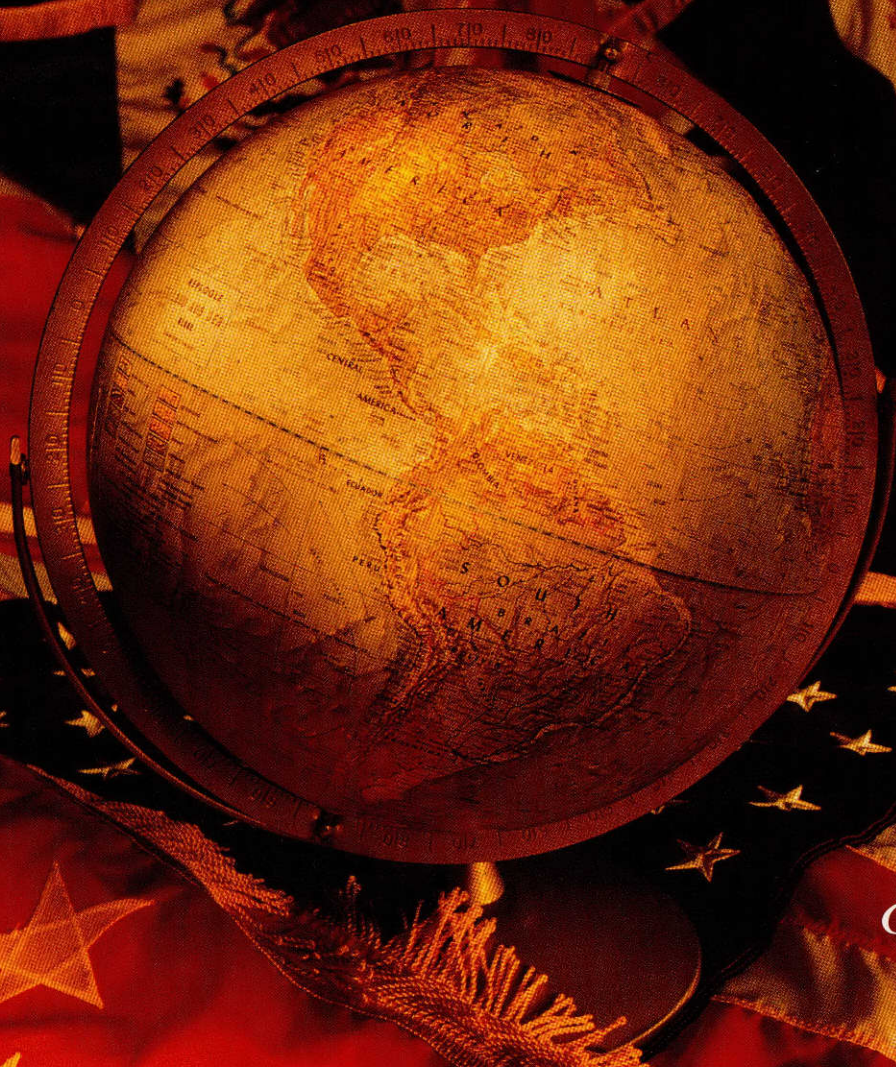


2
T 300.6
V829
5:1

VISTAS

TEXAS TECH RESEARCH

Fall 1995



*Business
Across
Continents*



VISTAS

TEXAS TECH RESEARCH

Fall 1995

Vol. 5 No. 1

Each issue of *Vistas: Texas Tech Research* (Library of Congress ISSN 1055-9159) reflects the goals, techniques, results and drama of research and creativity at Texas Tech. The magazine describes only a few of the many scholarly activities conducted at Texas Tech University and at Texas Tech University Health Sciences Center.

The magazine is published three times a year by the Office of News and Publications, 212 Administration Building, Texas Tech University, Lubbock, Texas 79409-2022, (806) 742-2136. Funds for the publication of *Vistas* are provided from private donations to the President's Council. No state appropriated funds are used.

Text from *Vistas: Texas Tech Research* may be reprinted without permission, as long as credit is given to Texas Tech. Please direct all inquiries concerning text and photography to the Office of News and Publications at the above address.

President

Robert W. Lawless, Ph.D.

Vice President for Institutional Advancement

William G. Wehner

Director of News and Publications

Margaret S. Lutherer, Ph.D.

Editor

Kippira D. Hopper

Designer

Jerry Kelly

Photo Editor

Artie Limmer

Photographers

Joey Hernandez

Mark Mamawal

Writers

Charles Griffin

Steve Kauffman

Jennifer LeNoir

Preston Lewis

Sandra Pulley

Michael Sommermeyer

Myrna Whitehead

Circulation Director

Debbie Shelfer

Printer

Parks Printing

Texas Tech is committed to the principle that in no aspect of its programs shall there be differences in the treatment of persons because of race, creed, national origin, age, sex or disability, and that equal opportunity and access to facilities shall be available to all. Direct inquiries to the Office of Affirmative Action, 163 Administration Building, Texas Tech University, Lubbock, Texas 79409-1073, (806) 742-3627. Persons with disabilities who may need auxiliary aids or services are requested to contact the Office of News and Publications.

Copies of this publication have been distributed in compliance with the State Depository Law and are available for public use through the Texas State Publications Depository Program at the Texas State Library and other state depository libraries.

Copyright 1995 Texas Tech University

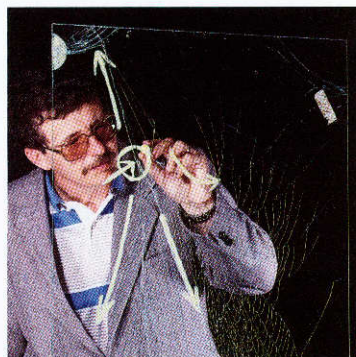
ABOUT THE COVERS

Front—Widening our world scope, faculty and students in the Texas Tech University College of Business Administration are sharing in educational and research exchanges to bridge the gap among the United States and its international neighbors in cultures, histories, languages, political systems and business environments. The College of Business Administration has the highest international student enrollment at the university, with a current total of 190 students from other lands. (Photo by Artie Limmer)

Inside Front—Dean Carl H. Stem, Ph.D., of the Texas Tech University College of Business Administration, believes that rapidly growing global competition is the primary reason for the integration of the international perspective into business education. Stem compares universities and colleges that develop international projects to businesses looking into the future—and remaining competitive in the global market. (Photo by Artie Limmer)

Inside Back—With construction progressing quickly, the new Southwest Collection/Special Collections Library Building on the campus is scheduled for completion in July 1996. The \$8.8 million facility will house in its 80,000 square feet the Texas Tech University Libraries' special collections, including Rare Books and Manuscripts, the Archive of the Vietnam Conflict and a new entity, the University Archive. (Photo by Artie Limmer)

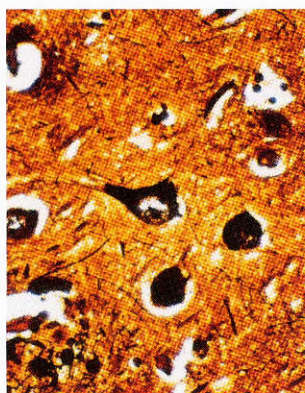
Back—Texas Tech University student Mikhail V. Shubov, a sophomore mathematics and physics major, was among the top 25 ranking undergraduates in the 1995 annual William Lowell Putnam Mathematical Competition which drew 2,324 student participants from 409 universities in North America. Shubov's parents, Victor and Marianna, both teach in the Texas Tech mathematics department. The family arrived in Lubbock in 1989 from St. Petersburg, Russia. (Photo by Artie Limmer)



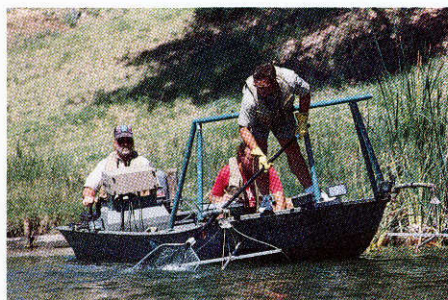
Page 2



Page 8



Page 16



Page 19

OBSERVATIONS

A Glance at Research and Creativity

Ground Zero; Boomerang Adults—Seeking Refuge Again (*and Again*) in the Parental Nest; Students Granted Choices in Alternative Schools

2

VIEWPOINT

Roll of the Dice: Native American-Sponsored Gambling May Be Way Out of Decades of Poverty, by Les Cullen, M.A.

From Florida to Washington, bingo and casino gambling have spread to more than a hundred Indian reservations, raising economic and legal issues, along with the question of the effect gambling might have on Native American cultures.

6

COVER STORY

Traversing the Globe: International Odysseys Guide Business Education, by Jennifer LeNoir

Knowing the world increasingly is becoming a global village, faculty and students in Texas Tech University's College of Business Administration are building international programs for the exchange of information and experiences about the world's cultures.

8

FEATURES

A Scientific Jungle—Researcher Probes AIDS Virus and the Brain, by Preston Lewis

A neurology researcher is studying two of the most perplexing areas of research in medical science, the enigmatic AIDS virus and the complex brain.

16

Baiting for a Balance, by Charles Griffin

A researcher in range and wildlife management is working with the Texas Parks and Wildlife Department to evaluate a technique for reducing a nuisance species of fish inhabiting bodies of water throughout the state—and in the process is studying ways to manage an ecosystem.

19

Lyerla's Tenacity Perseveres, by Jennifer LeNoir

Librarian Gloria Lyerla had a reputation for being persistent in her abilities to retrieve hard-to-get research materials for patrons. Her influence continues even after her death through grants that enable Texas Tech researchers to access rare information, sometimes in obscure places.

22

High-Tech Pouch Could Serve as Surrogate Kidney, by Sandra Pulley

A Texas Tech researcher in surgery hopes to create a balloon, constructed from a kidney patient's own intestinal wall, to pump necessary filtered blood back into the body. The artificial kidney could reduce both medical bills and patient anxiety.

26

PERSPECTIVES

Caring: The Other Mark of Excellence, by Judith A. Ponticell, Ph.D.

Caring in a learning environment makes a world of difference in students' motivation to learn and in their behaviors in the classroom and in life. An education researcher says that at the university level we do not have to fear that caring is a substitute for academic standards, but we should invest in this 'other mark of excellence' because learners cannot thrive without it.

30

A Glance at Research and Creativity

Ground Zero

Standing in the crater directly outside the remnants of the Alfred P. Murrah Federal Building, H. Scott Norville, P.E., Ph.D., came to the stark realization that nothing in his extensive experience with blasts could have prepared him for the carnage and destruction wrought by the Oklahoma City bombing.

Norville, director of the Texas Tech Glass Research and Testing Laboratory, used the bombing of the Alfred P. Murrah Federal Building in Oklahoma City to evaluate the results of his continuing blast research.

Prior to the Oklahoma City bombing, Norville had examined several sites of actual explosions including an explosion at a rocket fuel plant in Henderson, Nev.; another at a Shell Refinery near Norco, La.; a natural gas explosion in downtown Fort Worth, as well as in a rural area near Brenham; and the explosion of a fireworks facility south of Oklahoma City.

"I have seen a number of actual explosions in addition to participating in the detonation and study of 50 small blasts as well as two large blasts (one blast being a simulated nuclear explosion), but nothing prepared me for what I saw in Oklahoma," Norville said. "Perhaps I saw more than I wanted."

According to the Oklahoma City Medical Examiners' Office, 169 people died as a result of the April explosion, while hundreds of others were injured. According to Norville, flying glass shards accounted for injuries to between 400 and 500 people.

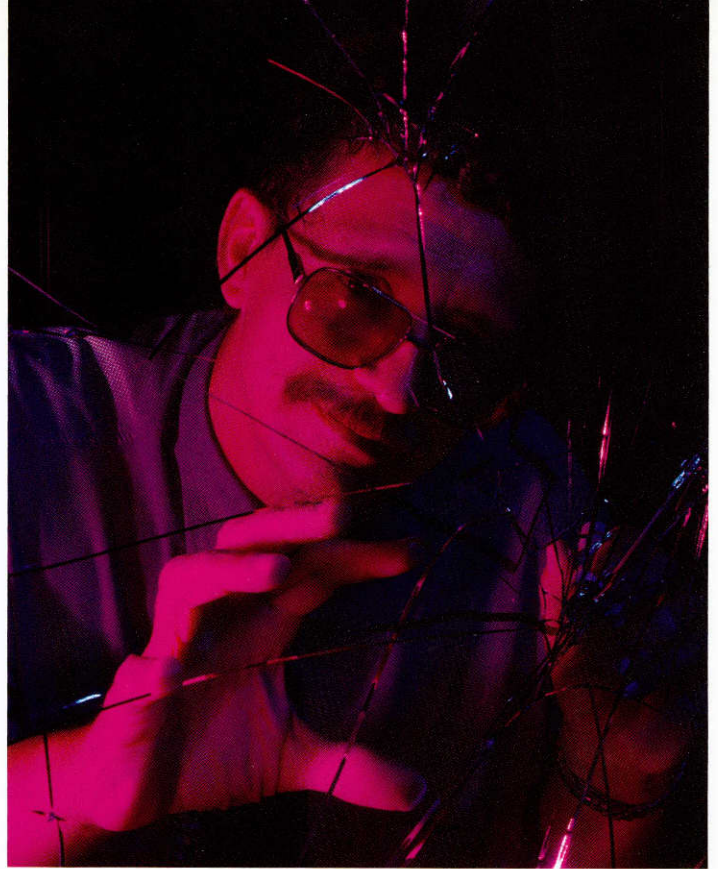
Norville said two primary purposes exist for his re-

search: first, to inform people that some glass products can reduce injuries and damage; and second, to encourage or require glass manufacturers to design these types of glass.

Norville said the Oklahoma explosion confirmed conclusions he previously had drawn through his laboratory research. Specifically, he said that in a blast of that magnitude, laminated glass — which is used most commonly in the windshields of cars and trucks — performed the most adequately. While, monolithic glass (a single sheet of glass) exhibited the poorest performance. Norville also noted that window films did not appear to significantly reduce breakage, hold the glass in frames after fracture or adhere to the majority of the resulting glass shards.

Glass Research and Testing Laboratory investigators Milton Smith, professor of industrial engineering; Kim King, senior engineering major; and Norville arrived in Oklahoma City the day following the explosion.

"The area surrounding the building was sealed by federal, state and local police, making entry into the scene difficult. We were neither allowed to collect specimens of broken glass, take measurements nor enter or touch damaged buildings. However, we understood that security was of primary importance and within those constants examined the glass as closely as possible," Norville said. He added, however, he and the other researchers were allowed to photograph buildings once inside the law enforcement perimeter.



Artie Lämmer

Norville and his investigative team divided the damaged area surrounding the explosion into three zones. The area designated as zone one was the closest in proximity to the explosion (within five blocks) and zone three was the furthest from the blast.

Norville said almost complete glass breakage and structural damage was prevalent within zone one. According to Norville, glass types and constructions observed in zone one consisted of insulating glass, laminated glass, glass blocks, monolithic tempered glass, monolithic annealed glass and monolithic glass with a daylight application of window film.

"Annealed refers to the process in which glass has been heated and allowed to cool slowly to prevent brittleness," Norville said.

Of these glass types, which all sustained breakage, only laminated glass in doors remained in its frame following the explosion, he said.

"The main function of windows and window construc-

Norville evaluates the results of the Oklahoma City blast.

tion under adverse conditions such as an explosion should be to maintain closure of the building envelope," Norville said.

He added that if a window performed its function adequately during an explosion or natural disaster, it would reduce deaths and injuries to people in proximity to the structure, reduce damage to the contents of buildings and expedite the cleanup process.

In zone two, approximately six to seven blocks from the explosion, researchers saw moderate to heavy glass breakage with relatively no structural damage. Norville said all of the same glass types in zone one were present in zone two. The investigative team observed that, with the exception of monolithic glass, all of the glass functioned properly and kept building envelopes closed. However, according to Norville, window film still did not provide any observable reduction in glass breakage nor did it maintain window

glass in frames following fracture.

In zone three, the area farthest from the explosion, insulating glass performed very successfully, Norville said. He added that one high-rise building, with windows consisting of insulating glass, was left unscathed although it did sway several feet as a result of the blast.

Originally, Norville's research began as the result of a question posed to him by a member of the U.S. Air Force. He said the Air Force wanted to know how many windows would break if a missile was to detonate on a launch pad. According to Norville, the Air Force was not pleased with the results that estimated large amounts of breakage.

As a result of the Air Force's initial question, Norville, in conjunction with members of Texas Tech's Institute for Disaster Research, conducted further studies regarding various types of glass and how they react when struck by wind-blown missiles and/or shock waves.

Norville's laboratory experiments have consisted of propelling gravel, hailstones and small 2-by-4 timbers at glass as well as detonating low-level blasts at a facility west of Tahoka.

"Developing a more breakage-resistant glass is something European nations have been attempting to accomplish for years because of a growing number of terrorist attacks," Norville said. Although terrorism has not been prevalent in the United States, he believes the attacks in New York City at the World Trade Center and in Oklahoma City are warning signs of a trend which will create a greater need for blast studies.

—Charles Griffin

Boomerang Adults

Seeking Refuge Again (*and Again*) in the Parental Nest

When the last child leaves home to head for a job or to attend college, many parents believe their homes will transform into their private sanctuary once again. However, in today's society in which events such as unemployment, divorce, and an unstable economy can bring uncertainty, many adult children have sought refuge in the nest from which they sprang.

"Boomerang adults," a term coined to identify adult children who return to their parents' home, has attracted the interest of Texas Tech University researcher Joyce Munsch, Ph.D. Munsch and her colleagues from Cornell University began looking at the phenomenon of boomerang adults in 1986. Although other researchers had focused on how events and conditions in the children's lives affect the likelihood of a return, Munsch took the research one step further by examining which mothers were more likely to have their adult children return to the nest.

"I wanted to know, by

using longitudinal data, the characteristics of the moms themselves, which made them more likely to have adult children returning home," said Munsch, associate professor of human development in the College of Human Sciences.

Munsch had worked with a research team that had compiled an extensive data set of 427 women from a mid-sized community in central New York City. Phyllis Moen of Cornell University was the principal investigator on the project that re-contacted and interviewed 427 women who had first been interviewed in 1956. The 1986 research team recorded various events that had occurred throughout the women's lives during the previous 30 years. The results since have been presented to the Population Association of America and abstracted in *The Boomer Report*.

"In 1986, we managed to contact 73.6 or three-fourths of the original core group," Munsch said. "Twenty percent of the women had died, 4 percent of the

women were never located and 3 percent refused to participate."

Munsch was able to obtain detailed histories of these women's lives, including education, marital status, family size and financial information in a time-line format. Among the women who had an empty nest, 40 percent had an adult child return to the parental home.

Munsch and the research team divided the sample into two groups: women who had adult children who never left home and women who had had an "empty nest."

Munsch explained, "Some researchers have looked at the characteristics of the adult children who return home, such as their gender, age and marital status. And other researchers have looked at social trends, such as an increase in the unemployment rate, rising inflation, an increase in the age at the first marriage, prolonged education and an increase in the divorce rate, as circumstances that often send adult children back to the nest. But," said

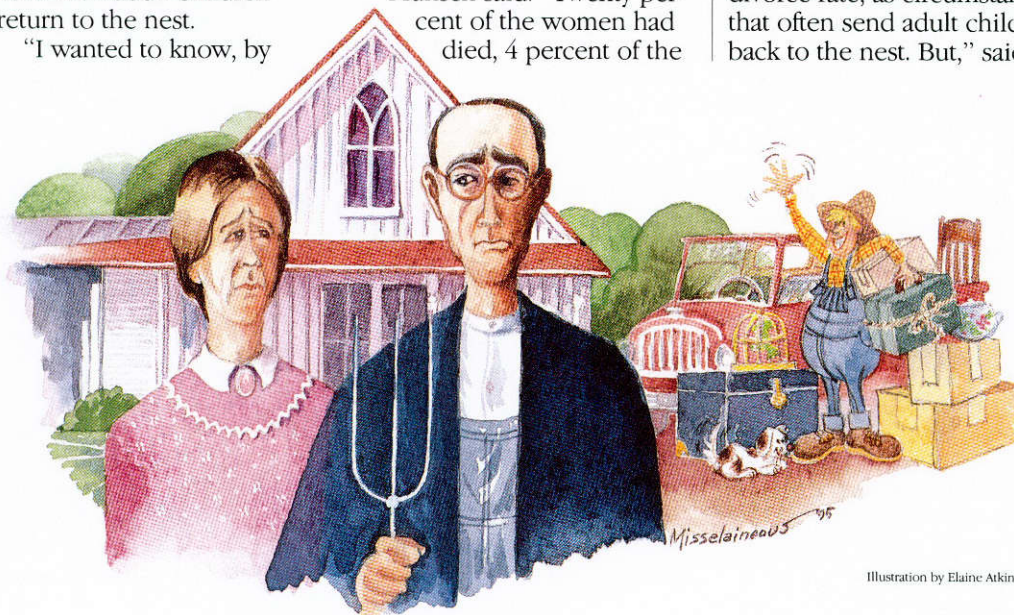


Illustration by Elaine Atkinson

Munsch, "it seemed that there were things that might have happened in these women's lives that indicated which ones were likely to have their adult children move home again.

"Of the 286 women who had possessed an empty nest over a period of time, 40.2 percent had experienced the return of at least one adult child by 1986," she said. The average age of returning adult children was 24.4 years and the average length of time the parental nest was empty before a return was three years. Munsch also added that she found no gender difference in the adult child in the data she collected. She found that households with large families were more likely to have adult children return home compared to smaller-sized families.

"The largest group of returns could be described as the 'way station returns,' adult children on the way from one situation to another with a stopover at the parental home," Munsch said.

This group included adult children who were either recent college graduates seeking employment or adult children who had experienced a financial/professional set-back or marital disruption that necessitated a return to the parental home.

"The second group usually involved the issue of caregiving, either an adult child who was involved in an accident and needed someone to care for him or her, or the child returned home because a parent had become ill and needed care," Munsch said.

"The thing to remember here too is that the women in the 1950s, when these women had young families, viewed the family differently from women today, and their roles

and attitudes played a large part in the study," Munsch said. "At that time, women were less likely to work outside the home, although many women were active outside the family either through volunteerism or social clubs. These roles outside the home were, in fact, important."

Munsch found that mothers with more roles in 1956 were less likely to have adult children return to the parental home. Also, women who had found parenting stressful when they had young families were less likely to have their adult children come home again.

Education also was an important factor for which mothers were more likely to experience the return of adult children to the nest. Munsch said, "Women who returned to school after the birth of their children were more likely to have an adult child return to the parental home. Maybe these women were more flexible in their scheduling and the idea of going through another disruption did not bother them."

The researcher noted that the family's economic status was not an indicator of an adult child's return to the nest. Also, the mother's marital status could not predict whether an adult child would come home again, she said.

"It's clear that what is going on in an adult child's life isn't the only important thing to look at when looking at 'boomerang adults.' Parents still have a say on whether an adult child can return to the nest," Munsch said. "My research shows that what is going on in the mother's life, including her roles and attitudes, is the key predictor of the boomerang effect."

— Myrna Whitehead

Students Granted Choices in Alternative Schools

In the past when Johnny could not read, teachers placed the fault upon the student's shoulders and determined that the student was deficient. Educators now realize the problem is more complex: Students each learn in different ways, part of the theory behind the "alternative school concept."

According to Texas Tech University researcher Judith Ponticell, Ph.D., interest in the alternative school concept grew as recently as 10 to 15 years ago out of increased understanding that some students cannot function successfully in traditional school environments. Consequently, these students — frustrated with their performance in the classroom — often would become behavior problems for their teachers. As a result, these students often were sent to "alternative schools" or last chance schools.

"Problems arise when we think this is all there is to the alternative school model. There is a negative label associated with 'alternative school,'" Ponticell said. "Alternative school models also are characterized by flexible schedules in which students master concepts at their own pace. The model emphasizes smaller class sizes, real-life experiences, and cooperative learning, as well as a diagnosis of the student's strengths and weaknesses. In this view the student has a choice in his or her educational experience."

Alternative schools move away from the traditional model of lecture/recall and rote means of education, Ponticell said. Seat time, the

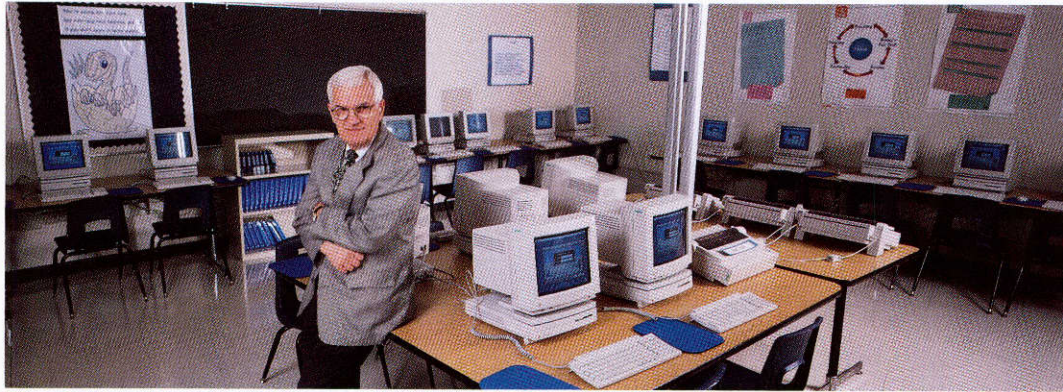
amount of time a student puts in completing classes often in lecture/recall format, has been the norm established for determining when one is finished with school. According to Ponticell, an alternative school model may allow the student to pursue the same core curriculum (science, art, music, etc.) goals in special projects outside the classroom, for example, by taking a stroll through a neighborhood and using the rhythms of music to describe the architecture of a building.

"Alternative school educators are called upon to be more creative in their approaches to a particular subject," Ponticell said. "Teachers may incorporate science, mathematics, art, music in a manner that relates these components to another subject.

"The team approach is a key component of the alternative school concept," she said. "This truly is an interdisciplinary means to education."

In the article "Alternative Schools: The State of the Art," Mary Anne Raywid, professor of education at Hofstra University, explains that alternative schools can serve as models for any school that seeks innovative change. The alternative school concept currently is divided into three different approaches to education.

One concept, according to Raywid, focuses on making the curriculum more challenging and fulfilling than the traditional core curriculum. This also is the theory behind magnet schools.



Artie Limmer

In the Lubbock Independent School District, the magnet school concept was introduced in 1978 at Ella Iles Elementary School. According to Gerald Skoog, Ed.D., professor of curriculum and instruction at Texas Tech, 60 to 100 students were selected to participate in the program. The new format featured multi-age grouping, team-teaching and alternative grading.

"During that time, if a student failed to master mathematics or some other subject in the traditional model, he or she was retained in the same grade for another year, and that had a stigma attached to it," Skoog said. "Using the new format, students could stay together for two years and eventually master all aspects of the curriculum at their own pace. In the end, they would all be on the same level."

At Iles, the students were divided into three sections — greenhouse (pre-kindergarten through first grades), forest (second and third grades) and argonauts (fourth and fifth grades). Each section was taught by a team of teachers who specialized in mathematics, science and reading.

According to then-Iles principal Kay Knight Howell, "We were on the ground floor as

far as building a program that would set the standard for other magnet schools. The idea of introducing so many new and innovative approaches to educating children was not only thrilling but a little bit scary."

To assess a student's development, the student was required to write several paragraphs describing the benefits of each project in which he or she had participated, Knight Howell said. The paragraphs then were critiqued by each team teacher to ensure the student had learned the objective of the exercise. Instead of a student receiving a letter grade, a parent-teacher conference was conducted to discuss the student's progress. "Texas Tech and LISD pioneered an effort at Iles as a part of the city's desegregation plan in conjunction with the Individual Guided Education's nationwide effort," Skoog said.

Raywid's second concept of alternative schools is the behavioral model for at-risk students. This program, which represents the last step prior to expulsion, usually houses students who are chronically disruptive. The program also can include some type of interschool suspension system.

The third alternative school

concept, says Raywid, focuses on remediation. This program is designed for students who may need additional academic, social or emotional development.

"In Lubbock, I'm familiar with six schools that utilize some alternative school concepts," Ponticell said. "Some of them use the multi-age groupings, interdisciplinary studies approach and the problem-solving component. Unfortunately, tensions arise when schools also are driven by the Texas Assessment of Academic Skills test. Standardized tests are associated with more traditional schooling, and new practices do not lend themselves to traditional assessments."

Despite the positive aspects of the alternative school concept, acceptance is still slow in coming, she said. Among the advantages of the alternative concept is that a student gets one-on-one attention in the classroom, students develop their own strategy to make themselves better learners, and teachers are rewarded for their creativity.

"Instead of viewing the child as an empty vessel waiting for knowledge to be poured into the brain, the alternative school views the child as the inquisitive learner who wants more than

In the computer laboratory at Lubbock's Cavazos Junior High School, Gerald Skoog contemplates the alternative school concept and its effects on individual students.

surface information," Ponticell said.

Disadvantages in the alternative school concept keep the program from gaining nationwide acceptance, she said. One problem is cost. It's costly, for example, to re-tool the entire current teaching staff. Also, parents and communities may be hesitant to accept the new wave of education.

"What do you say to a successful business leader who says, 'I went to a traditional school and I turned out OK, so why should we change the way we teach kids today?'" Ponticell said.

The biggest obstacle facing the acceptance of the model lies within the political context surrounding education, she said.

"Educators are caught today in a whirlwind of information. We know what changes have to be made in a system that moves very slowly," Ponticell said. "And we seem to focus still on a single test score as the measure of learning."

At Texas Tech, Ponticell said the College of Education recently completed a two-year revision process of the teacher preparation program. Now pre-service teachers spend about 65 percent of their time in the classroom working with children. The current crop of teachers are more familiar with alternative approaches to education. But, the system of public schooling is slow to change, she says.

— Myrna Whitehead

(Editor's Note: The following opinion piece was written by Les Cullen, M.A., a doctoral candidate in history. He holds bachelor's and master's degrees in history from Texas Tech University. His main fields of study are modern 20th century American history and modern British history.)

ROLL OF THE DICE

Native American-sponsored gambling may be way out of decades of poverty

By Les Cullen, M.A.

Over the span of a dozen years, bingo and casino gambling have spread to more than 130 Indian reservations from Florida to Washington. Each year, gamblers place bets worth more than \$1 billion at gambling facilities owned and operated by Native Americans.

The trend toward such activities on reservations resulted from a series of decisions handed down by the federal courts, beginning in 1979 with *Seminole Tribe vs. Butterworth*. The federal government supported the move to American Indian-sponsored gambling. On Jan. 24, 1983, President Reagan stated, "It is important to the concept of self-government that tribes reduce their dependence on federal funds by providing a greater percentage of the cost of their self-government."

Unemployment on reservations was consistently higher than the national average, and high percentages of Native Americans and their families remained on welfare. The rapid

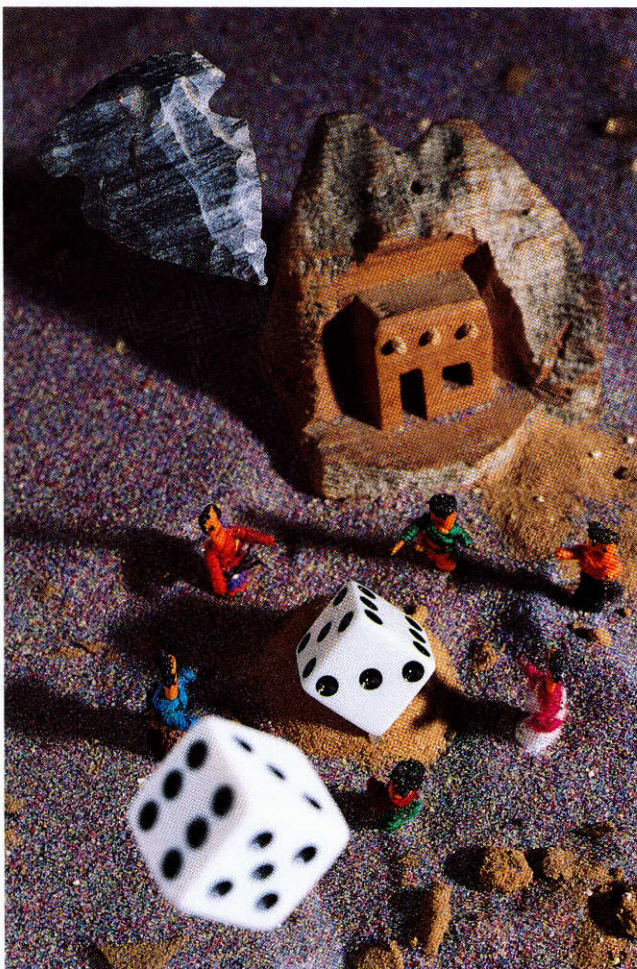
rise of gambling and the seemingly effortless ease with which it brought in revenue proved to be an irresistible lure to many poor tribes. The national government seemed eager to allow the

American Indian to expand into gambling as a means to provide self-sufficiency. The state governments, however, arrayed themselves against the idea of Indian gaming and worked diligently to prevent it.

The debate lasted for more than six years, from 1982 until October 1988 when Congress passed the Indian Gaming Regulatory Act (IGRA). Lawmakers intended the measure to regulate Indian gambling while at the same time turning it into a viable source of revenue for the tribes.

The bill divided gambling into three classes. Class I encompassed traditional Native American games and reserved regulation of such games to the tribes. Class II games included lotto, certain types of card games, and most importantly, bingo. The law gave regulatory power over Class II activities to the National Indian Gaming Commission. The law allowed tribes to undertake Class II games if such games were already legal in their states in any form. Class III gambling included classic Vegas-style games such as blackjack, roulette, slot machines, pari-mutuel betting on horse racing and dog racing, and jai alai. Tribes only could indulge in such activities if the games were already legal in their state and if the tribe negotiated a compact with the state government.

Critics of Native American gambling, most notably the congressman from the state of Nevada and representatives of the Nevada Gaming Control Board, claimed before the Senate Committee on Indian Affairs that tribes could not possibly regulate gambling operations properly, and that tribal facilities would be easy marks for organized crime.



Mark Mamawal

A spokesperson for the Western Conference of Attorneys General agreed, stating that unregulated Indian gambling, "Represents a threat to the public welfare of the nation because it provides new havens for organized crime to operate in total disregard of state laws concerning gaming."

Native Americans angrily responded to such claims. Roger Jourdain, chairman of the Red Lake Band of the Chippewa Indians, said in response, "The Red Lake Band of Chippewa believes that the first instance of organized crime on Indian reservations occurred when the Bureau of Indian Affairs was given the responsibility for managing Indian affairs." Moreover, Paul Maloney, a senior policy council at the Justice Department, dismissed critics' claims of rampant Mafia infiltration of Indian lands, "Insofar as organized crime is concerned, the Department of Justice believes that to date, there has not been a widespread or successful effort by organized crime to infiltrate Indian gaming operations."

Though the Congress may have believed the IGRA to be sufficient to its purpose at the time, it since has proved vague and unwieldy. Native Americans and their lawyers quickly utilized loopholes in the law. Tribes renamed Class III games in an attempt to pass them off as Class II games, and in the case of slot machines, actively defied state laws banning the devices.

The states responded in a variety of ways. Connecticut and Washington attempted to ban Class II games to deny the games to reservations. Both states lost in court. Other states, including Arizona, New York and California, launched police raids on reservations to confiscate illegal gambling devices. In all three cases, the involved tribes sued the states and won. Court decisions and federal action clearly favored the right of Native Americans to operate tax-free gambling establishments on reservations.

The latest tool the states utilized in an attempt to resist Native American gambling was the 11th Amendment to the United States Constitution. On the basis of long-established legal precedent, the states argued that Indian tribes constituted foreign entities

because the tribes were outside the jurisdiction of the state. The 11th Amendment holds that such an entity cannot sue a state without that state's consent. Several states, including New Mexico, Alabama and North Dakota, have utilized the Constitution's guarantee of immunity from lawsuits to protect themselves from tribes arguing that the states failed to negotiate Class III compacts in "good faith," as specified by the Indian Gaming Regulatory Act.

Factionalism remains an important issue in 20th century Native American Studies, and gambling has exacerbated tribal divisions in some cases.

No one exactly is certain what "good faith" means. The lawsuits that arose from the Class III compact negotiations and the 11th Amendment defense of the states are ongoing.

The federal government displayed mixed results in regulating Native American gambling through 1992. Despite the well-intentioned Indian Gaming Regulatory Act of 1988, the competing interests made little progress. The National Indian Gaming Commission still had not laid down regulatory guidelines more than two years after its creation, and the Justice Department refused to act until the guidelines were created.

The animosity between tribes and states over the definitions of Class II and Class III gambling and negotiations "in good faith" did not help the impasse.

Beyond the economic and legal issues, there remains the question of the effect casino gambling might have on Native American culture. Some tribes, such as the Shakopee Sioux, have enjoyed enormous financial benefits from gambling profits.

Unscrupulous management companies have bilked other American Indians out of investment money and tribal profit from the gambling operations. Some tribes gained a more intangible asset in increased pride due to the self-sufficiency gambling profits allowed. Other tribes, most notably the St. Regis Mohawk of Northern New York, have encountered only factionalism.

Factionalism remains an important issue in 20th century Native American Studies, and gambling has exacerbated tribal divisions in some cases. The St. Regis Mohawks became divided over the issue of gambling and that division was at the root of the defense of Mohawk sovereignty. The split over the issue turned violent. Anti-gambling mobs representing traditional Mohawk culture attacked two of the five casinos on the reservation. The Mohawk Warrior Society fought back with automatic weapons. Several days of fighting resulted in the deaths of two Mohawks, and authorities intervened.

A very different example of the effects of gambling on Native American culture occurred in early 1992. The Mashantucket Pequot opened the Foxwoods High Stakes Bingo and Casino on their Connecticut reservation. At the facility's grand opening, Slow Turtle, the tribe's medicine man, performed a ritual in which he blessed the casino and its master plan that includes a golf course, three hotels, a Native American Museum and an "historically accurate" Indian village.

Perhaps gambling's negative influence on Native American culture is moot in any case. Gambling industry experts pointed out in 1992 that there was a nationwide trend toward legalized gambling in the United States. Many states, like Texas, now run lotteries, and most of the states adjacent to the Mississippi River have re-legalized river boat and dockside gambling.

The question is, will people be willing to go out of their way to gamble on a remote reservation if they are able to do it closer to home? Native Americans, who face poverty, unemployment and official neglect on the reservations, continue to believe that they have little choice but to roll the dice and take that risk. □

TRAVERSING THE GLOBE



International Odysseys Guide Business Education

By Jennifer LeNoir

Photos by Artie Limmer

Although the world increasingly is becoming a global village, Americans, startlingly, know very little about their international neighbors' cultures, histories, languages, political systems and business environments.

Faculty and students in the College of Business Administration at Texas Tech University are building international programs for the exchange of information and experiences about cultures — knowing that the economic survival of the United States depends on our knowledge about other countries.

The world's economy is growing more interconnected and interdependent. Other countries' citizens have extensive knowledge about American business, says Jocelyn Hein, a finance graduate, who participated in the university's London Consortium Business and Humanities Semester Program during the spring of 1995.

Hein said her study abroad experience sparked an intense thirst for knowledge about other people and places. The London Semester Program helped her become more accepting of change and of other cultures.

"I find myself reading new and different types of literature that I previously might have thought was boring. Studying in London was the best experience of my life because I saw so much and met so many different European and American students," Hein said. "By the end I realized I had grown more intellectually independent and personally assertive."

To keep professionally competitive in the global market, students and faculty members are participating in an expansion of international activities. Texas Tech students who learn about business principles within the context of a global neighborhood possess the needed interpersonal, cultural and edu-

Carlton Whitehead has explored joint master's and doctoral level programs and student exchanges at the University of Guadalajara in Mexico.

cational backgrounds that later will help them successfully compete in the marketplace. Faculty members who include international elements in their curriculums and research efforts pass on knowledge that is current and pertinent to the rapidly globalizing world.

The integration of the international perspective into business education expands and blends students' knowledge of classroom textbook cases with real world international experiences, according to Carl H. Stem, Ph.D., dean of the College of Business Administration.

Rapidly growing global competition is the primary reason for infusing international perspectives into the Texas Tech learning environment and for broadening opportunities for study abroad exchanges, Stem said.

Secondly, Stem said, the concept of university-level education for business actually originated in the United States. As a result, foreigners have adapted to and have a good understanding of the business culture of the United States; however, Americans have been slow to adapt to a global business environment.

"Our graduates must have a clear perception of the globalized economy and an understanding of its implications for career preparation and business success," he said. "The American master of business administration degree is the international model for graduate business education throughout the world. That is why so many foreign students seek to study business in the United States."

Stem, originally from Nashville, Tenn., became interested in the merits of international education while in high school. He won a one-week trip in 1953 to the United Nations in New York City after winning an essay contest. Later, as an international economics and finance major at Vanderbilt University, he served as the regional director

of the southeastern United States for the Collegiate Council for the United Nations. Additionally, he spent the 1957-58 academic year as a Fulbright Scholar at the University of Reading in England studying graduate international economics. Stem earned a master's degree and a doctorate in economics in 1960 and 1969, respectively, from Harvard University.

"Our young people just do not have a sense of the international world as compared to European students. For example, European students in master's programs are typically required to learn to speak two languages in addition to their native language," Stem said.

To address this issue, the Texas Tech College of Business Administration currently maintains an ongoing collabora-

tion with the department of classical and modern languages and literatures. Through this affiliation, language majors may pursue a minor in business and then move on to complete a master's degree in business in one year after receiving a bachelor's degree in a foreign language. Students in the programs are encouraged to take advantage of study abroad opportunities to enhance their language skills and their understanding of foreign cultures.

Study abroad programs are still somewhat new to Texas Tech and to the entire state of Texas, according to Jacque Behrens, director of the Division of International Education at Texas Tech. Behrens explained that beginning in 1993 the university started charging a \$1 international education fee to all stu-



International student George Fabian Crewe, a junior from the United Kingdom, studies management information systems in the College of Business Administration.

dents. The fee, part of a statewide program, is deposited into separate scholarship funds at state-supported schools choosing to participate in the program. Fees assessed at Texas Tech benefit students who want to participate in study abroad programs offered through institutions throughout the nation that allow students to receive academic credit at Texas Tech. Currently, about 150 to 200 Texas Tech students, less than 1 percent of the student body, annually participate in study abroad programs.

While funding scholarships for study abroad opportunities is important, relationships with foreign universities must be established to ensure positive experiences. Don R. Haragan, Ph.D., executive vice president and provost at Texas Tech, last year took a delegation of the deans of law, engineering, business and architecture to the University of Guadalajara, Mexico, as part of Texas Tech's efforts to initiate collaboration between the two institutions. The arrangement specifically focused on programs that will respond to international business issues and opportunities available through the North American Free Trade Agreement (NAFTA).

Relationships with foreign universities also are built through cooperative faculty research projects and exchanges. For example, in July 1994 Texas Tech faculty members Barry A. Macy, Ph.D., professor of management and director of the Texas Center for the Productivity and Quality of Worklife, and Carlton J. Whitehead, Ph.D., professor of management and associate dean of the College of Business Administration, spent a week at the University of Guadalajara exploring joint master's and doctoral level programs and student exchanges. Macy and Whitehead assisted Guadalajara administrators in establishing their own Total Quality Management Research Center primarily



for small businesses.

"A growing amount of interchange and activity currently exists between Mexican and American institutions of higher learning because of potential NAFTA opportunities," Stem said.

Take the example of Miguel Ramirez, a junior business administration major at Anahuac University in Mexico City, who completed a business curriculum at Texas Tech during spring 1995.

"Studying in another country is important because the world is competing internationally. By coming to the United States, I refined my English and gained an understanding of American culture that will provide better relations between our countries, and in turn, will help me have successful international business interactions in my profes-

sional future," he said.

Another junior business administration major at Anahuac University in Mexico City who pursued business courses in spring 1995 at Texas Tech concurs. "I came to Texas Tech to improve my English because it's the language of the world," said Elias Dergal. "Because of NAFTA, I want to make myself more marketable to U.S. and Canadian companies that already have started moving to Mexico."

Because of NAFTA implications, Stem said, Mexican universities are interested in increasing the number of their faculty members with doctoral degrees by starting more doctoral programs in Mexico and by sending students to the United States to pursue doctoral degrees. The universities also want to



Richard L. Peterson served as a visiting lecturer in 1994 at the Shaanxi Institute of Finance and Economics in Xi'an, China.

upgrade many of their non-advanced degree faculty members to the master's degree level. As a result, Stem advocates more funding from the Mexican and United States' governments to support these collaborations.

Stem is a member of the board of directors of the American Assembly of Collegiate Schools of Business, the national association of business school deans. He says the organization sees three major focuses for change in today's business world: rapidly changing technology, a growing diversity in the workforce, and globalization of business.

In an attempt to remain at the forefront of the future, 45 percent of all business administration faculty members at Texas Tech are involved in

international teaching, research and other international activity, Stem said.

"You won't find many business schools in the nation where there is as large a percentage of the faculty who are as interested in research and other activities outside the United States as there is at Texas Tech," he noted.

Currently, College of Business Administration faculty members are collaborating on international research projects and are teaching at foreign business schools. Since the spring of 1991 five faculty members have taught in the college's London Semester Business Program for undergraduates. During the past two years, two faculty members have taught in the international master of business administration program, in which the college partici-

pates through the Consortium for International Business Studies (CIBS) in Pordenone, Italy. As well, the college's faculty regularly attend and contribute their research findings at international conferences.

Texas Tech is the first CIBS consortium member to send students to Italy; the other 16 member universities to date have sent only faculty members. To date 80 students from around the world have participated in the program, and of those, seven were Texas Tech graduate students who studied in Pordenone during the spring semester 1994.

Texas Tech business faculty have served as visiting professors and lecturers at countless foreign universities, Stem said.

For example, Professor Mark Peterson, Ph.D., recently returned from Amsterdam where he was the keynote speaker at the Kurt Lewin Institute. At the institute, he discussed "The Lewinian Soul of Organization Studies," which was based on the influence that Kurt Lewin, a prominent German-born Jewish social psychologist, has had on organizational studies in the United States. Lewin developed a field of theory during World War II that describes the way that a larger social context, such as a country, affects the interactions among people.

Previously Mark Peterson, a professor of management, spent 1986 in Japan as a Fulbright visiting professor. Since then, he has continued his research efforts on studies about multi-national businesses and comparisons of local government management issues.

He also has been assisting South Florida entrepreneurs who are working with Latin American businesses. To better understand the merits of some of these international relationships, he currently is conducting a comparative study of middle managers in 25 coun-

Recently returning from speaking at the Kurt Lewin Institute in Amsterdam, Mark Peterson previously spent a year in Japan as a Fulbright visiting professor.

tries. The difficulty of the comparative study, Peterson explained, is the limited presence of foreign faculty members at conferences in the United States available to act as survey distributors in other countries.

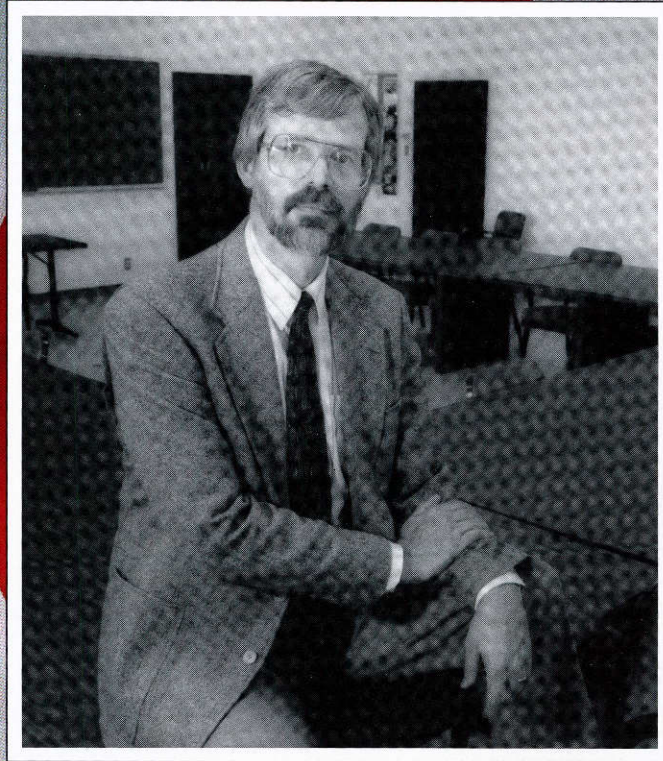
Mark Peterson's international teaching and research experiences give him real world examples to use in his classes. He stressed, however, that being involved in the international academic or business world is expensive.

In other examples, Dale Duhan, Ph.D., associate professor of marketing, served as a visiting professor at the Norwegian School of Economics and Business Administration in Bergen during the 1993-94 academic year. Other Texas Tech faculty who also have served in Norway are Professors of Marketing Roy Howell, Ph.D., and James B. Wilcox, Ph.D.

Texas Tech has a strong interchange with Turkish universities. Paul Randolph, Ph.D., professor of information systems and quantitative sciences, spent the 1990-91 academic year as a Fulbright visiting professor at the Middle East Technical University (METU) in Ankara, Turkey. Recently he was selected as the recipient of a second Fulbright Visiting Professorship to Turkey for the 1995-96 academic year.

Randolph first became interested in the Turkish culture when he was invited during the 1970s by the United States Agency for International Development to teach for one year at METU. Later, in 1988, when Turkish Prime Minister Turgüt Ozal visited the Texas Tech campus, along with two university presidents from Turkey, Randolph was convinced to return to METU.

While his first experience was marked by political unrest, the country's national political climate had improved greatly by his second visit in 1990. Since then, Randolph has been responsible for recruiting numerous



Turkish students to Texas Tech to pursue both undergraduate and graduate degrees in business.

"The Turkish students who study at Texas Tech are top quality academic students. The experience helps them to understand that people all over the world are the same," Randolph said. "Having them here broadens our students' perspectives as well as helps them to realize that even though Turkey is a less developed and poorer country than the United States, its students are as bright and as interested in learning as American students.

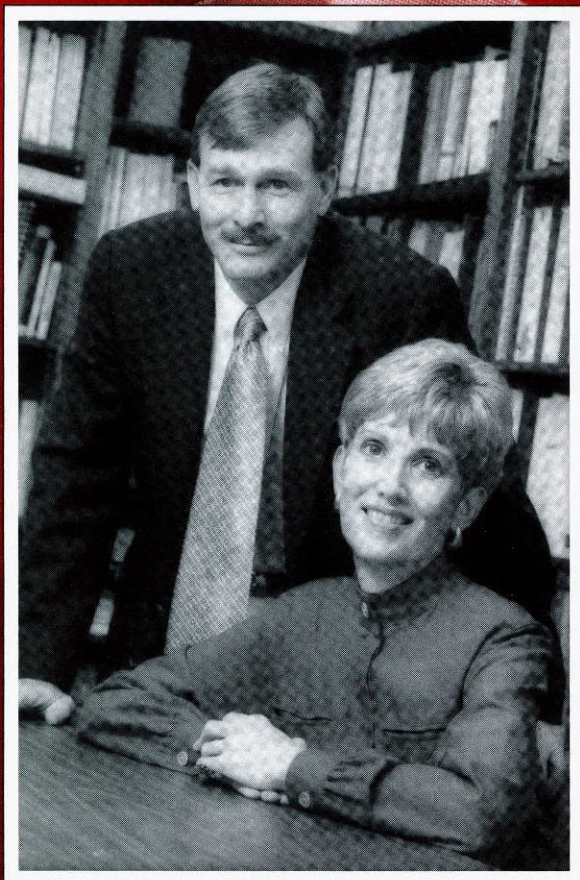
"If students are preparing for a life in the business world, they very possibly will travel abroad," Randolph said. "International study exchanges are necessary if American students are to

realize that while everyone is different, it's important to respect other cultural belief systems."

Banu Altunbus, a native of Ankara, who earned a master's degree in business administration at Texas Tech in 1994, said she sought her degree at Texas Tech because of her interest in marketing — and the best place to study fresh, new information about marketing is in the United States.

Altunbus currently is employed by Texas Tech's College of Business Administration as a graduate adviser and recruiting coordinator in the Graduate Services Center.

"I dislike being isolated from the rest of the world. Studying in another country gives people so many dimensions to their personality and interests. More



Grant Savage, director of the MBA program in Health Organization Management, and Carole North, program assistant, work to establish international study abroad experiences for MBA/HOM students at similar programs in the United Kingdom and Turkey.

the Finnish university.

Hunt, whose research expertise focuses on organizational change and leadership across time, says a limited number of studies exist on the topic. Currently he is involved in joint research projects with Arja Ropo, Ph.D., an associate professor of business at the University of Tampere, which center on ways Finnish banks responded to deregulation in the late 1980s. Extensions of the researchers' work have resulted in new findings about banking strategies.

"Understanding substantive banking strategies, as well as opening up one's thinking and adaptability to change, will make future business graduates more flexible. Future employees will have to work with diversity that involves people and ideas," Hunt said.

Through the college's ties with foreign institutions and other international study programs, Texas Tech is working to offer more study abroad opportunities for its students.

"The international experience is an end product in the sense that it sensitizes students directly to the global changes underway and the challenges of dealing with foreign cultures," Stem commented.

In an increasing effort to bring an international element into students' academic experiences, the college received a two-year \$50,000 grant in 1993 from the Fund for the Improvement of Post-Secondary Education (FIPSE). The grant supports student exchanges that are funded through the United States Department of Education.

Stem says the term "reciprocal student exchange" means that Texas residents may pay student fees at their local universities, and foreign students may pay fees at the universities in their home countries, and then the students exchange places at the collaborating universities. A balance in student flow, however, must be maintained in order for the exchanges to be economi-

importantly, individuals have a character-building experience because they learn how to survive on their own," Altunbus said.

Understanding what brings success in international business means that Texas Tech business graduates must realize that the expansion and sometimes dissolution of borders truly translates into a globalized economy. To keep pace with the educational changes, faculty members need to be involved in international teaching and research opportunities, Stem said.

Texas Tech business faculty increasingly are involved in academic teaching and research stints throughout the world. For example, James Burns, Ph.D., professor of information systems and quantitative sciences, spent time in

1993 lecturing about business process re-engineering and simulation topics at King Faud University of Petroleum and Minerals in Saudi Arabia.

Richard L. Peterson, Ph.D., professor of finance, returned to Texas Tech in June 1994 from the Shaanxi Institute of Finance and Economics in Xi'an, China, after serving as a visiting lecturer. Peterson taught classes in banking and finance for both undergraduate and graduate students.

The college's international involvements also reach to Finland, where James G. Hunt, Ph.D., Horn professor of management, spent the 1994 summer at the University of Tampere on a special grant from the Academy of Finland that supports his joint research in leadership and management with faculty at



Dale Duban was a visiting professor at the Norwegian School of Economics and Business Administration in Bergen.

cally feasible for each school.

In the FIPSE exchanges, Texas Tech's College of Business Administration is partnered with the University of Central Arkansas' College of Business Administration in Conway, Ark., to provide American students with the experience in a Northern European culture in one semester and in a Southern European culture in the following semester, Stem said.

Students in the FIPSE program, who may receive partial funding in the form of scholarships, must be fluent in Spanish or French. They may choose to study at the University of Teeside in northern England; the Ecole Supérieure de Commerce at St. Etienne in France; the University Politecnica in Valencia, Spain; or the Hague Business School in

the Netherlands. The four European partner schools are funded by the European Union.

"You can't learn culture and lifestyle in a textbook; you have to experience it first-hand," said Stan Meador, a senior marketing and public relations major from El Dorado who spent the 1994 fall semester in the Netherlands and the 1995 spring semester in Spain.

Begun five years ago, the London Consortium Business and Humanities Semester Program has enabled 65 Texas Tech business students to have an international experience without having to be fluent in a foreign language, Stem said.

Jeffrey Harper, a 1994 management graduate from Arlington, participated in the London Semester Business Program

because he believed he needed something on his resume to set him apart from other job applicants. He recently applied to the Texas Tech Graduate School in hopes of pursuing a master's degree in business administration.

"I learned life skills by being put into a foreign country and having to make it on my own. The experience gave me a great deal of self-confidence in learning that I can make it in almost any situation," Harper said.

Ellie Norman, a 1993 marketing graduate from Austin who participated in the London Semester Business Program, further explained, "If you are looking for something that will set you apart from other students, this is it." Currently Norman is pursuing a master's degree in healthcare human resources at Southwest Texas State University in San Marcos while also working as a human resources coordinator at Healthcare America in Austin.

Participating Texas Tech students will take classes in the fall of 1995 at Richmond College in London. The college operates on the American semester system and is accredited by the Middle States Association. Financial aid and scholarships are available, and students receive discounts to many cultural events in London.

Texas Tech Associate Professor of Management Grant Savage, Ph.D., has taught courses in the London Consortium Program. "The program gives students a wonderful opportunity not to miss a beat in their academic program and at the same time to expand their horizons. During my visit, students had the option of participating in an organized 10-day spring break trip to Moscow and in day-long and weekend excursions to places such as Wales, Scotland, Paris, Austria and Russia," he said.

In addition to making arrangements for Texas Tech students to study abroad, Texas Tech's College of Busi-

With expertise in organizational change and leadership across time, James G. Hunt spent a summer at the University of Tampere in Finland.

ness Administration actively is recruiting European and other foreign students to pursue degrees here, according to Stem. For example, Texas Tech will be represented by business administration alumni at the fall 1995 International Education Fair in Hong Kong. The college also has numerous recruiting materials available through the Franco-American Commission for Education Exchange in Paris. The commission, which is the only information center in France focusing on educational opportunities in the United States, posts materials on thousands of American universities and colleges.

A recent **Chronicle of Higher Education** article documented that 19 percent of foreign students in the United States pursue business degrees. This figure is higher than for any other academic discipline offered by American institutions. Additionally, during the 1993-94 academic year, American institutions of higher education experienced a 2.5 percent increase, greater than the previous year, in the number of foreign students attending their schools.

Currently the College of Business Administration boasts the highest international student enrollment, 5.3 percent, at Texas Tech, said Stem. This percent of international business students is above that for the university as a whole, which currently is less than 4 percent of the total student body.

"I would hope our international enrollment in the college would grow to about 10 percent of our student population. Texas Tech benefits in many ways from the presence of foreign students. They provide an intellectually stimulating and diverse approach to looking at learning and problem solving," Stem said.

Stem established a goal in 1992 of doubling the number of the then 100 international students enrolled in the college by the fall of 1997. In 1995,

however, he has almost met that goal with the college's current enrollment of 190 international students.

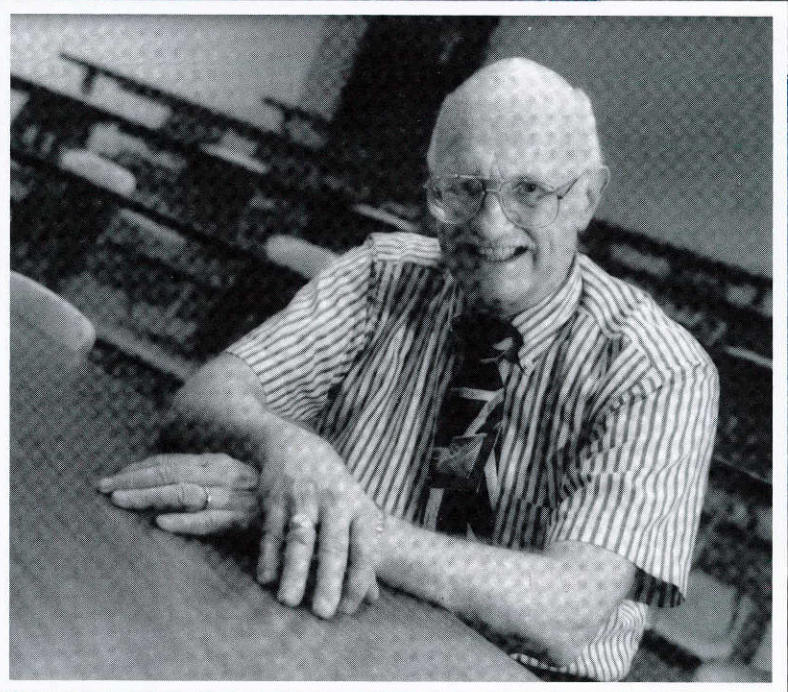
The college continues to actively recruit international students, of which 85 percent are regular degree-seeking students. Only 15 percent of the foreign students currently are visiting Texas Tech's business programs for the purpose of completing a semester abroad, which they will transfer back to their home universities for credit in their degree programs.

Stem reiterates that we must continually work to bring a larger international dimension to the business curriculum and more study abroad opportunities as the knowledge of international issues, politics, economics and business becomes more and more critical to the

United States remaining competitive in the global market.

Faculty members at Texas Tech increasingly contribute a larger part of the international perspective offered by the college by looking closely at the world around them in the development of international projects, Stem said. In this respect, universities and colleges may be compared to businesses looking at the future.

"Understanding the interconnected nature of what is learned in business schools, as well as how to translate it into everyday life, means that learning must occur beyond the traditional classroom boundaries — and those boundaries extend beyond one's own language, culture and business environment." □



A SCIENTIFIC JUNGLE

Researcher Probes AIDS Virus and the Brain

By Preston Lewis

While medical researchers often are described as working on the frontiers of science, a scientific jungle provides a more fitting metaphor for the area Frank J. Denaro, Ph.D., is researching.

That's because Denaro — an assistant professor of neurology at the Texas Tech University Health Sciences Center — is studying the enigmatic AIDS virus and the complex brain, two of the most perplexing areas of study in medical science. The HIV-infected brain is a jungle of neurons, antigens, lymphocytes and cytokines with interlocking relationships as tangled as jungle vines. Like a dense jungle, these complex biological thickets hide many secrets.

Although the human immunodeficiency virus (HIV-1) which causes AIDS is believed to infect the central nervous system shortly after it enters the body, pathological or psychological symptoms do not show up in the brain for a

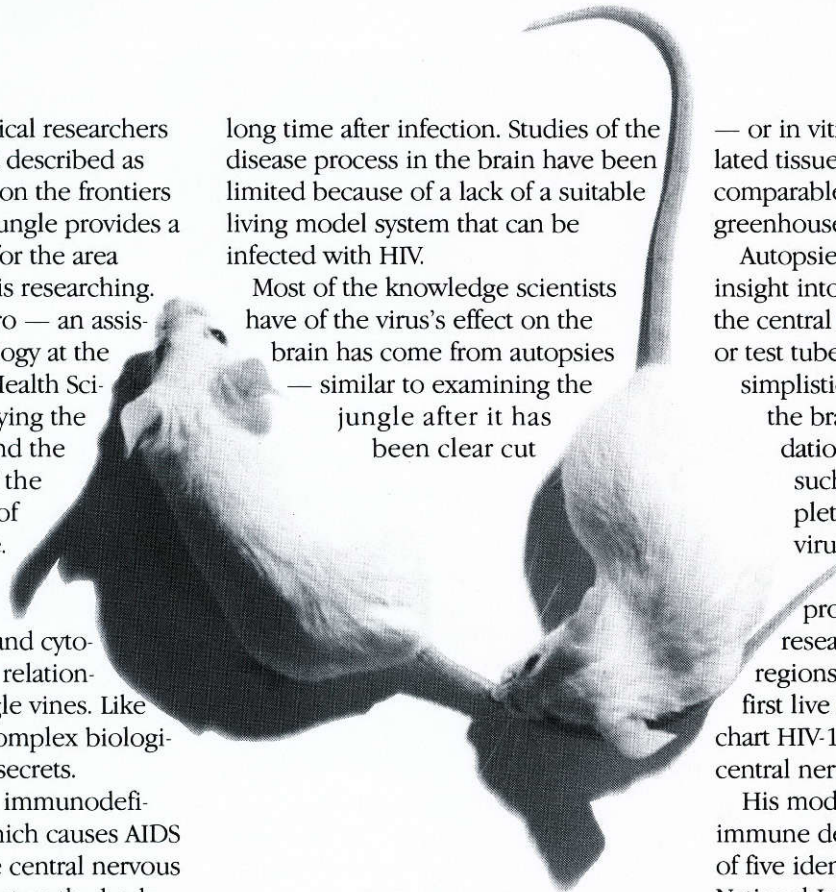
long time after infection. Studies of the disease process in the brain have been limited because of a lack of a suitable living model system that can be infected with HIV.

Most of the knowledge scientists have of the virus's effect on the brain has come from autopsies — similar to examining the jungle after it has been clear cut

— or in vitro experiments using isolated tissue or cell preparations — comparable to studying the jungle in a greenhouse.

Autopsies can give only limited insight into the dynamics of change in the central nervous system and in vitro or test tube experiments can be too simplistic a model, particularly for the brain. Though laying the foundation of further understanding, such studies provide an incomplete picture of the insidious virus's disruption of brain function. To circumvent those problems, Denaro has taken his research safari into uncharted regions by developing one of the first live models that can be used to chart HIV-1 infection of the brain and central nervous system.

His model, using severe combined immune deficiency (SCID) mice, is one of five identified nationwide by the National Institutes of Health in the journal *AIDS Research and Human Retroviruses* as an innovative approach to



Photos by Artie Limmer

studying the virus and its disruptions of the brain.

"I am interested in neurodegenerative disorders," Denaro said, "because these conditions, including Alzheimer's disease and Parkinson's disease as well as viral infections of the brain, are also our greatest medical challenges."

Once an HIV infection develops into AIDS, the risk of neurologic symptoms increases dramatically. As many as 28 percent of AIDS patients ultimately may be affected by neurologic symptoms, according to studies in the *Journal of Neuropsychology*. Those symptoms, though variable in individual patients, can include difficulty in moving or loss of sensation in the extremities. Behavioral changes or dementia similar to Alzheimer's disease also may result.

"As has been shown with Alzheimer's disease, dementia can increase the health care burden to patients, their families and the health care system," Denaro said. "Obviously the best thing ultimately would be to have a cure and prevent any brain damage from occurring. But in the short term, maybe we can find something to protect the nerve cells and slow down the process or maybe we can make current antiviral therapies more effective."

But to find even a stopgap measure, researchers must understand how HIV-1 affects the living brain. Denaro is the first to use SCID mice for such neurological studies. Developed in 1988 by Melvin Bosma, Ph.D., SCID mice are bred with nonfunctional immune systems. Later Donald Mosier, Ph.D., of San Diego, transplanted human cells into these mice to produce the equivalent of a human immune system. The mice then could be infected with HIV.

Working in association with Mosier's lab, Denaro was the scientist who confirmed the existence of human cells and the virus in these animals. The immune system is suppressed in SCID mice because they are born with non-functional lymphocytes. Lymphocytes are the cellular lions of the immune system because they stalk antigens, or foreign particles, and kill microorganisms invading the body.

The lymphocytes fall into two general types, T-cells and the less numerous B-cells. The cells differ in the way they attack foreign cells.

B-cells identify foreign bodies and secrete specific antibodies that attach to the surface of an invading microorganism and mark it for killer T-cells to attack. T-cells come in two varieties: killer cells and helper cells. The killer T-cells, which account for 80 percent of the lymphocytes, attack foreign microorganisms by clinging to their surface and releasing chemicals which help destroy the microorganisms or abnormal cells. The helper T-cells assist the killer T-cells by directing them to foreign microorganisms and enhancing the killers' ability to destroy them. In people infected with the AIDS virus, the helper cells gradually are destroyed, impairing the body's immune system. As a result, AIDS patients become susceptible to opportunistic infections which can harm many systems in the body, including the brain.

"Because the SCID mice are already

immune-compromised, they can accept human T-cells or macrophages and take on the characteristics of the human immune system. We can also infect these human cells with HIV to produce a living model," Denaro said.

When the HIV-1 is introduced to the SCID mice, the disease progresses similarly to its course in humans.

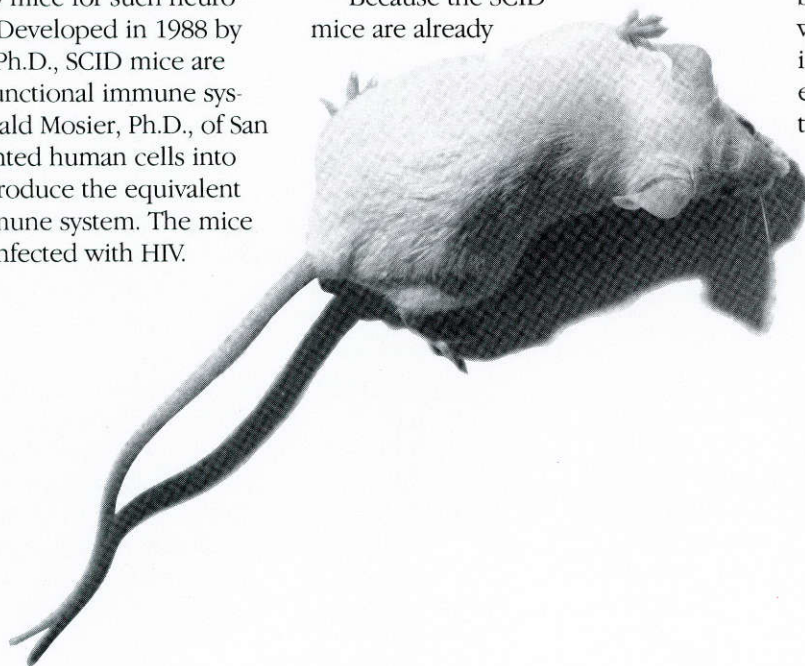
"This research focuses on the neuropathology of the disease," Denaro said, "and this model allows us to test how this damage is being produced."

Denaro said current research has shown that the neurons themselves do not become infected with HIV in the human brain. Instead, microglia, helper T-cells and macrophages are believed to be the primary cells that are targeted. Microglia cells are the brain's resident macrophages, but T-cells and other macrophages — the immune system's cellular vultures because they scavenge and devour dead cells — migrate to the brain as well. After a variable incubation period in those cells, the virus begins to cause havoc.

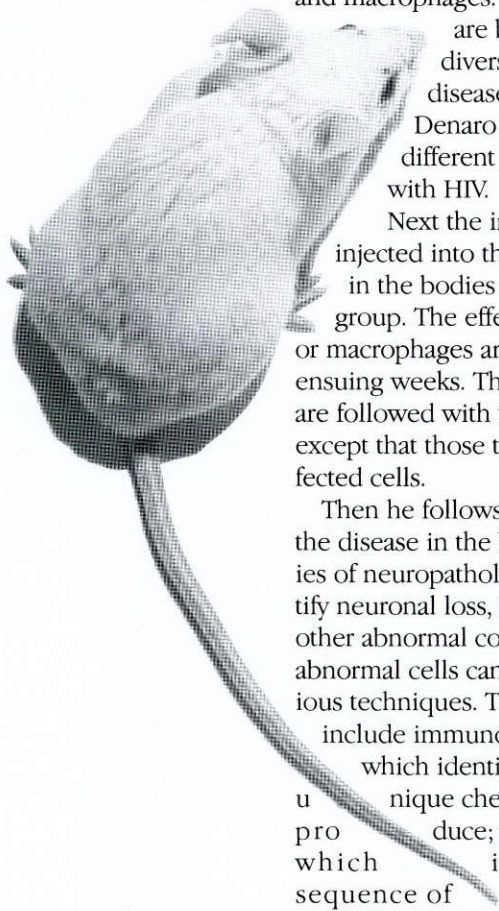
Denaro is trying to answer several questions, including what are the prominent mechanisms of viral entry to the brain and what mechanisms cause the damage to the neurons.

In trying to identify the path of viral entry he is examining whether the virus itself passes through the blood brain barrier and infects the microglia or whether it is transported to the brain in infected cells. A third option for viral entry may be a combination of those two possibilities.

After HIV invades the brain, it gradu-



*When the HIV-1
is introduced
to the SCID mice,
the disease progresses
similarly to its course
in humans.*



ally kills neurons. In the autopsies of infected brains, significant neuronal loss is observed. One theory is that specific HIV peptides — protein fragments consisting of several amino acids — damage neurons. Another possibility is that the microglia, macrophages or lymphocytes respond to the infection by secreting proteins called cytokines. These cytokines then initiate biochemical chain reactions which damage the neurons.

“As with all medical research,” Denaro said, “we would like a real understanding of the disease process so we can ultimately help people.”

The studies are complicated, even using the SCID mice. First, Denaro selects the animals, usually at two months of age, and divides them into experimental and control groups. Then, he obtains human cells and sorts them into B-cells, killer T-cells, helper T-cells and macrophages. Because these cells are believed to have diverse functions in the disease progression, Denaro then infects these different lymphocyte subsets with HIV.

Next the infected cells are injected into the brain or elsewhere in the bodies of the experimental group. The effects of infected T-cells or macrophages are observed over the ensuing weeks. The exact procedures are followed with the control group, except that those test animals get uninfected cells.

Then he follows the progression of the disease in the brain through a series of neuropathological tests to identify neuronal loss, tumor growth or other abnormal conditions. Infected or abnormal cells can be tagged by various techniques. These methods include immunocytochemistry, which identifies cells by the unique chemical markers they produce; in situ hybridization, which identifies the unique sequence of viral RNA or DNA; and Polymerase Chain Reaction (PCR)/in situ hybridization, which amplifies the amount of DNA and RNA and then identifies changes.

“These methods help to reveal the

magnitude of neuropathological changes and how the viral infection is progressing,” he said.

Denaro’s research, which is funded by a five-year, \$500,000 grant from the National Institutes of Health and is done in conjunction with researchers at the University of Portland in Oregon, will provide a better picture of HIV infection of the brain.

But Denaro wants to take the research further and ultimately correlate the physical changes in the HIV-infected brain with sensory-motor problems in the test animals.

He first became interested in the effect of HIV on the brain while studying viral infections of the nervous system during a fellowship in San Diego where he worked in the laboratory of Peter Lampert, M.D. Lampert described the neuropathology of slow viral infections. The concept of slow viruses resulted in important ways of looking at neurodegenerative diseases.

“We received so much pathology material from the different post-mortem cases of AIDS patients that I began research projects in the area of HIV/central nervous system disease,” he said.

In so doing, he became one of the first researchers in the nation to look at the relationship between AIDS and the brain. In 1985, only five years after publication of the initial studies identifying AIDS, Denaro gave the first paper presented to the 24,000-member Society of Neurosciences on an AIDS-related neurological topic. Even today, a decade later, no more than a dozen labs nationally are doing comparable neurological HIV research.

Denaro’s studies will, of course, be long and involved with implications that are not fully understood at this point, but in the end Denaro may have helped develop a model which could unravel the tangled web of medical unknowns that makes the HIV-infected brain such a research jungle.

“Like Madame Curie said, ‘Things aren’t to be feared but to be understood.’ Though she was talking about radiation, the same thing applies — and maybe more so — to the AIDS virus as well,” he said. □

Baiting for a Balance

By Charles Griffin

Minnnows, crickets, worms, spinner baits, flies — many avid fishers argue that they know just what type of bait will bring in a great catch. However, Jimmy Winter, Ph.D., of the range and wildlife management department at Texas Tech University, claims an electrical current will make most fish practically jump into the boat.

Winter said that through the use of a pulsed electrical current and a dipping net he can catch more than 50 fish in five minutes. However, fishing is more

than a sport for Winter — it's a way to study and manage an ecosystem.

Winter and his students, in conjunction with the Texas Parks and Wildlife Department, are evaluating a technique for reducing a nuisance species of fish inhabiting bodies of water throughout Texas.

Most of the waters in West Texas are small reservoirs that have been constructed by the state, municipalities or private groups, said Winter. Gizzard shad, a member of the herring family, were deliberately introduced into the reservoirs within the last 20 years as a source of food for native West Texas game fish like largemouth bass, according to Winter.

However, shad have become overabundant in many Texas reservoirs, so much so that predators cannot control the growing shad population. In addition, because of their large numbers, some shad have been able to grow approximately a foot in length, which is too large for the average

predator to feed upon, Winter said.

"Basically, the reservoirs have a lot of energy tied up in a species that is not much good for the ecosystem. That energy should be channeled into game fish or other fish that are important to humans," Winter said.

The overgrowth of the shad population can be attributed, in part, to the waters the shad inhabit, Winter said. Gizzard shad normally feed near the surface of the water and roam the upper waters of a lake. Largemouth bass, however, feed in shallow weedy areas near the shore, thus the largemouth bass have not been able to keep the shad population in balance.

According to Winter, another problem presented by an excessive shad

population is the potential for a large die-off of the species.

"The shad can become so abundant that they can eat themselves out of house and home. As a result, numerous shad may die, in turn becoming unsightly as well as creating an undesirable odor," Winter said.

In an effort to control the shad population, Texas Tech and personnel from the Texas Range and Wildlife Department are studying the effects of introducing hybrid-striped bass and striped bass as predators into two West Texas lakes. Tanglewood Lake, located about 10 miles south of Amarillo, and Buffalo Springs Lake, approximately 5 miles east of Lubbock, were selected as the sites for the study.

"These two lakes are very similar which makes for a good comparative study. Both lakes are approximately 230 acres in size; each produces a lot of rooted plants, algae and fish; and both are reservoirs formed by canyons," he said.

Winter, as well as the Texas Parks and Wildlife, began sampling the lakes annually beginning in 1991 to estimate the size and make-up of each lake's fish population. In 1992 and again in 1993 Tanglewood Lake was stocked intensively with 25,000 hybrid-striped bass, and Buffalo Springs was stocked with 25,000 striped bass. Both species are open-water predators.

Hybrid-striped bass are a cross between white bass (known in Texas as "sand bass") and striped bass. He said hybrid-bass grow quickly and can weigh as much as 20 lbs. He added that the hybrid bass is a very hearty fish.

The striped bass or "stripers," which spawn in streams, are originally native to the Atlantic coast of the United States.

"Due to hatchery practices, we learned that striped bass will do very well in inland bodies of water. They have been successfully stocked in large reservoirs in the southeastern part of the United States, including in a lot of



Mark Mamawal

This gizzard shad was one of many fish measured to determine the growth rate of the species in Buffalo Springs Lake.

A member of the Texas Parks and Wildlife Department dips his net into the shallow waters of Buffalo Springs Lake to catch fish, which have been temporarily immobilized by the electro-fishing process. The fish later are returned to the water unharmed.



Mark Mamawal

lakes in Texas," Winter said.

Striped bass can grow to be very large — approaching approximately 100 lbs. According to Winter, however, the largest striped bass recorded in Texas was a mere 45 lbs.

Once both West Texas lakes were stocked, the sampling program began to determine the success of the hybrid-striped bass and the striped bass as predators. Winter said he specifically was looking at the growth rate of the striped and hybrid-striped bass as well as the changes in the size, distribution and abundance of the gizzard shad.

Winter and Texas Parks and Wildlife personnel use both gill nets and electro-fishing to sample the fish populations of the lakes. A gill net, Winter explained, looks like a tennis net with

different sized mesh. Once in the spring, four gill nets are anchored to the bottom of each lake. The nets have approximately five different kinds of mesh in which to catch fish by entangling their heads, gills and/or spines.

"The gill nets tell us about the fish community, how abundant a type of fish is, as well as their average sizes," Winter said.

Electro-fishing, Winter explained, uses a pulsed electrical current which acts as a form of anesthesia by momentarily immobilizing fish. A gas generator, or a similar power source, generates an electric current which is channeled through a control box and is released into the water by electrodes extending from the front of a boat.

"We use direct current. The peculiar thing about direct current is that the fish actually are attracted to the positive electrode. As soon as the fish get into the electrical field, they orient toward the positive electrode and then actively swim toward it," he said.

To be effective, electro-fishing must be conducted in relatively shallow water. Thus, while fishing, the boat and its crew typically move slowly around the shore or stay near structures and stumps where game fish typically like to hide, Winter said. The electro-fishing is conducted at 10 stations where samples are drawn for five minutes per station. He said at each station at least 50 shad are measured for length and are later released.

"When fish come into the vicinity of the current they are immobilized just long enough for them to be scooped from the lake into a tub of water. Unless you are very quick with the net the fish will escape because they only come up for an instant before diving back down," he said.

Electro-fishing is conducted both during the day and in the evening. Once a month, between June and October, both Winter, his students and Texas Parks and Wildlife personnel engage in daytime electro-fishing to determine the abundance and the average size of the gizzard shad.

In September and October nighttime electro-fishing is conducted to determine an approximate number of game fish inhabiting the lakes. Winter explained that electro-fishing for game fish was more successful at night because game fish typically come into shallow water to feed in the evening,

"Our preliminary findings indicate that the striped bass and hybrids are growing roughly about the same rate. And they are growing quite well," Winter said. He added that both types of fish reached approximately 12 inches in length over a two-year period.

Winter said, based upon data generated from samples taken from the fall of 1994, the abundance of the gizzard shad appears to be down — suggesting that the stripers and the hybrid stripers are feeding heavily on the shad. However, he said, the average size of the shad in the sample increased.

"That's not surprising. The fact that nothing is feeding on the large shad, coupled with the presumption that the stripers are hitting the little shad heavily, would explain the increase," Winter said. He estimated that it could take two more years for enough large shad to die-off to determine the actual average size of the shad.

Winter said the reason he uses the words "appears to be down" is two-fold. First, he explained one data set did not necessarily define a trend. Second, he said, shad have a variable reproduction rate.

"They are kind of a boom or bust species. So if our samples came from a bust production year, we are not really looking totally at the effects of the stripers and the hybrid-stripers," he said.

Winter said other methods could be used to eliminate the shad, such as a fish toxicant. Selective fish toxicants interfere with the oxygen intake and suffocate certain fish. Winter said that fish poisons are safe, however, they are also expensive. In comparison, he said, stocking bodies of water with hybrids and striped bass is fairly inexpensive. According to Winter, striped bass can be raised in a hatchery for under \$1 per fish. Clearly, when trying to rid gizzard shad from bodies of water larger than local reservoirs and playa lakes, stocking would be far more economical, Winter said.

"The bottom line is that we are changing the size distribution of the gizzard shad so that they are more available to predators. At the same time the hybrid-striped bass and the striped bass should provide excellent new fishing resources in these lakes. Both types of fish are good fighters and they are good eating, so they will provide a new recreational opportunity on the lakes," Winter said. □



Mark Mamawal

Rob Weller, one of Winter's research assistants, tracks tagged fish using ultrasonic telemetry.

Lyerla's Tenacity Perseveres



Illustration by Jerry Kelly

By Jennifer LeNoir

Gloria Lyerla had a reputation throughout the region for retrieving library materials that were considered difficult to locate, according to E. Dale Cluff, Ph.D., director of libraries at Texas Tech University.

"She was one of the most knowledgeable persons with respect to all the library materials, and as equally persistent in her research to locate items for the patrons. If a person was having a difficult time finding materials, Lyerla could track things down when others could not," said Cluff.

When Lyerla died in 1986 at the age of 57, the McKinney native had worked for the university library at Texas Tech since 1952, ultimately serving as the interlibrary loan department head at the time of her death.

Her brother, James Griffin of Dallas, along with family and friends, helped establish an endowment fund in 1988 in her memory. The Gloria Lyerla Research Travel Grants enable Texas Tech researchers to travel to sites and physically access information from rare and or difficult to retrieve materials.

"As a reference librarian, Gloria knew the importance of referencing and accessing information. I felt that the travel grants were an ideal way to remember her as well as her interests," said Griffin.

"She was a gregarious, up-beat person who liked to laugh a lot. I appreciated her knowledge, team playing ability and commitment to serving the public," noted Virginia Andrews, head of automation at the Texas Tech Libraries.

Andrews, who met Lyerla in 1957

when working as a student assistant at the library, remembered Lyerla as a fascinating person who possessed a great deal of library knowledge and experience. Andrews returned to the Texas Tech Libraries in 1960 as a librarian where she worked under Lyerla's guidance.

Between 1976 and 1977, Lyerla and Andrews worked together to implement the interlibrary loan module of the Online Computer Library Center system, which contained an international database of information. Lyerla was responsible for securing interlibrary loans, which for the first time involved accessing materials and sending requests over the computer instead of sending information through the United States mail, said Andrews.

"Gloria possessed a tremendous knowledge and along with the new technology, brought the interlibrary loan department to a higher level of service," Andrews said.

The Gloria Lyerla travel endowment grants, first awarded in 1989, have been presented to several Texas Tech faculty members annually to assist them with travel expenses in conducting research at libraries, archives, museums or other repositories throughout the world. The grants have been valued at \$750 each since 1993.

To date, 16 Texas Tech faculty members have benefitted from the endowment established in memory of Lyerla.

The impact of the Lyerla grants is far reaching, as many faculty members continue to publish numerous scholarly articles based on the original information and data gathered at various

*The Gloria Lyerla
Research Travel
Grants enable Texas
Tech researchers to
travel to sites and
physically access
information from
rare and or difficult
to retrieve materials.*

Photos by Artie Limmer

library repositories after returning to Texas Tech.

Benjamin Newcomb, associate professor of history at Texas Tech, was a travel grant recipient in 1994. Newcomb conducted research related to the Great Awakening clergy of colonial America. He currently is writing a scholarly article about changes with respect to the clergy's ideas toward political parties. Newcomb said his research helped him learn specifics about how the clergy were skeptical of political divisions because it conflicted with the scripture.

His grant covered about half of his travel expenses to the Beinecke Library at Yale University in New Haven, Conn., the Hartford Theological Seminary Library in Hartford, Conn., the Connecticut Historical Society in Hartford, Conn., and the Presbyterian Historical Society in Philadelphia, Penn., where he researched the unpublished sermons of Jonathan Edwards, Gilbert Tennent and William Tennent.

"Without traveling to the actual library repositories, I wouldn't have had other opportunities to look at these unpublished materials because they are not available on microfilm and it's too much material to be copied," said Newcomb. "Plus, I really didn't know exactly what I needed until I had read through some of the materials.

"It's wonderful that the grants are available. They're something that was badly needed, and I have no doubt they will continue to be needed in the future," said Newcomb.

A scholar of British literature, Associate Professor of English Bruce C. Clarke conducted research in April at London's Royal Institution of Great Britain concerning the extension of thermodynamics from physics into social and literary domains. The travel grant enabled him to research a collection of unpublished letters by John Tyndall, a scientist and author who corresponded with major thermodynamic researchers



Above: Peterson remembers Lyerla finding the papers of a leading tornado researcher from the 1920s and '30s. Right: Funds helped Handa expand her research in Japanese architecture.

as well as with significant literary and philosophical figures from 1850-1880.

Without the Lyerla grant, Clarke said he would have had to personally finance his London travel expenses because no other local funding is available that is similar to the Lyerla grants.

"It's exciting when I'm working with original old materials because I get a feeling for the world people lived in. Seeing intellectual history from the personal perspective of the scientists' friends and colleagues is a unique experience," said Clarke, who will incorporate his research findings into a book focusing on the connection of thermodynamics to literature and culture.

Another faculty member and Lyerla grant recipient, Assistant Professor of History Megan M. Koreman traveled to the Hoover Institution Archives in Stanford, Calif., in May to conduct research related to the social reconstruction of the Netherlands after World War II. Her research will focus on the role of food and the international aspects of reconstruction, especially the involvement of Americans in feeding individuals living in the Netherlands. She will research the collection of papers from Dutch and American men and women who were involved in organizing and receiving food relief in the Netherlands during the 1940s.

Richard E. Peterson, professor of the

atmospheric science group and chairperson of the department of geosciences at Texas Tech, remembers Lyerla initially assisting him in researching and locating a variety of papers through interlibrary loan that were written in German during the 1920s and 1930s. Those papers contained the work of Johannes Letzmann, one of the world's leading tornado researchers between World War I and II.

In 1994, Peterson benefitted from Lyerla's assistance again when he became the recipient of her travel grant. He conducted research at the University of Tartu, Estonia, to expand on research previously published on Letzmann regarding tornadoes, particularly in the Eastern Baltic region. Letzmann taught and conducted research on severe storms while a faculty member at the University of Dorpat (now Tartu), before being forced out of his country because of a secret treaty between the Russians and Germans. His records were virtually inaccessible until recently, said Peterson.

As a result of his research on Letzmann, the Estonian meteorological community decided to host a special academic conference focusing on Letzmann's work in September. Peterson was scheduled to be the keynote speaker.

Peterson's search to discover more about the work of Letzmann, who died in 1971, also guided him to Luneburg, Germany, in April 1995. He spent three days sifting through seven boxes of recently discovered Letzmann papers that had been stored in an attic at the "Carl Schirren Gesellschaft," a society aimed at promoting the Baltic German culture. Currently, he is applying to the National Science Foundation for funding regarding another trip to Germany so he may complete his research.

A 1993 grant recipient, Rumiko Handa, an assistant professor of architecture, says the funds helped to expand her research in the area of Japanese architecture from the regional to national level. She used the monies to conduct research at the National Diet Library in Tokyo, Japan, where she focused on a project titled "Architectural Details: The Japanese Art of Joinery."

Joinery, according to Handa, "exists in the joints between different parts of a building such as wall and floor or column and beam. Joinery, although a small portion of a building, is related to



With Lyerla monies, Koreman studied the social reconstruction of the Netherlands after World War II.

the order of a building as a whole.”

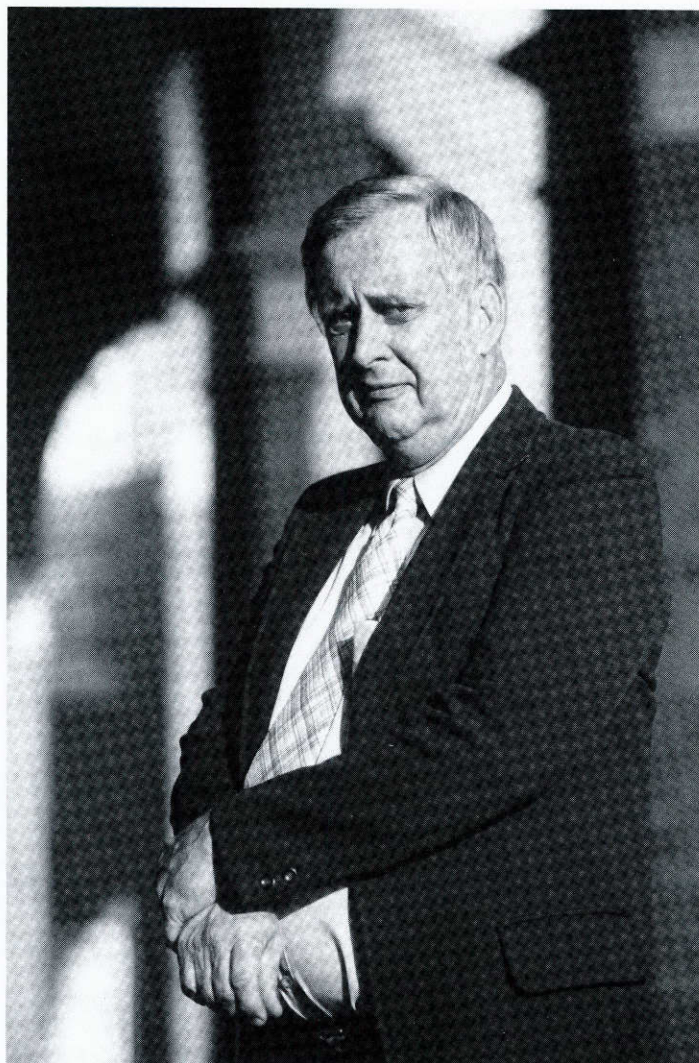
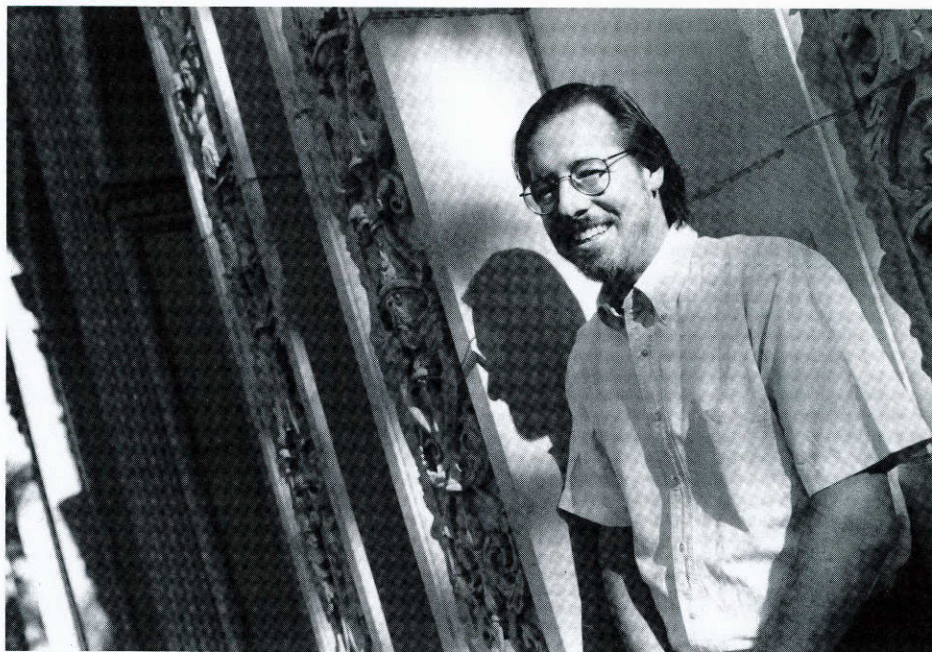
To learn more about the thought process behind Japanese joinery, Handa researched the notion of “Mu,” a Japanese word that means “nothingness.” Part of her data collection involved interviewing three architects in Japan with respect to the notion of Mu as well as discussing the topic with professional colleagues at Japanese universities. The Diet Library contained pertinent materials to her research about Japanese philosophers who have been interested in the concept of Mu for numerous centuries.

As a result of her Tokyo trip, she was able to present an academic paper at the Association of Collegiate Schools of Architecture in Montreal, Canada. Her paper was selected as one of the most noteworthy papers from the Southwest region of the United States in 1994.

Without the grants, Handa would have had to assume all the responsibility for her international travel expenses. She says the travel grants are important, especially for new faculty members who are trying to become recognized in their academic disciplines.

Lyerla knew that cooperation between faculty and staff members is paramount if mutual goals are to be accomplished, according to retiree Margaret Dickson, a Texas Tech librarian who had worked under the direction of Lyerla in the periodicals department.

“It takes all of us working together to have a good library. Gloria was the type of supervisor who gave a person a duty and gave them the tools and necessary information to fully accomplish a job to benefit the library, the faculty and the university — to provide better service to everyone,” Dickson said. She added that this grant is exactly what Lyerla would have wanted: It continues the job she started. □



*Above: Clarke visited London's Royal Institution of Great Britain with his travel grant.
Right: Lyerla monies helped Newcomb research the Great Awakening clergy of colonial America.*

When a chemical explosion spews toxic gases into the air, rescue units often are called to contain the disaster.

When toxicity levels in the blood rise, the human body makes a 911 call to its own poison control center, the kidneys.

As managers of one of the world's most effective filtering systems, the kidneys can clean up to 1.2 liters of blood

a minute, regulate fluid levels and return the body's toxicity levels to normal.

But when the body's poison control center fails, the results can be fatal.

Each year Americans spend more than \$12

billion dollars to help thousands deal with kidney failure. Modern technologies for treating the illness, such as dialysis and renal transplants, require lengthy hospital stays or carry a high risk for infection.

Saeed Akhter, M.D., an assistant professor in surgery at the Texas Tech University Health Sciences Center, hopes to reduce both medical bills and patient anxiety with a balloon that costs about \$10 a day to maintain. This balloon, a high-tech pouch constructed from the patient's own intestinal wall, would serve as a surrogate kidney, pumping filtered blood back into the body.

If approved for human patients, this artificial kidney not only could save taxpayers billions of dollars a year, it also would provide those suffering from kidney failure with kinder medical alternatives to dialysis and transplants.

"Until the early '50s there was not a treatment for renal failure," Akhter said. "People who developed a kidney condition usually died. Although present treatments prolong a patient's life, they also take a heavy physical, emotional and economical toll."

For example, the first treatment

devised for kidney failure, called hemodialysis, requires four- to five-hour sessions, three days a week. During these appointments, a large machine simulates the kidney by extracting blood, filtering it and returning it to the body.

This mechanical kidney extracts toxins effectively, but it also prevents a patient from holding a full-time job.

"It's not only time consuming, but it also places an economic burden on the community," he said. "Hemodialysis patients can't hold normal jobs. They normally can't support themselves, and dialysis is expensive.

"We are talking about a tremendous cost. The patient needs to be mobile in order to earn a living."

The second method of dialysis, called peritoneal dialysis, grants patients this needed mobility. But mobility comes with a high risk for serious internal infections.

In peritoneal dialysis, a plastic tube inserted in the abdominal cavity collects waste material. The patient instills dialysis fluid into the abdomen, then empties the liquid every four hours.

"This sounds like a good idea. It allows a patient to be a productive member of society. But because a tube is inserted in the body, patients must use sterile precautions whenever they change the fluid," Akhter cautioned. "The tubing and the dialysis solution have to be sterile."

These requirements not only increase cost, they also lower patient interest in the procedure. The drawbacks, coupled with a high rate of infection, cause some patients to burn out after being on peritoneal dialysis for only a couple of months.

"On the other hand, renal transplant is the ideal way to treat the problem," he said. "But there is a tremendous shortage of organs. Every day, every year the number of organs available decreases."

If organs are available and the transplant goes well, the patient has a good chance of leading a normal life. But before any kidney transplant, patients have to undergo immunosuppression

High-Tech Pouch Could Serve as Surrogate Kidney

By Sandra Pulley



Lubbock resident Solia Diaz undergoes the anxiety of kidney dialysis as a patient at University Medical Center.

treatment so the body will accept the new organ. This leaves them open to opportune infections. It also leaves them open to huge medical bills, because the cost of immunosuppression treatment is high.

"And then if the kidney fails or the body rejects it, we are back to square one. Back to dialysis," Akhter said.

Although successful transplants still offer the best cure for kidney failure, Akhter's research may give patients another workable option.

Akhter is creating a pouch that will purify blood like the kidney does. Created from the small intestine, the pouch would rest inside the patient's body cavity, recycling blood back into the bloodstream after filtering it.

The patient would simply fill the pouch with dialysis fluid in a procedure similar to peritoneal dialysis. The new pouch would not require sterile precautions because it would be made from the intestine, which offers a natural resistance to infection. As a part of the digestive tract, the intestine can withstand the many harmful organisms that are ingested with food.

"There are some bacteria in everything we eat," Akhter said. "But our body isn't harmed unless we consume large quantities. This is a built-in resistance. We can use this resistance to our advantage."

In addition to requiring no sterile precautions, the intestinal wall also offers one more advantage — a large surface area compacted into a tiny space. This surface area is needed to keep the dialysis fluid in constant contact with the waste material pouring into the new "kidney."

The intestinal wall would function like a spaghetti strainer, keeping recyclable elements on one side, while allowing waste products to pass through. The more surface area available, the more effective the filtration.

The intestine is perfect for this function because it is designed like an accordion. Each section of intestine appears flat but it actually contains hundreds of folds called villi. These villi contain even smaller folds, the microvilli. This design not only con-

serves space, it also creates a large surface area from which the intestines can absorb nutrients into the blood stream.

"If you stretch a two-inch segment of intestine, it will turn into a 24-inch segment as far as a surface membrane goes. Nature has sequestered a large surface area in a very, very small space."

This surface area will allow Akhter to take a relatively small piece of intestine and make it into a surrogate kidney.

This idea of an infection-free pouch, called a continent reservoir, currently is used for bladder replacements. Urologists take a section of the intestine and convert it to a balloon-like pouch. Once connected, the sack collects urine until it is ready to be excreted. Patients can empty the pouch through a tiny nipple, which is surgically constructed on the lower abdomen.

"This is functional for the patients," Akhter said. "They can go swimming and wear bikinis without anyone noticing they have a medical problem. When they need to empty the reservoir, they just go the bathroom and catheterize themselves to drain the urine."

In 1992, Akhter began to test his continent reservoir theory. His first goal was to determine which section of the intestine would best excrete the blood's five major toxins. Akhter started from the ground level, designing an

experiment that would pinpoint the most effective piece of the intestine.

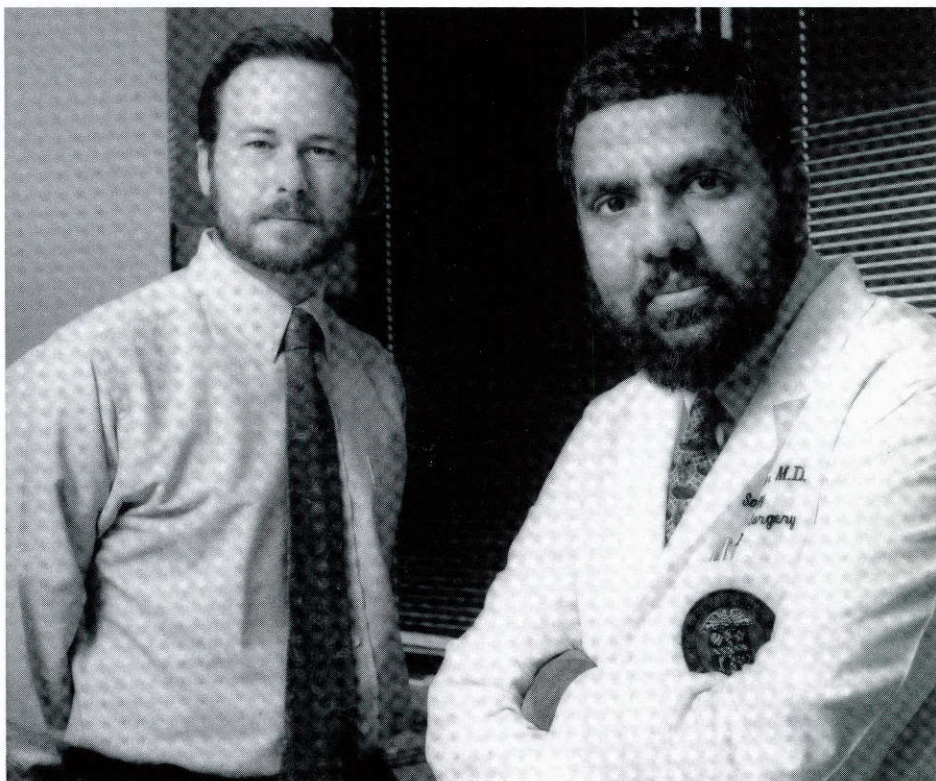
"One problem was that no one had isolated the specific piece of the intestine best-suited to excrete wastes. Some used different pieces of the small intestine and still others used the colon. No one tested the various chemicals in a controlled way to see which piece yielded the best results."

Akhter created a composite pouch with different pieces of a pig's intestine. He used one piece from the colon, one piece from the ileum and another from the jejunum. The ileum and the jejunum are both parts of the small intestine.

After instilling dialysis fluid, Akhter could measure how well the new pouch would work. The "kidney" effectively filtered water, urea, potassium and middle molecular weight toxins, four of the major substances the real kidney extracts. A fifth substance, creatinine, also was extracted but not as well as the others.

"These results were very encouraging," Akhter said. "At least I knew the experiment was workable."

Akhter presented these preliminary findings to the American College of Surgeons' annual meeting in October of 1993. Encouraged by the feedback, he set out to do a larger acute experi-



Artie Limmer

Saeed Akhter, M.D., (right), Scott Greene (left) and Paul Bunn, M.D., (not shown) are working to give kidney patients alternatives to current medical treatments.

ment, again in pig models.

"The reason we used a pig was because physiologically the pig is closest to human beings," he said. "The only disadvantage of using a pig is that it grows fast. We start with a 40-pound pig. By the time the experiment is over he is 150 pounds and difficult to control physically."

Working with pigs is also expensive. Even during short experiments, each animal costs from \$3,000 to \$4,000 to maintain. Taking care of the animals can quickly range into the tens of thousands of dollars.

During the first acute experiment, Akhter used 10 pigs, constructing new kidney pouches in each one. Each pig pouch was made with parts of the ileum, the jejunum and the colon. Akhter wanted to test which part of the intestine produced the best results and which length of intestine was optimal.

"When similar experiments were done in the '50s, the science of research had not evolved to the point where people were very stringent and very particular about all these aspects," he said. "Even the right length of the intestine was not known. So somebody had used one foot, somebody had used three feet, and there was no consensus."

At the end of his acute experiment, Akhter found that the pouch made from the distal, or bottom part, of the ileum filtered best. These results were presented at the annual meeting of the American Urological Association in May of 1994.

This fall Akhter will see whether the pouch composed of only the distal ileum will function in the pigs for extended periods. Paul Bunn, M.D., and Scott Greene, a medical student, have aided Akhter in his research.

Although the research looks promising, Akhter said many questions need to be answered before human trials can begin. For example, the ideal composition of the dialysis fluid and the length of dialysis are still not known.

"We want to devise a fluid where you can prolong the dialysis time without affecting the quality of dialysis," he said. "My second goal is to determine the ideal chemical composition of dialysis solution. With longer dialysis times and fewer dialysis fluid changes, the costs decrease dramatically."

Currently, one three-liter bag of peritoneal dialysis fluid costs about \$28. Because patients who use peritoneal

dialysis must instill clean fluid six times a day, the costs quickly rise to \$168 a day, plus the additional expense of sterile tubing and gloves.

"The costs are so tremendously high because everything has to be sterile," Akhter explained. "The solutions used for dialysis are not very complex chemicals, so if the sterilization was not required, the price could be drastically reduced."

But the bottom line from Akhter's research has more to do with human benefits than economic ones.

If this process works in humans, it will only require one major surgery. Because the intestines of the individual are used, there is little chance for rejection or infections.

"If this experiment works, I think it will be revolutionary treatment for chronic kidney failure," he said. "It will give patients their lives back." □

Inside the Kidney. . .

The kidneys are 4 to 5 inches long and weigh about 6 ounces.

Acute kidney failure is caused by three main categories:

1. Toxic agents, immune reactions to drugs or certain infections;
2. A sudden drop in blood pressure, which can result from serious burns and injuries;
3. Blockage of the urinary tract.

About 50 percent of patients with kidney failure have diabetes.

Kidney failure can be completely asymptomatic, but some patients do experience frequent urination. As the kidney fails, urine contains more water and less waste products. When toxins build up in the blood, the patient feels increasingly more tired and lethargic.

In rare cases called analgesic nephropathy, consuming large amounts of painkillers can cause end-stage renal failure. You have to take nearly a dozen pain pills a day, most often over-the-counter remedies that combine many medications in one tablet.

If you urinate frequently for more than a week, see a physician.

No treatment can reverse chronic kidney failure, but doctors can help slow its progress and counteract symptoms.

One kidney can be donated by a close living relative, because the body needs only one kidney to function. The remaining kidney will enlarge to take up the extra work.

(Editor's Note: The following essay was written by Judith A. Ponticell, Ph.D., assistant professor of educational leadership. Her areas of expertise are learning theory; teachers' beliefs and their impact on learning; at-risk students and at-risk schools; and corporate learning.)

CARING:

The Other Mark of Excellence

By Judith A. Ponticell, Ph.D.

Talk to children and adolescents about good teaching, and they will tell you about the power of teachers who care. They will tell you about helping and willingness to help; about valuing individuality and being involved in students' thoughts and ideas; about showing respect and being tolerant; about being success-oriented, explaining expectations for work, checking for understanding, and encouraging thinking and creative possibilities; about valuing fun, providing guidance, going the extra mile, and being a real person.

They also will tell you about the difference that experiencing caring in a learning environment makes in their motivation to learn, their attitudes about learning, the degree to which they push themselves to work hard, and their treatment of their teacher and their classmates.

Why at the university level should we care about caring? Because without caring, *learners* cannot thrive. In almost

every call for education reform, there is an underlying assumption that if learners feel cared for and encouraged to work hard in their role as students, they are more likely to do their best to learn. More importantly, there is the assumption that students must be able to make a connection between what they learn and how they live.

When we speak of excellence in rela-

tion to a college or university, we generally speak first of the educational mission of the institution. The intellectual currency and productivity of the learning community and the academic success of students matter. We do not have to fear that caring is a substitute for academic standards. Caring establishes an effective *culture for learning*. We do not have to choose between

Ponticell recalls her experiences teaching in 1972 in a one-room schoolhouse in an Amish community in Illinois, while sitting in the Bairfield Schoolhouse, c. 1890, located at the Texas Tech Ranching Heritage Center. The last year of operation of the Bairfield School was 1937.



standards on the one hand and caring on the other. The issue is not whether we have and uphold standards for our students, but how those standards are *expressed* in day-to-day human interactions.

In an institutional setting that highly values research, the word “caring” seems an awfully soft construct, lacking in precision. But, caring has great social currency. People “understand” caring as a necessary and integral part of life and living through all our experiences. Central to caring is a concern about how we should *be* with other people, and central to the teaching/learning enterprise should be a concern about the presence or absence of caring in everything relational in learning environments.

Lev Vygotsky argued in “Mind in Society” (1978) that interpersonal learning is the basis of academic learning. When caring and responsive teaching recognizes, understands, and

respects students, trust is established, and caring interpersonal relationships are built in classrooms. Such relationships provide a safe haven for risk taking, and purposeful, disciplined learning requires risk taking — the willingness to challenge one’s limits, test one’s assumptions, change one’s beliefs and practices.

What does caring look like? Caring is hard to see; it is an integral part of human interactions. What are some ways we might see caring in university learning environments?

We would see caring, for example, when students are recognized. Professors know students’ names, greet them in hallways or upon entering classrooms, and spend a few moments regularly talking to someone about anything and everything at some time. We can see caring when a student is attended to in the classroom. Professors and other students make eye contact and move or lean closer to focus on the stu-

dent’s question or observation.

Caring also can be seen and felt when honest classroom discourse is valued. Talk is reciprocal, requiring both professors and students to listen and to hear as well as to speak. Caring is experienced when the possibility of participation is extended to many rather than the vocal one or two. Professors field students’ responses to other students, so that every student is part of the conversation at some time.

Caring also can be seen in respect for students’ time. Professors start classes on time, end on time, are available during office hours, return phone calls, and respond with interest and concern—rather than impatience—to questions. We would see students feeling cared for when help is genuinely given and students are not demeaned for needing or asking for help.

Caring also is experienced when a variety of teaching methods are offered because professors acknowledge differ-



Artie Limmer

These technical dimensions of teaching are not being dismissed here as unimportant, but the focal point around which teaching should be organized is not the technical but the relational.

ences in students' learning styles and cognitive strategies. Students feel caring when expectations are made clear. If students are going to be held accountable and grades assigned for task performance, then students need to know what successful task performance is expected to look like. We won't see caring for students when they are held accountable for some mystifying set of criteria that only the professors know.

We also can see caring in students' behaviors in the classroom. When students work in groups, we see caring when they share ideas and resources to serve the group. Students' successes are acknowledged and celebrated. Students exercise choice and consensus building. They exercise the freedom to be responsible for the feelings of others and for the feel of the classroom. Students who are caring and feel cared for approach a professor about classroom occurrences they deem unfair, when they're really bored with a particular teaching strategy, or when they have an idea that can make a project better. In a caring learning environment, students support, not slander, each other and the professor. They act responsibly in the classroom because they feel guilty about breaking the trust of the relationships built there.

Sometimes the more technical aspects of college teaching dominate our thinking in academic communities. We sometimes focus more on ownership of courses we teach; on competition and control; on academic tasks; and on dealing with class sizes, administrative tasks, and research responsibilities that make the *building* of relationships and bonds of trust with students an afterthought rather than a deliberate teaching intention.

These technical dimensions of teaching are not being dismissed here as unimportant, but the focal point around which teaching should be organized is not the technical but the relational. Without human connections in the college classroom, the professor may have the subject-matter knowledge, the technical ability to manage a class, and the research productivity to fulfill promotion and tenure requirements. But, the professor and the institution will not

have the students.

Alasdair MacIntyre's "After Virtue" (1981) views caring as more than an abstract belief. Rather, caring is a moral concept, something that must be reaffirmed continually in everyday life through the quality of our interactions with others. The teaching-learning enterprise provides numerous opportunities for such reaffirmation (e.g., professor-student relationships, human learning contexts, students' self-image and self-understanding). But, such opportunities can be missed if the relational aspects of teaching are seen as additive rather than as core dimensions of the academic endeavor.

We live in a social culture that defines human beings as distinctly rational animals. In "Tragic Sense of Life" (1954), Miguel de Unamuno observed: "Man is said to be a reasoning animal. I do not know why he has not been defined as an affective or feeling animal. Perhaps that which differentiates him from other animals is feeling rather than reason." How students and faculty *feel* about the learning environment—whether they are happy, engaged, confident, eager for experience, perceiving they are cared for—matters.

Nel Noddings of Stanford University suggests in "Excellence as a Guide to Educational Conversation" (Teachers College Press, 1994) that we will know if we are succeeding in our efforts to establish excellence in our learning communities when our students are not only academically successful, but also when both our students and their teachers enjoy being in classes, engage in fewer incidents of anger and "nastiness," and exhibit "more acts of kindness, more expressions of concern for others, more open conversation and fewer acts of control."

An excellent college or university should attend to the *quality* of life experienced by its students in its classrooms. Attention to the quality of life in college classrooms does not mean focusing solely on academic success, but also attending to the "feel" of the human interactions through which academic learning is facilitated. Caring is the other mark of excellence. □



CAMPUS SCENES



Texas Tech University
News & Publications
Lubbock, Texas 79409-2022

Non-Profit Org.
U.S. Postage
PAID
Lubbock, Texas
Permit No. 719