foundation. Of the 147 fellowships awarded throughout the nation this year, Spiegelman is one of only four grant recipients in Texas.

Willard Spiegelman

Marshall Terry, English, received the 1994 Faculty Award for Outstanding Service to Alumni from the SMU Alumni Association.

David Weber, History, received an award from the Spanish Ministry of Culture for his book, *The Spanish Frontier in North America: 1513-1921*.

Fred Wendorf, Anthropology, received the 1993 SMU Alumni Association's Award for Faculty Excellence. ▪

SPONSORED RESEARCH

AWARDS

1993-94

During 993-94, sponsors awarded $7,206,420 o SMU or direct and indirect costs of research nd sponsored projects conducted by 3 faculty and staff members. The dollar alue of awards decreased slightly from the 7,308 28 received in 1992-93, and the number of wards processed decreased from 136 o 107. wards include grants, contracts, and xtensions and modifications of existing rants nd contracts.

Sources of the $7,206,420 were agencies of he federal government, 70 awards, $5,102,153 70.8% corporations, 12 awards, $376,223 5.2%); ate and local government agencies, even wards, $902,334 (12.5%); and foundations and other, 18 awards, $825,710 (11.5%).

Dedman College received $5,106,381 in 70 wards Division III, Natural Sciences, was warded $3,881,779 in 53 awards; Division II, ocial iences, $1,137,300 in 16 awards; and SEM, $7,302 in one award. In 1992-93, Dedman College received $6,214,875. The School f Engineering and Applied Science received 1,788,43 in 29 awards during 1993-94, ompared with $954,681 in 1992-93. The Law chool 113,888, Meadows School of Fine rts, $500, and Cox School of Business, 31,74 received one award each. There were fi other awards totaling $160,366.

Following is a list of principal investigators r project directors who received aggregate wards f $50,000 or more.

illiam Abraham, Theology, The Pew Evangelical cholar Program, $100,000, Pew Memorial rust.

ichard Bo, Computer Science and Engineering, enchmarking and Performance Improvement Tools for Manufacturing and Service Processes ear 1 of 3), $65,094, National Science oundation.

avid Blackwell, Geological Sciences, Thermal Regime of edimentary Basins, $10,000, Mobile ounda on Inc.; Geothermal Resource Evaluation Based on Heat Flow and Thermal Conductivity Data for the United States, $50,000, EG&G Idaho Inc.

James Brown, Political Science, Arms Control Verification Conferences: fall 1993 and 1994, $335,196, Advanced Research Projects Agency.

Jerome Butler, Electrical Engineering, PILOT VI, $29,999, Millimeter Software Development; Part Two, $30,000.

John Buynak, Chemistry, Rearrangements of Functionalized Organosilanes (year 3), $30,500, Welch Foundation; Allenes of Synthetic and Biochemical Importance, $80,480, National Institutes of Health.

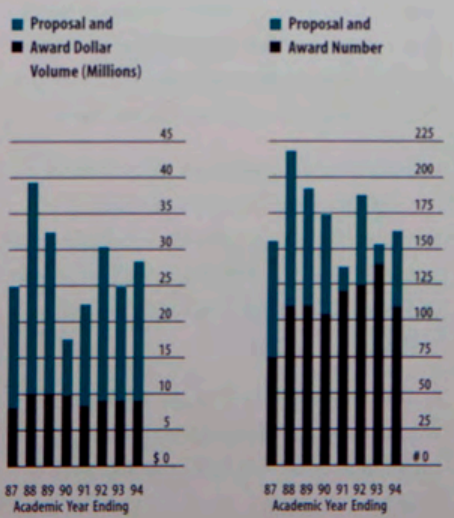
Zeynep Çelik-Butler, Electrical Engineering, Low-frequency Noise Measurements as a Characterization and Testing Tool in Solid-State Devices (year 2 of 2), $100,965, National Science Foundation.

Carlos Davila, Electrical Engineering, Eigenvector Techniques for Time and Frequency Domain Analysis of Sensory-Evoked Brain Potentials, $93,663, National Science Foundation; Objective Measurement of Visual Contrast Sensitivity and Acuity via Adaptive Line Enhancement of Steady-State Visual Evoked Potentials, $175,845, Whitaker Foundation.

Thomas Edwards, Teacher Preparation, Upward Bound (year 3 of 3), $259,704, Department of Education.

Margaret Eich, Computer Science and Engineering, In Memory Database Recovery Issues: REU Supplement, $8,000, National Science Foundation; In Memory Database Recovery Issues (year 2), $64,999, National Science Foundation.

SPONSORED RESEARCH AND PROJECTS



Paraskevas Evripidou, Computer Science and Engineering, Research Initiation Award: Massively Parallel Processing Based on the Decoupled Synchronization Computation Model of Execution, $96,328, National Science Foundation.

David Freidel, Anthropology, Yaxuna Research Project, $92,267, Selz Foundation.

John Goodge, Geological Sciences, Comparative Petrologic, Structural, and Geochrononmetric Investigation of High-grade Metamorphic Rocks in the Transantarctic Mountains (year 1 of 3), $91,981, National Science Foundation; Conference Support for 1994 International LIRA Workshop: Ross Oregon — Crustal Structure and Plate Tectonic Significance, $17,396, National Science Foundation.

Henry Gray, Wayne Woodward, and **Richard Gunst,** Statistical Science, Examine Climate Data and Global Temperature Change, $200,000, Department of Energy.

Henry Gray and **Gary McCartor,** Statistical Science, The Development of New Statistical Methodology for Improved Monitoring, $262,377, Advanced Research Projects Agency.

Robert Gregory, Geological Sciences, In-Situ Stable Isotope Ratio Determinations at the Picmole Level Using Laser-aided Combustion, Gas Chromatography, and Continuous Flow Mass Spectrometry, $252,938, Texas Higher Education Coordinating Board.

Herbert Haas, ISEM, Core Support for Archaeolmetric Service of a Radiocarbon Dating Facility (year 3), $87,302, National Science Foundation.

Vicki Hansen, Geological Sciences, Structural, Kinematic, and Strain History Analysis of Ishtar Terra Deformed Belts, Venus: Tectonic Constraints for Geodynamic Modeling (year 2 of 3), $50,450, National Aeronautics and Space Administration.

Eugene Herrin, Geological Sciences, The Role of Near-source Phenomenology on Regional Seismic Observations (year 2), $59,339, Air Force; Pakistan Incremental Array, $400,000; Project X: Research In Mini-array Technology, $200,000, Advanced Research Projects Agency; Seismic Studies: Cost Growth, $18,865, Advanced Research Projects Agency. ▸

Narayan Hosmane, Chemistry, Novel Catalysts in Siegler-Natta Olefin Polymerization, $215,000, Texas Higher Education Coordinating Board; New Frontiers of Carboranes and Metallacarboranes (year 3), $30,500, Welch Foundation.

Yildirim Hurmuzlu, Mechanical Engineering, Study of Gait Stability of Normals and Post-Polio Patients Using Nonlinear Theory (year 3), $52,756, Whitaker Foundation; Experimental and Theoretical Study of Rigid Body Collisions of Robotic Systems (year 2), $67,316, National Science Foundation.

David Johnson, Mechanical Engineering, Dynamics and Control of Injection Molding Machines, $116,878, Leadwell CNC Machines Manufacturing Corporation.

Richard Jones, Biological Sciences, Polycomb-group Genes and Gene Regulation (year 3 of 5), $137,421, National Institutes of Health.

Alireza Khotanzad, Electrical Engineering, Hourly Load Forecasting Using Neural Networks (EPRI funding), $141,767, Electric Power Research Institute; (TU Electric funding), $2,500, TU Electric; Predicting Runoff from Rainfall Using Neural Networks, $3,548, Albert H. Halff Associates Inc.

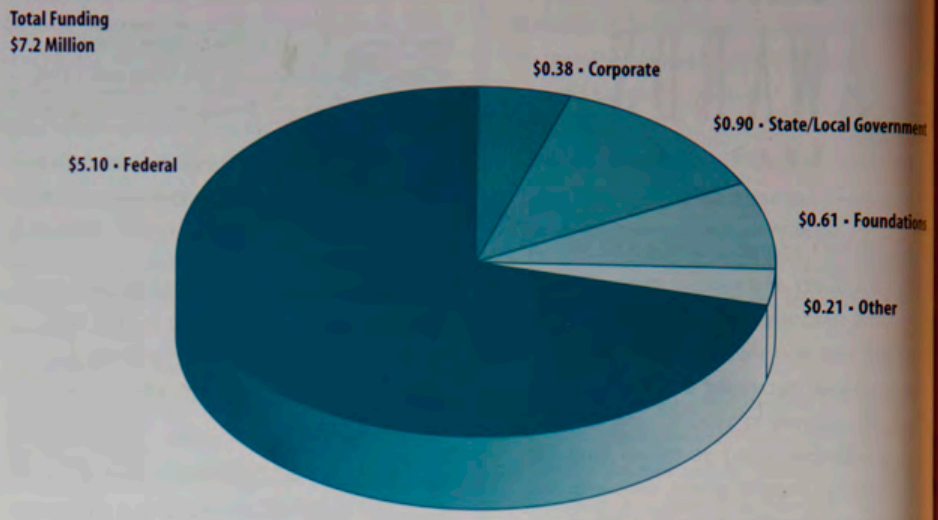
Michael Lattman, Chemistry, Fundamental Studies on "Hypervalent" Main-Group Elements Constrained by Macrocycles, $25,000, American Chemical Society; Materials and Catalytic Chemistry of Cyclic Oxygen and Nitrogen-stabilized Main Group Element Derivatives (year 3), $30,500, Welch Foundation; High-Coordinate Main-Group and Main Group/d-Block Metal Chemistry, $45,000, National Science Foundation.

Victoria Lockwood, Anthropology, The Effects of Capitalism on Rural Tahitian Women, $121,497, National Science Foundation.

David Matula, Computer Science and Engineering, Design of a Next Generation Floating Point Unit for the x86 Architecture, $71,723, Cyrix Corporation; Integrating Virtual Reality, DSP, and Vector Processing Capability into a Personal Computer, $174,234, Texas Higher Education Coordinating Board.

Daniel Moldovan, Computer Science and Engineering, Research and Development of Semantic Network Array Processor, $85,000, National Science Foundation.

1993-94 FUNDING SOURCE DISTRIBUTION



Frederick Moss, Law, Law School Clinical Experience, $113,888, Department of Education.

Sukumaran Nair, Computer Science and Engineering, Network Restoration Control Strategies for Self-Healing Hybrid Ring Network Topologies Utilizing Digital Cross-Connect Systems, $58,381, Alcatel Network Systems Inc.

William Pulte, Anthropology, Master's Program Leading to Endorsement in Bilingual Certification, $141,610, Department of Education.

Timothy Sliter, Biological Sciences, Molecular Genetics of Insect Steriodogenesis (year 1 of 3), $70,000, Department of Agriculture.

Edward Smith, Mechanical Engineering, Recycling of Waste Pallet Shot-Blast from Cast-Iron Manufacturing Processes (year 1), $44,158, Tyler Pipe; Recycling and Application of Waste Shot-Blast Fine for Treatment of Industrial and Hazardous Wastes, $157,419, Texas Higher Education Coordinating Board; An Evaluation of the Efficiency of Storm-water Sumps in an Urban Watershed as a Storm-water Treatment System to Reduce Nonpoint Source Pollution, $50,877, Texas Water Development Board.

R.S. Sohal, Biological Sciences, Neurobehavioral and Immunological Markers of Aging (NIH through TCOM), $55,906, Texas College of Osteopathic Medicine; Cellular Aging and Oxygen Free Radicals, $128,833, National Institutes of Health.

R.S. Sohal and **William Orr,** Biological Sciences, Antioxidant Enzymes and Aging in Transgenic Drosophila, $196,456, National Institutes of Health.

Ryszard Stroynowski, Physics, Research in Experimental and Theoretical High Energy Physics, $509,000, Department of Energy.

Brian Stump, Geological Sciences, Research and Development Support in Intermediate Scale Explosion Source Experiments: Los Alamos Explosions, $77,179, The Regents of the University of California; Ground Truthing Technologies for Mining and Nuclear Explosions (first increment), $28,583, Air Force.

Vic Teplitz, Physics, Personnel Assignment Agreement, $50,996, Universities Research Association Inc.

Steven Vik, Biological Sciences, Structure-Function Studies of E. coli F F ATPase (year 6 of 7), $147,242, National Institutes of Health; Structure-Function Studies of E. coli F F ATPase: Minority Supplement Initiative, $8,467, National Institutes of Health; Structure-Function Studies of E. coli F F ATPase — SURE Supplement, $2,221, National Institutes of Health.

Fred Wendorf and **Angela Close,** Anthropology, A Proposed Study of the Late Neolithic in the Egyptian Sahara, $103,909, National Science Foundation.

Patty Wisian-Neilson, Chemistry, Poly(alkyl/arylphosphazene) Copolymers (year 2 of 3), $30,500, Welch Foundation; Synthesis and Characterization of Poly(alkyl/arylophosphazenes) and Their Derivatives (year 3), $65,999, Texas Christian University/ARO. ▪

Compiled by Larry Smith
Director of Research Administration

VOLUME 2 1994

The *SMU Research* magazine is produced annually by the Office of Public Affairs for the Office of Research and Graduate Studies of Southern Methodist University. Please send correspondence to Office of Research and Graduate Studies, Southern Methodist University, PO Box 750240, Dallas, TX 75275-0240, or call 214-768-4345. E-mail: bphillip@sun.cis.smu.edu

OFFICE OF PUBLIC AFFAIRS

Editor: Susan White

Art Director: Victoria K. Olvera

Designer: Rebecca Brown

Photographers: Hillsman S. Jackson, Paul Talley, Doug Hopfer

Contributors: John P. Churchill, Kim Gustafson, Lori Johnson, Ali Jones, Kara Kunkel, Gary Shultz, Kathleen Tibbetts

OFFICE OF RESEARCH AND GRADUATE STUDIES

Contributors: Barbara Phillips, Larry Smith

94550 2/95

SMU RESEARCH
Office of Research and Graduate Studies
Southern Methodist University
PO Box 750240
Dallas TX 75275-0240

Nonprofit Org.
U.S. Postage
PAID
Dallas, Texas
Permit No. 856

For more information about SMU Research and Graduate Studies, call 214-768-4345.