

### TEXAS TECH RESEARCH

Summer 1995



Mending the Medical Needs of West Texas



#### ABOUT THE COVERS \_\_\_\_

Front — The Texas Tech University Health Sciences Center provides a national model for rural health care delivery. Faculty and administrators assess their progress over the past quarter century in fulfilling their institutional mission. The health care demands of West Texas — an area larger than all but four of our 50 states — create outreach and delivery concerns from isolated rural areas like the Big Bend region to overcrowded urban centers like El Paso. New issues in the healthcare debate form questions concerning combining primary care physicians with expert specialists.

Inside Front — Satellite technology, like Texas Tech's HealthNet, is linking rural physicians, residents, nurses and therapists with all the specialties and knowledge a tertiary medical facility provides. This pioneering technology can bring expertise and reassurance to rural doctors and nurses, who often before felt isolated. (Photos by Artie Limmer) Inside Back—Adults nearing their certification for scuba diving are learning through a Continuing Education class, taught by Jacalyn Robert, Ph.D. (Photo by Mark Mamawal)

Back-Texas Tech was one of seven universities nationwide-and the only one in Texas-to have the maximum four students among the 285 selected to receive the prestigious 1995-96 Barry Goldwater Scholarship. The winners were selected, on the basis of academic merit, from among the 1,300 mathematics, science and engineering students nominated from nearly 600 post-secondary institutions. Texas Tech recipients are: (left to right) Brooke Phillips, a senior biochemistry major from Lubbock; David Bessire, a senior physics major from Lubbock: Janel Hopper, a senior biochemistry major from Lubbock; and Amanda Wright, a junior cell molecular biology major from Clovis, N.M. (Photo by Artie Limmer)

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Summer 1995		Vol. 4	No. 3

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.

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Kippra D. Hopper Editor Designer Jerry Kelly Photo Editor Artie Limmer Mark Mamawal Photographer Wayne Barringer Writers Charles Griffin Steve Kauffman Emily S. Kinsky Jennifer LeNoir Preston Lewis Sandra Pulley Michael Sommermeyer Myrna Whitehead Circulation Director **Debbie Shelfer** Printer Parks Printing

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### **OBSERVATIONS**

A Glance at Research and Creativity

### The Sixth Quark: The Top of the Matter

Picture two tennis players facing each other at opposite ends of the court, and they both decide to serve at the same time. The energy in their swings sends two balls hurtling at each other, accelerating as they meet. Suddenly a blinding explosion knocks both players to the ground as the balls collide at mid court. The players dust themselves off and run over to where the balls have hit.

They expect to find bits and pieces of felt and rubber, but there lying in the middle of the court they find something entirely different: a bowling ball.

Put simply, the previous scenario is what happened when physicists at Texas Tech University participated this spring in the discovery of the top quark. More than 450 scientists from 35 research labs worked together last March at the Fermi National Accelerator Laboratory in Illinois in a research collaboration called the Collider Detector at Fermilab (CDF). Their quest was to find the last undiscovered quark of the six quarks predicted to exist by current scientific theory.

Using particle beams from Fermilab's Tevatron, an energy particle accelerator, the CDF collaboration observed top quarks being produced in high-energy collisions between protons and antiprotons, their antimatter counterparts. The accelerator allowed the CDF collaboration to verify the existence of the top quark and to measure its mass.

When a proton and anti-

proton collide, they both smash to bits, and pieces fly off in every direction. When this happens some of the pieces flying off are heavier than the proton and antiproton combined. The top quark, which is more than 100 times as heavy as a proton, showed up as one of these pieces.

"Our results indicate that the top quark has a mass approximately equal to an entire atom of tungsten, making it much heavier than any other known elementary particle," said Alan Sill, Ph.D., one of Texas Tech's contributors to the project.

Sill, an assistant professor of physics, along with Vaia Papadimitriou, Ph.D., assistant professor of physics, and Douglas Benjamin, Ph.D., postdoctoral researcher, are Texas Tech members of the CDF group that found the top quark and provided strong support for the quark theory of the structure of matter.

Physicists identify top quarks by the characteristic electronic signals they produce. However, other phenomena can sometimes mimic top quark signals. To claim a discovery, experimenters had to observe enough top quark events to rule out any other source of the signals.

"Discovering and fitting together the pieces of this extraordinary puzzle is part of the adventure of particle physics," said Sill. "As particle physicists have peered deeper into the heart of matter, their questions have changed. We now want to understand why particles have the masses that they do, why there is more matter



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than antimatter in the universe, and what makes up the 90 percent of the matter in the universe that we know exists but is now invisible to us."

Texas Tech joined 35 other institutions around the world in making the first direct evidence of the subatomic particle. Scientists worldwide have sought the top quark since the discovery of the bottom quark at Fermilab in 1977. Sill said Texas Tech's research team helped make significant contributions to the operation of the experiment and the analysis of the data.

"Being in the company of universities like Harvard, Yale and Massachusetts Institute of Technology and working at one of the best international laboratories for high energy physics, allows us to work on the forefront of the field and participate in its most exciting developments," said Sill.

The top quark occupies a place in the "new periodic table" of quarks. The lightest quarks can be combined to make up ordinary matter such as protons and neutrons, and the associated generations of leptons, such as electrons, that make up the stuff of the universe. Sill said the top quark is more massive and more short-lived than the other five quarks, which made it difficult to find, but no less fundamental Alan Sill is one of three Texas Tech researchers who joined others to find the top quark, produced in a high-energy collision between protons and antiprotons.

to basic research.

"The story is not over. We plan to continue to study the top quark and its properties. These studies still represent an exciting frontier for particle physics in order to answer several unsolved and important questions," said Sill.

Now the research group will attempt to determine the interactions between the top quark and other particles to disclose the underlying physics that gives mass to particles.

Researchers also will attempt to explain why the top quark is nearly as heavy as a tungsten atom. The answer may be explained by the connection Einstein found between matter and energy. Accelerating the proton and the antiproton to almost the speed of light gives them an enormous amount of energy. When they collide, most of that energy can turn into a corresponding amount of mass in the form of the particles that fly out of the collision.

The experimental process is as if two tennis balls could move so fast that when they collided, a bowling ball flew out as a result of the impact. — *Michael Sommermeyer* 

2 VISTAS Texas Tech Research

### **Breaking the Chain**

"For the 365th-consecutive day, two Boeing 747 jumbo jets collided in midair, killing all 600 passengers and crew members on each aircraft... bringing the number of Americans who have died in commercial airplane accidents this year to 450,000."

"I bet it wouldn't take 365 of these plane crashes year after year before action was taken to solve the problem. It would only be a few days before a national outrage began."

> Donna Miller (foreground, left) bas benefited from a program initiated by Alvin Jones, M.D., that involves other doctors and his office staff in helping patients stop smoking. Supporting Miller are (background, left to right) Johanna Skiles; Laura Baker, M.D.; Ruth Cannon; Patsy Vaughn; Donna King; and Mary Jo Bell.

What if today's news read like this?

In reality, of course, no one would stand for half a million annual airplane deaths. But every year in America, says Alvin Jones, M.D., we stand by and allow almost one-half million Americans to die due to something well within our control — cigarette smoking.

"I bet it wouldn't take 365 of these plane crashes year after year before action was taken to solve the problem. It would only be a few days before a national outrage began," said Jones, associate professor and associate chairperson of Texas Tech University Health Sciences Center's department of family medicine. "So, how much longer do we have to wait before there's a national mandate to stop deaths caused by smoking?"

Jones decided he would not wait for action, so he developed what has become a nationally recognized physician intervention system to warn and counsel patients about the deadly hazards of smoking. Jones said any doctor can implement the program, but it takes a commitment by each office staff member to make it work.

Involvement can be as simple as a medical records keeper double-checking a patient's chart to ensure that his or her smoking status has



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been properly documented. It can be as seemingly insignificant as a nurse congratulating a patient for reaching a smokeless anniversary. Or, it can be as striking as a physician approaching the patient directly, showing photographs and models of lung and heart disease caused by tobacco smoke.

The success of Jones' system was recognized by the American Academy of Family Physicians with the 1994 Patient Care Award for Excellence in Patient Education by a Family Practice Residency Program.

"This program is most effective when everyone in the clinic is **committed** to helping patients quit smoking," Jones said. "Unfortunately, we have found that this kind of commitment is not practiced across the board in every doctor's office."

Medical journal articles verify Jones' suspicions. A 1988 study in the Archives of Internal Medicine indicates that only about half of smokers are advised by their physicians to quit smoking. A similar 1988 Journal of the American Medical Association article also shows that primary care physicians who counsel patients to stop smoking convince between 15 and 30 percent to give up cigarettes. Even if doctors were successful only 10 percent of the time, Jones says that would save tens of thousands of lives - and health care dollars - each year.

"Doctors are supposed to ask patients about smoking, but numerous studies have proven that it's not happening on a regular basis," Jones said. "We as physicians are in the business of curing. We can cure smoking, but we need to start doing more

#### about it."

Jones started taking action four years ago, and his early ideas have evolved into a program that works in four phases.

First, Jones asks patients about their smoking habits at every opportunity. Questions like, "How much do you smoke?" "How soon after waking do you have your first cigarette?" and "Have you ever tried to quit before?" give physicians a good base on which to plan their approach.

Second, Jones advises all smokers to quit by personalizing his message depending on the smoker's clinical condition and personal and family health history.

Jones' third step is to work with the patient to establish a target date to quit within the next four weeks. During that time, office staff provide patients with self-help materials and Jones advises that patients sign a stop-smoking contract. He also will prescribe nicotine gum or patches when necessary.

Once steps one through three are successful, Jones arranges follow-up visits and contacts. An office staff member will call or write the patient within a week of the initial visit to reinforce the decision to quit. Then, receptionists will schedule a pair of follow-up visits over the next four weeks to help ensure that the former smoker remains a nonsmoker.

He says creating a smokefree office and attaching smoker identifier and progress cards to each patient's chart are a few other tactics that help the Total Quality Improvement program.

Jones believes physicians can accomplish more because people want to quit smoking; they just need a little help. A study in the *Annual Review of Medicine* showed that about 90 percent of smokers would like to quit, and three out of four said a physician's advice would be somewhat or very effective in getting them to stop smoking.

Based on these findings, Jones and research coordinator Betsy Goebel Jones, Ed.D., have focused their efforts on making sure Texas Tech physicians — both faculty and residents — are doing their part to help patients stop smoking.

"We're concerned with the role our own family physicians, nurses and office staff play in the process," Betsy Jones said.

She said patients are reaping the benefits now that Texas Tech doctors are doing their part. "About 80 percent of the patients' charts indicate that doctors in our clinic are giving smoking advice," Betsy Jones said. "And our doctors are helping nearly one-fourth of those patients establish a date to quit."

It's not uncommon for a doctor to casually tell a patient that smoking is dangerous, but that method is inconsistent and ineffective, Alvin Jones said. His step-bystep system of approaching, counseling and monitoring every smoker and involving other office staff members is what makes the program work efficiently.

"You can bet that there would be some sort of quality improvement mandate in the plane crash scenario," he said. "Every six to seven weeks, tobacco products kill as many people as were killed in the entire Vietnam War. It's time to stop this foolishness."

— Wayne Barringer

### The Futures of Four Little Dragons —

### Brighter Than the Rising Sun

In the Asian Pacific Rim, an economic giant lies dormant waiting to awaken, while four little dragons attempt to eclipse the power of the rising sun.

The 21st century belongs to Asia. Japan is an economic superpower rivaled only by the United States, and China is a sleeping giant with a population of about 1.2 billion. The four little dragons — South Korea, Taiwan, Singapore and Hong-Kong are countries that cannot be ignored in the future, says Yung-Mei Tsai, Ph.D, a professor of sociology at Texas Tech University.

Tsai, director of the Asian Pacific Rim Studies minor, says he strongly believes that Texas Tech students should have some understanding of the Asian Pacific Rim countries because that region is the second largest trading partner with Texans. Western Europe typically has been the largest trading partner with the United States, however, in the 1980s the United States' trade with Asia surpassed trade with Western Europe for the first time, \$112 billion to \$110 billion.

Aie-Rie Lee, Ph.D., an assistant professor of political science, said there are several important reasons to encourage students to develop their knowledge about Asian countries.

Asia comprises roughly 33 percent of the Earth's total land surface, making it the largest of all the continents. In terms of population, Asia encompasses more than half of the world's 5.4 billion inhabitants. For example, Lee said, China and India constitute about 2 billion people alone.

"Another aspect of the importance of Asian countries is that Asia has been the birth place of the world's greatest religions and philosophies. Buddhism, Hinduism, Islam and Confucianism were born in Asia. So you might say Asia is perhaps the most diverse continent in the world," Lee said.

Perhaps the most widely known reason for Asia's importance is the presence of an economic dynamicism in the region. "Some scholars now even speak about how the future lies in Asia and in the Pacific. Some even argue that the 21st century belongs to Asia," Lee said.

Lee noted an information gap exists between the United States and Asia. "We do not know about Asia as much as she knows about us. Ignorance and misconception in the United States and Asia could have major ramifications for both regions. So I believe that we must become more knowledgeable about these countries if for no other reason than our self-interest."

The Asian Pacific Rim Studies minor at Texas Tech initially began in 1990. The program is interdisciplinary and offers courses in architecture, history, economics, the Japanese language, philosophy, political science and geography. In addition, the program offers a limited number of scholarships for



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qualifying students.

The minor requires a minimum of 18 hours. A student participating in the program is required to complete three of eight core courses and can choose from approved electives to meet the remainder of the requirement.

"I think students who minor in this program are smart enough to know what their future will be. Students, sooner or later, will have to deal with people from Asian countries," Lee said. She

added that students who participate in the program will have a better understanding of the world in this global century.

"I think what we do here as a minor is expose students. We kind of open a window or a door and show them a little bit," Tsai said. He emphasized that the program could not "cram" in everything, but did provide a background and foundation for students to build upon.

Tsai said he believes many

Asian countries have something to offer to students. For example, China has a long history. Its society invented paper, the compass and gunpowder. China also has a rich literary history.

"When I teach a course on China I focus on how China has survived so long. They have something to teach us," Tsai said. Family is the core Chinese social institutional unit.

Family is so strong that it is virtually indestructible and

transcends space and time."

He said he also focuses on Japan's reconstruction after World War II and its ability to rise from total destruction to the world's second largest superpower in 25 years. Tsai said he also emphasizes the growth of the "four little dragons" which have managed to surpass Japan in some areas of economic growth.

Tsai said he believes Eastern and Western philosophies contrast in concerns about

dragons — South Korea, Taiwan, Singapore and Hong-Kong – are countries that cannot be ignored in the future. **)** 

how people relate and work together. "The Eastern model focuses on how to get the best out of everybody. In the United States, what we do is, we get the best and forget about everybody else," he said.

Tsai also pointed out that people of the Asian region tend to work better together. "For example, some (American) basketball teams have the best talent in the world, but they don't work as a team, so they cannot win the games," he said.

Tsai added that countries of the Asian Pacific Rim seem to be beating the United States in some economic areas, and having an understanding of the differences between the two cultures is beneficial.

Job opportunities also thrive for Americans in Asian countries. "American corporations in Japan are doing a \$150 billion business per year while Japanese corporations in the United States are doing only about \$50 billion. In other words, there are actually a lot of opportunities for Americans to work in Japan for American companies," Tsai said.

Tsai and Lee both agreed that most students would benefit by enrolling in the Asian Pacific Rim minor given the growing importance of the Asian region. "I think most people who are interested in business and foreign service, even pre-law students who are interested in international law, would benefit from the minor," Tsai said.

He also said that he hopes students enrolled in the program might be a little more sensitive toward the behavior of people who reside in the Asian Pacific region.

— Charles Griffin

### Funding, Beyond the Basics

The Texas Tech President's Council was organized more than 30 years ago to support programs and projects beyond the reach of the stateappropriated budget for Texas Tech. Today the council's more than 500 members provide unrestricted funds for the Office of the President.

"The funds made available by the President's Council will positively influence the direction of the university and health sciences center for years to come. None of the programs created because of the President's Council would have been possible without the generosity of the private sector," according to Texas Tech President Robert Lawless.

In 1991 the President's Council established and funded **Vistas: Texas Tech Research**. Since that time the council has published the magazine and nurtured its growth from an initial circulation of 4,000 to a current circulation of about 10,000 subscribers.

A new project of the President's Council is Texas Tech Select, a scholarship program for National Merit Scholarship semifinalists. The program allows Texas Tech to offer a full scholarship to every high school student in the Southwest designated a semifinalist. In addition the council helps support the Office of Quality Service which oversees customer service and quality focus programs on all campuses. Each fall the council sponsors a President's Community Forum which allows select community leaders to get an inside look at the operation of the institutions.

The President's Council a also funds the President's Excellence in Teaching Awards given each year at the university and health sciences center.

In January, the Texas Tech President's Council announced the establishment of the President's Council/Honors Program Distinguished Lecture Series. The series will feature national and international scholars and business leaders who will speak to the Texas Tech undergraduate honors program.

Currently more than 200 students are part of the University Honors Program. These students participate in special seminars such as the Distinguished Lecture Series to develop critical thinking and methodological skills.

High school students in the top 10 percent of their class or with strong college entrance exam scores are encouraged to apply to become members of Texas Tech's Honors Program, directed by Gary Bell, Ph.D., professor of history.

"The Texas Tech University Honors Program is a vehicle for rewarding achievement in our very best students. Through a variety of benefits, including early registration, special treatment in the library, special housing accommodations and the wonderful opportunity of hearing speakers, such as those sponsored by the President's Council, our honor students are provided with those extras that help them maximize their educational years," according to Bell.

The first speaker in this year's Distinguished Lecture Series was Drayton McLane Jr., of Temple. As chairperson of the McLane Group, McLane operates one of the most successful companies in the United States. He also is owner of the Houston Astros professional baseball team.

The series also featured Helen Robson Walton of Bentonville, Ark. Walton spoke on "Putting Your Life's Values in a Proper Perspective." Widow of WalMart Discount Stores founder Sam Walton, Helen Robson Walton played a key role in the development of her family's business into the largest retailer in the world. Active in a variety of civic activities, Walton currently serves on the National Executive Committee of the Presbyterian Church Foundation.

Final speaker in the 1995 **Distinguished Lecture Series** was Joseph Taylor, professor of physics at Princeton University. Taylor was awarded the 1993 Nobel Prize in physics as a result of having confirmed the veracity of Einstein's General Theory of Relativity. Taylor's family has a long and distinguished history in American higher education. His ancestor, Thomas Pym Cope, was a founder of Haverford College, and his ancestor and namesake, Joseph Taylor, was the founder of Bryn Mawr University. Taylor discussed "Scientific Search and Discovery."

"The foresight and generosity of the President's Council in funding this outstanding speaker's series for Texas Tech is a wonderful development on our campus," Lawless said. "It is certainly a major reason that Texas Tech's Honors Program is becoming well known throughout the nation for attracting some of our country's best undergraduate students."

— Margaret Simon Lutherer



Mark Mamawa

## Knocking On Unequal Opportunities

By Willy E. Rice, Ph.D, J.D.

#### VIEWPOINT

(Editor's Note: The author of the following essay is Willy E. Rice, Ph.D., J.D., professor of law at Texas Tech University. He teaches insurance law and torts and is a recognized insurance-law expert and quantitative methodologist. The statistical findings in this article are excerpts from a larger study that is slated for publication later this year.)

ndeniably, small businesses are the primary creators of jobs and economic opportunity in this country. Also, homeownership is a major component of the "American Dream." Yet, in the 1990s. racial minorities and women continue to confront nearly insurmountable barriers when attempting to secure smallbusiness and mortgage loans. In fact, a sound body of economic and legal research reveals conclusively that minority and unmarried female applicants are significantly more likely to experience both inadvertent and intentional discrimination when requesting credit and various types of loans.

More disturbingly, nearly five years ago, **The Wall Street Journal** reported some major findings: Commercial banks, savings banks, private mortgage banks and savings and loans are systematically "redlining" African- and Mexican-American neighborhoods. Redlining is the practice of securing a map and drawing red circles around both low- and middle-income minority neighborhoods to deny loans, credit and insurance to the populace of those areas.

For example, the **Journal**'s analyses revealed that literally thousands of federally insured banks and hundreds of mortgage companies are violating federal fair-lending laws. **The Journal** reported that some lenders are twice as likely to deny mortgage loans if applicants reside in heavily populated, minority communities or in particular zip codes. As a matter of fact, even after researchers control for the influence of applicants' wealth, income, educational status and creditworthiness, they find that minorities are less likely to receive mortgage loans than non-minorities.

These "national lenders" as well as so-called "hometown lenders" are reg-

ularly and systematically redlining minorities' neighborhoods and practicing racial discrimination. This is happening even though both minority and non-minority taxpayers subsidize the Federal Deposit Insurance Corporation (FDIC) and the Federal Savings and Loan Insurance Corporation (FSLIC). Without doubt, these corporations are insurance companies. What's more, they insure each depositor for up to \$100,000, if regulated institutions' managers or directors mismanage, embezzle or lose depositors' money.

Fairly recent economic and actuarial studies substantiate another "truth" that minority entrepreneurs always have known: Insurance companies discriminate, too. Specifically, insurers who sell business, fire, homeowners and liability insurance are significantly less likely to insure low-risk applicants if those consumers are racial minorities. Additionally, these carriers are less likely to insure small businesses when those enterprises are located in zip codes with a high concentration of Africanand Mexican-Americans. This latter form of geographic discrimination is called "insurance redlining."

o be fair, representatives of the banking and private-mortgage industries would argue that everyone who applies for credit or a loan cannot be successful. Lenders stress that the decision to approve an application is based primarily on an applicant's creditworthiness. Bankers and others also would argue that a consumer's ability and willingness to satisfy a debt are important factors. Furthermore, lenders who defend race-based lending and "redlining" activities readily admit that all taxpayers - including middle- and working-class African-, Anglo- and Mexican-Americans — insure federally regulated financial institutions. But these financiers stress that access to loans and credit is a privilege rather than a legal right. The latter observation, of course, is correct. Yet, as of this writing, lenders have not explained why the privilege is so strongly correlated with immutable characteristics like race, ethnicity and gender. The evidence is clear: Middle-class Anglo-American males employ the privilege significantly more often and easily than middle-class Hispanic or African-American women.

Representatives of the insurance

industry adamantly deny that the industry discriminates or redlines minority neighborhoods. First, industry spokespersons assert that insurers do not permit any single factor — such as race, geographic location, gender, marital status or the socioeconomic status of the neighborhood — to determine whether an individual or a small busi-

ness will be insured. Insurers also insist that the decision to sell 2 homeowners, business or liability policy at a certain price is based solely on the perceived risks associated with the insurance applicant. Of course, many minorities and women will never accept such arguments; their experiences tell them otherwise. More important, the Department of Justice, the Comptroller of the Currency, as well as federal and state courts increasingly are refusing to accept both lenders' and insurers' excuses for discriminating against creditworthy and low-risk minorities.

My research discloses that an overwhelming majority of women and racial minorities conclude that American bankers and insurance companies discriminate on the basis of impermissible factors. What's more, these perceptions are causing an ever-increasing number

of female and minority consumers to commence "anti-redlining" and "equalaccess-to-credit" lawsuits. Quite simply, a new wave of lawsuits is flooding federal and state courts because women and minority applicants conclude they are victims of discrimination. In addition, the Department of Justice and the Office of the Comptroller of Currency are filing more suits against offending lenders. And, at the state level, consumers and state insurance commissioners are filing significantly more lawsuits against insurance companies.

What is causing this renewed interest in "redlining" and "unequal access to loans and credit"? Between 1990 and 1994, **The Wall Street Journal** published many articles outlining lenders' and insurers' mistreatment of minority and women consumers and applicants. Those reports certainly have generated a considerable amount of interest in "redlining" and in ways of stopping the practice. However, middle-class "babyboomers" genuinely desire to enforce federal fair-lending, and states' anti-



Rice sees increases in anti-redlining suits.

insurance discrimination laws are the major forces behind this new wave of litigation.

But what are fair-lending laws? In 1974 congressional hearings revealed that commercial banks, savings banks, mortgage companies, savings and loans and other financial institutions were undermining the creation of jobs and stable communities by denying creditworthy middle-class consumers and small businesses equal access to credit. Simply put, evidence showed that lenders refused to extend credit on the basis of gender, race, color, national origin, marital status, religion and age. To help eradicate such unwarranted lending practices, Congress passed the Equal Credit Opportunity Act (ECOA). Under the ECOA, an unsuccessful loan or credit applicant may commence a private action against any lender or creditor who allows impermissible factors to influence lending decisions.

In 1977 a different set of congressional hearings revealed another disturbing phenomenon: Federally insured financial institutions were contributing to long-term unemployment, social decay and other pathologies in both urban and rural communities by failing to serve the credit needs of the communities in which they were chartered to do business. Some congressional members called this scheme "redlining," because banks refused to lend money to any creditworthy consumer or small business located within the redlined areas. To help address such egregious, anti-consumer and antibusiness practices, Congress enacted the Community Reinvestment Act (CRA).

Neither private citizens nor consumer groups can enforce the CRA. Congress gave that power to the Federal Reserve Board and a few other federal agencies. But, federal courts have held that aggrievants — who reside in redlined communities — may bring private causes of action against savings banks, savings and loans, private mortgage banks, and commercial banks under the Fair Housing Act of 1968. Moreover, disgruntled consumers may sue insurers under the Fair Housing Act, if those companies discriminate on the basis of race or geographic location.

iven the renewed interest in the ECOA, CRA and the Fair Housing Act, I decided to explore the plight of women and racial minorities who filed actions against lenders and insurers. I located 300 federal- and statecourt decisions covering a period of nearly 45 years - 1950-1993. The decisions involve "redlining," insurance discrimination and discriminatory access to loans and credit. After reading the cases, creating and coding certain variables and performing computer analyses, the results are clear: Lenders, insurers and the taxpayers who underwrite the FDIC and FSLIC will be the loser in this new wave of litigation. Racial minorities and single women, however, will receive some relief; but

their successes will depend upon two important factors: 1) whether their suits originate in state or federal courts; and, 2) whether defendants are savings and loans, commercial bankers, privatemortgage bankers or insurance companies. As always, the only true winners will be lawyers and large law firms.

pecifically, my research uncovered several unexpected but powerful findings among cases decided on the merits. First, minority applicants, especially African-Americans, are substantially more likely to win in federal courts when defendants are either private mortgage companies or insurance companies. The percentages are 66.7 and 61.5 percent, respectively. On the other hand, minorities are somewhat less successful in some federal courts when defendants are banks and savings and loans. But minorities are extremely successful when they sue bankers and other lending institutions in state courts; they are successful nearly 70 percent of the time. More important, middle-class African-American complainants won an impressive 77 percent of the lawsuits filed against respective savings banks, commercial banks, savings and loans, private mortgage companies and insurance companies.

Second, I also collected data to determine the plight of Anglo-Americans who filed denial-of-loans and denial-ofinsurance actions against lenders and insurers, respectively. Surprisingly, Anglo-American applicants are slightly more likely to lose half of the lawsuits filed in both state and federal courts. The observed percentages are 52.8 and 51.8 percent, respectively.

Third, a large number of single and married women - primarily Anglo-Americans — commenced unequalaccess-to-credit and denial-of-loans actions under the Equal Credit Opportunity Act. Additionally, these consumers sued several insurance companies in state courts. Quite simply, the results are astounding. Female applicants are significantly less likely to win insurance-discrimination suits in state courts. But they are substantially more likely to win "financial services" actions against lenders in federal courts. The percentages are 20 and 74.2 percent, respectively.

My general assessment is that, clearly, many racial minorities and women have legitimate complaints against national and local insurers and lenders. And, until very recently, neither state nor federal regulators — state insurance commissioners, the Federal Reserve Board, the Federal Trade Commission, the Office of the Comptroller of the Currency (OCC), FDIC and FSLIC - cared about these consumers' insurance and capital needs. But, with much prodding from the Department of Justice and from consumer advocates, these regulators have become more active. In fact, over the last two years, the Justice Department and OCC have brought racial-discrimination and anti-redlining suits against several major lenders. Some states' insurance commissioners have been active, too.

Also, it is unquestionable that offending insurers, banks, savings and loans and private mortgage companies have overlooked another important phenomenon: Within the past 25 years, racial minorities have been winning a significant majority of suits initiated under federal fair-lending and states' antiinsurance discrimination laws. Sophisticated insurers and lenders have begun to appreciate minorities' successes; consequently, they have begun to negotiate favorable settlements with injured minorities to prevent increasingly pro-consumer juries from deciding racial and sex discrimination suits.

he only true winners in these types of conflicts are attorneys. The losers are the millions of insurance consumers who underwrite insurance companies and taxpayers who subsidize the Federal Deposit Insurance Corporation and Federal Savings and Loans Insurance Corporation. Without doubt, these consumers and taxpayers are the ones who actually pay the large damages awards when shortsighted and unsophisticated directors, managers and agents discriminate against creditworthy and low-risk minority and female consumers. Therefore, until such "heads-in-the-sand" directors and managers appreciate that working- and middle-class women and minorities will no longer tolerate "redlining" and other forms of discrimination, we will continue to witness an even larger increase in the number of fair-lending and insurance-discrimination suits. Without doubt, states' anti-discrimination laws, the Fair Housing Act of 1968 and the Equal Credit Opportunity Act of 1974 are very alive and well.  $\Box$ 

## **Preserving Rural Medicine**

Texas Tech persuades new doctors to enter the unique family practices of West Texas

By Wayne Barringer

Photos by Artie Limmer



"There are still more family physicians lost to rural areas than are provided, so the bucket is still leaking more than we're pouring in." he path of medical history is more a spiral than a circle, explains Dr. Olesya Hulchiy, a professor of public health from Kiev State Medical University, during a visit with doctors of the Texas Tech University Health Sciences Center. Through an interpreter, she says that things do not come full circle and repeat themselves.

The new issues combining primary care with expert specialists form questions that lead her and her six other Ukrainian colleagues to West Texas to learn more about the Texas Tech model for rural health care delivery.

"The model here relates well to the new debate about specialization and primary care medicine in my country," she says. "We are in West Texas to learn about telemedicine and rural outreach because we also seek to care for our under-served population."

The doctors from Kiev, along with their host, Dr. Richard V. Homan, chairperson of Texas Tech's department of family medicine, realize that they have a great deal in common.

The Ukraine is only slightly smaller than the state of Texas; large rural areas remain under-served by health care providers in both places. A national trend away from training in subspecialties toward an emphasis on primary care is growing in both countries.

The United States Information Agency has arranged for the Ukrainian visit because the fulfillment of the mission of the Texas Tech University Health Sciences Center — to enhance the delivery of rural health care in West Texas — can provide important information to regions in the United States and countries around the world. As Texas Tech becomes known as a model for rural health care delivery, faculty and administrators look back over 26 years to assess their progress in the realization of the institutional mission.

The health care demands of West Texas — an area larger than all but four of our 50 states — create outreach and delivery concerns for this vast, sparsely populated land. From isolated rural areas like the Big Bend region to overcrowded urban centers like El Paso, Texas Tech faculty and administrators for more than a quarter of a century have faced the rural health care crisis head-on.

The key, says Health Sciences Center Executive Vice President and Provost and Interim Dean of the School of Medicine Bernhard T. Mittemeyer, M.D., is to provide more primary care physicians to this chronically under-served region.

"We're committed to putting physicians into practice in West Texas," Mittemeyer said. "We've consistently done that. Now our challenge is to keep rural doctors in touch with technology and to keep them from being lured to metro areas."

Homan agrees: "So many rural doctors are retiring or are being attracted to urban centers for more lucrative practices. There are still more family physicians lost to rural areas than are provided, so the bucket is still leaking more than we're pouring in."

The numbers, however, show that Texas Tech is pouring faster than the national average. More than 60 percent of Texas Tech medical graduates elect primary care specialties such as family medicine, internal medicine, obstetrics/gynecology and pediatrics. The national average is up from around 15 percent in 1992 to close to 25 percent in 1993.

Homan sees Texas Tech's and his department's role as a West Texas high quality physician manufacturing facility. "Our function is to try to provide more primary care physicians both locally and in outlying areas to extend the primary care network of physicians, thereby extending the network of patients that have access to Texas Tech subspecialists."

Homan's department now provides post-graduate resident practice opportunities in rural towns such as Shallowater and Hale Center, and during the next six months Homan plans to enter into a residency training agreement with Big Bend Medical Center in



The health care demands of West Texas — an area larger than all but four of our 50 states — create outreach and delivery concerns for this vast, sparsely populated land. Alpine. This means post-graduate physicians, or residents, receive training in rural towns and develop a rapport and often a bond with citizens.

Homan said extending family practice residency training out into rural hospitals will help the towns, the residents and the health sciences center.

"The mission is clear for our department. There's an outcry of need for family physicians in those areas."

While the human touch is preferred, it's not feasible for a doctor, nurse or therapist to personally treat patients in every medically under-served town in West Texas. But Texas Tech's HealthNet — a satellite and fiber optic medical communications technology — is linking rural physicians, residents, nurses and therapists with all the specialties and knowledge a tertiary medical facility provides. HealthNet is closing the gaps in West Texas' vast landscapes by bringing patient consultations and continuing education to health care professionals throughout the region.

The service allows doctors isolated by geography to rest easier. They know that if a complex medical situation arises, they are only a televideo conference call away from experienced specialists.

Before this pioneering technology, many rural doctors and nurses felt isolated by the hundreds of miles separating small towns from tertiary care medical centers like Lubbock. But now, HealthNet can bring specialty care and education to the rural practitioners.

"That's important," says Mittemeyer, "because we've found that one of the main reasons individuals are reluctant to practice in these small communities is the fear of isolation. No one likes to feel like they're left alone on a deserted island, but HealthNet's technology and its people bring expertise and reassurance."

Mittemeyer said Texas Tech already has made significant strides through HealthNet in reaching out to the small rural communities. "We're not focused on taking the small-town doctor's practice away and closing them down," he said. "We want to reach out to ensure the persistence of these people and facilities, and HealthNet through its rural education and consultations makes that its primary objective. That's one of the many reasons why the Legislature has been so supportive of HealthNet." Government and West Texans have supported the health sciences center because the school has made a difference in a variety of ways.

With the state's first accredited Continuing Nursing Education Program, Texas Tech's School of Nursing has had success at furthering the institution's rural mission. During its first decade, the school developed the nation's first baccalaureate program to have students begin clinical practice in the first semester of their first year and continue clinical practice throughout the entire curriculum.

"So much of what we do relates in one way or another to rural health care," said Nursing Dean Pat S. Yoder Wise, R.N., Ed.D. "I think that the consultations faculty provide to small hospitals and communities through the Practice Program and the growth of the nurse practitioner's role in health care delivery offer significant opportunities for us to have a real impact on revitalizing health care in the rural community. More than 79 percent of graduates have stayed in the West Texas area."

Government and community joined together to allow Texas Tech's School of Allied Health to extend its reach into the Panhandle and the Permian Basin.

Dean Shirley McManigal, Ph.D., has led the school in the same spirit in which the health sciences center was created: If West Texas was to have an adequate supply of health professionals, it was going to have to train more of them close to home.

McManigal said community support has been critical in continuing Texas Tech's growth. In 1993, the Ector County Hospital District dedicated \$3.5 million to help establish allied health training in the Permian Basin. In Amarillo, the Texas Legislature joined with Amarillo's High Plains Baptist Hospital, Northwest Texas Health Care Systems and St. Anthony's Hospital to commit five years' funding to initiate allied



HealthNet is closing the gaps in West Texas' vast landscapes . . .



They know that if a complex medical situation arises, they are only a televideo conference call away from experienced specialists. health education in the Panhandle.

"This kind of support has really been overwhelming," McManigal said. "It shows the sense West Texans have that we can develop our own health professionals. Our School of Allied Health is still relatively young, but we're striving to provide the best physical therapists, occupational therapists, speech and hearing specialists and clinical laboratory scientists for all of West Texas.

"Our graduates are highly recruited in West Texas because we have the equipment, facilities and faculty to really make a difference."

The only equipment David Freed, Ph.D., needs is his slide projector and briefcase. His facilities are his car and various small, rural West Texas churches.

Four or five times a month, Freed, a Texas Tech Alzheimer's education specialist, packs up his slide show and his car and drives as many as three hours to talk to elderly West Texans about Alzheimer's disease.

The trips are part of a two-pronged program that aims to identify Alzheimer's victims and provide assistance to their families. Freed and his staff at the Rural Alzheimer's Disease Education Program can provide effective caregiver training, but identifying disease sufferers is a major roadblock.

In most rural areas 35-40 percent of people are over age 65 and in general are unlikely to seek medical services for psychological disorders. So Freed is asking clergy to help identify and advise suffering families.

"Clergy have regular contact with hundreds of townsfolk, and they're the ones people trust," Freed said. "When rural families have concerns, they will talk with their minister."

Then, when those in need of help are found, Freed and his staff counsel individuals on how to cope with the cruel neurological disease.

"Patients need an understanding caregiver. To provide that, caregivers need understanding and training because caring for an Alzheimer's patient is not instinctual. It's very difficult. We're trying to reach out and provide that knowledge to caregivers."

Two years ago Freed's was the only program of its kind in the United States. Now more than two dozen Alzheimer's programs have contacted Texas Tech to learn how to begin their own rural outreach. "... the nurse practitioner's role ... offer(s) significant opportunities for us to have a real impact ... in the rural community."



Freed and his staff talked with more than 350 clergy members in 1994.

"I'm convinced training caregivers with education and information about Alzheimer's has some impact on the course of the disease."

Freed's work is focused and effective, and those results span across Texas Tech's service region.

Through its three schools, the health sciences center's four campuses in Amarillo, El Paso, Lubbock and Odessa provide more than 400,000 ambulatory patient visits each year, which is about one patient for every six West Texas residents. Health sciences center doctors throughout the region delivered 12,276 babies in 1993, which is nearly onethird of all babies born in the western 68 counties of Texas.

The School of Medicine alone has graduated more than 1,400 physicians and more than 1,600 resident physicians. About 800 doctors have remained to practice in West Texas after graduating from or completing a residency at Texas Tech.

Once doctors begin their practices in West Texas, they need to retain their ties to Texas Tech's resources. The Library of the Health Sciences at Texas Tech is helping to pave the information superhighway for rural practitioners and their facilities so they can continue to help better people's lives.

Through the Library's computer and communications systems, rural doctors have a gateway to the ever changing body of knowledge they must rely on to remain current. That gateway is expanding, as the Library will open a new, larger facility later this year. Library Director Richard Wood said as the facility grows, regional health care providers will have even greater access to professional medical resources and data banks, such as the National Library of Medicine.

"We already have more than 50 external contracts to provide health agen-



"Clergy have regular contact with hundreds of townsfolk, and they're the ones people trust. When rural families have concerns, they will talk with their minister."



"We're striving to become one of the balf-dozen rural bealth research institutions in America. That acknowledgement will come in time."



cies, clinics and hospitals in our service area with medical searches, document delivery and data base access," Wood said. "Soon we'll be equipped to provide a wider variety of services to more practitioners who need them."

As the library becomes more successful at assisting in the rural health care battle, others throughout the health sciences center continue to do their parts:

With the expansion of the state's prison system and collaboration among the Texas Department of Criminal Justice (TDCJ), Texas Tech and small rural hospitals are saving health care in some West Texas towns. Texas Tech has contracted with TDCJ for inmate patient care, and Texas Tech arranges for the local hospitals to staff the units and provide inpatient and emergency care. In many cases, this agreement is keeping doctors and nurses in these towns when otherwise they may have left. Through this healthy partnership, health care availability is alive and well in many towns in which services otherwise would have dried up and blown away.

■ E. Lee Taylor Jr., M.D., assistant to the executive vice president and provost and regional dean for the health sciences center's Amarillo campus, is aggressively pursuing ways to attract more physicians to start their practices in the 26 counties comprising the Texas Panhandle.

With funding assistance from private foundations, including the Don and Sybil Harrington Foundation, and area hospitals, such as Northwest Texas and St. Anthony's, Taylor has established programs that provide scholarships and forgivable loans to medical students and residents who agree to practice at least two years in the area.

 Texas Tech nursing school in the Permian Basin has produced 114 bachelor of science in nursing graduates since 1987. One of that program's strengths lies in its ability to keep its graduates in West Texas: 90 percent of those completing the program are caring for patients in West Texas, and 98 percent have remained in Texas.
El Paso's programs are centered

around border health and community-



Health sciences center doctors throughout the region delivered 12,276 babies in 1993.

based training. Texas Tech's partnership with El Paso County, the University of Texas at El Paso and the W.K. Kellogg Foundation Community Partnership Initiative is helping third-year medical students receive training in communitybased sites rather than at the medical center. El Paso is one of seven U.S. sites cooperating in the program, which aims to make health care available where it was not before and to help physicians become more aware of unique needs in urban health care.

Texas Tech's medical student enrollment increased from 100 to 120, and El Paso also will receive the extra 20 third- and fourth-year medical students to enhance their border health initiatives. ■ On Dec. 1, 1994, Mittemeyer named Alvin Jones, M.D., assistant dean for rural affairs. In his role as chief of the newly created office, Jones will be responsible for formalizing Texas Tech's rural outreach efforts by assessing and addressing the medical support needs of physicians in those areas.

"We need a comprehensive plan for health care in West Texas," Mittemeyer said. "Some communities can't afford a doctor, but they need health services. This office will play a major role in defining those needs and making programs available to develop solutions."

Helping to accommodate the needs of rural practitioners has been one of the institution's objectives since its beginning. Mittemeyer said he's proud of how Texas Tech has matured in that regard, but he is constantly looking for ways to improve.

"We have to be responsive to the people of this region," he said. "We must continue to be innovative, focusing on primary care centers, being an extremely available group practice with outstanding specialty care, and we must have our entire health care team be service oriented and quality focused. We can no longer afford to be any different."

He said that goes not only for health sciences center patients, but also for the rural health care practitioners who need our continuing education and support.

"We're striving to become one of the half-dozen rural health research institutions in America. That acknowledgement will come in time. Right now, I can tell you that I'm proud of our programs and our people, and I'm proud of the impact Texas Tech has had caring for West Texas."



Artie Limmer

## A Standing Army for the 'Golden Hour'

#### By Sandra Pulley

n a lonely stretch of highway outside Dickens, a sports car jumps the median, colliding headon with a pick-up truck. For the vehicles' passengers, the medical care available within the next 60 minutes will not only determine the patients' quality of life, but also the likelihood of their survival.

Emergency workers know that even seconds wasted between the crash scene and nearest hospital can mean tragedy for the accident victims and their families.

But in places like Dickens, Olton, Seagraves and other West Texas towns, the hospital is not always seconds away. Sometimes hospitals are minutes away, sometimes half an hour or more.

In these settings the "Golden Hour"

Emergency workers know that even seconds wasted between the crash scene and nearest bospital can mean tragedy for the accident victims and their families. becomes more precious to Emergency Medical Services personnel, who form the lifeline to trauma care for isolated communities.

"As smaller hospitals are forced to close their doors, Emergency Medical Services become the health care system," said Neil Coker, the director of Emergency Medical Services at the Texas Tech University Health Sciences Center. "EMS is the rural health care safety net. Our people provide the first care to patients and access to the rest of the health care system."

In the South Plains this safety net is woven by a network of neighbors, who volunteer their time and money to provide critical care during medical crises. This "volunteer army" needs specialized training to face the rigors of emergency medicine, Coker said.

"Training volunteers is different because they have lives outside of EMS," he said. "When volunteers respond to a medical emergency in a small town, the victim is almost always someone they know. In extremely stressful situations, they have to be conditioned to respond without being impeded by emotions."

Preparing EMS volunteers for these stresses is one of the primary focuses of courses offered by the health sciences center through the School of Allied Health.

The program here also takes training out into the communities that need it most, Coker said, lessening the commute for potential volunteers. EMS courses are now offered in towns like O'Donnell and Tahoka, and flexible training schedules allow volunteers to work while they train. Despite the conveniences, EMS training is not easy.

Paramedics must pass three courses and competency requirements before being licensed. The three courses include more than 1,000 hours of work in the classroom, in the ambulance and in hospitals.

Students practice trauma, burn, cardiac and pediatric life support and participate in simulated accidents, such as extricating victims from manholes and overturned cars.

These training situations are especially important for EMS workers in rural areas as smaller hospitals continue to transport critical patients to regional medical centers like Lubbock for emergency care.

"We aren't just ambulance drivers, although we may still have that image to some in the community," Coker said. "We are health care professionals."

And like other health care professions, the EMS volunteer turnover rate is high. The nearly 600 people a year who enroll in EMS training courses at the health sciences center are needed to refresh the ranks of emergency care.

"EMS is a lot like a standing army," Coker said. "Most of our volunteers' time is spent waiting for something to happen. They go from being in a state of rest to treating victims within four to five minutes, and their job is 24 hours a day, seven days a week. The work involves high-stress situations."

Despite the stresses, Coker said that EMS needs to continue its outreach into outlying communities.

"In many cases, these volunteers are the last lines of defense against a health care crisis in rural America," he said.  $\Box$ 

## CHERNOBYL: A Hot Zone of Mutated Life

By Michael Sommermeyer

Photo courtesy of Robert Baker

"Some people are surprised to learn that there are animals living there, but of course there are." he countryside surrounding the Ukrainian nuclear power complex at Chernobyl is serene, and if this wasn't the site of the world's worst nuclear-reactor disaster, a visitor might not think anything was wrong. However, the high radiation readings, the empty farmhouses and the deserted cities tell a different story. No human lives within 10 kilometers of the Chernobyl site.

Visitors to the site and the workers who maintain the two remaining nuclear power generators must wear protective clothing, especially face masks, and then stay only a short time or accept the risk of exposure to radiation. Everything in the area is contaminated with radiation and must be treated with the concern afforded to nuclear waste. Chernobyl is a hot zone, but that doesn't mean nothing lives there.

"Some people are surprised to learn that there are animals living there, but of course there are," said Robert Baker, Ph.D., Horn professor of biological sciences at Texas Tech University. In 1994, Baker traveled to Chernobyl to begin a series of animal studies. The expedition was arranged between the United States Department of Energy and the Ukrainian government. Baker was joined by two colleagues from the University of Georgia's Savannah River Ecology Plant, Ronald Chesser, Ph.D., and Michael Smith, Ph.D. The three researchers went to Chernobyl to document the effects of radiation on the mammals, amphibians and plants surrounding the No. 4 reactor which exploded on April 26, 1986.

"These trips represented the first major effort for a molecular genetics study of the animals in the area," Baker said. "The danger posed by radioactivity and a turbulent economic and political climate have prevented serious study of the surrounding ecology, however we have been able to perform some complex and informative experiments."

The explosion of Chernobyl's fourth reactor occurred during a test in which the graphite-moderated reactor was running but its emergency watercooling system was turned off. During the course of the experiment and changing of the fuel rods, a series of miscalculations allowed neutron buildup in one area of the core. Suddenly, the nuclear reaction went out of control, shattering the fuel rods. Soon afterward a second, steam-induced explosion blew the 500-ton concrete lid off the reactor, whose containment structure was not designed for such pressures. A large plume containing 50 tons of radiative fuel and waste spread out over much of the western Soviet Union and portions of Europe.

The disaster killed 31 persons immediately or shortly thereafter and caused the hospitalization of more than 500 others. As smoke, debris and radiation filled the air following the explosion, children from the local schools of the nearby city of Pripyat played outside and watched the fire burn. Baker said the children undoubtedly received massive doses of radiation which showed up most prominently in their thyroid glands.

Later, persons living within 30 kilometers (19 miles) of the site were loaded onto buses and evacuated from the surrounding area by the Soviet government. These people, leaving behind their lives, were taken to diverse places far from Chernobyl.

"Pripyat was a modern city that's now empty. No one lives there. In the houses, there are jars of food that were left half-eaten. There are Ferris wheels, playgrounds, parks, apartment buildings and restaurants that form an eery ghost town. It's a sad testament to a failed system," Baker said.

The mass exodus also has caused a problem for researchers wanting to document the effects of the radiation cloud on the human residents. Baker said, as these people were scattered throughout the Soviet Union, they were lost and the records of their existence were lost as well.

"Thyroid cancer is up in many regions of the former Soviet Union, yet no one knows which people were exposed at Chernobyl," Baker said. "Many say they lived near the plant, but it's hard to say. The Soviet government didn't keep good records and that makes it tough to document the human effects of the radiation."

However, the animals remain at Chernobyl and their presence is helping Baker and his colleagues find some answers. At the Chernobyl site, the radiation fallout contaminated the soil and the plants around the reactor. The trees and the soil in the path of the radiation plume were removed leaving a barren path that leads away from the site. Water flowing into the reactor core ended up in a body of water called Canal One, contaminating the water with radioactivity.



Photo courtesy of Robert Baker

A researcher points a Geiger counter at a pair of bird's eggs found near Chernobyl.

"Fish in that canal have lesions and mutations; however fish are alive in there," Baker said. As part of the investigation, the research team introduced catfish into the canal to find out how animals that were not initially exposed to the radiation can adapt or survive radiation insults to their genes. Also frogs and snails have been collected from the mud surrounding Canal One and other areas near Chernobyl's fourth reactor to find out how they have adapted to a highly radioactive environment.

"If anything is receiving maximum radiation, it is these frogs," Baker said. "If you point a Geiger counter at the mud they live in, it beeps like crazy and goes off the scale." Baker is the principal investigator in a third experiment involving the collection of small mammals around the reactor that may lead to more clues about how the animals living near the reactor have managed to survive while confronted with massive mutations in their DNA, the basic genetic code of life. Other researchers working with Baker on this project include Ron Van Den Bussche, a research associate in the department of biological sciences, and undergraduates Amanda Wright, Erin Reat and Lara Wiggins.

"We want to know what kind of condition these small mammals are in. Are they just surviving? Do some have mechanisms for repairing DNA? And does natural selection give these animals an advantage?" Baker said. All of those questions are important because they could explain why life has gone on at Chernobyl and how Mother Nature makes repairs to an ecosystem following a nuclear disaster.

To find out how the DNA of these animals has been affected by radiation, the team collected about 200 mice near the failed power plant. Baker and the other scientists are looking for such things as deviations in DNA sequences, chromosome structure and skull symmetry. Other uncontaminated mice from another area also were collected for comparison as controls.

When looking at a normal strand of DNA, the genetic code, researchers find a highly ordered pattern in the first, second and third letters of the threeletter words that make up the code. Normal variations in DNA fit a set pattern of changes in the first, second and third letters of each word. Generally, for every 10 changes in the first letter, researchers will find one change in the second letter and 33 changes in the third letter. Changes in the third letter are more tolerated because they are less important to the language. Whereas, changes in the first and second letter can have a profound effect on the protein coded by the gene.

Baker said at Chernobyl the DNA of the mice collected at the site presented the research team with a surprising result.

"In these mice we found an equal number of first, second and third changes in the letters that make up the DNA strand. The DNA variations didn't fit the normal distribution indicating that the animals at Chernobyl have a



Photo courtesy of Robert Baker

highly altered pattern in their DNA chains resulting from radiation exposure." Baker said the intense changes in the DNA patterns are surprising because it was thought exposure to extreme amounts of radiation would cause more subtle and predictable changes over time.

"We presume that when the reactor exploded massive doses of radiation may have pushed the system over the top causing immediate changes in the DNA in the mice that survived," Baker said. "Now changes in the DNA are taking place much slower because 97 percent of the radiation around the reactor is gone; however, the damage to the DNA in the animals has left its signature."

Baker said the team now wonders: If there has been a huge change in the DNA, why are these animals doing so well? He suspects that when an animal's DNA undergoes extreme stress, such as radiation poisoning, the system may be more equipped to handle the change than previously thought.

"We also expect that the animals of

Chernobyl will have a higher rate of cancer and a shorter life expectancy," Baker said. "However, because more young are born than can survive — and many will still live long enough to reproduce — the populations appear superficially to be normal."

Baker said the outcome of the investigation should lead to a marker gene that could help researchers estimate the amount of exposure to the people who were subjected to the radiation cloud. Because the population was moved following the accident to other regions, tracking the human impact of the accident has been slow and inconclusive.

"If we identify a specific marker gene in these mice that can be compared to a gene in the thyroid tissues of the people who lived at Chernobyl and their future generations, we may be able to see how the DNA has adapted or been affected by the accident," Baker said. "The next step is to locate thyroid tissue from exposed children to see if the genes differ from what they are in other tissues of the body or in their mother's tissues." Horn Professor Robert Baker and two colleagues traveled to the contaminated area to document the effects of radiation on the mammals, amphibians and plants surrounding the No. 4 reactor.

This information could help doctors in the region identify those people who were at Chernobyl and later lost in the system.

Baker returned to Chernobyl this May to continue the small mammal investigation and to begin a new series of experiments involving the birds that live in the reactor core. Baker said there are many owls who have made the inside of reactor No. 4 their home, and studying what genetic problems they have encountered will be an intriguing exercise.

"We have an excellent opportunity to see the survival of an ecosystem," Baker said. "On one hand, it is frightening to consider how the radiation has inflicted intense changes on these animals, yet it is astounding to see how well these animals are surviving under these adverse circumstances."

# **Clinton Redefines Media's Perceptions of the First Lady**

By Emily S. Kinsky



illary Rodham Clinton now has a communication style named after her according to the research of Elizabeth Watts, Ph.D., assistant professor of journalism in Texas Tech University's School of Mass Communications.

Watts recently adapted a study by Myra Gutin, author of "The President's Partner," into the coverage of first ladies in the media. Gutin studied the communication activities of first ladies beginning with Florence Harding, but her study did not include Hillary Rodham Clinton.

Watts, who earned her doctoral degree in 1992 from Ohio University, has researched other areas including medical researchers and media agenda setters and the reporting on polio and AIDS research in the news media. She also has done historical research on the early life of Bess Furman, a reporter for the Associated Press who covered Eleanor Roosevelt's press conferences.

**Clinton is the only first** lady to have pursued a career in a profession. Her coverage showed more political emphasis than social aspects. **)** 

> Researcher Elizabeth Watts has named a new political communication style for First Lady Hillary Rodham Clinton.

"I really wanted to look at what was going on with Hillary Rodham Clinton in comparison to the other first ladies," Watts said.

Gutin had defined three styles of communication used by first ladies including the "social hostesses/ceremonial presences" category, also referred to as "White House-keepers." This group included Bess Truman and Mamie Eisenhower.

"First ladies were typically viewed as hostesses," Watts said. "Their communication style emphasized the social aspects, such as entertainment, clothing and trend setting."

The second category was named "emerging spokeswomen." These women were more active publicly and privately. This group includes Lou Hoover, Jackie Kennedy and Pat Nixon.

"They may or may not have had their husband's approval for their activities," Watts explained. "That's why they're referred to as 'emerging'."

The third group is called "political surrogates." These women first received support from their husbands to participate in presidential decision making, but their media coverage still emphasized the social aspects, Watts said. This category includes Betty Ford, Rosalynn Carter, Nancy Reagan and Barbara Bush.

Watts went beyond Gutin's research at this point and specifically looked at the magazine coverage of first ladies from Hoover to Clinton. Her study consisted of a content analysis of magazines from each election through the first 100 days of office. Watts included any article found in the "Reader's Guide" which listed a first lady as the topic. The list of magazines ranged from "Ms." to "Mother Jones." The number of articles totaled 145. Watts tested the categories created by Gutin, then added a new category for Clinton.

"Clinton is the only first lady to have pursued a career in a profession," Watts said. "Her coverage showed more political emphasis than social aspects."

Watts discovered that 39 different magazines covered the first ladies from Hoover to Clinton during the time period studied. News magazines, such as "Newsweek" and "Time," amounted to 46 percent of the coverage, and women's magazines, such as "Good Housekeeping" only amounted to 9 percent of the total coverage. She found that news magazines tended to cover first ladies after Bess Truman more than women's magazines, and Watts believes this could be attributed to the magazines' weekly, rather than monthly, coverage.

The majority of the coverage in all the magazines was positive, 65 percent, with 30 percent neutral and 7 percent negative.

Articles about the more political first ladies still included much personal information, like family life, education, interests and training — information that appeals to magazine readers, according to Watts.

"I started with Lou Hoover because she was the first to use some modern communication tools," Watts explained. "She was the first first lady to speak over the radio. Then Eleanor Roosevelt came along and hosted her own press conferences."

Articles about the more political first ladies still included much personal information, like family life, education, interests and training information that appeals to magazine readers.

Watts explained that Bess Truman basically took a step backwards for first ladies by not doing anything outstanding. In the next election and first 100 days, Mamie Eisenhower did more communication activities, which Watts supposes may be because she was more adjusted to the attention.

"Jackie Kennedy followed, and one of the first things she did was to give a tour of the White House for a CBS documentary," Watts said. "Lady Bird Johnson only could be covered during the first 100 days, but had 11 articles. Then Pat Nixon didn't really pursue any activities that would give her coverage."

Betty Ford also was covered only during the first 100 days, so she did well to have had 10 articles about her, Watts said. Betty Ford was very outspoken, and because she was diagnosed with breast cancer during the time studied, more articles were generated, Watts explained.

"Rosalynn Carter had 11 articles. She was different because she didn't want to have anything to do with reporters wanting to know about her clothing. She told the media she would bring her own clothes, her own sewing machine, and would cut her own hair." Watts said. "She also told them she planned to sit in on cabinet meetings and host her own press conferences. She probably left the reporters spinning, because that was not the norm."

Nancy Reagan was another one of the "political surrogates."

"Reagan was a mixed bag. She was a former debutante and had been in Hollywood, so right away they focused in on her looks: her skin, hair and dress, and on her activities of redecorating the White House. It was almost the exact opposite of what Carter planned to do."

Articles about Barbara Bush also focused on her looks, but for a different reason, Watts explained. Many of the comments were on her older appearance.

"Then came Clinton and the media had to start over and try to figure her out. An integral part of her communication style is that she wanted it to be different. She was not going to be sitting around figuring out seating charts for state dinners."

Out of the whole group of first ladies, Clinton received the most coverage. Of the 50 articles discussing Clinton, only six were negative, and most were neutral, in other words, not complimentary and not finding fault."

"While Carter, Reagan and Bush got 11, 13 and 15 articles respectively, Clinton had more than three times that number," Watts said.

Magazines, according to Watts, appear to like the "political surrogate" style best. That style of communication is what people expect of a first lady, she said.

"But it also shows that if the first lady decides to use a different style, like Clinton, they're still going to cover her," Watts added.

Watts found another interesting element in her study: Two first ladies received entirely positive magazine coverage during the designated period. Those first ladies were Johnson and Bush.

"It will be interesting to see what happens with the next first lady," Watts commented. □



icture someone eyeing an attractive shirt hanging on a clothes rack. A sales clerk approaches, and the individuals begin debating about what price would be considered reasonable for the item. Now imagine for a moment that shirt prices fluctuate from day to day. What if the price of a shirt were \$80 today, but possibly could be \$60 tomorrow, and \$50 the following day? How would one determine a reasonable price for the shirt?

Don Ethridge, Ph.D., a professor in the Texas Tech University department of agricultural economics, believes he has developed a system that could remedy the pricing problem — not for consumer goods, but for commodities, or more precisely for the quality

## About a Bale of Cotton

#### By Charles Griffin

characteristics of those commodities.

In a commodities market, where a good such as cotton is bought and sold, certain outside forces like weather conditions and buyers' expectations affect the stability of the market. In such a market there is a need for reliable and timely information. The availability of more and better information in a marketplace creates a more pricing-efficient market and thus price instability is held down, Ethridge said.

"Cotton is a very heterogeneous commodity. The consumer probably thinks a pound of cotton is a pound of cotton. Not so," Ethridge said.

In the United States, producers use a quality grading system to track distinct differences in cotton. The textile grading system consists of the following characteristics: a color grade, a leaf grade, a measurement of length, a measurement of fiber length uniformity, a measure of fiber strength, an indicator of foreign material present in the fiber and a micronaire measure (which indicates fineness and maturity). Varying combinations of the attributes of cotton result in essentially different types of cotton with varying prices to match. "There are 12,000 to 15,000 different possible combinations, so the quality dimension of cotton becomes extremely complex. In the market every one of those quality dimensions has relevance. This means that when it comes to understanding prices, the buyers and sellers out there in the marketplace need a lot of information," Ethridge said.

The varying prices among the different types of cotton create a huge amount of information, he said. Historically, the government has engaged in price reporting to provide objective information for every grower to use in order to keep markets efficient and competitive.

"The U.S. Department of Agriculture has been reporting for a long time, but the U.S.D.A. system does not measure this deluge of price information but instead consists of opinion, he said. Ethridge said his system, called the Daily Price Estimation System (DPES), is fairly high-tech and can do for price reporting what High Volume Instrument (HVI) did for quality information.

HVI is the system that generates quality information on cotton. Consumers as well as producers use the information to establish a reasonable price for the commodity. The DPES can make pricing more efficient by placing pricing information with the quality information being produced by HVI.

"The point is that particularly with new technology, with computers and what we can do with what we know about econometric systems, we can do a lot better on prices than we did 50 to 75 years ago," Ethridge said.

conometrics, the centerpiece of the DPES, operates within the realm where economic theory, math and statistics collide. Econometrics is a descriptive term for a general approach to estimating and quantifying economic phenomena, Ethridge explained.

The DPES operates by first receiving raw sales data from the only two electronic markets for cotton that exist in the United States. Both electronic markets, Telcot and The Network, operate in Lubbock and collect sales information throughout Texas and Oklahoma. Telcot is owned by the Plains Cotton Cooperative Association, and The Network is a private firm owned by Dan Davis of Lubbock. During the evening the electronic markets' information on individual sales is off-loaded onto the DPES system. The program is driven by a communications software package.

"We're collecting somewhere between 60 and 75 percent of all the producer transaction information in the states of Texas and Oklahoma. That's a phenomenal amount of information. And this is not just somebody's guess," Ethridge said.

The system then runs a set of diagnostic tests on the data to ensure the information has been received without error.

"We have safeguards built in so that this system doesn't just take a mass of numbers and just say they are OK. We run it through a system to assure ourselves that the data appear to be valid," Ethridge said.

nce the data are checked, the computer dials the VAX system, a mainframe computer located on the Texas Tech campus, in which the data are combined with the econometric model and a program called Statistical Analysis System (SAS). The system generates an equation which describes a system of prices based on that day's sales. The equation is placed in a LOTUS spreadsheet and is broken into tables of prices for the different market regions.

Ethridge said the equation actually is more accurate but the table is more user-friendly for buyers and sellers. The collected and processed information finally is sent to a small group of users by facsimile machine. The information also is put on an international bulletin board maintained by the National Cotton Council in Memphis, Tenn. This bulletin board allows people from anywhere in the world to obtain the information produced by the DPES.

"We developed this for Texas and Oklahoma simply because we have been able to envision an access and had extremely reliable market data for the Texas and Oklahoma market," Ethridge said.

The DPES, to this point, has been confined to the Texas and Oklahoma area because researchers have not developed a low-cost way to collect data from other areas. However, Ethridge said he is working to find a solution. Ethridge also is looking into disseminating the information on a wider basis through satellite distribution systems.

"We've developed the DPES in such a way that it could be used by the government or by some objective industry group that would be interested in applying it. We hope we have developed it so that it is adaptable into widespread use," Ethridge said.

he DPES project was funded initially by the U.S.D.A. and currently is funded by the Texas State Support Committee and Cotton Incorporated.

Jeff Brown, a research associate, Darren Hudson, a doctoral student, Becky Baylor, a master's student, and several other graduate students have assisted Ethridge in creating and maintaining the DPES. Ethridge is using the results from the DPES in various other studies, some of which include building a cotton variety selection model and cleaning cotton in cotton gins.

The cotton variety selection model is a computer software package that allows farmers, extension personnel, cotton geneticists and seed companies to evaluate the merits of various cotton genotypes under different growing conditions, Ethridge said. He explained the cotton variety selection model considers cotton yield, quality, color, length, strength, as well as numerous other factors and the inherent variability in yield and quality attributes. A DPES equation, created through an average of DPES equations spanning three years, is used to determine the values of a variety of cotton genotypes when both yield and quality attributes are held variable, he said.

Ethridge said the DPES also may affect the cleaning of cotton in cotton gins.

Ethridge said he is working on a related project that examines the price of cotton at the final pricing point in the market.

"Where the DPES looks at producer prices — prices at the first sale in the market chain — we have a project sponsored by the Committee for Cotton Research Inc., in which we are attempting to identify price premiums and discounts that are paid by textile manufacturers. It's a companion study looking at the last pricing point in the marketing system," Ethridge said. "It should be ground-breaking work." □



## Tattoos, Not Just for Motorcycle Mamas Anymore

#### By Preston Lewis

Myrna Armstrong says more and more professional women are obtaining tattoos. nce the indelible marks of men on construction crews, sailors on shore leave and leather-clad bandits on Harley-Davidsons, tattoos have crossed the gender barrier.

More and more women, says Texas Tech Nursing Professor Myrna Armstrong, R.N., Ed.D., are letting tattoos get under their skin. And, these women aren't just motorcycle mamas or counterculture artisans.

They are often career-oriented women who work as lawyers, engineers, accountants, teachers, architects, bankers, secretaries, dentists, psychologists and nurses.

Armstrong, who has conducted one of the first surveys of professional women with tattoos, said the number of women obtaining tattoos in this country has quadrupled over the last two decades. Now almost half of all tattoos are done on women.

"Tattooing appears to be increasing in popularity among women, despite being a permanent and unconventional procedure with purchase and health risks. I first became interested in the topic because of the health risks," Armstrong said.

The health risks of tattoos can range from the mild to the serious. Because needles are used to inject dyes under the skin, transmission of blood-borne diseases is possible under unsanitary conditions. The most commonly reported problems, however, are allergic reactions to the red dye, cinnabar, yellow pigment and cadmium used to color the tattoos. Such reactions can develop within a few weeks or even years after the tattooing procedure.

Several cultural indicators suggest tattoos are no longer taboo among women, Armstrong said. For instance, more and more female models on magazine covers and in advertisements have tattoos. Temporary tattoos that wash off after a few days are sold in drug stores and department stores. Many greeting cards now have tattoo-



Artie Limmer

"Some people get doctorates and some people get tattoos, whatever it takes to make them feel they are unique." related themes.

Whether women have created this wave of tattoo popularity or merely ridden it, the decision to get a tattoo remains a very personal one for a woman and one that is often wrapped up in a woman's self-image.

"Some people get doctorates and some people get tattoos, whatever it takes to make them feel they are unique," Armstrong said. "For many women tattoos are a form of selfactualization."

Armstrong said some women may never have felt that sense of self-fulfillment because they've either been abused or come from oppressed environments. The tattoos may be a symbolic form of personal freedom.

"The tattoos appear to provide some professional women with a unique product which symbolizes their individuality," she said.

According to the study, the most common sites for tattoos were shoulders/shoulder blades, breasts, ankles, wrists and buttocks. The most common designs were flowers, especially roses, butterflies, hearts and birds. Only three survey respondents had names incorporated in their tattoos. Nineteen of the women had tattoo pieces, which are large tattooed sections with multiple designs for a mural effect. Five women reported tattooed eye or lip lining procedures.

A colonel in the U.S. Army reserves, Armstrong became interested in tattoos when she was the officer in charge of an Army physical exam section in the Dallas area. The exam team conducted some 200 exams monthly.

"We saw a lot of reservists," Armstrong said, "and I began to see more and more female officers, not just enlisted women, with tattoos. I began to talk with them and the more I learned the more interested I became. I have a sociology background as well as nursing and patient teaching so it all came together."

From a nursing standpoint, Armstrong wanted to identify the health risks. From a sociological standpoint, she wanted to determine what made a professional woman decide to get a tattoo in the first place and what the social risks were once she did.

Initially, she didn't know where to find subjects for her questionnaire so she began to ask women if they knew of career women who had tattoos. Within two months, she found 27 women in the Dallas area. She then placed an ad worded "Seeking career women who have had tattoos for at least six months to fill out a survey" in alternative newspapers in Philadelphia, San Francisco, New Orleans, Atlanta, Washington, D.C., and Madison, Wisc.

Armstrong received responses to the ad from more than 150 women and identified 134 as meeting the criteria for her survey. Of those surveyed, 43 percent reported salaries of \$25,000 or greater, 45 percent were single when they received their first tattoo, and 43 percent had a baccalaureate or higher degree. At the time of their tattooing, the respondents ranged in age from 17 to 50 and at the time of the survey from 23 to 65. Forty percent of the women had two or more tattoos, including one 65-year-old engineer with 17 tattoos.

As the survey progressed, Armstrong identified three risk factors women had to consider: purchase risk, health risk and possession risk.

"If you are shopping for a car, you can take it for a test drive and decide whether you like its lines and its handling before you make a decision," Armstrong said. "There are no test drives with tattoos. How many people know how to purchase a tattoo, which is probably one of the most permanent things in life? That's what I call a purchase risk."

In addition to dissatisfaction with the look of the tattoo, other purchase risks include pain during the procedure and itching afterward.

Beyond short- and long-term allergic reactions, the health risks can include malignant melanoma and less serious skin cancers such as basal cell carcinomas. Additionally, syphilis, tuberculosis and infectious hepatitis have been transmitted by tattooing. Though no reported cases of AIDS have been contracted through tattooing, Armstrong said the transmission is possible.

Although tattoos can be removed by surgery, cryosurgery and dermabrasion, these procedures often lead to scarring. Armstrong said laser therapy is the best



Artie Limmer

methodology, but unfortunately the technique is expensive, is seldom covered by insurance and still lacks uniform removal results for all tattoos.

The possession risks result from the views of tattoos held by family, friends and society in general.

"Once you have a tattoo, do you like it? Does your family? Has it interfered with your career if it is visible? These types of questions relate to possession risk," she said.

Though acceptance of a tattoo, the study showed, was common from a woman's partner or friends, it was less likely from mothers, siblings and children and least likely from physicians, registered nurses and fathers.

"Fathers' responses ranged from silence to disparaging remarks and demonstrated their traditional perspectives and their concern for how other people would respond to the tattoo."

Stereotypes were hard to ignore. One survey respondent, a social worker, wrote Armstrong to suggest that doctors be told not to check between her toes for needle marks just because she had a tattoo.

"Biases against tattoos remain evident among several groups of people, including health care providers," Armstrong said. "Changing attitudes, beliefs and prejudices is not easy.

"Nursing's emphasis on health and health promotion makes it the natural profession to provide information to potential tattoo recipients so they become more knowledgeable consumers."

"Once you have a tattoo. do you like it? Does your family? Has it interfered with your career if it is visible?... **Biases** against tattoos remain evident among several groups of people, including health care providers. Changing attitudes, beliefs and prejudices is not easy."

#### PERSPECTIVES

(Editor's Note: The author of the following essay is Randy Reddick, Ph.D., assistant professor and journalism division coordinator in the School of Mass Communications. He is co-author of "The Online Journalist: Using the Internet and Other Electronic Resources.")

## Fear and Loathing on the Information Highway

By Randy Reddick, Ph.D.



Mark Mamawal

he Information Highway! Instant access to the greatest libraries and archives of the world — without leaving your desk. No passport required. Geopolitical boundaries irrelevant. The written word. Recorded speech. Music. Graphics. Video. Data files. Instant collaboration.

What will it mean? For society? For scholars and researchers? Answers to these questions are shrouded in ambiguity and beset with ambivalence. The Information Highway! The most powerful information utility yet devised. But then so was television a half century ago — and the telephone before that and Gutenberg's press before that. On the one hand, such great potential for teaching, learning and communicating in this new Digital Age. On the other hand, a time waster. A wedge between parents and children. A source of moral depravity. An enabler of wicked conspiracies. A mother of evil.

The Information Highway exists as much in vision as in reality. More grandiose visions combine satellite communications, high definition television, advanced computer and fiber optic technologies in a complex, seamless global network.

That network would provide access to television-on-demand, computer conferencing, legal documents, distance education, health care consultation, electronic mail, government resources, shopping, news and even computer games. It would be a new "place" for people to do business, to discuss issues of importance, to go to school, to "visit" museums and libraries, or to attend theater. And people would do this without leaving their homes.

The scope of the Information Highway is limited only by the imagination one attaches to the enabling technologies. The current administration imagines "an information revolution that will change forever the way people live, work and interact with each other." To that end, the administration has launched a government initiative titled the National Information Infrastructure.

Some pieces of the Information Highway are the substance of dreams. Others are under construction, and parts of the highway are already in place.

The largest piece of the highway in place already — the Internet — also remains under construction. A worldwide network of computer networks, the Internet has grown with alarming speed. During the first six months of 1994, the number of host computer domains (see sidebar, "How Big Is the Internet?") on the Internet grew from 2.2 million to 3.2 million. Every 30 minutes a new computer network connected to the Internet. The pace continued through the third quarter. Then, during the last quarter of 1994, "The Net" grew by another 26 percent. A Host Domain Name Survey in January counted 4.85 million host computer networks.

For the millions of persons online today, the Internet provides access to university libraries, government databases and computer systems operated by research institutes, non-profit organizations, of universities, government bureaus, businesses and military establishments. The Internet also is a vehicle for bringing people together through electronic mail, discussion groups, role-playing games and more.

Some current network events illustrate how Internet capabilities are changing some of the rules by which we live and do business. During a recent strike by employees at San Francisco's major newspapers, management of the San Francisco Examiner and the San Francisco Chronicle put electronic versions of their newspapers online. The online "newspapers" contained full color photographs, liberal use of graphics, as well as varying sized headlines, bylines and body text.

Almost overnight, the striking newspaper workers put out their own online publication, called the **San Francisco Free Press**. They needed no presses to print nor trucks to deliver their product. Both sets of online newspapers employed "hypertext links" to connect their readers to other network resources not controlled by the newspapers.

### The scope of the Information Highway is limited only by the imagination one attaches to the enabling technologies.

During the Nov. 8, 1994, general election, readers interested in the latest vote counts could click on an icon or select text and immediately be connected to a computer system run by the State of California. In the last six months a dozen or more states have announced similar services.

Words, numbers and pictures are not the only information formats available through the Internet. The Rolling Stones made their November concert in the United States available live over the Internet. Sites such as the Underground Music Archive and Virtual Radio permit "Internauts" to sample performing groups' latest music. Some programs on the Internet allow people scattered throughout the globe to "chat" with each other in real time by typing their "conversation" at their computer keyboards. At least one site on the World Wide Web is the virtual equivalent of an international telephone, passing digital audio signals along the network so people can talk with one another as with the telephone.

Prior to 1993, commercial activity on the Internet was discouraged. Today, business people of all kinds are scrambling for roadside stands and places in electronic malls along the Information Highway. The monthly **Internet Business Journal** prints a chronicle of business opportunities for companies using the Internet.

New firms appear daily with "cyberspace" store fronts. If you live in the right location, you can connect to Pizza Hut, choose your pizza toppings and crust, and order from your computer keyboard. Need a book? Connect to booksonline.com (run by a Prentice Hall subsidiary), and search by title, author or subject. Want to order flowers or a gift for someone special? You can "see" the merchandise online before ordering. All this is available today. Barely a year after the current administration "opened" the Internet to commercial exploitation, the number of commercial hosts worldwide surpassed the number of educational institutions.

Large, high-tech companies and small entrepreneurs alike are scrambling to stake claims in cyberspace. As they do so, they join with educational institutions, government and military agencies, and non-profit organizations in sculpting a new world order that is blind to the geopolitical boundaries which have defined so much of history and civilization in the past.

It is a formula for significant, substantial change in the way people worldwide "live, work and interact." A revolution of global reach is underway.

What will it all mean for us tomorrow?

Scholars already can browse catalogs of libraries around the world. Big name businesses, research establishments and universities already have committed major resources toward exploring the Internet's potential for doing business, for assisting collaboration and research, and for expanding the reach of higher education. News hounds can tell computer systems just exactly what they want to read and how they want it packaged. Already, paper-and-envelope correspondence has given way to e-mail in many business and educational circles, and the number of people telecommuting is on the rise.

As people's **need** to leave home for routine daily matters is reduced, some fear that we may lose important social skills. Thus, prophecies on the Information Highway do not all envision, as Miranda marvels, "a brave new world" filled only with wonder, joy and light. There are dark and murky specters as well.

One shadow across an otherwise bright scene is that by "living" online we lose much of our ability to communicate face to face.

Others observing the evolving information age are concerned about a whole raft of legal matters involving privacy, copyright and libel laws. If you post an original message to an online news group or discussion list, have you given up your right to exclusive benefit from original publication? Libraries wanting to provide patrons with the convenience of online searching and retrieval of information, have found themselves grappling with difficult copyright questions.

As government records have become increasingly committed to the digital environment, two forces have conspired to make private information that was public when it existed in paper format. On the one front, some argue that data tapes in the hands of high tech entrepreneurs can become powerful tools for perpetrating major large scale scams or fraud on unsuspecting people — by the tens of thousands. On a second front, government agencies on alert for new sources of revenue, have found new profit centers in the computerized records they keep on all of us.

Groups such as the Electronic Frontier Foundation and the Taxpayers Assets Project have aggressively lobbied for the proposition that government data belong to the public and that which was public on paper should remain so on electronic media.

In addition to questions of who "owns" information on the Information Highway, there are uncertainties about who controls - or should control access. And that question itself is encumbered by currents at cross purposes. On the one hand is a vision of changing "forever the way people live, work and interact with each other." There is in the fabric of this vision a democratic thread supposing that ALL people will have access. As big as the Internet is and as fast as it is growing, "The Net" is still the domain of an elite minority in society. How will it become as ubiquitous as television is today?

For decades, access has been virtually free to institutions of higher learning. More recently, the Free Net movement has made access free — or nearly so — for citizens in communities where Free Nets exist. Free Nets have generally relied on a cooperative effort including both government participation and volunteer efforts. A lasting, democratic access in our system will certainly have to replace the volunteers with for-profit business interests.

Much of the Internet was built using

government funds. A number of sizable (multi-state) networks connected to the Internet have been built using private monies. A new industry — Internet access providers — already is booming. These providers give to their subscribers dial-up telephone access to the Internet. While they are reaching out to millions of people not yet online, established businesses and entrepreneurs continue to set up shop in cyberspace.

These groups may soon find themselves in positions similar to those of early television station owners. Those pioneers found themselves selling television sets in order to build a larger base of users that would in turn appeal more strongly to advertisers who would buy time on television. Those establishing online business and hungering for larger markets will campaign for powerful personal computers in every home. Their campaigns will result in continuing declines for the cost of home computers. Schools will broaden their offerings in computer education.

While the network user base is expanding, important boundaries for rights and responsibilities of network citizenship will be drawn. Those boundaries will cover privacy, copyright, obscenity and other issues.

Historians and scholars face still other concerns. Research papers have been freely available on the Internet for years. Scholarly, refereed journals in digital format, rare three or four years ago, are finding their ways onto the network. Source materials for those articles are also available. Scholars have struggled with questions of how do you cite electronic publications. Traditional style guides have not answered all issues. Most disturbing is the ephemeral nature of network files.

Here today. Gone tomorrow. I may provide you with full, thorough, citations of wonderful work available on the Internet. Wanting to replicate my work, you find that half the materials are not "where" I said they were. They may have been moved. They may have been simply taken off line. Somebody may have changed a program that provided access in the past but requires new syntax today. Worse yet, the files in question may have been deleted. Librarians and scholars alike must wrestle with archiving questions. Who is responsible? The integrity of data easily manipulated raises still other questions.

It will be some time before the Information Superhighway approaches in reality what the visionaries dream. Along the way to realizing that dream, many issues will have to be resolved. Old assumptions about rights and ownership will continue to be challenged, and new "rules" will emerge. It is difficult to predict precisely how all this will be resolved.

One thing seems certain. Totally independent of any political vision, the Digital Revolution, with all its online nooks, crannies, eddies and waves will in fact change the way people do business, interact, attend classes, and do many of the rest of the things that are now a part of our daily lives. □

### How Big Is the Internet?

A lot of numbers are thrown around loosely to tell how large the Internet is. It is almost impossible to know how many users there really are. One of the few objective measures of the Internet's size and growth is the Domain Name Server Survey that counts the number of host domains connected to the Internet.

Academic Computing Services at Texas Tech, reports that Texas Tech's VAX cluster is host to 7,887 accounts. The VAX cluster shows up as the host "ttacs" at the domain "ttu.edu." In the Domain Name Server Survey, the VAX cluster would get counted as one host domain. Because many sites, like Texas Tech, are host to hundreds or thousands of individual users, it has led some people to estimate the number of Internet users worldwide upwards of 100 million.

A version of the Domain Name Server Survey may be found online at http://www.isoc.org and through ftp://ftp.isoc.org.

- Randy Reddick



### CAMPUS SCENES



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