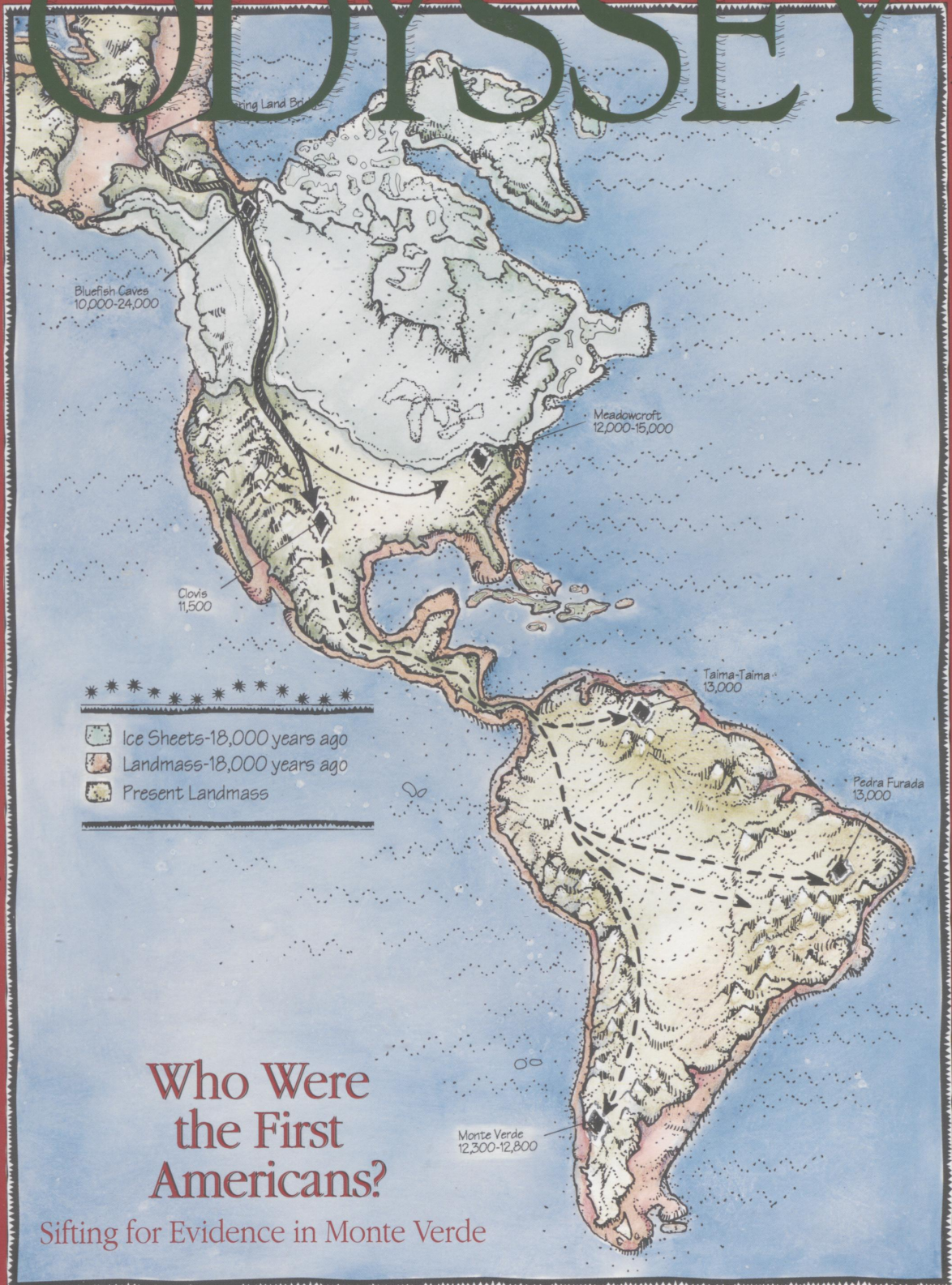
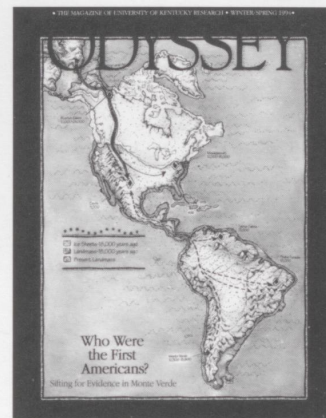


ODYSSEY



Who Were the First Americans?

Sifting for Evidence in Monte Verde



The University of Kentucky, the commonwealth's graduate education and research institution, exists to provide opportunities for the education, personal growth and development of individuals and to contribute to the improvement of society.

With this mission as its premise, one goal of the university is to conduct programs of basic and applied research which support graduate and professional education, provide for the advancement of knowledge, and seek solutions for the acute problems of society.

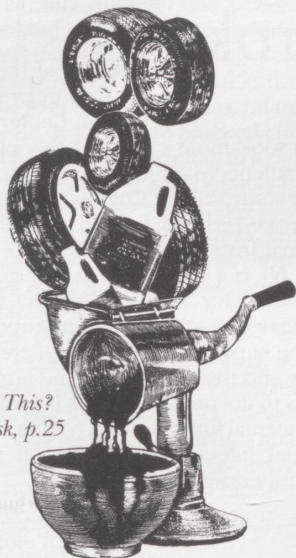
The university's research mission also acts as a magnet for attracting top graduate students who want to participate in nationally competitive research projects. This research experience can offer them a significant advantage in their education while laying the foundation for future research and development. *ODYSSEY*, through articles about various research projects and graduate education programs, reflects the breadth of the university's search for new knowledge and the myriad of research endeavors underway. The progress that the university has made toward achieving its research mission and securing the extramural funds required to support these types of endeavors would have been impossible without the talents and dedication of our researchers.

The goal of *ODYSSEY* is to offer the reader the opportunity to share in some of the excitement, curiosity and creativity evident in the research underway at the University of Kentucky.

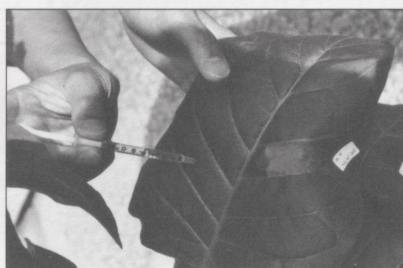
Cover Illustration

Around 12,000 years ago, according to a long-held theory, fur-clad hunters crossed a now submerged land bridge between Asia and Alaska and became the first humans to enter the New World. Trailing game on a generally southward route, they left physical evidence of their travels. The dates established for archaeological remains from such a distant past are highly controversial. Radiocarbon dating in the 1930s of stone spearpoints discovered at Clovis, New Mexico, has led scientists to believe that the Clovis people settled in America around 11,500 years ago and were the first Americans, and this theory has held until the present. Now, however, discoveries at the site of Monte Verde in southern Chile have convinced many researchers that humans must have entered the New World much earlier. See "Who Were the First Americans? Sifting for Evidence in Monte Verde," page 6.

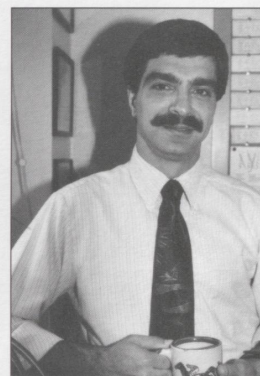
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(Pathologically Correct) Behavior, p. 11



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of Parasites, p. 30

Volume XI, No.2

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Assessing Damage in the Wake of Stroke

by Sharon Reynolds

A violinist, and teacher of the violin for decades, Donna Wiehe is an expert in the subtleties of musical expression. Skilled in understanding various shadings of nuance and tone, Wiehe knew that immediately after her recent stroke there was a distinct change in another instrument—her voice.

"I don't have the subtleties of intonation I used to have. I sound so flat," she says. "There is just a different quality to my voice."

Wiehe is one of a half million Americans this year who suffered a stroke—the leading disabling disease of people 50 to 75. Although she hasn't been able to use her left arm since her illness last March, bringing a halt to her violin playing, she believes she was fortunate. She came very close to being in another statistical category—one of the 150,000 deaths resulting annually from stroke.

Like the aftermath of a tornado that can devastate one side of a street, leaving the other untouched, damage from a stroke may seem willful, bizarre. But a closer look, through modern imaging techniques, has shown that the damage follows certain anatomical rules.

Researchers now know that patients such as Wiehe, whose stroke resulted in damage to the right hemisphere of her brain, may experience non-verbal communication problems. Although in Wiehe's case that flat tone of voice is obvious mainly to those who know her well, some patients suffer more extreme impairments to their facial and vocal expressions.

Because people often pay more attention to how something is said than to what is said, scientists in the Stroke

Program of the University of Kentucky's Sanders-Brown Center on Aging have begun to look more closely at this phenomenon among stroke patients with right-hemisphere brain damage. A five-year study, "Social Cognition following Right-Hemisphere Stroke," is being funded by a \$500,000 grant from the National Institute of Neurologic Disorders and Stroke. Wiehe, 60, is a participant in this study.

Principle investigator Lee X. Blonder, an assistant professor of behavioral science and anthropology at UK, is examining the impact of right-hemisphere abnormalities on patients and their families in the home environment. She plans to document changes in patients' social, emotional and mental functions and compare this behavior to the social interaction and marital relations of people with left-hemisphere damage.

The fact that some patients, such as Wiehe, appear to have experienced few changes raises other questions, says Amy Kirkpatrick Herbst, Blonder's research assistant. "How quickly will these problems be resolved? Is the damage permanent or is the brain reworking itself to accommodate loss in one area? We are looking at all these issues," says Herbst.

"Stroke" is actually a generic term covering a number of disorders involving blood flow to the brain, explains Creed Pettigrew, associate professor of neurology and co-investigator in the study. It encompasses cerebral infarctions—the type of stroke being examined in the UK study—and the more lethal brain aneu-



Alix Roughen

Donna Wiehe, at home with the Wiehes' dog Mignon

rysms. Specifically, Blonder and her associates are looking at cerebral infarctions that have affected the brain cortex, the outermost area of the brain, and subcortical structures like the basal ganglia and thalamus. Infarction involves tissue death due to blocked circulation in the brain; aneurysm refers to a permanent abnormal stretching, and possibly bursting, of blood vessels.

"Within the cortex, many areas control emotions, behavior, handedness, how we speak," says Pettigrew. "All those areas live on the surface of the brain."

The frontal temporo-parietal lobes, where non-verbal expression is controlled, is the area the researchers are most interested in. Strokes affecting this area can be viewed on a CAT scan or by magnetic resonance imaging (MRI). They are caused by atherosclerosis, or hardening of the arteries. High blood pressure, high blood cholesterol and smoking are all risk factors for such strokes.

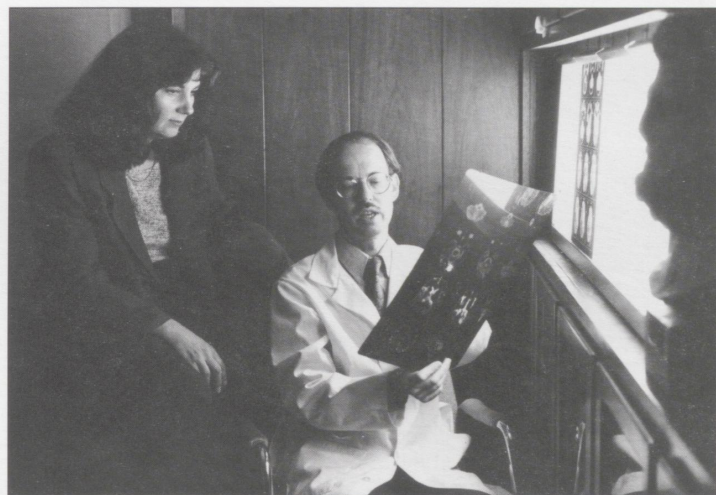
Wiehe, who was in excellent health prior to her stroke in March of 1993, had none of these risk factors. Mystified at first, doctors found that a tiny blood clot had broken loose through a small hole between the left and

Like the aftermath of a tornado that can devastate one side of a street, leaving the other untouched, damage from a stroke may seem willful, bizarre.

right ventricles of her heart and travelled to the brain. This minor defect had caused no previous problems and had apparently gone undetected.

Most of the patients in the UK study, like Wiehe, have had fairly significant strokes, says Blonder. "They've been immediately aware they had something and usually come into the emergency room right away. Within a week, there may be enough of an improvement for them to be discharged. Many of them go to Cardinal Hill Rehabilitation Hospital [in Lexington] for three to four weeks."

To qualify for inclusion in this study, patients must have no history of alcohol or



Bryan Baylor

substance abuse, multiple strokes or psychiatric problems. They cannot be taking mood-altering drugs or have a co-occurring disorder such as renal failure or metastasizing cancer. The spouse must be knowledgeable enough to report on the patient's behavior at home.

Since November of 1992, when recruitment began, the researchers have enrolled 15 married couples, with nine currently active in the study. Participants range in age from 31 to 78. Researchers will continue to enroll subjects through most of 1995.

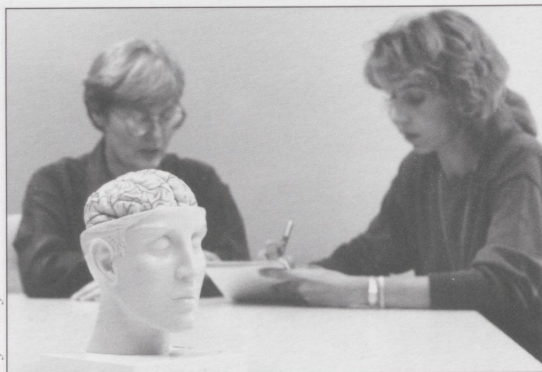
Subjects must have a CT scan or MRI two to three days after the event to show clearly that they have had a thromboembolic cerebral infarction. (CT scans done sooner are often inconclusive since strokes do not appear until several days later, says Blonder.)

Those with right-hemisphere damage will be compared to a group with left-hemisphere damage and a control group of orthopedic patients. Orthopedic patients are being used to show that the results aren't just a reaction to a physical disorder. Such patients also undergo a rehabilitation regimen similar to that of stroke victims.

During her postdoctoral studies at the Uni-

Lee X. Blonder and Creed Pettigrew examine a patient's MRI scans to pinpoint the area of damage caused by stroke. UK's Stroke Program is a Center of Excellence at the Sanders-Brown Center on Aging.

continued on page 4



Research Assistant Robin Heath (left), a UK graduate student in anthropology, and Amy Kirkpatrick Herbst, a clinical research assistant, are working with Blonder and Pettigrew in the stroke study.

versity of Florida, Blonder, working with Kenneth M. Heilman and Dawn Bowers, discovered that stroke patients with right-hemisphere damage had little problem verbalizing, unlike some whose stroke had affected the

left side. However, right-hemisphere patients demonstrated a marked difference in their ability to modulate their voices or to use gestures and facial expressions to convey emotions. They also had a difficult time inferring similar emotions from the non-verbal cues of others. However, when an actual emotion was defined in a sentence, they were able to understand that emotion.

Researchers theorized that some patients with right-hemisphere damage can remember what an emotion means, but not how it makes the face look or the voice sound. Such patients want to have a conversation but are impaired because of this non-verbal communication disorder. People with left-hemisphere damage, on the other hand, have problems with language but not with expressing emotions.

"We would predict that the spouses of patients with right-hemisphere damage would be very upset, would feel that the patient didn't care about them," says Blonder. "Nobody's ever looked at the long-term effect of the non-verbal communicative disorders on spouses and relationships."

Patients in the study are evaluated in the hospital, then six and 18 months later in the home environment. The spouse is asked to observe the patient for a wide range of problems—from unusual mood changes to difficulties in walking. A key tool for analyzing non-verbal behavior in the study is a

videotaped interview conducted by Herbst to see if patients are becoming more facially expressive and are healing.

No two stroke patients are alike, Blonder notes. "We had a patient at the University of Florida who had a small right-hemisphere stroke," she recalls. "It destroyed his ability to spell, which is usually something you find in a left-hemisphere stroke. We found out that he was dyslexic as a child." In other cases involving damage to the left-temporal lobe, patients have lost such skills as the ability to remember the names of animals or of their fingers, she says.

And among patients with right-hemisphere damage there is a subset who deny that they have had a stroke. They may think they've ended up in the hospital because of a particularly bad headache, says Blonder. Such a condition was further complicated in one patient in the UK study who also had "left-side neglect"—an inability to focus on space at the left side of the body. Although doctors warned him not to drive, he thought nothing was wrong with him and got behind the wheel of a car during a weekend pass home. Fortunately, he avoided having an accident.

Once preliminary results begin to come in from the study, more information about the workings of the brain may be revealed. Blonder and her associates say if families and health-care workers understand the dynamics of right-hemisphere damage, a patient is more likely to receive help for non-verbal communication problems, and relationships may benefit.

Like the complexities of the brain, the resilience of the human soul can also be intriguing. Once told by doctors that she might never walk again, Donna Wiehe enjoys a private triumph each time she takes a turn around the block. And when they say she may not be able to play the violin again, a little voice inside whispers back, "We'll just see about that." ♦

Paying Close Attention to Stroke

Stroke is a "woefully under-appreciated medical condition," says Creed Pettigrew, associate director of the Stroke Program at the University of Kentucky Medical Center.

"We see this on a daily basis," says Pettigrew. "People come to our hospital days after the damage of a stroke has taken effect and may have become permanent. Often, they have underestimated the seriousness of their condition."

Simply recognizing the symptoms of a stroke could save many lives. In Pettigrew's view, the same sort of nationwide, public education efforts that have been aimed at controlling heart disease could be used to reduce the number and severity of strokes.

"Just about everybody knows that if you run up a flight of stairs and have crushing chest pains, you're either having a heart attack or a warning," he says. "That has become ingrained in the public consciousness with a little education. The same thing hasn't happened for stroke."

"Stroke" refers to a wide variety of medical conditions involving blood flow to the brain. The most common is a cerebral infarction, in which blood flow to the brain is altered or blocked, resulting in damage to brain tissue. Risk factors for cerebral infarctions include high blood pressure, high blood cholesterol and smoking. Brain hemorrhages, though less common, account for most of the stroke deaths and often occur as a result of weakened areas in the walls of cerebral blood vessels being ruptured.

Delaying medical help for a cerebral infarction—also known as a "brain attack"—can result in irreversible brain damage. One symptom of stroke is the

One symptom of stroke is the sudden onset of weakness in one or both limbs, often accompanied by a numbness or tingling.

sudden onset of weakness in one or both limbs on one side of the body, often accompanied by a numbness or tingling. The numbness is similar to the feeling one gets from a Novocain injection in the dentist's chair, says Pettigrew. "There are very few conditions in the body that can produce these symptoms, aside from an alteration of the flow of blood to the brain."

Since the warning signs of a mild stroke may lack the immediacy of those accompanying a heart attack, a person experiencing them may simply decide to go to bed. The symptoms, which can last from one to 24 hours, may have disappeared by the time he awakens.

"The best opportunity for intervention is within three to six hours," Pettigrew says. "That's why a brain attack is a 911 medical emergency."

UK's Stroke Program, a Center of Excellence at the Sanders-Brown Center on Aging, is the only location in the state that has experimental drug protocols to lessen the amount of brain damage occurring immediately after stroke. Other highly developed approaches of the program range from acute stroke protocols to medications for preventing stroke and new neurosurgery techniques.

One in three strokes occurs following clear warning signs that could lead to proper identification of treatment.

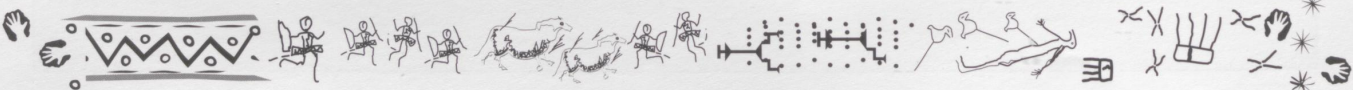
Yet in a recent Gallup Poll, 97 percent of those surveyed couldn't name one symptom of stroke.

Pettigrew also cites these chilling statistics:

- Stroke is the third most common cause of death in the United States and in Kentucky.
- Among women, stroke is the second most common cause of death, primarily because women live longer than men. The risk for stroke increases for every decade past 55 for both sexes.
- There are 500,000 new cases of stroke nationwide each year; of that number, 150,000 will result in death.

Yet, says Pettigrew, the National Institutes of Health allocated only \$66 million last year for stroke research, in comparison to \$1.7 billion for cancer research.

The American Heart Association and the National Stroke Association are working towards better public education, he notes. "But there needs to be federal leadership, as with the Great American Smokeout. If people learn to take their doctors' advice seriously and change their eating habits, exercise more and stop smoking, they could significantly reduce their chances of stroke."



by Ruthie Maslin

It's long been postulated that the first human inhabitants of the Americas were the Clovis people—so named for the elaborately fluted spearpoint associated with them. A New Mexico Clovis site excavated in the 1930s turned up human artifacts 11,200 years old, and for decades that date was acknowledged as the earliest known human habitation in the Americas.

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front of this research based on his more than 15 years of work at the Monte Verde site in Chile.

The site was accidentally discovered in the mid-1970s by some local men in a marshy area near what is now a small creek. They were clearing paths for their ox carts. Cutting back the banks of the creek to widen their trails, the men literally stumbled upon some buried wood and bones which were later found to be bones of a mastodon. This site has subsequently been meticulously excavated by an international, interdisciplinary team of more than 80 experts, headed up by Dillehay.

The evidence uncovered at Monte Verde has both astounded and excited the archaeological community, not only because it radically changes the dates of the first human inhabitation of the Americas, but also because of the excellently preserved organic materials, such as chunks of mastodon flesh, grains and seeds, and even human skin and hair. In a discipline where one usually digs up and examines inanimate remains such as stone tools and bones, finding a strand of 13,000-year-old human hair is like striking oil.

"If it's not the case that the Clovis people were the first in America, then that's a significant—and not altogether welcome—finding," says Dillehay. "Clovis to date has been sort of a sacred cow that you just don't touch. You don't change it. A lot of people have built their whole careers on its archaeological primacy."

Naturally, the Monte Verde discovery has raised eyebrows as well as numerous questions and challenges from the scientific community. Dillehay says he realized early on the impact the Monte Verde findings would

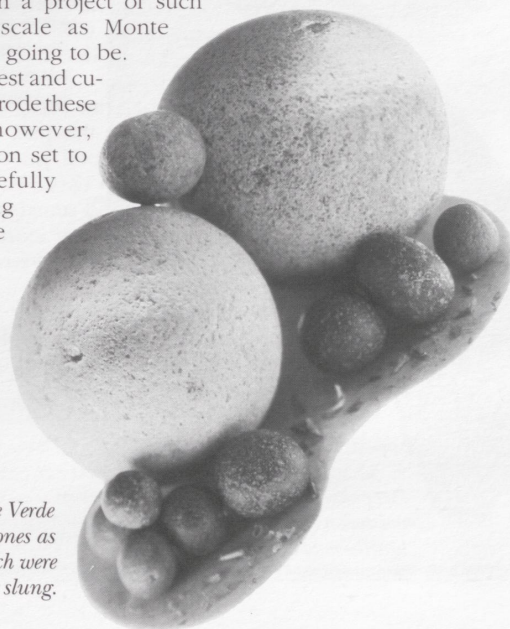
The workers clearing paths for their ox carts literally stumbled upon some buried wood and bones, which were later found to be bones of a mastodon.

likely have on the archaeological community, so he prepared from the start for the barrage of skepticism he and his team would probably face. He knew Monte Verde was an exceptional site. It wasn't merely the usual cache of bones and stone implements: some happy circumstances of nature had perfectly preserved a wealth of organic debris.

Soon after he heard about the site, Dillehay went to Monte Verde to check it out. He did some initial excavation, quickly realizing the potential implications—the magnitude—of what he found there. He admits that he even had second thoughts about being involved in a project of such immense scale as Monte Verde was going to be.

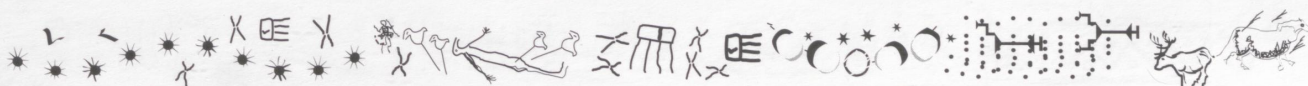
His interest and curiosity overrode these doubts, however, and he soon set to work carefully assembling a massive

continued on page 8



Neal Brown/c 1993 Discover Magazine

Hunting gear at Monte Verde included rounded stones as large as softballs, which were thrown or slung.



The findings at Mount Verde revise the long-held scenario depicting the lifestyle of the earliest Americans, from their diet to their mobility.

interdisciplinary team of experts, from geologists to biologists to chemists, and he began the painstaking, time-consuming task of meticulously unearthing and documenting every inch of the site.

The time and effort paid off. Monte Verde has turned out to be one of the richest and most important archaeological finds in this century.



Dillehay says that archaeologists are basically "at the mercy" of what is preserved in archaeological records. "One needs to keep in mind that a lot of these remains of past cultures are highly perishable. Usually what is preserved are such things as stone tools and bone tools. While such artifacts can

provide valuable clues about ancient cultures, they do little to illuminate what the day-to-day lives of those people were like. Sites like Monte Verde add a whole other dimension to that limited view of the past.

"What Monte Verde adds to our perspective on the past is that we have extremely good preservation of organic debris. Skin tissue is preserved. Hair is preserved. Food remains—of potatoes, fruits and seeds—are extremely well preserved. Even the foundations of hut structures the people had.

"So we have a much clearer and wider window to look through to interpret the past. That, I think, has been the number one

impact of Monte Verde."

But Dillehay cites as another major impact of Monte Verde on the scientific community the fact that remains discovered there—especially the organic material—revise the long-held scenario depicting the lifestyle of the earliest Americans. He identified several major differences between the lifestyle of the Clovis people and that of the people living at Monte Verde.

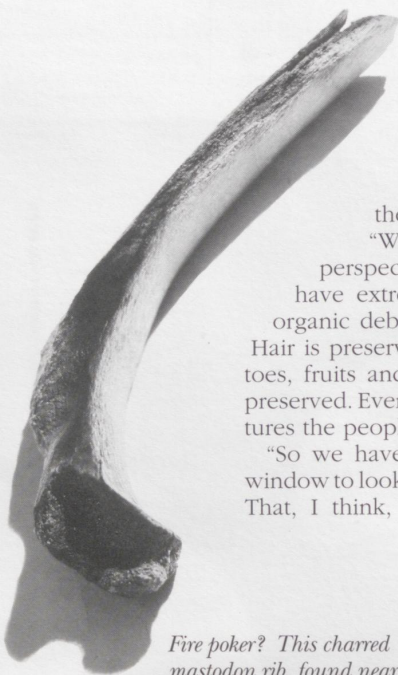
The Clovis were mainly big-game hunters, for example. However, in addition to hunting big game, there is strong evidence that the Monte Verde residents also grew vegetables for food. Evidence suggests these earliest Americans used and cultivated plants and grains to supplement their diet of meat and fish. Staying in one place long enough to plant and harvest crops implies that the Monte Verde people were also more settled, and perhaps envisioned the long-term planning of a society, rather than the day-to-day hunting mentality scientists have associated with the Clovis people.

There's another issue involving mobility. Most people picture the earliest Americans as highly mobile (which a lot of them were), living for a while in one campsite, killing off the big game there, then moving on to another site with more game. At Monte Verde, Dillehay says, there is some evidence that the inhabitants "stayed put quite awhile and exploited a fairly rich environment."

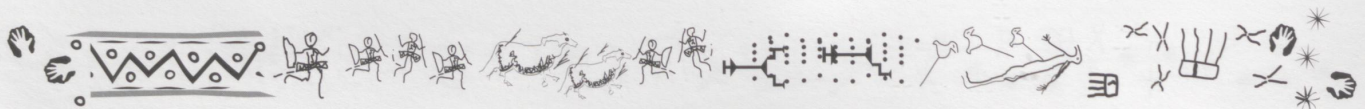
Except for some further excavation of lower levels of the site, Dillehay says the main field work at Monte Verde is basically finished. While items from the deepest levels of the site have been dated back some 33,000 years, Dillehay says evidence strongly questions the validity of those remains as coming from a human-produced site.

"There is a question about the validity of cultural material at that level, and I am the first to question that validity," he says. "When you get that far back in time, culture—which is to say, the artificially modified environment—

Neal Brown/C 1993 Discover Magazine



Fire poker? This charred mastodon rib, found near a hearth, may have been used to tend fires.



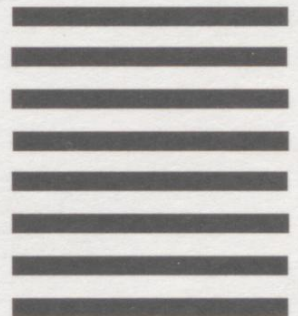


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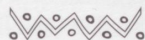
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gets rather crude. At some point culture mimics nature and nature mimics culture; and those examining such primitive remains would be hard-pressed to say if what they are looking at is the result of some human conscious act or some natural phenomenon such as a forest fire."

Dillehay's second book on the findings at Monte Verde is due out sometime next year, and many skeptics of the preliminary work released on the Monte Verde findings are looking to this book to answer many of their questions about details of the actual artifacts and architecture at the site.



While the debate continues about the actual first documentably inhabited site in the Americas, Dillehay is turning his attention and efforts to several long-term projects he says also captivate his intellectual interest. Chief among these are his work with pre-industrial, village-level Inca societies in the tropical forests of Peru, and his work with the Mapuche people in southern Chile.

Dillehay began his archaeological work in Peru and has been going back there for 20 years. "Intellectually, I'm just much more interested in long-term social economic changes in kinship organization, political organization and changing economies," he explains of his interest in examining these Inca cultures. "That work I find equally exciting [as the Monte Verde work], although it hasn't captured the same amount of attention as Monte Verde because Monte Verde pushes right up against a well-entrenched paradigm. My Peruvian research doesn't try to change a paradigm but rather enhance an existing one." He will again travel to Peru next summer to continue his work there.

Living and working in the field is one of the best—and worst—parts about being an ar-

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Tom Dillehay, whose research was also featured in the premier issue of ODYSSEY (Spring 1982)

Ken Gould

"What Planet Is This Stuff From?"

Tom Dillehay of the University of Kentucky, the final speaker, began to tell us about Monte Verde.

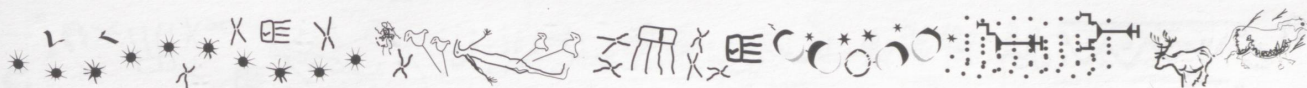
Ten minutes into the talk, the fellow sitting next to me whistled softly in astonishment, then asked aloud of no one in particular, "What planet is this stuff from?" I was wondering that myself. The evidence from Monte Verde was unlike anything most of us—who early in our careers learned to be thankful just for stone tools and scraps of bone—had ever encountered before in our archeological earth. When Dillehay finished 45 minutes later, the hall erupted in applause. I forgot about dinner.

That day in Maine many of us saw for the first time pictures of the extraordinary archeological treasures of Monte Verde: artifacts of stone and bone, of course, but also of wood and ivory; freshly preserved leftovers from meals of leaves, fruits, nuts, and seeds; the remains of crayfish and paleocamel; the torn flesh of an extinct mastodon; even the footprint of a child.

Those are hardly the usual contents of an archeological site. They are unheard of for one in the Americas dating to some 13,000 years before the present. The pros in the hall that afternoon knew exactly what that meant: the Clovis-first barrier to the peopling of the Americas, standing strong at 11,200 years, was threatened.

—David J. Meltzer

(The author was attending the annual meeting of the American Anthropological Association in San Francisco last December. Excerpted from "Coming to America" by David J. Meltzer/(c) 1993 Discover Magazine)



Responding to the public's "Hollywood" notion of the life of archaeologists, Dillehay says that sleeping in a hot tent for two or three months, sweating heavily all night and waking with your hair sticking to your head isn't romantic.

chaeologist, Dillehay says. "It gets old," he explains. "Often you've had a long hot day and the only possibility for a bath is in a hot creek. Then when you get out, it's hard to get all the sediment off yourself."

"Sometimes you sleep in that hot tent at night and you get up in the morning and you're sweating so much your hair's sticking to your head, and you do that for two or three months

in row. That's not very romantic."

But, Dillehay says, fieldwork has its positive aspects, such as the camaraderie that develops among the archaeological team—what Dillehay calls “the campsite mentality”—and the enjoyment of doing the kind of work he really likes to do.

And while it may seem a bit strange for an archaeologist to study living people, Dillehav says there are direct and important implications that the present has on a study of the past. "What is it we can learn about the past by examining the living, indigenous people?" he asks. "In archaeology we need analogies. How do we know what we know? One way of setting up an analogy to interpret the past is to look at indigenous societies of today. If I can do that myself instead of relying exclusively on published literature, then I think it makes me a better scientist."

The analogy he is seeking in his study of the Mapuche centers on his research on public ritual. The Mapuche have large-scale fertility ceremonies celebrating agricultural as well as human fertility. Dillehay is particularly interested in the gender issues and issues pertaining to male-female relationships that are brought to light through these fertility ceremonies.

After years of studying the current culture, Dillehay says he will now begin looking back

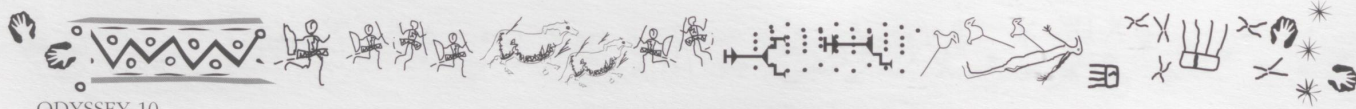
in time to find ways to link present with past, or what he calls the "archaeological correlates" of current patterns.

During his stay with the Mapuche, he will be excavating some sites from the 12th through the 18th centuries. One of the earthen mounds he will be excavating, for instance, has the oral tradition associated with it that tells of an ancient Mapuche leader buried there. The Mapuche have asked Dillehay to put a trench in the mound to see if anyone actually is buried there.

The concept of excavating the past of a living, current society right in their presence is one of the things that most excites Dillehay about this type of work. If he does find skeletal remains in the mound, he says it will please the local people because it will confirm their oral traditions and make them proud of their "memory record."

"That work really excites me a lot, not only in terms of the thrill of doing it, but I enjoy living out in the countryside with the Indian populations and doing ethnography and archaeology while they're standing right beside me. I like to evoke some response from them, to see what they've got to say about it."

Dillehay says that there's a very satisfying mutual excitement and curiosity when he works under the gaze of the local population. "After all," he says, "it's their past." ♦



Studying PC (Pathologically Correct) Behavior

by Jeff Worley

"Plants are a lot smarter than we think they are."

This evaluation, from Sheng Yang He in the UK Department of Plant Pathology, comes in the context of a discussion on how plants defend themselves. "How do you defend yourself when you can't move?" He asks. "The answer is, you have to have a diversified system of defenses—you have to be smarter than your enemy."

With a number of recent discoveries about plants' complex defense systems, plant pathologists are suddenly finding themselves in the spotlight usually reserved for researchers in human biomedicine. A recent article in *The New York Times* chronicled several of these recent findings, and focused in part on He's work when he was a member of a research team at Cornell University last year.

"I was part of Cornell's research team headed by Steven Beer and Alan Collmer working to understand *Erwinia amylovora*, the bacterium that causes blight in pears," says He. "We were able to isolate the crucial molecule that causes this blight, a substance called harpin." This molecule is so potent that when it alone is brushed onto a plant, that bit of tissue self-destructs. The defense mechanism, called the hypersensitive response, is both surprising and deadly: as the plant's own flesh self-destructs, the toxic, acidic contents of its ruptured cells douse the invading organism and kill it. This local cell suicide saves the rest of the plant.

At the time of this discovery, He was a post-doctoral fellow at Cornell. Eager to continue his work with harpin in the community of a well-established plant pathology department, he chose to come to UK as an assistant professor. "It's a very strong department, and they were in need of a bacteriologist. I just got here in July," he says from his new office in Ag Science North, "so I'm still settling in."



Alix Roughen

Although he's barely had time to move the books he brought with him from their boxes to his shelves, He has his lab up and running. The central question He is trying to answer is how a plant—once it realizes it's being invaded by a potential pathogen—triggers this hypersensitive response.

In explaining what he does know about this response, He starts with one of the most common plant invaders, bacteria. Scientists know that although bacteria cannot penetrate and enter a plant cell (some animal pathogenic bacteria do), they can pump proteins out of the cell. It's these extracellular proteins that bacteria need to find in a host plant to begin an invasion of plant tissue.

You can see the results of this interaction with wildfire disease on tobacco, He says. This destructive bacterial disease, as the name implies, can spread like wildfire on a tobacco leaf, yellowing and eventually withering the whole leaf. It's what you can't see with the naked eye, however, that interests He.

"There's another kind of cellular death that may be going on in a tobacco plant, and that's what we're focusing on," He says. "There are other pathogens out there—other types of

He injects a panel of a tobacco plant with an extremely high dose of purified harpin. Within 24 hours, cells in an injected area (the lighter panel here) will self destruct to contain damage to the whole plant.

continued on page 12

Harpin molecules are so potent that when brushed onto a plant, that bit of plant tissue self-destructs.

bacteria, fungi, and viruses, for example—for which tobacco is not a host, that is, the pathogens don't infect tobacco. Why don't

they? In some cases it's because they're killed by the hypersensitive response, which turns out to be a very effective first line of defense."

A recent discovery by plant pathologists has led to a much clearer understanding of this crafty defense mechanism. As reported in *The New York Times* article, researchers have isolated a crucial family of genes called the hrp (pronounced harp) genes, which work in bacteria to make proteins that are necessary for the microbes to invade a plant. The proteins may work by gently killing a few plant cells, an act that releases the nutrients the bacteria need to grow and colonize the host.

When powerful harpin molecules invade a pear tree, for example, their hrp proteins allow them to move from a blossom down into the cluster holding the flower, then into the branch holding the cluster. Eventually, the bacteria work their lethal way into the trunk of the tree.

But while hrp proteins are essential for penetrating a susceptible host, in this case a pear tree, they can have a very different effect on a resistant plant. "Our group at Cornell learned that one of these proteins, harpin, is a potent trigger of the hypersensitive response," says He, who points to a tobacco plant leaf in his lab as an example. "Unlike a pear tree, tobacco is not a host for this particular bacterium. When harpin comes in contact with a tobacco plant cell, the result is quick cell death brought on by the hypersensitive response; this sacrifice also destroys any bacteria in the neighborhood." Plant pathologists, He among them, are intensely interested in how the same protein can have such two radically different effects on two different types of plants.

He points to a section of a tobacco leaf that has a yellow circle about the size of a silver dollar. "We've injected this area with an abnormally high dose of harpin," the researcher says, "so we can see what the reaction looks like." Unlike the sweeping blight caused by wildfire bacteria, this relatively small area is well contained.

How does a plant know how to trigger this hypersensitive response? This is the central question of He's research, and to find the answer to this question he is using much smaller and faster-growing plants than tobacco.

He walks from the lab to a growth chamber, which resembles a boxy refrigerator, in the hallway. The dozens of plants in the large dish he pulls out look like miniature clumps of parsley. "These are *Arabidopsis*," he says. "It's particularly suitable for genetic analysis because it is easily managed, it has a very short life cycle and a very small genome." A genome is a set of chromosomes that contain all the genetic information of a plant or animal.

These plants, when sprayed with a harpin solution, will turn yellow, then brown; then they will die. That is, almost all of them will. The plants that don't die are the ones He is interested in. "We take the ones that aren't somehow affected by harpin—we call them 'mutants'—and analyze their genetic structure," He says. "We believe there's a receptor on the plant cell surface which interacts with harpin. What's going on with these mutations that allows them to block this interaction at some stage—that's what we're trying to find out now."

The long-range goal, He says, is to find the genes responsible for blocking the harpin action. Once this is accomplished, the genes can be cloned and can be used to make plants resistant to various diseases—a wide variety of plants, not just tobacco, He emphasizes. Damage done by traditional pathogens, wildfire bacteria in tobacco, for example, may in this way become localized and contained. The entire plant would no longer die from this bacterial infection.

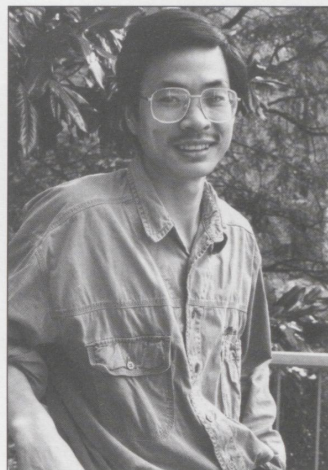
In addition to the ability of a plant to defend itself through self-mutilation, researchers have found at least three other tactics in a plant's defense arsenal: the production of antibodies to poison an invader, the quick stiffening and cross-linking of its cell-wall fibers to stone-wall attackers, and the production of enzymes that literally chew an enemy apart.

"We've come to learn that plants have a very complex system of defenses," says He, "with as many different components as the immune system found in people." The comparative complexity of a plant's immune system isn't the only common ground we share with plants. Research into the nature of hrp genes has recently uncovered what He calls "another very intriguing link.

"The bacterium we focused on at Cornell has been found to be a first cousin of some long-hated human diseases," says He, "including the bacteria that cause shigellosis (a severe diarrhea) and the bacteria that cause bubonic plague."

"It's an interesting commonality," says Susan Straley, UK professor of microbiology and immunology, who has spent the past 13 years studying the bacteria that cause *Yersinia pestis*, more widely known as The Plague or The Black Death. "Even before Sheng Yang came here to UK, researchers at Cornell had been talking with me about some work of mine that had recently been published on the secretion mechanism of the proteins I've been studying, what sorts of approaches we were taking and so on," Straley says.

"Although not a lot is known yet about harpin, we can see that it does something that allows a bug to live in a plant just as *Yersinia* virulence proteins allow an invader to live in an animal host," Straley says. "The discovery of harpin is a breakthrough in allowing us to see what kinds of pathogen interactions occur in plants."



Alix Roughen

Sheng Yang He had two postdoctoral fellowships at Cornell before coming to UK in July of this year.

The comparative complexity of our immune systems isn't the only common ground humans share with plants. Researchers have also studied a bacterium that is a first cousin of some long-hated human diseases—shigellosis (a severe diarrhea) and the bubonic plague.

"Who can say what the significance of the harpin discovery is?" says Steven Beer from his office at Cornell. "The existence of harpin or harpin-type material had been postulated for 30 years and unsuccessfully sought until we found it. Whatever its significance, it does open some other avenues for research that may lead directly to better controls for bacterial diseases of plants."

Beer emphasizes the point that the discovery is a good example of the fruits of fundamental approaches to practical problems. "The approach being taken more and more is to discover the basic way bacteria work and figure out how to interfere with that," says Beer. "It's through fundamental research like this that the real jumps to understanding have come." ♦

HONORABLE MENTION

In our continuing look at the alumni of the University of Kentucky's graduate programs, this issue's "Honorable Mention" reflects the great diversity in the paths our graduates have chosen. From a teacher who is now in her 70th year of teaching and still receiving awards for her outstanding work, to the president and CEO of an international communications company, to an education graduate who heads a home in Colorado for children with severe emotional and physical needs, to the first psychologist elected to Congress, to the owner of a perennial nursery in a small town in Kentucky, their common bond is UK.

Certainly my roots with the University and Lexington reflect connections to some of the alumni in this issue. One of the alumni featured is the son of the obstetrician who delivered my brother, while another graduate, who is leading a research team this year to Antarctica, grew up in Kinhead Hall (formerly a men's dormitory), the building that now houses our office and where we publish *Odyssey*. Her father was a UK professor of history, a professor of mine in my freshman year, as well as director of men's residence halls. Another alumnus featured, and who is now working to develop support for the Kentucky Education Reform Act, is someone I have known since we were children. Still another, who had a distinguished career as an English professor at UK, is married to my patient but long-suffering violin teacher in elementary school.

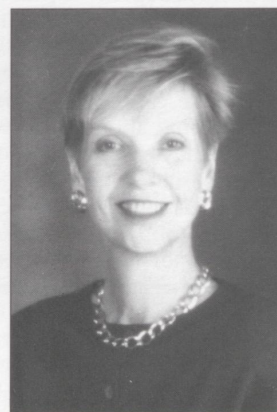
But perhaps these ties aren't so unusual after all. The University is a family, albeit a large one, and our connections, ties and scope reach around the world—through our graduates. Among the recollections of this issue's alumni, many of you may also find old friends, or reminders of professors, classes or memories of your time at UK. I hope you will. And if you are a alumnus of one of UK's graduate programs, I hope you will take the time to fill out the form on pages 23 and 24 and send it to us. We will continue to share as many of your responses as possible in future issues of *Odyssey*.

Impact and Achievements of UK Graduate Program Alumni

*compiled and edited
by Susan Hodgetts Stempel*

Diana H. Wall Freckman

*Ph.D., Plant Pathology, '70, is president of the American Institute of Biological Sciences, which has more than 80,000 biologists as members from over 40 scientific societies. This year she is leading a research team to study the "simplest food web in soils in the Dry Valleys of Antarctica." With her hometown as Lexington, Freckman is also a "child" of the University: she grew up in Kinhead Hall (now the home of *Odyssey*) when her father, Bennett H. Wall, was director of men's residence halls and a professor of history. She recalls*



Diana H. Wall's early years were spent on the UK campus where her father was a professor. Now she is leading a research team to Antarctica and also heads a biological sciences group comprised of over 80,000 members.

HONORABLE MENTION

that the "Fabulous Five" [basketball] and football teams lived in Kinkead and Bowman Halls. Currently, Freckman is director of Natural Resource Ecology Laboratories and associate dean for research at Colorado State University in Fort Collins.

Claude M. Vaughan

M.A., Ph.D., Business & Economics, '67, is state budget director for Kentucky. Among his career highlights, he includes his role as executive director of the Governor's Economic Development Commission and his time as a professor of economics at Eastern Kentucky University. Vaughan received a fellowship while doing his graduate studies at UK and worked with Dr. Virgil Christian on a project studying the economic impact of Kentucky toll roads. Vaughan says an early opportunity he had to work with Coach Adolph Rupp was "an experience of a lifetime."

Jean Gardner Pival

M.A., English, '61, recently retired as an associate professor of English at UK. A native of Springfield, Ohio, Pival resides in Lexington. Among her accomplishments at UK is the establishment of the linguistics program and the organization and establishment of the English Institute. One of her publications, *The Writing Commitment*, which she co-authored, is in its fifth edition.

Jonathan Stuart Graciala

M.B.A., Business & Economics, '66, is the deputy director of the Illinois Department of Commerce and Community Affairs. Originally from Yonkers, New York, Graciala received both his undergraduate and graduate degrees from UK, and twice received the H.B. Earhart Fellowship in Accounting.

Mark S. Snell

J.D., Law, '86, is a Houston attorney who was recently honored by those within his profession for his advocacy of low-cost legal services for the poor and pro-bono legal assistance to charitable organizations. According to a feature in *The Houston Chronicle*, Snell also has instituted nationally acclaimed programs for hunger relief and youth services. Snell was born in Owensboro, Kentucky.

LeRoy Victor Smith

M.S., Physical Education, '63, continued his education after UK by earning a Ph.D. at California Western University in 1977. Now chair of physical education at Kentucky State University, Smith was selected football coach of the year on four separate occasions. Smith has served as secretary of the Franklin County Hospice in Frankfort and is a Paul Harris Fellow with Rotary International. Smith is married to Dr. Mary Smith, president of Kentucky State University and an alumnus of the UK College of Education.

Mark R. Elliott

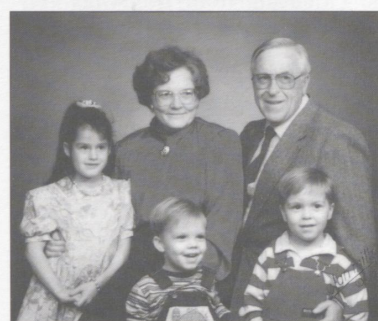
M.A., Ph.D., History, '74, resides in Wheaton, Illinois, where he is a professor of history and director of the Institute for East-West Christian Studies at Wheaton College. The Institute, which Elliott founded in 1986, seeks to provide the church, academia and the media with a better understanding of Christianity in the former Soviet Union and East Central Europe and to facilitate Christian ministries in these areas. A prolific author, Elliott is also called upon frequently for radio, newspaper and magazine interviews and for academic and church-related addresses. His speaking engagements have included presentations at Harvard and Oxford universities. He and his wife, Darlene, are the parents of four children adopted from Vietnam and Colombia.

Stephen E. White

M.A., Ph.D., Geography, '74, a native of Frankfort, Kentucky, is a professor of geography at Kansas State University and served as head of the department between 1979 and 1987. In 1991 White received one of only six awards for distinguished teaching given by the National Council for Geographic Education, and he received the Kansas State University Outstanding Undergraduate Teaching Award for 1988. An active researcher as well as teacher, White has headed projects funded by the National Science Foundation, the Ford Foundation, the General Service Foundation and the U.S. Department of the Interior.

Ruth Danner Wilson

M.A., Education, '68, is director and owner of Rainbow Children Services in Louisville, Colorado. Wilson describes RCS as "a group home for children with intense emotional and physical needs." Originally from Lexington, Wilson has had numerous positions, all in areas of helping people. Her jobs have included teaching el-



Ruth Wilson and her husband, Elmo, are shown here with their three grandchildren—Misty, Austin and Jesse. The couple has five adopted children.

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HONORABLE MENTION

ementary school for 18 years, serving as a rape crisis counselor, a domestic-abuse counselor, a deputy probation officer, a foster parent for 12 years, and a group home director for 102 children for three years. In addition, she has adopted five children, three of them Vietnamese, and is the grandmother of three children.

C.G. Mammel

M.A., Ph.D., Economics, '73, resides in Colorado Springs, Colorado and is chair and CEO of Norwest Banks of Colorado Springs. He has also served as chair, president and CEO of three other banks in Colorado.

Carla H. Hay

Ph.D., History, '72, developed the Women's Studies Program at Marquette University. An associate professor of history at Marquette, Hay has held numerous leadership positions, including being the first woman elected president of the national history honor society, Phi Alpha Theta, and serving as president of the Midwest American Society for Eighteenth-Century Studies. Originally from Louisville, Hay resides in Waukesha, Wisconsin.

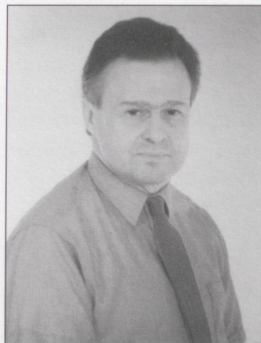
Jerry P. King

M.S., Ph.D., Mathematics, '62, is a professor of mathematics at Lehigh University in Bethlehem, Pennsylvania. Formerly, King was dean of the Graduate School at Lehigh. A recent book authored by King, titled *The Art of Mathematics*, has received a great deal of national attention. King is originally from Murray, Kentucky.

James Stephen Walter Wilson

M.S., Ph.D., Anatomy and Physiology, '67, is the only medicolegal detective in Kentucky. A Kentucky native, Wilson lives in Brownsville. After graduating from UK, he went on to Duke University Medical School, where he earned an M.D. in 1967. He describes

the work he does as "for the 'little man'" who has no advocate in medicine. Wilson has also been a consultant with the National Institutes of Health for 12 years, a professor of molecular medicine and pathology at the University of Tennessee, a member of the graduate faculty at both Duke University and the University of Tennessee, and author of 185 scientific papers. Having published one book, he is currently writing three others with one near completion and titled *Near Misses—The History of Kentucky Aviation*. Wilson was formerly a naval aviator. As a graduate student at UK, Wilson had an NIH fellowship and worked with Dr. Lois A. Gillian, anatomy, and Dr. M.B. Quigley, dentistry.



James S.W. Wilson plays a number of roles—as Kentucky's only medicolegal detective, a professor, consultant, author and a former naval aviator.

Marvin W. Hurley

M.A., Music, '62, has been organizing, building and structuring a public-school orchestra program for the Washington County school system in Hagerstown, Maryland, as well as teaching in the program. Hurley has taught elementary and secondary music for 30 years and has directed an award-winning high-school orchestra for 25 years. His wife, Nancy, is a biology teacher; they have two sons, both in high school.

William D. Bishop

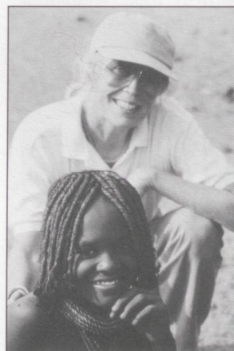
M.B.A., Business & Economics, '65, is president of Quintana Coal Company in Lexington. As a graduate student at UK, he held research and teaching assistantships and worked with Dr. John Fulmer in the UK Bureau of Business Research.

Allison Connelly

J.D., Law, '83, is the first woman to hold the position of public defender in Kentucky and one of only two or three women in the country directing a state's public defender program, according to UK law professor Carolyn Bratt. Connelly is primarily involved in work concerning the death penalty. She resides in Frankfort, Kentucky.

Elisabeth Braun (formerly Elsemie Esser)

M.A., Ph.D., Patterson School of Diplomacy and International Commerce, '63, is now in Namibia, Africa, where she is writing a book titled *Portraits in African Conservation*, which will be published in the U.S. in the fall of 1994. She says she is now in her fourth career over a 30-year period. Braun has also been vice president for international marketing and sales for Ameri-



World traveler Elisabeth Braun is shown here with a young Himba girl in the Kaokoland in northwestern Namibia. Braun is currently writing a book titled Portraits in

African Conservation and has spent two years in Africa interviewing people and researching their lives. Her book will be published this year.

HONORABLE MENTION

can Express since 1979 and vice president for integrated payment systems since 1985. Originally from Cologne, Germany, Braun says, "International curiosity brought me to the United States for graduate studies and that curiosity has been with me ever since...The sum total of my achievements is that I have built on each previous experience to arrive at where I am today: independent, writing on a subject I care about." She says she remembers "my years at UK with fondness and particularly my time under the mentorship of Professors Vandenbosch and Wasserman, both deceased."

Robert A. Collins

M.A., Ph.D., English, '60, founded the International Conference on the Fantastic in the Arts, which will have its 15th annual meeting in Ft. Lauderdale in March 1994. Collins, a professor and co-chair of the Florida Atlantic University Department of English and Comparative Literature, also edits an annual reference volume titled *Science Fiction and Fantasy Book Review Annual*, now in its fifth edition.

Jim Kovach

M.D., Medicine, '84, was recently featured in Cleveland's *The Plain Dealer* for his career change from middle linebacker for the New Orleans Saints to his role with Edison BioTechnology Center, which is centered around finding technology that can be turned into commercial products. Kovach earned his UK medical degree by taking classes each spring after the football season was over. However, after finishing his football career, he decided to pass on a medical career and instead earned a law degree at Stanford. Now in his new role, Kovach says he is able to put to use both his medical and legal training as he works toward developing Ohio's biotechnology business.

Marty Birkenthal

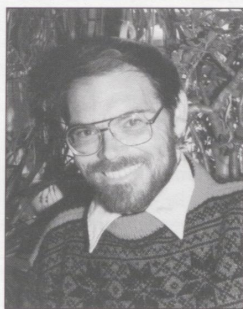
M.S., Geography, '72, has been very involved in the planning and implementing of rail rapid-transit service in the San Francisco Bay area for the past 16 years. Originally from New Jersey, Birkenthal earned both his undergraduate and graduate degrees in geography from UK before settling in San Francisco. He says his goal from the time of entering UK was to "be intensely involved in the field of rail transportation and urban planning."

Nicholine Mellish Core

M.A., Spanish, '71, is director of Parent Programs and Special Events at an independent boys school, Landon School, in Bethesda, Maryland. As director, she has headed the school's major fund-raising event since 1989. Called "The Landon Azalea Festival, its proceeds go to assist scholarship recipients and, under Core's leadership, the contributions have doubled during her tenure. She cites as one of her most important career achievements the raising of her two sons. Born in Steubenville, Ohio, Core now resides in Potomac, Maryland.

Jim Conrad

M.Sc., Botany, '72, describes himself as a "freelance writer, eco-tourism guide, tropical naturalist." Abroad most of the time, Conrad makes his home in Calhoun, Kentucky. He has published



Jim Conrad spends much of his time abroad, writing and serving as an eco-tourism guide.

over 200 articles and stories in nationally and internationally distributed magazines, and has authored three books. Currently, he is under contract to write *A Naturalist's Guide to Mexico* for Mountaineers Books of Washington State. He says his most significant career achievement to date "...is reaching 45, having led an interesting life, and finding myself not in debt a single cent."

Joseph Essex

M.S., Physical Education, '91, received the top award for student research presentations for his thesis project presented at a National Aerospace Medicine Association meeting. Essex was competing with other graduate students, most of whom were studying in departments of physiology or biomedical engineering. Subsequently, Essex applied for and received the one naval officer's commission in flight physiology for that year, overcoming, as his UK advisor Ronald Bulbulian says, "...stiff competition from medical students normally targeted for such positions." Lieutenant Essex is currently in training as a jet pilot and continues his training as a flight physiologist in San Diego, California.

Richard C. Lamb

Ph.D., Physics, '63, came to UK as a graduate of the Massachusetts Institute of Technology. As a graduate student here he was awarded fellowships by the UK Research Foundation and the National Science Foundation. While completing his doctorate he worked with UK's Marcus McEllistrem on an NSF project. Now a professor of physics at Iowa State University in Ames, Iowa, Lamb has played a key role in the discovery of high-energy radiation from a distant, active galaxy and co-developed a sensitive detector of very high energy cosmic radiation.

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HONORABLE MENTION

Donald L. Fowler

M.A., Ph.D., Political Science, '66, is a retired colonel in the U.S. Army Reserve and president of Fowler Communications, Inc., an advertising and public relations firm located in Columbia, South Carolina. Active in politics, Fowler was chief executive officer for the 1988 Democratic National Convention and former chair of the South Carolina Democratic party. Fowler has also been a professor at the University of South Carolina.

C. Henry Besten, Jr.

M.B.A., Business & Economics, '72, serves as senior vice president for Ashland Coal, Inc. in Huntington, West Virginia.

Travis Talmadge DuPriest, Jr.

Ph.D., English, '72, went on to study at Harvard, receiving an M.T.S. in 1974 and then went for a year of study at the University of Durham in England. Now executive director of the DeKoven Foundation in Racine, Wisconsin, he is currently on leave from his position as professor of English at Carthage College in Kenosha, Wisconsin. As a student at UK, he received an NDEA fellowship and worked with Carolyn Hammer in the Rare Book Room of the King Library, composing and printing on letterpress books by Thomas Merton and Wendell Berry. DuPriest is also an Episcopal priest, an author and a poet.

Anna Laura Hood Page

M.A., Music, '67, is a free-lance composer and organist. She has published a number of compositions, conducts clinics on music, and participates in festivals, concerts, and composer weekends with colleges and churches nationwide. Originally from Louisville, Page resides in Clarksville, Tennessee.

Ron Carson

M.A., Political Science, '72, went on to earn another graduate degree, an M.P.A., from the University of Southern California in 1975. As deputy state budget director for Kentucky, he has served under four consecutive governors—Governors Brown, Collins, Wilkinson and Jones. Previously, he was a budget analyst under Governors Ford and Carroll.

Rice Cowan Leach

M.D., Medicine, '66, has been commissioner of health for Kentucky since 1992. Previously, he was chief of staff in the Office of the Surgeon General of the U.S. Named a Distinguished Alumnus of the UK Medical Alumni Association, Leach provided direct clinical care to American Indians through the Indian Health Service between 1966 and 1988. After graduating from UK, he earned a degree in health services administration from Harvard University. Leach has also served in a public health service capacity in Guatemala, La Paz, Bolivia and Panama. A native of Lexington, Rice and his wife, Mireille Labbe Leach, have three children.

Thelma Beeler

M.A., Education, '57, has been recognized by Ashland Oil, Inc., as one of the top 10 teachers in Kentucky. Beeler began her career as a teacher in 1922, and since her retirement in 1974 still substitute teaches, asking for the maximum allowable 100 days of substitute teaching each year. Her chief domains as a teacher were drama, speech and English when she was teaching full-time. Her long-time role in directing the annual school plays led Lafayette High School to name its auditorium after her. For the last several years, Beeler has worked with problem students through the Suspension and Failure Eliminated (S.A.F.E.) Program. As one 1993 Lafayette High School (Lex-

ington) sophomore describes Beeler's continuing interest in teaching, "She likes what she's doing and students respect her for it."



Thelma Beeler, named one of Kentucky's top 10 educators, receives her award from Governor Brereton Jones. Beeler was a teacher of one former Kentucky governor, John Y. Brown, Jr.

James F. McDonald

M.S., Engineering, '64, was recently elected president and chief executive officer of Scientific-Atlanta, an international communications systems company. McDonald holds two patents, one on image printing and one for computer terminals. He serves on several boards, including Burlington Resources, Data Beam Corporation (owned by former UK faculty member Lee Todd), and Cadis, Inc. Before this most recent appointment, McDonald was a general partner specializing in high technology companies with J.H. Whitney & Company, a private investment firm in New York. McDonald and his wife, Paula, have three daughters and have recently relocated from Illinois to Georgia.

Oscar C. Page

M.A., Ph.D., History, '67, is president of Austin Peay State University in Clarksville, Tennessee. He has taught at the University of Georgia and has served as an administrator in higher education since 1971. A native of

HONORABLE MENTION

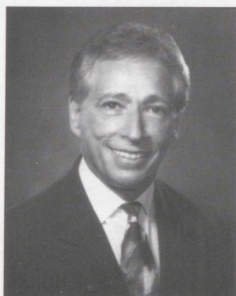
Bowling Green, Kentucky, Page was the recipient of a Haggin Scholarship at UK as a graduate student.

Mitch McConnell

J.D., Law, '67, was elected in 1990 to his second term in the U.S. Senate. Among the committees he serves on and posts he currently holds, McConnell is the vice chair of the Senate Select Committee on Ethics and is the Senate Republican leader of election law reform. As a student at the University of Kentucky, he was elected president of the Student Bar Association. His first venture into a political career came when he was a summer intern for Senator John Sherman Cooper. After graduating from UK, McConnell became chief legislative assistant to former Kentucky U.S. Senator Marlow Cook. McConnell also served as deputy assistant attorney general under President Gerald Ford. A native of Louisville, he is the father of three daughters, Ely, Claire and Porter, and recently married Elaine Chao, president of the United Way of America.

Alvin S. Baraff

Ph.D., Psychology, '63, is a psychotherapist and the author of numer-



The new book Men Talk, by Alvin S. Baraff, is described by another author in the field as "An antidote to the man-

bashers . . . When men speak for themselves, the similarities greatly outweigh the differences between the sexes."

ous scholarly and popular articles, and has appeared on television shows such as "Geraldo," "Dr. Ruth," "Nightwatch," "Oprah," and "CBS This Morning." One of his recent books is titled *Men Talk: How Men Really Feel about Women, Sex, Relationships, and Themselves*, which is described as "the first book to take readers into the intimate circle of men's therapy groups." Baraff is also director and founder of MenCenter in Washington, D.C.

Ruth Bradfute Heizer

M.A., Philosophy, '65, continued her studies after UK, receiving a Ph.D. from Indiana University and an M.R.E. from the Southern Baptist Theological Seminary. A professor and the chair of philosophy at Georgetown College in Georgetown, Kentucky, Heizer graduated number one in her undergraduate class at Baylor University and was the recipient of numerous awards and honors during her college years. Now married to James Heizer, a professor of history at Georgetown, the couple has three children. Heizer was born in Knoxville, Tennessee.

Ronald K. Gaynor

M.S., Civil Engineering, '82, has been appointed vice president of the American Ecology Corporation in Houston. In his new assignment, Gaynor will take responsibility for disposal, transportation, treatment, and development activities within the radioactive waste operation. He will continue his current duties as vice president for corporate development for the company's facilities in California and Nebraska.

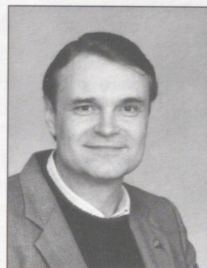
Beverly Nickell Raimondo

M.S.L.S., Library Science, '69, serves as director of community support for the Prichard Committee for Academic Excellence. For 21 years she worked at IBM in Lexington and retired when IBM was sold to LexMark. She says she began her "second career of develop-

ing grassroots support groups, in support of the Kentucky Education Reform Act."

John C. Hunsaker III

M.A., J.D., M.D., German, Law and Medicine, '77, came to UK as a graduate from Yale College in New Haven, Connecticut. He is a lawyer and physician, practicing what he describes as the "obscure specialty of forensic pathology." As an associate professor of pathology at UK and as associate chief medical examiner within the Kentucky Medical Examiner's Program, Hunsaker describes the demands of his work—"The professional who deals with death every day needs to have a personality with well-grounded coping mechanisms..."; yet, he says, "...it is an intensely satisfying personal experience to aid the bereaved in understanding how and why their beloved died." Originally a native of Ashland, Kentucky, Hunsaker is married to Brenda C. Bender, a UK graduate with a B.A. in family studies and an M.S.W. in social work.



Forensic pathologist John C. Hunsaker III is both a lawyer and physician. He says his work in dealing with death requires a personality well-grounded in coping mechanisms.

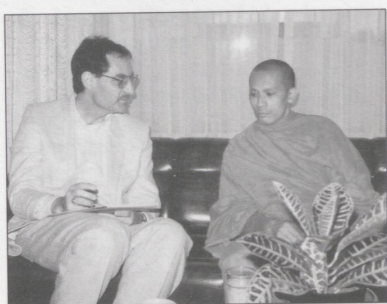
Christopher D. Tori

Ph.D., Psychology, '71, worked in Kentucky for two years after graduation, coordinating the drug treatment programs of the Blue Grass East Comprehensive Care Center. Afterwards, he returned to his home state of California to work with addicts and those

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suffering from severe personality disorders. Now on the faculty of the California School of Professional Psychology in Alameda, he recently spent a sabbatical year in Thailand as a visiting professor at Thammasat University in Bangkok, where he received training in Buddhist meditation practices. He explains that the meditation practices "...are very relevant to the problems of addicts and those who lack adequate self-control." As a student at UK, Tori had a Haggin Fellowship and studied psychotherapy outcome with Dr. William T. McReynolds.



Psychologist Christopher Tori studied Buddhist meditation practices while on a recent sabbatical in Thailand.

VirginiaAnn Greer Shadwick

M.S.L.S., Library Science, '87, served as president of the California Faculty Association between 1985-1989. She is currently president of the National Council for Higher Education, National Education Association, and has been serving in this capacity since 1989. A resident of Pacifica, California, the Frankfort, Kentucky native is projects librarian at San Francisco State University.

Chris Gorman

J.D., Law, '67, is the attorney general for Kentucky. Among his accomplishments as attorney general is the establishment of a select Task Force on Child Sexual Abuse that produced a

nationally recognized package of model laws and practices. He has also been active in lobbying for the passage of sweeping new laws aimed at the prevention and punishment of domestic violence. Gorman has been elected chair of the Southern Conference of the National Association of Attorneys General. A native of Louisville, he currently resides in Frankfort.

James B. Day

M.S., Mechanical Engineering, '69, is director of engineering (propulsion systems) for the U.S. Air Force at Wright-Patterson Air Force Base in Ohio. Originally from Whitesburg, Kentucky, Day received both his undergraduate and graduate degrees from UK. He cites attaining the senior executive service rank, the highest civilian rank achievable, at age 43 as one of the highlights of his career. Day and his wife are the parents of two daughters, Kathy and Beth, who are both students at UK in mechanical engineering.

Marilyn Jean Poulter Musacchio

M.S.N., Nursing, '76, was a Kellogg Fellow during her graduate studies at UK and went on to earn a Ph.D. at CASE Western Reserve University. Now an associate professor and director for nurse-midwifery at the University of Alabama in Birmingham, Musacchio also earned the rank of Brigadier General as an Army Nurse Corps officer in the U.S. Army Reserves. Musacchio is originally from Louisville.

Gordon F. De Jong

M.A., Ph.D., Sociology, '63, has been named a distinguished professor of sociology and director of the graduate program in demography at Pennsylvania State University. A native of Gray Hawk, Kentucky, De Jong cites among his accomplishments having provided

externally funded pre-doctoral awards to third-world graduate students in population studies for the past decade, and integrating students into the over \$2.9 million in grants for research and training projects he has headed. As a graduate student at UK, De Jong received support from the UK Research Foundation and worked with Dr. Thomas Ford on a southern Appalachian survey project which was associated with the Kennedy administration's war on poverty in Appalachia.

Pamela Guthrie

Ph.D., Clinical Psychology, '93, has already authored several publications about services for the severely mentally ill and, during her graduate work at UK, served as research coordinator for a National Institute of Mental Health grant to study crisis intervention for severely mentally ill adults in Kentucky. Now a research associate at Vanderbilt University, the new graduate's UK department chair, Mike Nietzel, says she is on her way to "a nationally prominent research career."

Lorraine D. Rodriguez

Ph.D., Microbiology, '73, received her Ph.D. nearly 30 years after earning her master's degree at Ohio State University. She points out that "...My oldest daughter, Carmen, and I, as well as her future husband, graduated in the same



Lorraine D. Rodriguez, shown here with her husband Juan, has retired from UK but has continued her work in science through the Kentucky Academy of Sciences.

HONORABLE MENTION

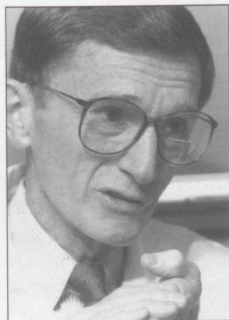
[UK] convocation in 1973." Rodriguez worked for 10 years at UK on pesticide impact assessment and pesticide applicator training. She says that in retirement she has continued to work with the Kentucky Academy of Sciences as a volunteer and recently prepared "Kentucky Mentors-Women in Science, Mathematics and Engineering" profiles of 145 professional women willing to serve as mentors to high-school girls.

Thomas W. (Tim) McClure

M.S., Entomology, '84, owns Buck Creek Perennials in Finchville, Kentucky, a business which he describes as one of Kentucky's largest perennial nurseries. As a graduate student at UK, McClure worked with Dr. Dan Potter studying tree borers and grub control. He describes his education at UK as "a key ingredient to my success." He and his wife, Kathryn L. McClure, have three children.

William R. Markesbery

M.D., Medicine, '64, is director of the UK Alzheimer's Disease Research Center and the UK Sanders-Brown Center on Aging, which has been determined by the National Institutes of Health to be the best aging center in the U.S. He also is a professor of neurology, pathology and anatomy at UK. Known internationally for his expertise in neurology and Alzheimer's disease, Markesbery is a member of the Univer-



Under William R. Markesbery's direction, UK's Sanders-Brown Center on Aging has been named as the best aging center in the U.S.

sity of Kentucky Hall of Distinguished Alumni and a Distinguished Alumnus of the UK College of Medicine. In 1991 he served as president of the American Association of Neuropathologists.

Jill W. Hall

M.A., Communications, '70, continues her studies at UK as she works toward her Ph.D. in communication. Now residing in Louisville where she is an assistant professor of speech and communications at Jefferson Community College, she is also working with Professors Ramona Rush, communication, and Tom Stipanowich, law, on research related to the Mediation Center in Lexington, which opened in June 1992.

J. David Whitehouse

M.S., Civil Engineering, '67, is the president of two companies in Lexington—Howard K. Bell, Consulting Engineers, Inc. and Aqua/KWS, Inc. In a 1989 feature in the *Lexington Herald-Leader*, Whitehouse is described as earning his living "by tackling problems other people would rather forget"—waste disposal, for example, or designing earthquake-resistant buildings. Son of prominent Lexington physician A.J. Whitehouse, David Whitehouse decided early on that he didn't want to be a physician. "I really had no desire to get into medicine. I always liked to build things." Whitehouse's daughter, Leanne Marcum, shares her father's interests and is also a civil engineer. As a UK graduate student, Whitehouse worked with Dr. Robert Lauderdale on a Water Resources Institute grant to study the removal of pesticides from water. Whitehouse is married to Susan Clay Whitehouse.

Barney O. Barnett

M.S., Agricultural Economics, '72, is president and CEO of Farm Credit

Bank of Louisville. The Kentucky native, who also received his undergraduate degree at UK, resides in Shelbyville.

Fraya Pugh Clark

M.S., Library Science, '69, is an English teacher at the West Virginia School for the Deaf and Blind in Romney, West Virginia. A resident of Slanesville, West Virginia, Clark has been teaching since 1965 at a number of schools in Virginia and West Virginia.

Sister Mary Francis Dirr

M.A., Special Education, '67, came to UK from Villa Madonna College (now Thomas More College) to pursue a graduate degree in special education. She says her years at UK hold fond memories for her. She particularly appreciates the "dedicated faculty, especially Dr. Albert Levy, for their valuable contributions to the field of special education and the enthusiastic spirit they transferred to us." Dirr resides in Bellevue, Kentucky, where she is coordinator of special education at St. Michael School.

Jennifer Coffman

J.D., Law, '78, has made history this October by becoming Kentucky's first female federal judge. Her appointment is to the bench of the U.S. District Court for the Eastern District of Kentucky. The lifetime appointment is, as described by UK law professor Carolyn Bratt, "...an extremely impressive judgeship to secure. Judge Coffman joins a very small handful of women who serve as judges in the federal system." As an attorney, Coffman won a \$1.2 million age-discrimination judgment for miners laid off by a steel mining company in Harlan County. She also represented UK basketball recruits Shawn Kemp and Sean Woods during the NCAA's investigation of the UK basketball program. Coffman is

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married to Wesley Coffman and the couple have two children, Will, 13, and Blair, 9.

Lexington Herald-Leader



Jennifer Coffman's recent appointment as a judge for the U.S.

District Court in the Eastern District of Kentucky marks the first time in Kentucky history that a woman has been appointed to the federal bench. Coffman's husband is shown beside her at the October swearing-in ceremony.

Martha May McCarthy

M.A., Curriculum & Instruction, '69, attended UK both as an undergraduate and graduate and then continued her studies at the University of Florida, receiving both an Ed.S., '74, and a Ph.D., '75. A professor of education law and policy at Indiana University, her contributions have been recognized by many awards and prizes. A prolific researcher, she has written or co-authored five books and written over 150 articles. McCarthy started the Indiana Network of Women Administrators in 1981, and the organization now has a mailing list of over 300. She was inducted into the UK Alumni Hall of Fame for the College of Education in 1991, and the same year she was named the sixth recipient of the Tracy M. Sonneborn Award for distinction in teaching and research at IU.

Glenn B. Collins

M.S., Agronomy, '63, continued his studies after receiving an undergraduate and graduate degree from UK by earning a Ph.D. at North Carolina State University. Now with a national reputation as an outstanding researcher and teacher (and featured in *Odyssey* several times), Collins is a professor of agronomy at UK. He has also served as

associate dean for research and has held the Philip Morris Professorship. A valuable mentor to UK students and graduates, Collins cites his most significant career achievement as the development of his students.

Ted Strickland

Ph.D., Education Psychology & Counseling, '80, has the distinction of being the first psychologist in Congress after his election in 1992 as a member of the House of Representatives from southern Ohio. Licensed as a clinical psychologist in 1983, Strickland has worked as a consulting psychologist for a maximum security prison and has been a faculty member at Shawnee State University. Regarding Strickland's new career direction, UK faculty member Judith Worell notes, "Psychologists have seldom applied their expertise and understanding of people and how they change to the political process. This is a landmark event and should be recognized and celebrated." He is married to another UK graduate, Frances Smith. The couple reside in Lucasville, Ohio, Strickland's hometown.

Martha Desposito

M.A., Fine Arts, '90, is making a name for herself as an artist in Ohio. Recently featured in a Cleveland newspaper, *The Plain Dealer*, Desposito had an art show this past spring titled "Cats and Other Entities." Although she considers herself a painter, Desposito uses fabric extensively in her work, much of which involves animal and human figures. In 1992 she was featured in *Fiberarts Design Book Four*, published in English and Japanese. She plans a show at the Wasmer Gallery of Ursuline College this December. Desposito lives in Chagrin Falls, Ohio.

Timothy M. Lake

M.M.A., D.M.A., Music, '91, is a young

musician already being given some attention by the music world. According to a concert preview in *The Atlanta Constitution*, Lake has "composed what might be the first concerto for five-string banjo and symphony orchestra." Lake's work was premiered at Emory University with the Atlanta-Emory Orchestra in April of 1993. Other appearances include the Al Jolson One Hundred Birthday Festival in New York City, numerous appearances in Ecuador, Cincinnati, the International Music Festival in Graz, Austria and the Telemark Festival in Norway. Lake studied at UK under the guidance of composer Joseph Baber. The musician has also recently released an eclectic banjo album titled "Only in the Movies," through Padraig Records, a recording company he owns. Originally from Manhattan, New York, Lake resides in Lexington.



Among Timothy Lake's musical accomplishments are several releases, including "I Can Play the Banjo," "Sweet 'N Sour," and "It's Got to Be Love." The young musician, named

in the 1992 and 1993 editions of Who's Who among Rising Young Americans, also gives private music lessons at a local music company in Lexington.

Forrest W. Calico

M.D., Medicine, '66, is president of Appalachian Regional Healthcare, Inc. Originally from Lancaster, Kentucky, Calico resides in Lexington. After earning his M.D. at UK, he earned an M.P.H. at Harvard School of Public Health in 1970. He is also presently serving a term, appointed by the governor, as a member of the Kentucky Long-Term Policy Research Center Board.

Information for *Odyssey Magazine*

Outstanding Accomplishments of our Graduate School Alumni

Please type or print

Your Name: _____

If your name was different at the time of your graduation, please indicate that name as well: _____

Address: _____

Phone: _____

[Office] _____

[Home] _____

Hometown: _____

Undergraduate Degree and Year Conferred: _____

Name of Institution Granting Your **Undergraduate** Degree: _____

Year Your UK **Graduate** Degree Awarded: _____

Degree: _____

UK College: _____

UK Department: _____

Additional Graduate Degrees

Degree: _____

Institution: _____

Year Awarded: _____

Degree: _____

Institution: _____

Year Awarded: _____

Professional Experience

Current Position: _____

Name of Company/Institution: _____

Location: _____

Career Highlights: _____

UK Background

Were you a fellowship or scholarship recipient while at UK? ☐ Yes ☐ No

If yes, please indicate the name of the fellowship or scholarship: _____

Were you involved in working on any faculty research projects during your graduate years at UK? ☐ Yes ☐ No

If yes, please complete the following:

Name of faculty member(s) with whom you worked: _____

Department: _____

Brief description of project: _____

Agency, if any, that funded the research: _____

(include additional pages if needed)

-over-

What do you consider your most significant career achievement to date?:
(include additional pages if needed) _____

Any other information you would like us to have: _____

Current Date: _____ Your Signature: _____

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KIOSK

New High-Tech Ventures Expected to Flourish

Devoted to research in five high-technology areas—molecular biology, computational sciences, biomaterials, material sciences, structural engineering—ASTeCC (the UK Advanced Science and Technology Commercialization Center) received its final federal installment of roughly \$4.5 million, and will be “up and running,” according to David Watt, “sometime between April and September” of 1994.

Watt, vice chancellor for Research and Graduate Studies, and director of ASTeCC, sees the \$18 million center as having two roles: as a research hub, fostering resident interdisciplinary faculty and staff to spur one another to high-tech discoveries, and as a commercialization center, housing for-profit corporations to develop those discoveries.

Kentucky Technology, Incorporated (KTI), a for-profit corporation wholly owned by the university, “will be assisting in the creation of new for-profit businesses that will be located in the ASTeCC building,” Watt stresses that the role of ASTeCC is to provide a research center for the development of discoveries that may lead to new business.

Once ASTeCC has nurtured these discoveries through their infancy to full-fledged commercialization, the community-at-large—that is, the entire commonwealth—will reap the benefits in the form of

large-scale production undertaken by new or existing businesses, Watt says.

“It’s a very exciting time,” Watt adds, “because ASTeCC fulfills a number of possible functions. It provides an outlet for faculty members who have entrepreneurial interests, it fulfills the university’s commitment to economic development, and it’s potentially an alternate source of income for the university in a time of shrinking resources from the state.”

AIDS: More Clues

HIV will infect 40 to 50 million people worldwide by the turn of the century, virtually ensuring that the scourge of AIDS will extend its global ravages, according to projections by the World Health Organization. The ongoing race for clues and interventions is fervent, and a postdoctoral fellow at the University of Kentucky is among the army of investigators. Elizabeth Fitzpatrick, working in the lab of Donald A. Cohen, associate professor of microbiology and immunology, has been investigating murine AIDS, using a mouse retrovirus that causes an AIDS-like immunodeficiency in susceptible mice.

While neither the same virus as HIV, nor the same disease as human AIDS, this retrovirus has similarities that, according to Cohen, “make it amenable to experimentation, and hopefully will shed light not only on the disease process

in the animal model, but also on human HIV infections as well.”

Cohen, who came to UK in 1982, says his lab has continued to investigate the interaction of normal T lymphocytes with other cells in the immune system. His AIDS-related research was a natural outgrowth of this work: helper T lymphocytes are the critical cells in the immune system affected by both AIDS and murine AIDS. Cohen says, “We’re interested from the viewpoint of immunologists, learning how the interactions between normal cells and affected cells are changed by this virus infection.”

“What we’re focusing on in our research,” Fitzpatrick says, “is the immunosuppression, which, in murine AIDS and in human AIDS, can lead to opportunistic infections. We’re looking at the mechanisms of that immunosuppression.”

Cohen further explains that, “in HIV infections, before the helper T lymphocytes are actually lost in an individual, those cells don’t function properly.” Helper T cells are the commanders-in-chief of the immune system. They identify the enemy and stimulate the production of other cells to fight the infection.

“That same dysfunction is present in this mouse model,” Cohen says. “What we’re hoping to learn is the mechanism by which this virus

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shuts off the immune system, and compare that with other researchers' results in humans to determine whether or not this really is a reasonable model that will allow us to approach the defect and try to find ways of reversing that defect."

Cohen and Fitzpatrick view their research as two-pronged. Once they have succeeded in identifying the defect, they would like to determine which component of the virus actually induces that defect.

In addition, Fitzpatrick and Cohen have been investigating the possible roles of external co-factors in changing the disease's course. They have been funded, respectively, to look at the effects of alcohol and cigarette smoking, and there is a pending grant to look at the effects of stress. Cohen says clinical evidence suggests each of these factors, in and of itself, "suppresses the immune system, and could possibly synergize with HIV infections and make the disease worse."

Another of their research areas is focused on the killing of certain T helper cells in virus-infected mice, a condition which also occurs in human AIDS. One theory, in both human and mouse models, is that the virus somehow triggers a form of programmed cell suicide, known as apoptosis. Readily discernible from other forms of cell death, apoptosis has been observed both in people with HIV and in Fitzpatrick and Cohen's animals with murine AIDS. "It would seem," Fitzpatrick concludes, "as if the cells are being signalled some way by the virus, which is leading them to become unresponsive and triggering some to undergo apoptosis."

Cohen cautions that their results cannot be generalized to HIV in-

fections at this point. "Until other labs identify what the defect is in HIV infections, we won't know whether or not this model truly reflects what occurs in HIV."

They also agree that researchers are at least several years away from effective vaccines for HIV. Vaccines would have to be developed to produce the most effective immune response. "At this point," Cohen says, "there are some raging arguments in the field as to what is the most appropriate form of the immune response that should be generated by a vaccine to make a person resistant to the virus. And though there is no answer right now, lots of researchers, worldwide, are working to bring that answer to light."

Battling Lung Cancer in Kentucky

First, the depressing statistics. Lung cancer is the leading cause of cancer-related mortality in Kentucky, accounting for 35 percent of cancer-related deaths in 1991. The rate has steadily increased from 1975 to 1989. U.S. Department of Health and Human Services figures for 1984-88 show Kentucky slightly trailing only Nevada nationwide in its death rate from lung cancer. Kentucky's rate per 100,000 people was 60.3 deaths while Nevada's was 60.4.

Despite these numbers, and the human suffering behind them, there has never been a coordinated effort in Kentucky to deal with lung cancer, according to UK oncologist Philip DeSimone. "One reason might be," says DeSimone, who began his medical career at UK in 1967 as an intern, "that lung cancer is very difficult to treat;

people get discouraged because unlike some other cancers, lung cancer doesn't often respond well to radiation or chemotherapy."

Because of what DeSimone calls a "great need for developing more effective treatment," he has begun work with a team of UK medical experts to try to reverse the statistics. With several new pieces of equipment now in place—high-dose-rate radiation equipment, a bronchoscope with video monitor, and a new X-ray system with a fluoroscope (which can examine deep bodily structures)—the project will soon be underway.

Screening for lung cancer is the first step, says DeSimone. "Though in the past screening for lung cancer hasn't proven to be that beneficial, some recent studies show that if you screen heavy smokers over the age of 50, screening can be effective." Those who come in for screening will have to pay a fee for X-rays and other lab work, but the cost will be minimal, says DeSimone.

"One advantage to participants is that a whole team of doctors will be located right on site at the Markey Cancer Center," says DeSimone. "Oncologists, radiation therapists, pulmonary specialists and a surgeon are all involved in the program."

A major component of the project is treatment. DeSimone says that through screening some cancers might be detected in an earlier stage and that the group's interdisciplinary approach will allow the researchers to combine several strategies to treating lung-cancer patients. One method of treatment involves Vitamin A, which, according to DeSimone, has been shown to be effective in

patients with "initial abnormal cancer-like appearance" in the lungs. "The Vitamin A we'll be using is called Accutane," he says. "The patients in this study—people who have had lung cancer that has been cured by surgery—will be taking it daily for three years."

Another component of the study, which will run until the year 2000, is educational. Participants will be given information on the effects of smoking and passive smoke. If you would like information about the possibility of becoming a participant in this study, call Dr. Philip DeSimone at (606) 281-4919 or 257-4491.

Mattson Receives \$100,000 Research Award

Because he was so focused on keying in some recent results from his research on Alzheimer's disease, Mark Mattson almost didn't answer the phone. But then he was very happy he did. The voice on the line was pleased to inform Mattson that he was one of three researchers in the U.S. to receive the 1992 Metropolitan Life Foundation Medical Research Award and the \$100,000 grant that goes with it.

"I just about fell out of my chair," says Mattson. "I didn't know anything about it." He explains that there is no application process for this research award, that Metropolitan Life uses a scientific advisory board to determine the yearly recipients. "I did find out later that Anne Young, the neurology chair at Harvard, had nominated me," Mattson says. "I sent her a very nice letter."

This award has enabled Mattson

to purchase needed equipment so that he can continue his work on the role of calcium in Alzheimer's. He explains that in disorders such as Alzheimer's disease and stroke, there is a massive influx of calcium to the brain's nerve cells. Small amounts of calcium move into the nerve cells during normal memory processes; however, a large calcium influx kills nerve cells by breaking down proteins and cell membranes.

"A lot of evidence indicates that an intracellular elevation of calcium damages neurons," Mattson says. He explains that excitatory neurotransmitters cause calcium movement into brain cells and that a normal influx of calcium allows electrical conduction of impulses between neurons. "But if calcium levels go too high for too long a time, then the cells activate enzymes that chew up the structural proteins in the cells, activity which can eventually kill the cells."

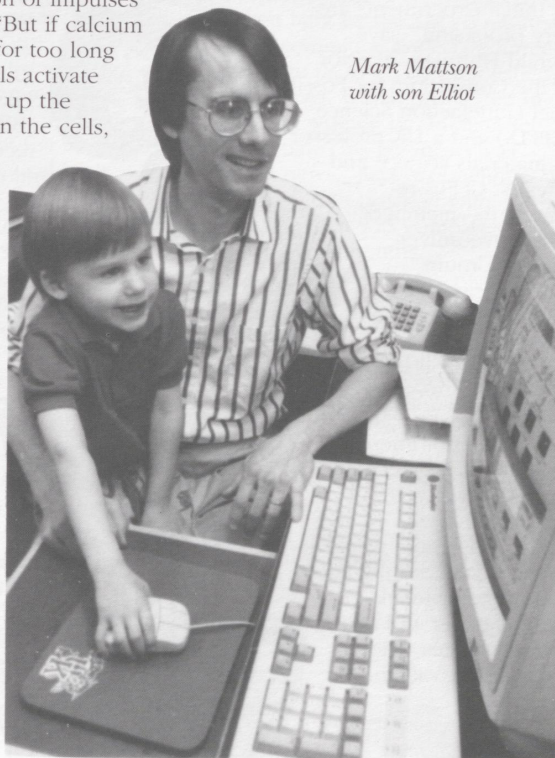
Unlike much research into Alzheimer's disease which uses brain tissue taken after a patient's death, Mattson and his co-workers are using live tissue. The researchers, using cells taken from a rat embryo, place these embryonic neurons in a prepared culture where the cells continue to develop normally. "Normally, as far as we can tell,"

Mattson adds.

Then, using fluorescent dyes, Mattson can "label" nerve cells as they grow and study their calcium levels under a microscope. "We're a long way from having treatments for Alzheimer's disease," Mattson admits, "but we're a lot closer to understanding what leads to cell death. There are some clinical trials that have just begun, based on the premise that calcium elevation is killing the cells."

—Some information taken from Sounding Board, newsletter of the Sanders-Brown Center on Aging

Mark Mattson
with son Elliot



Ken Good

Liquefaction Researchers Talking Some Trash

Question: What do you get when you mix some old rubber tires with coal and disgarded plastic, and toss in for good measure a bundle of newspapers and some garbage?

Answer: Sulfur-free oil.

What we might think of as the ultimate recycling project may become commonplace in years to come as liquefaction science moves into the area of co-liquefaction—developing methods to simultaneously liquefy coal and waste materials.

"Initial experiments are very promising," says Gerald Huffman, director of the Consortium for Fossil Fuel Liquefaction Science (CFFLS) and a UK professor of materials science and physics. CFFLS researchers—members of the five-university consortium which includes Auburn University, the University of Pittsburgh, the University of Utah and West Virginia University—and Department of Energy scientists have recently liquefied coal with rubber tires and with plastics. Other consortium researchers have successfully liquefied waste materials such as paper and agricultural wastes. The use of waste oils in

co-liquefaction processes also looks promising.

"On any list of our country's major problems," says Huffman, "two items that would surely appear are the disposal of municipal waste and our increasing dependence on foreign oil. Co-liquefaction could go a long way in helping to alleviate both of these problems."

"This research is very important because we will rely on coal as a primary energy source for many years," says Larry Anderson, a chemist at the University of Utah, adding that the U.S. has "more coal than the Middle East has oil."

Disgarded plastics make up around 40 percent of our landfills, he says, and the volume is growing.

With a recent \$9.7 million grant from the U.S. Department of Energy, CFFLS will continue its work in both the areas of direct coal liquefaction and co-liquefaction of coal.

"At the present time the rubber and plastics-to-oil process could make money if oil sold for about

\$28 a barrel,"

Huffman says. "The

price now is about \$18 a barrel, but the processing research is in an early stage, so it's likely that further development will drive costs down."

In a meeting last August, the American

Chemical Society said that efforts to commercialize scientific processes to convert plastics and oil will probably be driven by national legislative trends requiring plastics to be recycled. Without such legislation, scientists at the meeting said, the co-liquefaction process could take 10 to 15 years to commercialize.

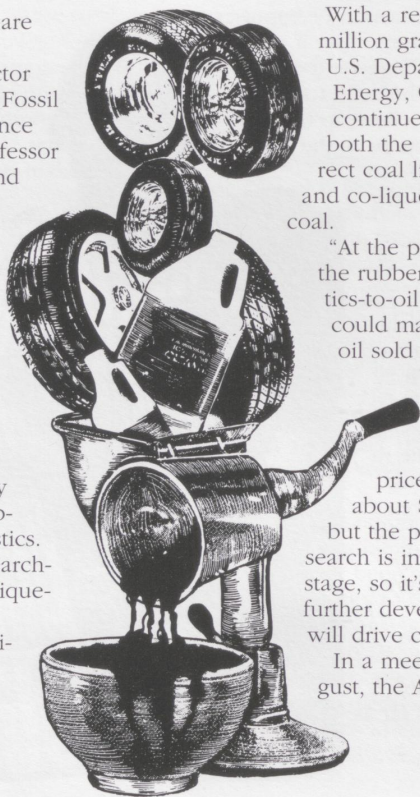
If there is legislation mandating recycling, this could become economical very quickly," Huffman says.

Clinical Trials: Who Should Be Included?

As any scientist knows, the validity of a population-based study depends on the make-up of the population studied. This axiom is at the heart of a recent project by two University of Kentucky researchers who examined various institutional policies and attitudes about the inclusion of women and minorities in clinical trials.

That this study took place at all was the result of a clash between a UK researcher and the university Institutional Review Board (IRB), which is responsible for ensuring that UK investigators are in compliance with federal requirements for the protection of humans and animals used in research.

"Three years ago, I presented a project to the IRB that focused on



a drug we were developing to help people who have cardiac failure," says Daniel Wermeling, an assistant research professor in the College of Pharmacy. "After discussing my proposal with the pharmaceutical company interested in the drug, I followed FDA guidelines, which included a general prohibition against using women of child-bearing potential in such a trial—when the drug is given to people for the first time." This exclusion, however, conflicted with a new NIH policy which stated that women should be included in greater numbers in research. The IRB attempts to oversee research by using a common criteria for approval of research, including FDA and NIH regulations.

"Because of the new NIH policy, the IRB told Daniel it couldn't approve his project unless women of child-bearing potential were included," says Ada Sue Selwitz, director of UK's Research Subjects Office and the IRB. "It was clear that federal guidelines and policies were contradictory," says Wermeling. "So after we talked about it, Ada Sue and I decided to work together to find out how other Institutional Review Boards were handling situations like this."

"It's a policy in flux," says Selwitz, who adds that this recent demand, particularly by women and minorities, to be allowed greater participation in clinical drug trials has led some regulatory groups to be more inclusive. She sees this attitude as a distinct turnaround from three decades ago. "In the '60s some women who during pregnancy took part in the thalidomide trials gave birth to deformed babies," she says. "The re-

sult was a public outcry of, 'Protect us!' That public concern served as the impetus for the development of a system to protect human subjects involved in scientific trials." Thalidomide, a tranquilizer and hypnotic, was found to cause abnormally shortened limbs in the newborn.

To try to understand how university and medical regulatory boards currently view the inclusion of women and minorities in clinical trials, Selwitz and Wermeling developed a survey which they sent to 641 IRBs in the U.S. The UK researchers received 329 responses, a 51 percent response rate.

"We found that most of the IRBs did not have specific policies addressing the selection of subjects with regard to gender, age or race," says Wermeling. He adds that there was a wide range of attitudes reflected in the study, from one board that felt it would "hammer investigators into submission" if need be, to several boards that felt the inclusion of women in clinical trials "wasn't an issue" for them.

"Then we had the people in the middle who said, 'IRBs should have only limited roles in this area,'" says Selwitz. "The middle-range view is that we should raise it as an issue and ask investigators to justify exclusions. If the exclusions are scientifically sound, then we should be willing to accept their justifications."

The issue of including minorities seemed to polarize the respondents much less. "Whether minorities must be included in a trial seemed to be not such a hot topic for the IRBs that responded," Selwitz says. Wermeling explains that in the past researchers have cited statistical problems to justify a "sub-group analysis" of racial minorities when the response of a certain race is

known to differ from that of caucasians. Wermeling cites anti-hypertension drug trials as an example. "Some anti-hypertension drugs have been found to lower the blood pressure of whites, but not of blacks; because their physiological system in regard to hypertension is different, blacks generally don't benefit."

Participation in clinical trials has taken on a new urgency with the spread of AIDS and the rise of AIDS activists, Selwitz says. "The public is now saying, 'Give us access.' And the only way you can have access to investigational drugs is through participating in clinical research trials."

Wermeling's proposed research project, by the way, was given the green light by the UK committee. "The committee ended up agreeing with us to go by established guidelines, which prohibited including women of childbearing potential. This go-ahead was good news," says Wermeling. "We were able to proceed with our work, which was completed within four months."

Selwitz, meanwhile, recently received some good news of her own. For her work on various aspects of research administration over the past 14 years, including numerous publications and presentations, she was given the prestigious 1993 Excellence Award from the Society of Research Administrators. Selwitz was chosen from a distinguished field of administrators in the U.S. and Canada.

UPDATE

Leishmania: The Rambo of Parasites by Jeff Worley

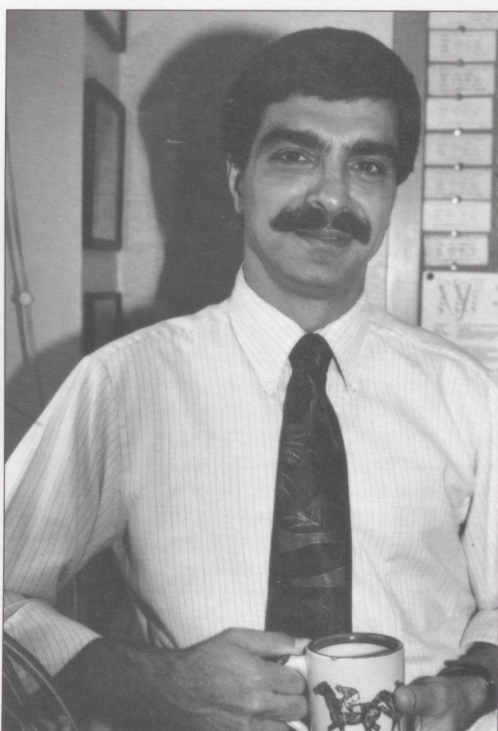
Sam Turco has a close working relationship with a parasite, and he doesn't care who knows it.

Turco, a UK professor of biochemistry, has spent over 10 years studying the unique characteristics of leishmania, a rugged and potentially deadly parasite that lives in sand flies. "Very few Americans have ever heard of leishmania," says Turco. "I had never heard of it until I began working with it."

The parasite's relative anonymity in this part of the world, however, hasn't kept it from spreading like a pestilent wind through many third-world countries. A *Newsday* article earlier this year, for example, reported that in Sudan a deadly form of leishmaniasis had claimed 40,000 lives and was threatening up to 400,000 more. In part because of a decade-long civil war in the country and also because available drugs to fight off the disease cost about \$100, leishmaniasis continues to kill hundreds of Sudanese each week.

"Unfortunately," Turco says, "parasitic diseases such as malaria and leishmaniasis are accepted as a way of life in third-world countries. And what little money is allocated to help with medication or research often never reaches its intended source because of the political structures of the countries."

In this country, leishmaniasis captured some headlines soon after Persian Gulf War veterans began returning home. At least 22 servicemen suffering from diarrhea, fever and



Sam Turco says it was leishmania's unique ability to survive that initially intrigued him to study leishmaniasis.

chills were found to be infected with the parasite, a discovery which led the Pentagon and the American Association of Blood Banks to declare a two-year waiting period for Desert Storm soldiers to donate blood. (The Central Kentucky Blood Bank already had a policy of not accepting donations from people who had visited regions where malaria is common, and that includes the gulf, a spokesman said.)

Turco's research, which was first featured in the Spring 1986 issue of *ODYSSEY*, is targeted on no less a goal than the eventual eradication of this disease. He says that he's "very pleased" with the progress his lab has made so far, but admits that the nature of the microscopic beast continues to challenge their best efforts.

"Leishmania works the same way most parasites do," Turco says, "with one unique difference. Once it gets into human blood through the bite of a sand

fly, it puts up a battle that would make Rambo proud."

Turco explains that once the parasite enters the human bloodstream, the cell wars begin. Macrophages, an elite corps of defenders, marshal themselves to engulf these noxious guests. Each single-celled macrophage extends several pseudopods which trap the invading cells and absorb them one by one. Normally, the powerful chemicals inside the macrophage will break down and destroy the components of the invad-

Alex Roughen

ing cells. The macrophage literally eats the enemy, cannibalizing and metabolizing their materials.

But not so with leishmania. "Leishmania becomes engulfed, like any other parasite, but it isn't killed by the macrophage," says Turco. "This parasite goes into the furnace of hell and somehow lives."

Turco says that it was the parasite's survivability that initially intrigued him, so he set to work to try to find out how it can survive an assault from the blood's frontline troops. "We figured there's got to be something unusual about the surface of the parasite that enables it to survive. We speculated that it must make an unusual micromolecule that prevents it from being killed by whatever the macrophage can throw at it."

After the researchers found that leishmania cells do in fact make a unique molecule, the hard part started—working out the structure of the molecule. "We spent eight years doing this, and fortunately we had most of the facilities we needed right here," says Turco, gesturing toward an array of lab equipment purchased a few years ago by UK. He and various graduate students also used the NMR facility at the Combs building.

"The question then became, 'Does this molecule have anything to do with why the parasite lives?'" Turco says. To answer that question, the researchers made mutants of the parasite that did not make this unique molecule. They put these mutants into a prepared culture teeming with macrophages. The macrophages did their job: they ate these invaders.

"Everything else was identical," says Turco, "which means this molecule is definitely required for the parasite to live." To further substantiate this find-

Turco was intrigued as to how the leishmania parasite could survive an assault from the blood's frontline troops.

ing, the researchers went one step further. They added the purified macrophage-resistant molecule to mutant cells that didn't have it and placed them in an identical culture. These mutants with their add-on molecule lived.

"So now what?" Turco asks, anticipating the next question. "So now we need to figure out how the parasite makes this molecule. If we can figure out the pathway the parasite uses to make it and some of the enzymes necessary, then through molecular modeling we can design drugs to knock out this molecule's ability to be synthesized. That's what we're working on now." He admits that this next step "won't be an overnight thing," but adds, "We're solidly on the road that leads there."

Looking a few years down that road, Turco is not quite so optimistic about the development and use of such a wonder drug. "Yes, there are thousands of lives hanging in the balance, but the problem is, there's not a buck to be made. The pharmaceutical companies aren't interested in putting research money into this because even if they did have a drug, who's going to pay for it? Obviously, some child in Brazil isn't going to have the money to pay for it. For the pharmaceutical companies, the bottom line is profits."

Turco says that even though U.S. funding agencies do put some money into research of parasitic disease—he

estimates around \$25 million a year—this amount is "a pittance," he says, when compared with the federal money allocated for AIDS research.

"AIDS is a major problem," says Turco. "It's an awful disease that we should be working hard to understand and cure. But the fact is there are much deadlier microbial diseases in the world. TB kills hundreds of thousands of children every year; malaria kills two million people a year. When was the last time you heard anything in the press about malaria?"

In addition to the scourge of malaria in Africa and many other countries, and a cholera epidemic last year in Peru that killed thousands of people, a number of old diseases once thought conquered in so-called developed nations seem to be making a comeback in this country. TB has recently spread in New York City among the homeless, overcrowded prison populations, and families living in emergency shelters. TB cases in children younger than 15 have risen 35 percent since 1985, according to the Centers for Disease Control and Prevention, as parents and other adults spread the lung disease in their homes. And cases of measles have jumped tenfold since 1980, mostly because of the failure to immunize children.

A 1988 Institute of Medicine report said the nation's public health services were in "a state of disarray, overburdened, underfunded, short of staff, and lacking in leadership." Since then, said the article, the situation has continued to worsen. The question many are asking: Is science losing the war against infectious diseases?

continued on page 32

"It's an interesting question," Turco says. "One factor, clearly, is that beginning in the late 1950s and continuing into the '80s there was a shift in focus by public health officials and researchers from acute infectious disease to chronic, degenerative disease. Surveillance activities to track outbreaks of the disease were cut. In short, we let our guard down."

A second factor, he says, is that infectious organisms are much more clever than we give them credit for. The drugs developed to treat some diseases are becoming ineffective because the microbes have learned how to adapt to them and have become resistant. Resistance to drugs, according to a Fall 1992 article in *NewsReport*, has particular relevance in U.S. hospitals, where one in 20 patients—some two million people—suffer infections they did not have when they entered the hospital.

"We've definitely got to put a lot more effort into meeting the challenge of the new generation of drug-resistant microbes," Turco says. Infectious diseases have never been a high priority in the U.S., he adds. "There simply aren't advocates or agencies for a particular infectious disease. There isn't an American Malaria Association, for instance. Even in hospitals and some specialty areas, you don't see many medical professionals who want to specialize in infectious diseases. It's

not a big money-making field or headliner."

For his part, Turco plans to spend "quite a few more years" working to get leishmania to offer up its secrets. In addition to his work with leishmania, for which he received the \$300,000 Burroughs Wellcome Molecular Parasitology Award in 1988, Turco, who holds a Ph.D. in biochemistry, teaches various classes in the College of Medicine. And he displays three plaques lined up on one wall of his office—Silver Pointer Awards for 1986, 1989, and 1992. "I'm particularly pleased to have gotten these, since the award is the result each year of a vote by first-year med students. It's great to be able to make an impact with young people moving into the medical field." ♦

"Infectious organisms are much more clever than we give them credit for. The drugs developed to treat some diseases are becoming ineffective because the microbes have learned how to adapt."

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