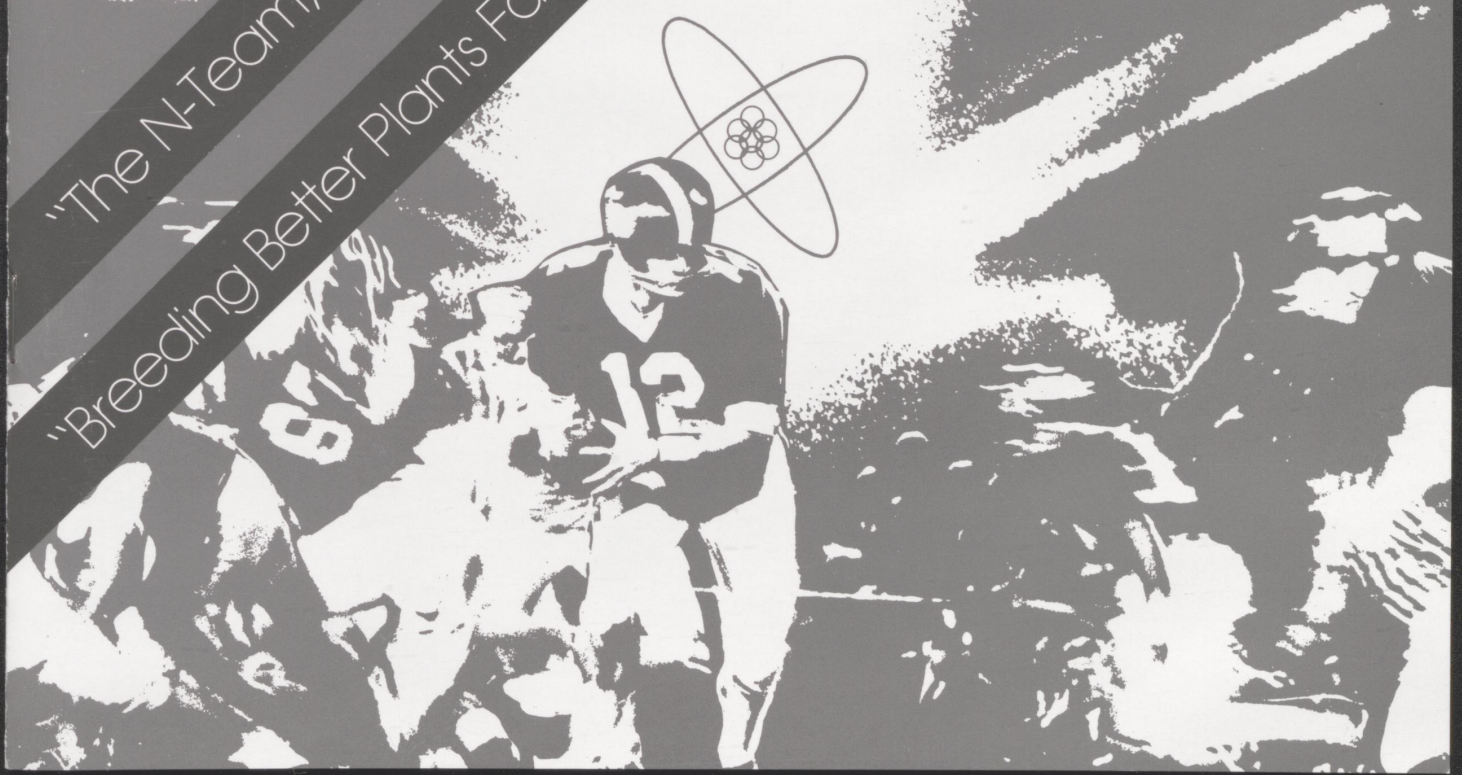


ODYSSEY

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SPRING 1984

"The N-Team," p.3
"Breeding Better Plants Faster," p.17



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ODYSSEY

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The N-Team

By Maria Braden

The tower juts like a grain silo from the corner of the University of Kentucky Chemistry-Physics Building, drawing scarcely a second glance from passing students and faculty.

But inside the "silo" is not grain, but a 25-foot, 15-ton nuclear accelerator, sheathed in a 17-ton blanket of 3/4 inch steel. It is the heart of UK's nuclear science program.

The accelerator is an apparatus which generates charged particles and sends them zinging down controlled pathways as a stream of high speed projectiles. Since 1964, it has enabled a group of UK scientists to focus on a broad area of low energy research and win international recognition.

UK's nuclear science research began more than 30 years ago, when two physicists built a "homemade" accelerator that attracted the attention of scientists at Oak Ridge. The Oak Ridge group had been asked by the Atomic Energy Commission to develop a means for powering satellites, but they needed basic, fundamental information which wasn't available.

"Because the accelerator was here and under construction, the Oak Ridge scientists said, 'We'll start this activity in your lab.' That was the real beginning of nuclear physics at Kentucky," said Dr. Marcus



McEllistrem, a nuclear physicist who is the chief spokesman for what has come to be called UK's "Nuclear Group."

"We began to develop a program of measurements in the late 50's. Until then we had been focusing on making (the accelerator) work in a more or less reliable fashion," he said. The program was led by Dr. Lewis Cochran, later to become vice president for academic affairs at the University, and Dr. Bernard Kern.

By the 1960s there was considerable interest in nuclear science nationally, and in 1964, physicists at UK were able to persuade the state and university to purchase a modern accelerator. McEllistrem dubs that "the beginning of the modern era."

The half-million dollar apparatus was three times as large as the homemade one, which cost less than \$10,000, and higher in energy and in intensity of particle investigation—and much more reliable, McEllistrem said. "It was much more elaborate for doing sophisticated experiments."

A new facility was constructed at the eastern edge of campus adjacent to the president's house to contain the equipment, making the total financial commitment close to \$1 million. The facility has been upgraded over the last 20 years as a result of continuing grant support. It is now one of only three or four operating facilities of its kind in the world.

Dr. Fletcher Gabbard, chairman of UK's Physics and Astronomy Department, said the lab is "one of the best in the world doing low-energy neutron physics." And he called the Nuclear Group "a unique combination of people and facilities. The group is exceptional . . . In the interaction of neutrons with nuclei and in the detection of neutrons which are produced in charged particle reactions, the research is outstanding."

What makes UK so good?

For one thing, UK scientists defined their mission early. Even in the 1960s, UK's new accelerator was not the most modern or the highest energy apparatus that could be obtained.

"It was a good, solid, reliable

machine with which one could do a lot of good nuclear physics, but it wasn't at the high energy frontier," McEllistrem said. "So we elected to go in another direction—what became called the challenge of precision and accuracy. That became the hallmark of our program.

"We elected to go with experiments that were very different and required very sophisticated detection methods and apparatus, he said. "Other places with higher energy machines could do experiments involving what scientists call 'skimming the cream'—to go in and quickly pass on to other areas, leaving to other scientists the task of putting it all together."

While there is merit to that, McEllistrem said it isn't his taste or style. "I wouldn't like to do that even if I could," he said. "I like to pick a problem, study it as thoroughly as I can, learn as much about it as I can and finish it. It's just a different style."

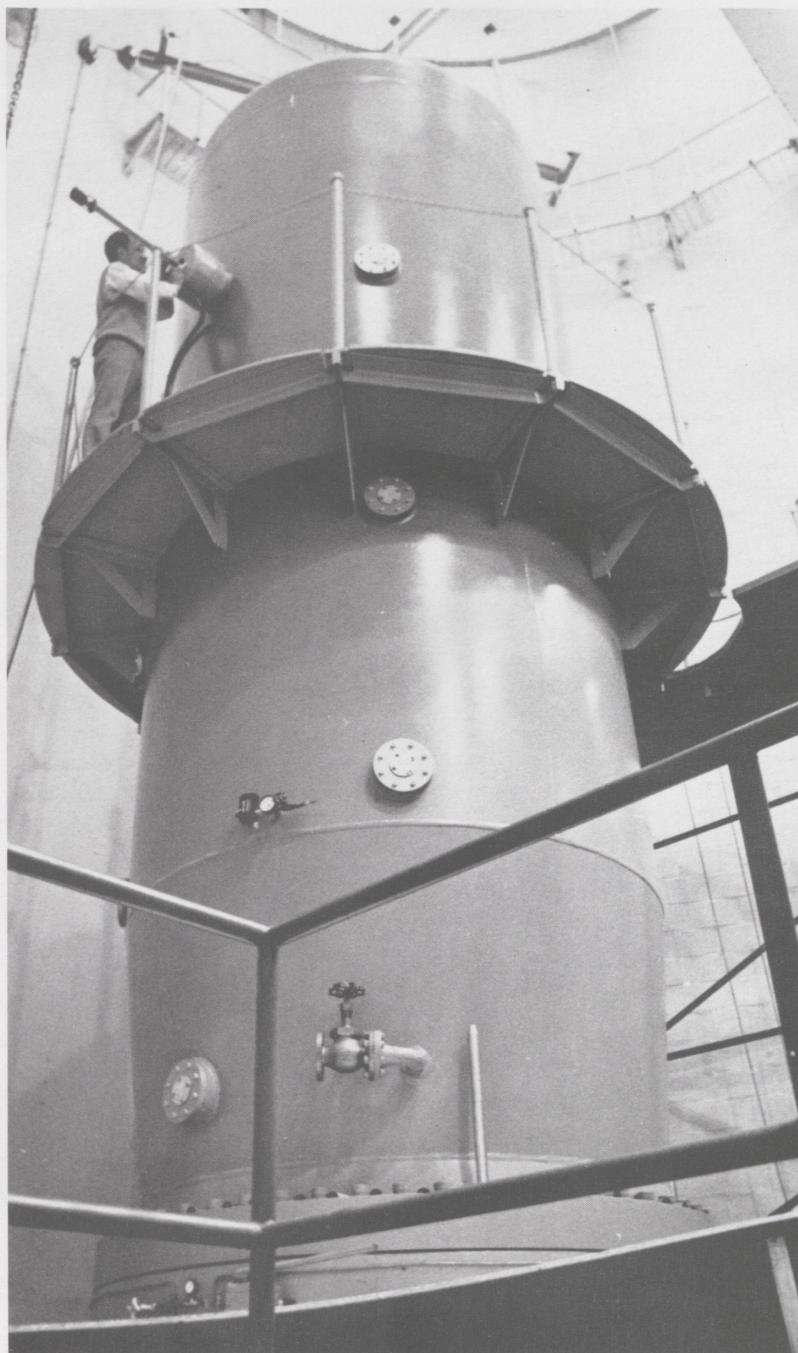
"Skimming the cream" tends to earn scientists more visibility and immediate recognition in the international scientific community, but McEllistrem said he doesn't mind—as long as UK's nuclear group continues to be recognized for its contributions to the big picture.

At the time that the decision was made to go the "precision and accuracy" route, the UK group was young and lacking in experience. It was unrealistic to go after a facility that would be at the high-energy frontier, so McEllistrem said the UK group carved out a more conservative, but no less important mission. The fact that the Nuclear Group has distinguished itself in low-energy neutron physics has enhanced UK's ability to recruit the best young scientists in the field.

For example, last fall Dr. Michael Kovash, a physicist with a degree from Ohio State who spent the last three years at MIT, joined the Nuclear Group. McEllistrem said Kovash would lead UK in a major new direction of research.

Kovash is "the first new permanent person since I came 20 years ago," said another senior faculty member, nuclear physicist Jesse Weil. "The group has been that stable.

"We've been together a long time. It's gotten to be something like a family operation," Dr. Weil continued. "We found ourselves



After the installation of the accelerator, the 24-foot high, 17-ton tank, pictured here, was put in place. It is normally filled with a mixture of 80% nitrogen gas and 20% carbon dioxide gas, to retard sparking.

personally compatible, and that has enabled close professional ties."

It is the Nuclear Group itself, as much as the accelerator, that has made the UK program as strong as it is.

One of the chief advantages to working in concert is flexibility, McEllistrem said. "It gives you the clout to focus as much personnel and resources as you need to solve a problem."

The disadvantage is that the flexibility is achieved at the sacrifice of professional identity. McEllistrem sees this as perhaps the biggest problem of the Nuclear Group, but said it has not been insurmountable.

"I think we work it out pretty well . . . Though we collaborate, each has his own project . . . and this is recognized by the funding agencies," he said.

Weil put it a different way: "One of the things that has given us a strong program is that there is a lot of coherence along with diversity. A lot of experiments are directed to different ends, but touch each other in many ways."

Although group research may be atypical in the humanities, it is fairly common in nuclear physics. UK's group, with seven scientists, is unusually large. Besides McEllistrem, Gabbard, Kern and Weil, who are now the senior faculty members, and Kovash, the newest arrival, there are two other faculty members: Drs. Robert Hershberger and Steven Yates.

The size of the nuclear science program at UK is also one of its strengths.

"No one person with one or two graduate students can launch a frontier experiment," McEllistrem said. "You can do experiments that are less interesting and less significant."

"You need a critical mass to mount a viable and effective effort. It's not only growth that counts, but the rate of growth," he continued. "If the rate

isn't high enough, it's not worth it." If too few people are working on a project and have nothing to show after three or four years, the program will come apart, McEllistrem said. That's why the size of UK's group is critical.

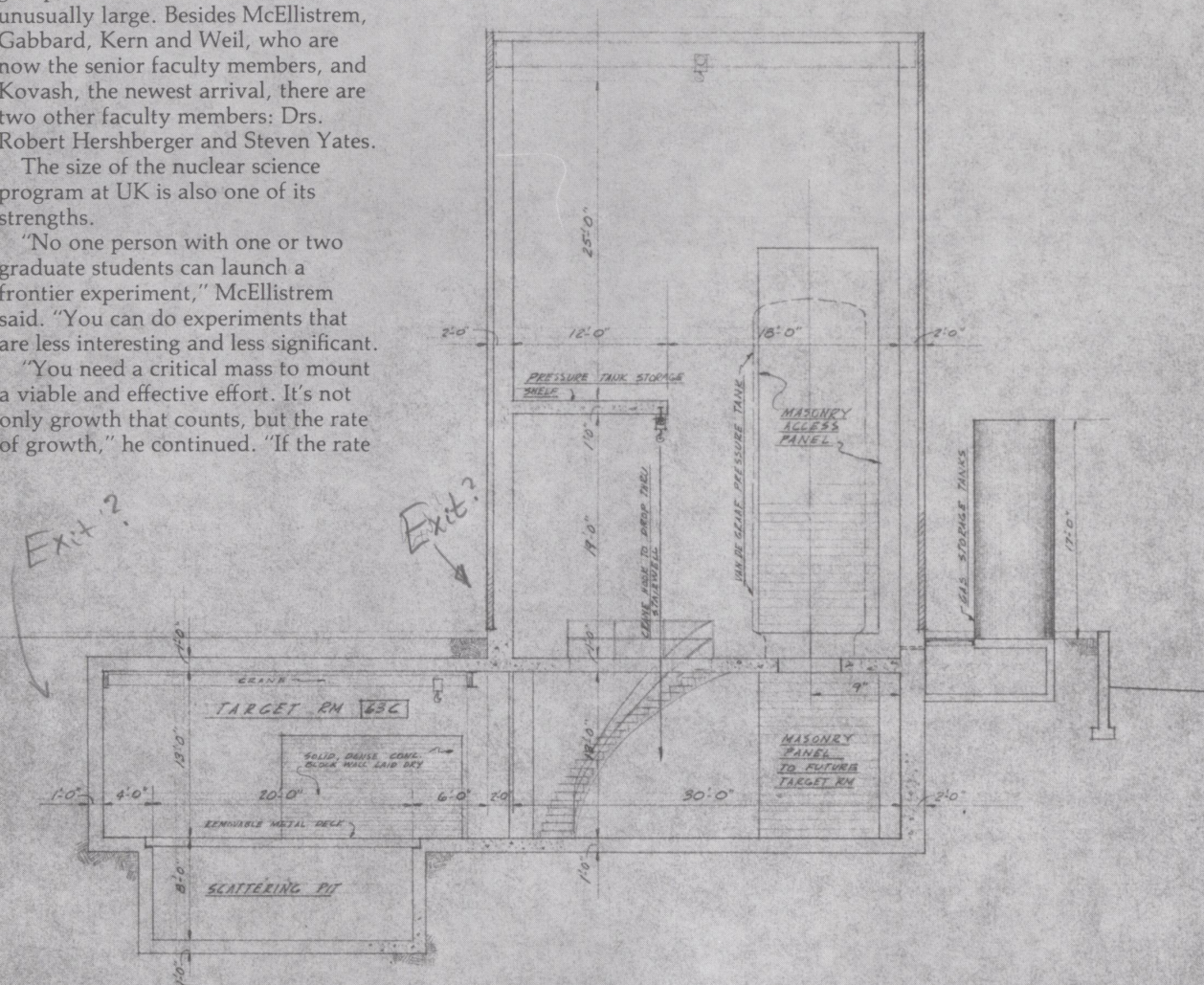
Gabbard cited another advantage to working as a group: the fact that members can reinforce each other's ideas and discuss things. He said inevitably there are personality clashes in any group, but that they have not been serious at UK. "The people involved have made contributions in their own style," he said. "It's kind of like putting on a play—you need various strengths, but all are seldom in a single person. You need people with different talents; that's what we have had in our Nuclear Group."

Another advantage the group has enjoyed is that different aspects of research have been funded over an extended period, bringing continuity and strength to the program.

Funding was a problem in the early days, Gabbard said, but since the mid-1960s, nuclear science research at UK has been continually funded by the National Science Foundation and others. "Now," he said, "people all over the world know about our work."

Just what is this work?

The group is trying to describe and explain mechanisms that bind nuclear systems together, which allow nuclei to behave like a cohesive fluid or, alternatively, like a collection of individual particles, McEllistrem said.



LONGITUDINAL SECTION A-A

Initial architect plans show the layout for the Van de Graaf Accelerator Laboratory including the target room, scattering pit, gas storage tank and the pressure tank. The two exits penciled in were incorporated in the final design.

Scientists use nuclear reactions to probe the structure of nuclei. Part of the group's work is pure research and part is the production of data which is used in other research.

The usual method of probing the structure of nuclei—which are the cores or focal points of atoms—is with electric particles. When they interact, they react both electrically and via the nuclear force. So scientists have the difficult and sometimes impossible task of untangling the effects of those two interactions.

"In choosing to work with neutrons, we avoided the electrical interactions . . . We gave up the usual methods of working with and managing radiation. We had to develop other methods," McEllistrem said. "This is what put us in a unique position, developing specialized expertise to deal with neutrons in a highly sophisticated and accurate way."

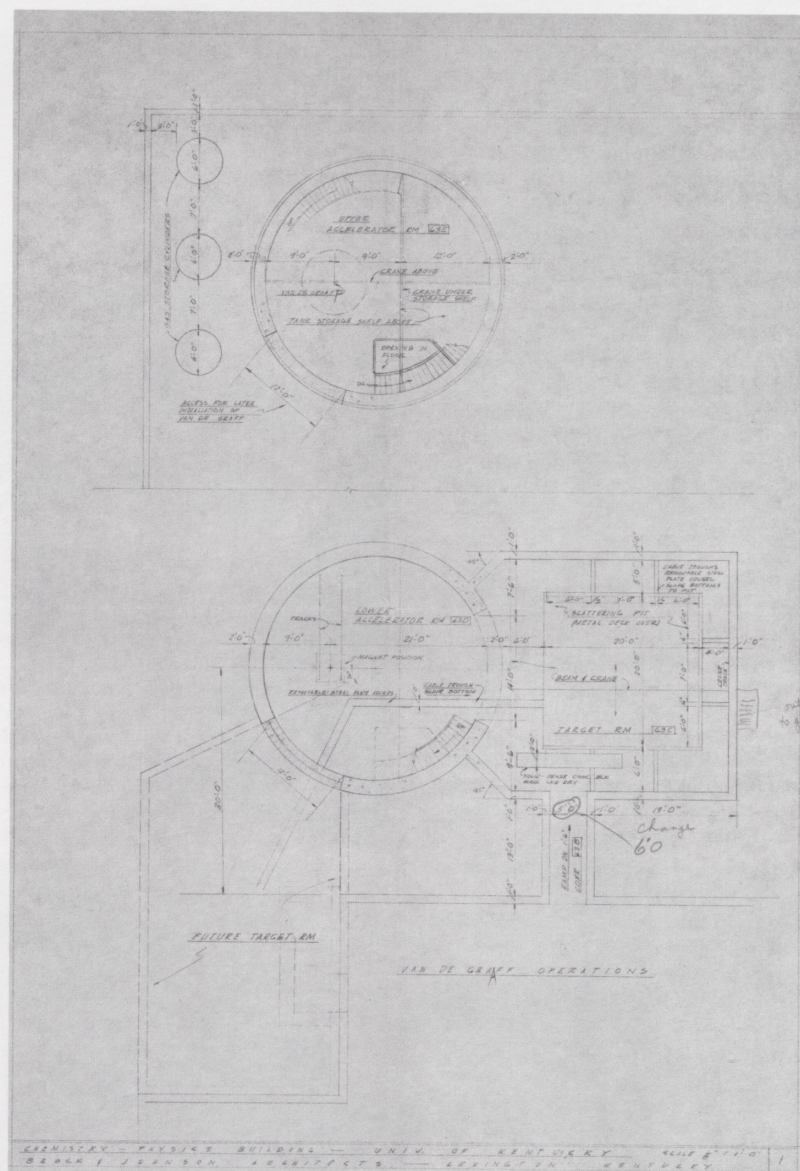
One way neutrons are used at UK is to study the ways in which nuclei absorb energy. That has been applied in neutron radiography (metal scanning) and in nuclear medicine.

In the latter area, the UK group proved, for example, that it was possible to produce a radioactive form of iodine with a small accelerator. The product is useful as a diagnostic tool in finding lesions. However, while UK scientists succeeded in making an iodine with high purity, they couldn't do it routinely without a larger, more powerful accelerator, so the project was relatively short-lived.

Another project examines energy absorption rates in material deposited by neutrons—a step toward determining which materials will absorb energy faster than others. When energy is deposited, it can transform materials, making steel brittle, for example. McEllistrem said data from the experiment could prove useful in the development of fission reactors.

In another experiment, Gabbard and Hershberger are measuring cross sections which help determine the reaction mechanism and rates of elements produced in stars. That data may be relevant for estimating stellar explosion rates, Gabbard said. That sort of research may ultimately answer questions about how the sun works.

Hershberger and McEllistrem worked together on an experiment in cosmochronology, in which they studied neutron reaction rates in stars



Aerial views of the Van de Graaf construction plan show the upper and lower portions of the accelerator as well as their planned surroundings. The plans were drawn in the early 60's and the laboratory began operation during 1965.

which set a rhenium-osmium clock. The process is used to date the age of the galaxy, and in turn that of the universe.

They concluded that the galaxy is some 20 billion years old, much older than other scientists working with different methods had said. Since publication of their findings last December, McEllistrem said a majority of nuclear physicists agree with the UK findings.

Most of this work takes place in an 8,000 square foot complex of rooms

that includes a 600 square foot neutron hall. Metal flooring covers a five-foot deep concrete pit and concrete block walls shield people from secondary radiation. One room houses two separate computer systems for data acquisition and analysis.

The facility functions an average of five days a week, 24 hours a day. When the accelerator is running, members of research teams are in the lab around the clock, McEllistrem said. It is not uncommon to find a senior faculty member in the lab at

midnight on a Saturday night, if an experiment is in progress. Graduate students and postdoctoral fellows are also in the laboratories at all hours of the days and nights. Opening new careers for developing young scientists, in fact, is one of the most important goals of the whole enterprise.

When things are up and running, the hall is filled, literally, with a sea of neutrons. Only a few neutrons are doing something that scientists are interested in. Events caused by the rest must be identified and rejected. The accelerator itself is not a source of radiation, but neutron experiments can sometimes produce charged particles and gamma rays which make the environment unsafe, McEllistrem said.

The lab is cleared for such experiments and scientists monitor them by closed circuit television. "We want to minimize the dose (of radiation)," he said, adding that a two-year dose in the lab is equal to, at most, a third of a natural year's dose for an average person.

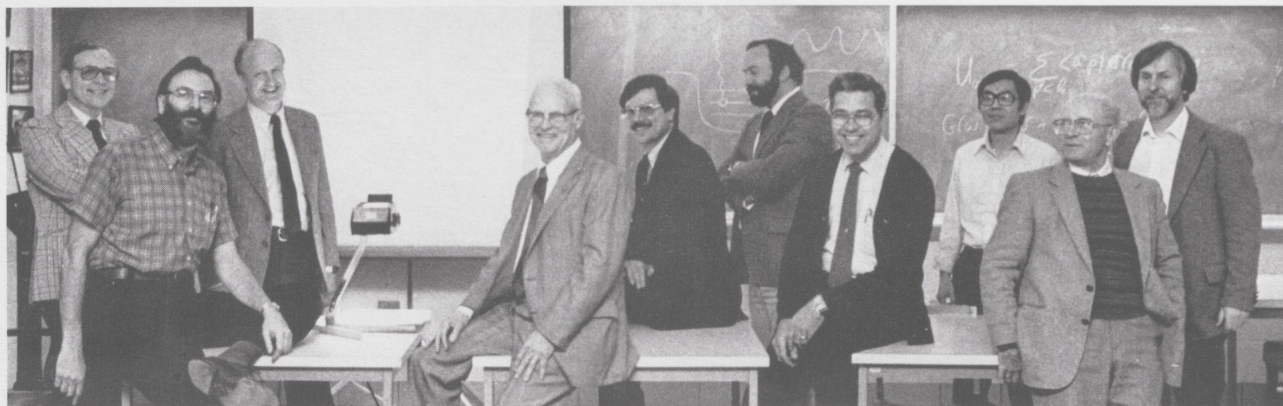
Because the facility is used for such a broad variety of experiments, some of the equipment seems almost jerry-built. While the accelerator is

This is not, McEllistrem assures one, because the University has not been generous. It is simple expediency. Experiments are temporary set-ups, and scientists would rather get on with the experiment than waste time engineering them properly, McEllistrem said.

As the lab's reputation grows,

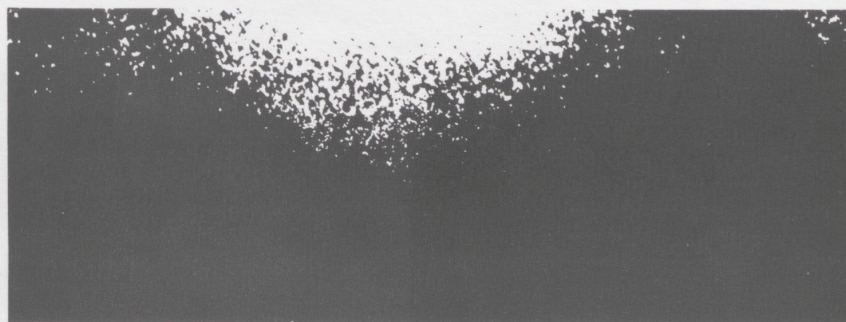
scientists from other Kentucky institutions and from facilities as far away as New York are coming to UK to collaborate in experiments.

It gives credence to Fletcher Gabbard's contention that UK is "known as one of the premier laboratories in neutron physics on the low energy range."



Among the UK faculty involved in the nuclear program are from left to right: Marcus McEllistrem, Jesse Weil, Fletcher Gabbard, Bernard Kern, Steven Yates, Michael Kovash, Robert Hershberger, Keh-Fie Liu, Marcele Coz, and Alan MacKellar.

unquestionably solid—all 32 tons of it, including the mount—there are cardboard cartons of paraffin placed on or near the beam lines that particles travel along, serving as shields. An old styrofoam ice chest substitutes for an expensive part on another beam line.



—photo by Bill Wells

A Disease That Robs The Cradle

By Susan H. Donohew

More than a quarter of all women of child-bearing age have a disease which will render nearly half of them sterile.

The disease can appear as early as the onset of puberty but most frequently appears when a woman is in her late 20's. It is called endometriosis.

Endometriosis is not life threatening. However, as more couples delay the start of their families until their careers are well established, many are discovering that the door to having their own children has been shut through the presence of the disease.

A woman can easily be unaware of having endometriosis since the symptoms of the disease are often not visible. This "invisibility" adds to the

insidiousness of the disease as early detection could prevent sterility or eliminate the need for corrective surgery later.

The disease develops from a malfunction of the menstrual cycle. Normally the lining (endometrium) of the uterine cavity is sloughed off during the cycle and discharged from the body through the vagina. However with endometriosis, bits of the endometrium move in a reverse direction and are deposited in the

abdominal cavity. Here they attach themselves to a variety of places such as the bladder, rectum, abdominal wall or even the lung. Once attached, they grow in a fashion similar to the normal endometrium of the uterus. However, instead of exiting out of the vagina at the time of menstruation, endometrial sloughings are redeposited into new areas of the abdominal cavity.

Infertility is only one of the symptoms of endometriosis, others are intense pain during menstruation, intercourse and defecation. Part of the pain results from adhesions between the endometrial implants and different parts of the abdominal cavity.

University of Kentucky endocrinologist Michael Vernon, who



A DISEASE THAT ROBBS THE CRADLE continued

has worked in the area of uterine physiology for the past decade, recently began a series of studies on endometriosis. Several things intrigued him about the disease.

"The societal pressures for fertility are enormous and infertility can have a very disabling effect on a person's lifestyle," said Vernon. "When I first began studying the disease, it was

women underwent hysterectomies as a result of endometriosis but the newer philosophy tends toward the idea that such radical surgery is no longer appropriate. Today physicians can treat the symptoms and often alleviate the infertility through the use of steroids.

Another aspect of Dr. Vernon's research addresses the need to better understand the disease through direct observation, an option not possible in humans. Under the National Institutes of Health grant Drs. Vernon

becomes pregnant, the endometriotic implants become smaller.

"We're not sure why the implants regress. However we are certain, contrary to popular belief, that it is not because of the presence of progesterone, the major hormone of pregnancy. It may be, instead, a protein secreted by the embryo and the isolation of this protein could represent a potential cure for the disease," Vernon said.

One of his theories on the disease is that when the endometrium implants itself outside the uterine cavity, the endometrium is not exposed to the same hormonal influences as it would normally be and thus runs in a pattern out of synch with the uterus. The implications, said Vernon, "may be the production of certain compounds which interfere with fertility."

The 35 year-old researcher is excited about the progress he and his colleagues have made so far in finding a cure for endometriosis. Raised in Lexington, Vernon graduated from the University of Kentucky in Zoology and then received a master's from Eastern Kentucky University in Biology and his Ph.D. in Reproductive Endocrinology from the University of Florida. He also served as a postdoctoral fellow in the Endocrinology-Reproductive Physiology Program at the Wisconsin Regional Primate Research Center.

His current appointment at UK is as an assistant professor of obstetrics and gynecology and director of the Radioimmunoassay Laboratory for the Reproductive Endocrinology Division at the University's Chandler Medical Center.

The prognosis for finding a cure for endometriosis is excellent according to Vernon, although his confidence is tempered with the realization that research funds are hard to get. But he thinks it is the women with endometriosis who will see that the research funds are made available. "They are finally coming out of the closet and saying 'I have it and I want help!'"

In past years many young women underwent hysterectomies as a result of endometriosis but the newer philosophy tends toward the idea that such radical surgery is no longer appropriate.

uncommon to hear about it but the public has become more informed and women have become more aware of their bodies. I was stunned by the number of people who did, in fact, have it."

It also appeared to him that it was a problem that might have a solution.

Endometriosis is a disease unique to humans, a factor which inhibits research. Definitive diagnosis, according to Vernon, is possible only through direct observation using very invasive procedures for the patient. Part of Dr. Vernon's research should make it simpler both for the patient and physician in the diagnosis and treatment.

Under sponsorship by the National Institutes of Health, Vernon's studies are the first to use uterine-specific proteins secreted by endometrium as a diagnostic tool for endometriosis. The endometrium secretes several proteins that are not normally found in the abdominal cavity. His research indicates that identification of these endometrial secretions within the peritoneal cavity would eliminate the need for surgery to confirm the presence of the disease.

There is no cure as yet for endometriosis but "we can treat the symptoms and sometimes alleviate infertility," said Vernon. "With conservative surgery, 40 to 80 percent of the patients experiencing infertility can conceive." In past years many

and Emery Wilson, professor of the UK Department of Obstetrics and Gynecology, and Michael Rush, assistant professor in the Department of Anatomy, have been able to induce endometriosis in rats, a significant first in providing researchers with a greatly increased opportunity to observe and manipulate the disease.

The procedure, developed by the UK research team, surgically implants small squares of the endometrium from the uterus of the rat into the rat's peritoneal cavity, creating the same type of conditions present in a patient with endometriosis. This enables the researchers to observe the development of the disease and the effect of different compounds on the growth of the implants. One observation that has become apparent is that when a rat with endometriosis

Diaries of Childbirth: What Mothers Thought

Historians have documented the ways in which childbirth has changed over the last 150 years, from a home-centered, social event to a medical event that takes place principally in hospitals.

But the history is based primarily on books and prescriptive manuals written for women by men. No one has looked at childbirth from the perspective of those most intimate with it—women themselves.

That's the approach University of Kentucky historian Nancy Dye is taking, and she has come up with some original findings.

She found, for example, a nearly

By Maria Braden

universal dread of childbirth, lasting into the early 20th century. And she found that the relationships of mothers with their children were very different than they are today.

With a Rockefeller Foundation grant, Dye was able to spend time during the last two years delving into archives to read diaries, letters and other personal writing dating back to the 18th century. She hoped to

illuminate what has been, until now, a very private and little-known side of childbirth.

From the mid-19th century to the early 20th century, childbirth was a virtually universal experience in America. Most women bore a child every two years; at the turn of the 19th century, the average woman bore eight children. At the turn of the 20th century, the average woman bore four. The frequency with which women gave birth and the lack of control they had over the decision to have children is strikingly different from the situation today.



—photo by Barbara Richie

One of the most profound shifts in women's history occurred over the course of the 19th century as the result of the idea of family planning and the introduction of effective means of contraception, Dye said. Modern American women generally look forward to, and prepare for childbirth. But in the 19th century, and well into the 20th century, women's diaries reveal a fear of pain and death in childbirth.

"It is impossible to overestimate the terror women associated with childbirth," Dye said.

Statements such as "My hour of difficulty and danger is near . . . may I be resigned to life or death" or "My blood chills" to think of an impending birth were typically found in diaries of the late 18th and early 19th centuries. "And with good reason," commented Dye. "In the event of any kind of complication, there was very little anyone could do."

Physicians didn't start playing a role

in childbirth until late in the 18th century, Dye said. Before then, they were called only in exceedingly difficult births, usually to cut up a baby in order to get it out.

It might be logical to assume that once physicians entered the picture, the experience of childbirth would improve—both in terms of maternal and infant mortality. But Dye and others have found that was not the case.

As part of her research, she studied puerperal sepsis or "childbed fever," associated with maternal death in childbirth. She found evidence that cases of puerperal fever increased throughout the 19th century.

"There doesn't seem to be as much (before) as when doctors started to manage birth . . . simply because they saw sick people, and had no knowledge of how germs spread," Dye said. In fact, the incidence of puerperal fever was highest in the hospitals—the 19th century lying-in hospitals where poor women generally gave birth. More than 90 percent became infected, according to Dye.

"My guess is that the majority of women throughout the 19th century developed peripheral infections as a result of childbirth, though it was not always fatal," she said.

Her research into medical efforts to understand, prevent and treat puerperal fever is only a small part of a larger focus on maternal and infant mortality. American death rates have always been higher than those of most other western nations, and Dye wants to know why. In particular, she has tried to find out how a woman's race and economic class affected her chances of dying in childbirth, and her infant's chances of survival.

One problem she encountered in her research is that it is nearly impossible to get reliable statistics of maternal mortality in the period she is studying, except in the case of some small communities. There was no widespread official record-keeping until the late 19th century.

While she cannot paint a statistical picture of maternal and infant mortality, she has been able to explore women's perceptions of childbirth and mortality.

She said the dread of childbirth and dying seems larger than would be accounted for by actual records of maternal mortality. This fits in with her belief that childbirth cannot be understood solely as a medical event.

In her grant proposal to the Rockefeller Foundation, Dye said that by learning about how women themselves viewed pregnancy and birth, "we can discover a great deal about women's self-perceptions throughout the past."

"I want to uncover as much as possible about the changing attitudes and expectations women have brought to the lying-in chamber and the delivery room. Quite simply, how have women felt about giving birth and becoming mothers?"

Although other historians are also asking these questions, Dye believes she has come up with original findings about the relationship of mothers and babies.

Throughout the 19th century, at least 40 percent of all deaths were of infants under the age of one, largely because of infant diseases and problems of infant feeding. "I found this fascinating, because even though people knew that lots of babies died, there was very little social concern over infant mortality."

Anticipation looks no further forward than spring and from that, I turn with horror. Fogy blood chills, every time thought brings me to those interesting scenes. I have always, from the first, had a presentiment that I should never live to see Fogy, and it grows stronger every day. At present, it appears an absolute certainty. I know every reason you can make use of to encourage me, but they are no security for me.

From the diary of Elizabeth Cranch Norton of Weymouth, Massachusetts, 1799, thoughts on her pregnancy. Source: The Massachusetts Historical Society.

1815

The last volume of my journal was ended the 28th of 1811.

Since then, frequent illness, and many other circumstances have prevented my continuing it. But as I now have a small family, and nothing to interrupt me, I intend beginning anew, thinking it will be a pleasant, and perhaps not unprofitable way of spending my leisure moments...

Since closing my last journal, I have been the mother of four children, which now lay side by side in the graveyard.

The first was born in 1811, Dec. 10th. The second the 10th of Oct. 1812, and lived only two days, the third the 4th of Sept., 1813, and the fourth the

25th of Nov. 1814.

This last was a sweet, interesting boy, and lived to be six months old. He was a lovely flower, and I trust he is now transplanted in the garden of Heaven.

Though the death of this child was a great trial, yet I hope I was made to how submissive to the will of my Heavenly Father...

The beginning of a new journal by Sarah Ayer of Maine in 1815 stating what had happened since her last journal entry in 1811. Source: Diary of Sarah Connell Ayer . . . Portland, Maine. Published by Lefavor-Tower Co., 1910.

She examined records in a New York City lying-in hospital, and found careful documentation of maternal death. But she said infant deaths were not counted—even at the turn of the century.

Dye considers that evidence of fatalism: "It would lead you to believe that people thought it was

beyond their control . . . that there was nothing that they could do."

In the diaries, she was surprised to find so little written about pregnancy and childbirth, since they were such central experiences in women's lives. She found statements of dread and apprehension when the birth was imminent, but little about how women

were thinking during the long months of pregnancy. She said the lack of entries during that time seems to reflect the lack of fantasy or anticipation of pregnant women.

But starting about 1800, she found a great deal in the diaries and other writings about mothers relating to their babies. The relationship is far

different than we know it today.

For example, babies were rarely referred to by name until they were a year or more old. They were referred to as "the Baby" or "it." Dye infers that women were afraid of becoming too attached to an infant because it might die, even if it was healthy and gaining weight.

"I found women experienced unbelievable anxiety" about their children, she said. And their fears were well-founded.

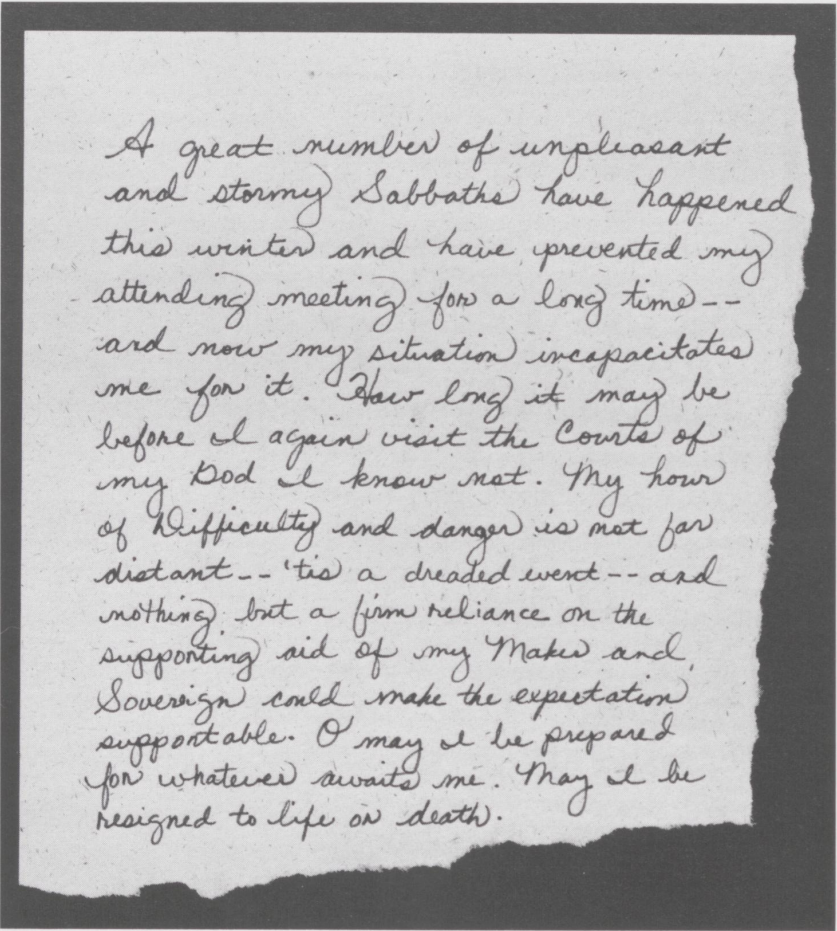
Although it is hard to quantify, she said there appears to have been an extraordinary number of babies and toddlers killed and maimed in accidents, such as falling into open fires or being scalded when pots of water or soup overturned. "You can't read many individuals' diaries without (something like) this happening," she said.

The modern idea of parental responsibility began to emerge in the 19th century. An enormous number of books began to appear about child care that said mothers had responsibility for their children. Women were told they had power over whether their babies lived or died.

While there was truth in that, Dye said there was also a basic flaw in the premise, because babies still died in large numbers from causes mothers couldn't control.

Another factor contributing to a sense of anxiety in mothering was the 19th century theory of infant development which said babies are sickly, frail and prone to ailments. Babies had to cross several hurdles, such as teething and weaning before "going alone" or walking. Once a child began walking it would begin to be called by name in the diaries and assume a certain permanence.

"We believe today the maternal-infant bonding is a process that takes place in the first days and weeks—even in the first hours—of an infant's life. I am concerned about how this process might have been very different in the past, especially given the fact that parents viewed their infants as highly vulnerable, impermanent beings. I think it is this sense of an infant's impermanence that gives rise to the historical notion of 'maternal indifference.' I do not think that



A great number of unpleasant and stormy Sabbaths have happened this winter and have prevented my attending meeting for a long time-- and now my situation incapacitates me for it. How long it may be before I again visit the Courts of my God I know not. My hour of difficulty and danger is not far distant-- 'tis a dreaded event-- and nothing but a firm reliance on the supporting aid of my Maker and, Sovereign could make the expectation supportable. O may I be prepared for whatever awaits me. May I be resigned to life or death.

A portion of a Jan. 5, 1800 letter from Louisa Adams Park of Newburyport, Massachusetts to her husband on the pending birth of their child in April. Source: American Antiquarian Society.

American parents were ever emotionally indifferent to their children, but they certainly have related to them in very different ways over time."

Although women were told in the early 19th century that they had responsibility for their children's well-being, there was no organized commitment to finding out why babies died and what could be done about it until late in the century. Dye wants to know why society gave women responsibility without knowledge.

Another area Dye has looked into involves the class aspect of childbirth. How have physicians asserted their control over childbirth, telling women that delivering babies is something only doctors should do?

The transformation, she said, appears to have happened initially with poor women who delivered in lying-in hospitals. Doctors worked

with them out of a sense of noblesse oblige or sense of duty.

"In the late 19th and early 20th century, lying-in hospitals became places for doctors to experiment and perfect their techniques . . . doctors began to assert an authoritative relationship with women, based on class and on the aspect of doctors being supposed to know about childbirth," explained Dye.

It was a big change, this movement of childbirth from the home to the hospital, and it was made possible by the new authoritative stance of doctors, Dye said. Childbirth became mystified to a great degree.

"What has happened throughout the 20th century is that women have begun to lose their knowledge of birth. They have no chance to see it . . . the first time you learn about birth is when you are pregnant or have a child. If you are cut off from knowledge of birth, it makes you

more dependent on doctors."

Other factors studied by Dye were the growing concern about maternal and child welfare that resulted from the feminist and social justice movements and led to more trust in doctors; and the use of anesthesia, which also helped mystify the process.

It struck Dye that tremendous differences in medical care, based on class, emerged in the 19th century. Middleclass women, for example, tended to have a far more equal relationship with their doctors than working class women, she said. These class distinctions and how they relate to childbirth will be one of the more

original parts of her research.

Another original area of research is the 19th century debate over whether childbirth is a natural phenomenon, best left alone, or whether it can be improved on with modern technology.

Dye sees a profound ambivalence—which continues today—over whether childbirth is natural and should be left alone, or whether man can improve on nature.

Dye has begun writing a new history of childbirth over the last 150 years. She expects to finish the book in about two years.

She has written that women have systematically been excluded from

American historical writing, and that historians' inability to deal with women's lives has distorted history.

Historians limited their research to a narrow range of questions which dealt only with public events. She points out that most life is lived in private and that most people don't have significant public roles—a fact that most historians have only begun to realize.

Dye hopes that her study of one of the most private experiences of women will more clearly illuminate the past for all of us.

June 5, 1856

I am tired of sitting still and doing nothing-- but hope I shall be patient and remember how much I have to be grateful for.

Baby was weighed today. We find he has gained a little. I begin to feel some new little tendrils winding themselves around my heart.

June 12, 1856

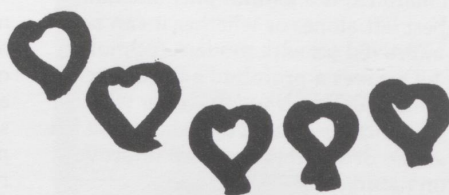
The dear little fellow-- I did not think I should love him so well so soon.

June 20, 1856

My little "birdie" has been a very quiet, good boy today. He is very precious to me, yet I do not wish to set my heart so fixedly upon him that I could not give him up at my Father's bidding.

Several diary entries of Caroline White of Brookline, Massachusetts on the birth of her first baby who was about a week old at the time of the first entry, 1856. Source: American Antiquarian Society.

Behavior Patterns And The Heart



By Tawny R. Acker

No one was surprised when George died from a heart attack. He ate too much, drank too much and worked too hard.

But no one expected Richard to be a heart attack fatality. He exercised, ate and drank moderately and firmly believed in holding the work day to seven hours.

George was a classic Type A, according to medical literature—an individual who, by his habits, abuses his heart and is at risk of contracting heart disease.

Richard was Type B, a person whose personal habits did not make him a candidate for heart disease, but who nevertheless became a victim of sudden cardiac death because of potent reactions to environmental stress which impaired coronary blood flow. Such reactions often lead to myocardial infarction or sudden death.

Annually over half a million Americans die from heart disease and in 350,000 of those deaths, the first indication of heart disease is death—sudden cardiac death. However, sudden death also occurs in people with chronic heart disease who have no signs of acute infarctions or heart attacks.

Examining the behavioral conditions that induce coronary vasoconstriction and the resulting effects on the heart, one of which may be sudden cardiac death, is a part of the research being conducted by University of Kentucky Professor David Randall. Randall's studies encompass 10 years of research aimed at gaining more knowledge about neural control of the heart. His previous research has indicated that the nervous system can constrict the flow of blood to the heart under several carefully described behavioral states.

In order to study this phenomenon, with a grant from the National Institutes of Health, Randall relies on basic Pavlovian conditioning techniques. For example, a dog is given food repeatedly at the sound of a tone, then the tone is sounded without the food being given. The dog responds to the tone by salivating and expecting to receive the food and, when the food does not appear, is confused. Several pairings of food with tone and tone without food then creates stress and anxiety for the dog. By using similar techniques, Randall and his colleagues can simulate what might occur in humans at the time of a coronary occlusion.

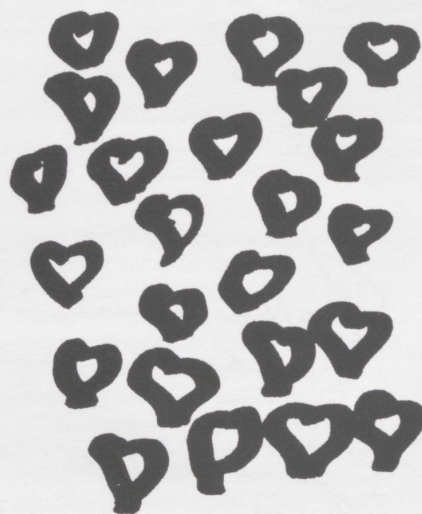
These experiments have allowed Randall to examine the effect of experimentally induced myocardial infarction or heart attack, combined with behavioral stress, upon the incidence of ventricular arrhythmias (or irregularities of the heart).

Randall says that a generally

accepted medical hypothesis contends that emotional stress causes cardiac arrhythmias which, under the appropriate conditions, develop into ventricular fibrillation and sudden death.

However, Randall's research indicates that the relationship between stress and arrhythmias is more complex when examined carefully at either the behavioral or physiological level "Indeed," he said, "it appears that certain behavioral situations are more potentially dangerous and, perhaps, a combination or pattern of different kinds of stress are responsible, rather than a single stress."

Although, his research may eventually help physicians define and identify the characteristics of individuals likely to suffer sudden cardiac death under particular



stressful circumstances, Randall points out that his research is basic—that is, the immediate objective is to improve understanding of the way in which the heart and brain interact in the intact, awake animal. "If this ultimately improves the quality of human life, so much the better."





Portrait Of A Heart Attack Candidate

Claire answered the phone. It was a business associate confirming arrangements made at a previous meeting.

"Yes, exactly as we discussed earlier," Claire said while writing a checklist for the day's activities.

"Yes," she answered impatiently while opening the day's mail and reaching for coffee and a pastry.

"Damn," she thought to herself, while he continued to slowly reiterate the terms of their agreement. "Is he slow, or what? We went over this yesterday. I don't have time for this."

The remainder of the conversation ensued with Claire finishing his sentences in an attempt to quickly end the call, while answering her mail and eating her breakfast.

It was a typical day for Claire. She was never content to do one thing at a time whether it was work or play.

Claire's behavior is indicative of a Type A personality—an individual who, because of stress and lifestyle, is thought to be more susceptible to heart disease.

The behavior Claire exhibited during the phone conversation is known in medical terms as "polyphasic" behavior and thought, which refers to doing or thinking about one or more things simultaneously. Polyphasic behavior is one of the key symptoms signaling a Type A personality, according to University of Kentucky Chief of Cardiology Anthony DeMaria.

"There is still debate among researchers as to the exact relationship between stress, personality, and heart disease," DeMaria said. "It is an overly simplistic view to say that personality is the only factor in heart disease."

"However, there are personality traits or characteristics which seem to be more prevalent in people with heart disease," DeMaria said.

Personality characteristics are divided for the purposes of this type of research into two categories, Type A and Type B with corresponding sets of characteristics.

Type A personality traits include: polyphasic behavior and thought;

continuous rapid activity in all areas; extreme impatience; feeling guilty about relaxing; nervous tics; and a continuous sense of urgency about everything.

Type B traits include a lack of all Type A characteristics especially those which involve impatience and an extreme sense of urgency.

Individuals rarely fall neatly into one category or the other, but usually possess some of each of the characteristics and this makes it difficult to measure the exact relationship between personality and heart disease. "Psychology is not a quantitative science," said DeMaria. "Therefore, it is impossible to measure how much of a Type A someone is and then relate that directly to heart disease."

However, if an individual clearly possesses a Type A personality—one with a great deal of stress—what can and should be done depends on the individual and his medical consultants, DeMaria said.

"It is up to the individual to consider his values and decide as to whether or not he wants to change," DeMaria said, "There are no guarantees that by changing these things that you will not contract heart disease, but then it may help. Only more research will be able to tell."

Which Type Are You?

TYPE A CHARACTERISTICS

- ☐ Impatience with the normal rate of events
- ☐ Polyphasic thought or performance

- ☐ Continually schedule too many events in too little time
- ☐ Feel hostility toward any individual with the same drives as yourself
- ☐ Feel guilty about relaxing
- ☐ Nervous tics
- ☐ Feel that success comes only to those who act quickly, and to keep up you must act quickly
- If everything is reduced to numbers—how many, how much and how quickly—are the only things that matter

TYPE B CHARACTERISTICS

- ☐ Unaffected by Type A characteristics
- ☐ Never suffer from extreme feelings of urgency and impatience
- ☐ Have no nonspecific hostility
- ☐ Able to relax without feeling guilty
- ☐ Play to play, not to exhibit superiority in another area

The differences in Type A and Type B personalities have been likened to the two characters in the fable about the tortoise and the hare. The hare is the Type A, who rushes on without a thought to the consequences, only pausing to show contempt for the slow moving Type B tortoise. As the fable ends, the tortoise has won the race, because he was steady, rather than speedy.



American agriculture is learning to worry. Undisputed champion of abundance, envied everywhere for the size of its surpluses, unparalleled for technical ingenuity, this great system of food production now is shadowed by soil exhaustion, the consequences of the use of chemicals and of crop specialization and the rebounding of other ambitious experiments in productivity.

A group of University of Kentucky investigators is exploring some of the more worrisome topics with agricultural researchers and research administrators across the country. Their findings may help researchers consider more carefully the directions, purposes and possible outcomes of agricultural research.

This inquiry begins at the beginning, with plant breeding. "Ethical decisions are made at the breeding level," says Dr. William B. Lacy, a UK sociologist with a joint appointment in the Colleges of Arts and Sciences and Agriculture. "Breeding goals are fundamental in this kind of research. For example, do you breed for food or for feed? The choice is decisive."

For Lacy and one of his colleagues, UK Sociology Professor Lawrence Busch, the current project is a third expedition into the somewhat uncharted world of agricultural research. Westview Press has published *Science, Agriculture, and the Politics of Research*, their study of the ways agricultural scientists select research projects. The authors reported that agricultural scientists were restrained by their adherence to disciplinary divisions, that scientific communication among them was "relatively infrequent, highly specialized, and insular," that this insularity leaves certain research goals unclarified, that university scientists must spend too much research time searching for grants, and it suggests that specialization may inhibit discovery while restricting broader public participation in research decisions.

The same publisher has agreed to bring out *Food Security in the United*

VALUES



ETHICS & FOOD

By Michael Kirkhorn

States, edited by Busch and Lacy. The authors explore some "important but often unaddressed issues related to food security," including water supply, soil erosion, nutritional value of food, the health and safety of farm workers, the safety of processed food and issues in plant breeding.

In their current research, they are adopting a new perspective. Social scientists interested in agricultural research have "produced a tremendous amount of critical material," Busch said. But they have tended to blame the agricultural researchers for failing to see the social or political implications of their work. Busch, Lacy, and their colleagues intend to take no "potshots" Busch said. Instead, by carefully interviewing many researchers, they hope to draw from them information which will reveal in some detail the structure of the agricultural scientific community and increase public understanding of how these scientists see the consequences of their research. The UK team will impose no views of their own on this "richly varied" community, but will try to learn from the scientists. The interdisciplinary approach is intended to reveal as

many facets as possible of the agricultural scientists' outlook, Lacy said.

The UK researchers' critical standpoint is evident in their writing, and it was evident, too, in the work sessions in which they decided the techniques of the new study. There, they expressed some concern over the possible reaction by agricultural scientists to sensitive questions.

Their uneasiness turned out to be mostly unfounded in the first round of interviews with agricultural scientists and administrators at Ohio State University late in February. These interviews an elated Lacy described as "excellent" for what they revealed about the intentions of Ohio State administrators, who were trying to establish their agricultural research programs among the best in the nation. But the earlier uncertainty was clear in the work sessions where the five-member UK team perfected the questionnaires which would be used for interviews with the subjects. Besides Lacy and Busch, an associate professor of sociology, the team consisted of Jeffrey Burkhardt, an assistant professor of philosophy, Edmund Oasa, a postdoctoral fellow with a degree in political science, and Michael Hansen, a postdoctoral research associate with interests in ecology and biology.

At the work sessions it was no longer necessary for the team to talk much about the basic purposes of the study. They had been specified in the proposal to the National Science Foundation and elaborated in discussions between the UK investigators. That purpose was, in the language of the proposal, to "identify and discuss ethics and value issues influencing agricultural research in the biological sciences," to examine how "ethical and value criteria . . . impinge upon research processes" and to identify "the dominant values affecting scientific research efforts, which may be displayed implicitly by agricultural research scientists." The proposal also indicated that the

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Breeding Better Plants Faster



By Michael Kirkhorn

Agricultural researcher Glenn Collins is riding high these days. His investigations in somatic cell genetics are handsomely funded. He holds a research appointment in plant somatic cell genetics (somatic cells are vegetative cells rather than reproductive ones), placing Collins in a good position to take advantage of some smart planning by those who foresaw the potential value to UK of cellular genetic research in plant improvement.

"We've received tremendous support," Collins told an interviewer recently in his tiny office at Agricultural Science-North. "We got into the field at an appropriate time and established a program and reputation for the application of somatic cell genetics to crop improvement."

"We're in a unique position to apply what we've learned because we did the groundwork. We are one of the three to five top laboratories in the country for plant somatic cell genetics. For tobacco, red clover and soybeans, we are the top lab."

Collins is slight and soft-spoken, and he makes his claim sound modest. But his specialty is one of those in the forefront of scientific research, and that means strong competition from other universities and private laboratories, as well as excitement—the sort of excitement which comes with being on the cutting edge of a major scientific movement. Only 44 years old, he is situated at the head of a research team which is certain to have an important impact on plant improvement through genetics.

Research conducted at UK on the biology, biochemistry and physiology of tobacco contributed greatly to the

University's headstart in agricultural genetics. "We were working with tobacco," Collins said, "and tobacco was the first major agronomic plant species which was found to exhibit the capability of growing as single cells in culture and being capable of regenerating into intact plants."

The ability to work with plant cells in culture is a key to the enormous potential of cellular and molecular approaches to crop improvement for such traits as resistance to diseases and insects, tolerance to herbicides, gene transfer and wide hybridization. Under the earlier systems of experimenting with plants for the purpose of developing improved varieties, a scientist might work with an acre of tobacco—8,000 to 10,000 plants altogether—knowing all the while that mutations occurred at a rate of once in 100,000 plants, or even less frequently. A scientist working with plant cells in the laboratory can grow 50-500 million cells in a single culture flask. This offers tremendous potential for selecting or genetically modifying plants. The selected or genetically altered cells are induced to differentiate into plants in the laboratory, transferred to the greenhouse, and made available as genetic resource material for plant breeders.

In practical terms this means that researchers who had needed from five to seven years to develop a true breeding line could do the same job in less than one year by generating pure breeding lines through the culture of pollen. "We used to be restricted to

what could be gotten from pollination and the formation of a seed," Collins said. "Now we take two vegetative cells called protoplasts and physically join them. We can take cells from different species and join them or go to a bacterium or a yeast and isolate a gene and transfer it to a tobacco plant."

For more than ten years Collins was a member of a conventional plant breeding team, "manipulating plants for the purpose of producing new cultivars (varieties)." "I was repeatedly confronted with the fact that genetic variability was not sufficient for the kinds of traits that plant breeders look for—genetic resistance to insects, more efficient mineral uptake, better photosynthesis," Collins recalled.

"We needed to look at other sources for genetic variation," he said.

The search for those other sources involved a refocussing of research from the study of the whole plant to experimentation with cells and tissues in culture. At this point Collins and his colleagues were getting into position for taking advantage of the revolution in genetics which was permeating biological research.

"We changed from the whole plant to the cellular level," he said. "Instead of experimenting with the sexual generation, we were dealing with huge numbers of somatic cells. Looking at what was going on in related areas, we became convinced that the future of crop improvement would involve cellular and molecular genetics along with conventional plant breeding procedures."

CONTINUED PAGE 19



investigators would pay special attention to "evidence of value and ethical conflicts faced by agricultural scientists."

Now the investigators had come down to a close examination of the instrument of their investigation—the questionnaire.

The importance of the questionnaire, and of the questionnaire-making process, in social scientific research of this kind cannot be overemphasized. The refinement of the questions to be asked of subjects required the investigators to arrive at a consensus, obviously, about what was to be asked. More subtly, it required that they find agreement on the tone of their inquiries, on the points where

Through five or six hours of discussion, aimed at giving questions a suitable and appealing context and introducing controversial topics circumspectly, the investigators arrived at agreement for the questions they would ask, the order in which they would be asked, and the areas where they would push for more information.

Because the study is concerned with values and ethics, all of the team members talk philosophically about the meanings and potential meanings of the inquiry. But, as resident philosopher, Burkhardt has a special responsibility, first to help frame the ethical context for the project, then to "set up the value questions," and, finally, when the interviews are completed, to help spot directions and "possible ethical conflicts." He also participates in the interviewing. "They

possibilities for the new sciences of genetic engineering and biotechnology, the cell- and molecular-level sciences which promise amazing developments in health care, pharmacy, chemistry and in food processing and agriculture. The agricultural scientists lag a little in these developments, which began emerging around 1970, but they are trying to find ways to catch up. Two research appointments in agricultural biotechnology have been established at UK, and more probably will follow.

As they hurry to catch up, will the prospects of joining a headlong rush into the future cause agricultural scientists to disregard ethical questions about the uses and consequences of the new technology, or will they develop a sensitivity about the values which ought to guide their research?

When the UK researchers ask these

The breeding of new plants is the crucial question to be considered when one looks at agricultural research. "How these decisions are made make clear the goals of the system . . ."

—Professor Lawrence Busch

they would probe for more detailed answers, and it required that they talk in some detail about their expectations for the kind of information they might receive from the agricultural researchers.

Lacy, extensively experienced in research, guided one of the discussions—the final session before the first full test of the questionnaires at Ohio State.

Conceding that "every question is a leading question to some extent," in which the investigators would lead the subjects "in the direction we want to explore," Lacy nevertheless cautioned his colleagues about introducing argument or criticism into the questioning process. "Be careful on these probes," Lacy said. "Don't be inflammatory. We have to be sensitive to things that trigger negative responses . . ."

say they're trying to make a sociologist of me," he said of his social scientific colleagues.

Burkhardt joined the project more than 2 1/2 years ago. His interest in the value context of scientific research had been expanded to include agriculture through discussions with members of UK's anthropology faculty, who were interested in agriculture. When he was invited to join the research group he saw the project as a "good focal point for a lot of the interests I had."

It also was clear from the discussions that the UK team was interested in ethical attitudes about biotechnology and its applications to agricultural research. University scientists are enthusiastic and in some cases ecstatic these days about the

questions, they are standing at an intersection which ought to allow them, to some degree, to foresee the development of agricultural research and therefore partly to answer some of the questions raised in Busch's and Lacy's books. For through these new sciences new plants will be bred, and breeding, as Lacy observed, is the crucial question to be considered when one looks at agricultural research. "How these decisions are made make clear the goals of the system, and the goals that scientists have is the key issue," Busch said.

As is the case with most significant research, this inquiry has evolved over a period of years. The current attempt to get beyond the disciplinary



The researchers came to realize that the technical decisions of plant breeders are also value decisions.

suspicion and isolation which Busch and Lacy feel characterize much agriculture research—to press beyond “the throwing of brickbats,” Busch said, “to bring out the issues”—is an outgrowth of a collaboration which began in 1976. That was when they began their research into how agricultural scientists decide what to study.

Then in 1981 they attended a Symposium on Sorghum in the 80s in Hyderabad, India. There, at a conference which was multidisciplinary, international, which involved Third World and Developed World participants and, for the first time, included social scientists, they saw with clarity, as Busch said, “the tremendous amount of working at cross purposes” among agricultural scientists. After that conference and as they completed a project in which they interviewed scientists working in the Sudan (this was the international phase of their work) they began to consider projects intended to see how, Busch said, “technical decisions of plant breeders also are value decisions.” They then asked themselves, “Why not look at some of these issues as they relate to domestic questions?”

The obstacles would be sizeable, for they had learned, Lacy said, how “extraordinarily difficult” it is to persuade scientists to talk across disciplinary boundaries. But they held a conference at Carnahan House, assembled a team, with Burkhardt serving as “resident ethicist,” and later including Hansen and Oasa, and set to work.

Their study would be intended to compensate for decades in which agricultural research was neglected by

social scientists and by philosophers. There is, Busch said, a “tremendous amount of social science research hypercritical of the technical sciences,” but until recently not much research has been conducted which focuses on the intentions and techniques of agricultural scientists.

The current research will continue into the summer months, and, of course, the outcome is unknown. But Busch, Lacy and their colleagues already have a considerable amount of research in print, and much of that is available from the UK College of Agriculture’s Committee for Agricultural Research Policy (CARP), an interdisciplinary group established with the help of a Ford Foundation grant and intended to examine agricultural research and extension policy issues, to study the communicating of information by the extension service, to study values in agricultural research and to develop “an interdisciplinary research community focusing on agricultural research and extension policy.”

Problems associated with surplus agricultural production are in themselves enviable problems to have. The research progressing at UK’s Scovell Hall, where the team of investigators meets, suggests that with competition for water and the exhaustion of soil, and considering the problems associated with highly specialized monocultural farming and the worldwide demand for nourishment as population continues to increase, the understanding of the directions and consequences of agricultural research and plant breeding may become not only useful but necessary if crises are to be averted.

BREEDING BETTER PLANTS FASTER continued

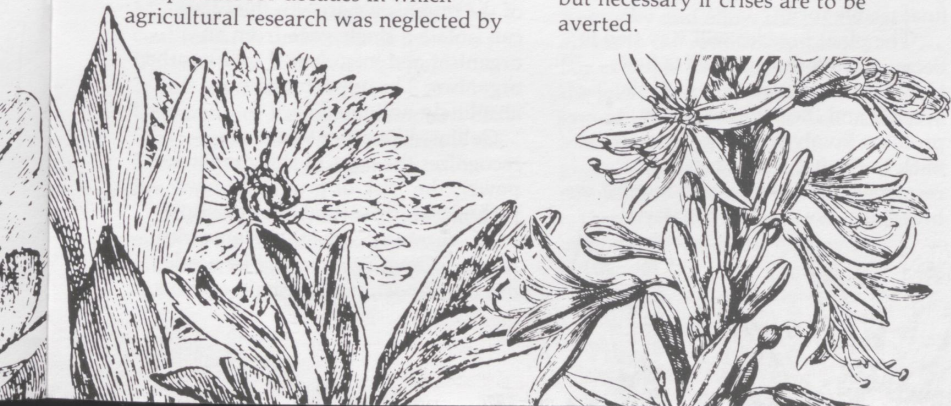
Meanwhile, cellular and molecular genetics was moving into other areas of the University. Major research efforts were initiated in the biological sciences and in medical research as well as in agricultural research. As this exciting, and expensive, transformation continues, its impact is being felt throughout the University.

UK’s administration has identified 18 scientists on the faculty who are working in biotechnology or genetic engineering, and for a university which expects to remain strong in basic research, this can only be a beginning. “There will be more activity,” said Wimberly Royster, vice chancellor for research and dean of UK’s Graduate School. “This will be an area in which we will place more emphasis. We already have some scientists doing important work in these areas.”

Because of the expense of these programs, and the necessity to compete with other universities and private laboratories for the services of highly qualified researchers, it is important, Royster said, for UK to “define what we need to do.” The situation would seem to call for interdisciplinary effort, and much of the research already crosses the traditional boundaries which divide university faculty members. The question of direction is crucial, Royster indicated, to keep UK in the competitive forefront, to keep it from being “left behind.”

Collins’ situation is illustrative of the longterm effort which is needed if scientists are to be ready to take on important new work. As early as 1975 he was publishing papers on tissue culture methods in tobacco breeding and on the genetic characteristics of Kentucky burley tobacco. In 1981 alone, he and his colleagues published ten papers. The accumulation of understanding, much of it proceeding from research with tobacco, brought his research to the point where he could make important findings in red clover and gain support for research into soybeans.

Tobacco offers scientists some interesting opportunities for investigation and soybeans are



CONTINUED PAGE 20

BREEDING BETTER PLANTS FASTER continued

universally important as a source of protein and oil. Why, you may ask, red clover? Red clover (*Trifolium pratense* L.) just happens to be another of those important food crops, a forage legume eaten by grazing animals over much of the United States and in the temperate regions of other continents.

It has "one major weakness," Collins said. "It will remain in the field for only two or three years, then it needs to be expensively reseeded."

For more than 40 years plant breeders have known of wild clovers which would persist for many years, Collins said. "A tremendous effort, unsuccessful, has gone into trying to hybridize those wild clovers with red clover." The sexual fertilization occurred, under traditional plant breeding methods, but the embryos died.

"We became convinced that the future of crop improvement would involve cellular and molecular genetics along with conventional plant breeding procedures."

—Professor Glenn Collins

In 1982, Collins and two UK colleagues, Norman L. Taylor and G.C. Phillips, reported that they had managed through a procedure called "embryo rescue" to create a hybrid between red clover and a perennial clover known as *T. sarosiense*. The process involved using clones of the parents with cross pollination in the standard way. Then pollinated florets were collected and, following sterilization, hybrid embryos were dissected aseptically from each floret. The embryos were placed in a "nutritionally optimized" culture medium and a sufficient number of those embryos survived not only to produce a viable hybrid but to offer

an example which could be used for the further combining of red clover with other species. The resulting hybrid has been tested in the field and promises to be more persistent than red clover.

Collins called soybeans "a difficult species," whose difficulties were worth endless scientific effort because the soybean is our "greatest source of protein and oil." No laboratory, he said, has "succeeded in developing a complete tissue and cell culture system for soybeans."

A recent grant (Collins holds grants from the U.S. Department of Agriculture and from private agricultural companies such as Agrigenetics, Philip Morris, Brown & Williamson Tobacco, and R.J. Reynolds Industries) is intended to provide support for efforts at UK to "develop a somatic cell system for soybeans and to attempt molecular genetic manipulation," Collins said. Dr. David Hildebrand and Collins will study about 1,000 genotypes of

soybeans collected from all over the world and screen their ability to grow in culture. They also will study soybean embryos, analyzing the "protein and chemical constituents along the pathway" which leads to the development of the plant, and conduct genetic experiments with soybeans.

In all of this work, Collins and other researchers work closely with plant breeders. To be proven effective, a hybrid must move from the test tube to one of the plastic cases in Collins' incubation chamber to the greenhouse to the field. The plant breeder, Collins said, takes the basic genetic resources and "puts them in final usable form."

"The plant breeder will stay tied in because often the problem is first identified in cooperation with the breeder and the solution of the problem involves taking the material back to the breeder. Then the researcher will follow with interest the breeding—how well the material

performs in the field. This is how we know that red clover hybrids have survived two winters. This is very much a team integrated approach to problem solving."

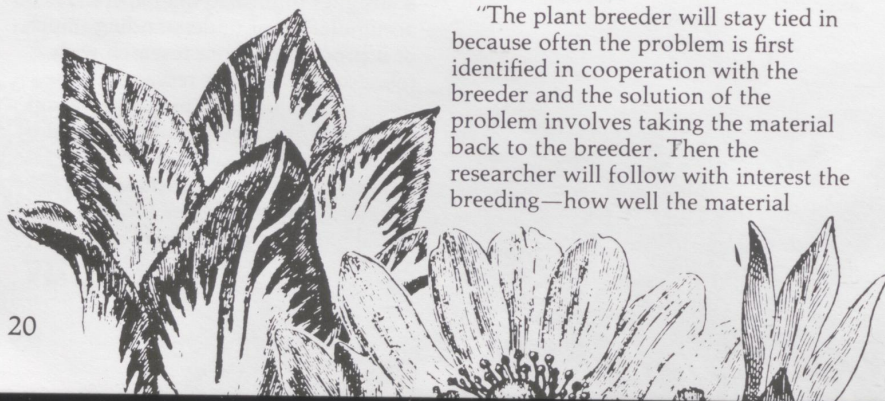
There already is collaboration at UK, through research projects and a seminar series, between biotechnologists and genetic engineers working in biology, medicine and in agriculture. More of that sort of cooperation may be expected because at the cellular and molecular level, in some ways, plants, animals and microorganisms begin to look alike. Collins is hopeful that through cellular and molecular genetic manipulations, agricultural scientists may restore some of the natural genetic variability which urban growth and intensive agriculture have destroyed. It is harder and harder, he said, for scientists to find wild plants which traditionally have been used in the genetic improvement of agricultural plants. "We have reduced genetic variability," Collins said. "Now

cellular and molecular genetic capabilities have expanded to all life forms the potential for accessing genetic variability."

The new sciences even offer the opportunity to read backward in evolutionary time, to study, Collins said, "the molecular relationship between various evolving life forms."

Even in a modest man, the sense of newfound power is evident. The material which makes up the gene was discovered 30 years ago, and now, Collins said, "We know what the gene product is, what controls it, how genes are turned on and off at stages of the organism's growth. Now we can isolate a single gene from an organism and introduce it into another organism. The opportunities are absolutely unlimited."

Collins, like other scientists, recognizes the risks of this unmatched power, the "risk of producing new pathogenic organisms," for example, or of "turning productive plants into weeds." Great caution will be needed, but the opportunities remain exciting.



90 Billion Tons & What Do You Get?



—photo by Warren Brunner

An estimated 98,000 Kentuckians are employed in some aspect of the coal business, according to a study conducted by the Kentucky Energy Center.

"The impact coal has on our economy is crucial and the employment figures show that," Commissioner of Kentucky Mine and Minerals Willard Stanley said. "The coal research underway at the University of Kentucky is vital."

One of several facilities on the University of Kentucky campus which focuses on coal-related research is the Kentucky Geological Survey in Breckinridge Hall.

"Although the Survey is involved in many areas of research, the key economic role coal plays in the state and the nation makes it one of our

By Tawny R. Acker

primary areas of research," Dr. Donald C. Haney, director of the Survey, said.

The Survey was established by the state legislature in 1854 to document the mineral and water resources in Kentucky and allow the public easy access to the resulting information. For example, the Survey documents the location and type of all the state's known coal deposits, as well as the location and measurements of the ground-water supplies and the oil and natural gas deposits. The information is then translated to maps which are available on open file or may be purchased.

Kentucky leads the nation in the

production of bituminous coal and currently produces approximately 150 million tons of coal annually. When compared to all coal-producing countries in the world, it ranks fifth behind China, the rest of the U.S.A., U.S.S.R. and Poland.

This important position in world energy resources makes current, detailed information concerning Kentucky's coal resources, which come to over 90 billion tons, a necessity not only for small mine operators and land owners, but governmental agencies as well.

The Survey's information is particularly helpful in light of the passage of the state's Federal Surface Mining Control and Reclamation Act of 1977 which requires the assessment of potential impact to the surface and



Clay County, Kentucky coal miners and the mine they were working as seen by Appalachian photographer Warren Brunner who has been recording the "hills and hollers" of Appalachia since the 1950s. These particular photos were taken in the early 60's. Courtesy of Brunner Studios, Berea, Ky.

ground-water resources of mineable lands prior to the issuance of mining permits.

"There is enough coal in Kentucky to keep us in the coal business for many decades and perhaps several centuries at current production rates," said Dr. James Cobb, head of the Coal Section of the Survey. "This is a conservative estimate," he explained, "because much of the coal is under towns or in other unmineable places."

It is important that all coal be documented even that which cannot be mined under today's technology, because new methods will be devised which will safely extract coal from very thin seams or gasify it in place, said Cobb. The location of coal, whether presently mineable or not,

"It's not enough to determine the amount of coal in the ground and where the largest deposits are. We must also determine the quality of the coal, because market value is determined by the quality."

—Dr. James Cobb,
Kentucky Geological Survey

affects future planning and energy developments.

Kentucky is unique in that it has coal resources in three different geographic areas: The Eastern Kentucky Coal Field of the Appalachian Basin, the Western Kentucky Coal Field of the Eastern Interior Basin and ligate of unknown,

When compared to all coal-producing countries in the world, Kentucky ranks fifth behind China, the rest of the U.S., U.S.S.R. and Poland.

but probably limited potential in the Jackson Purchase region.

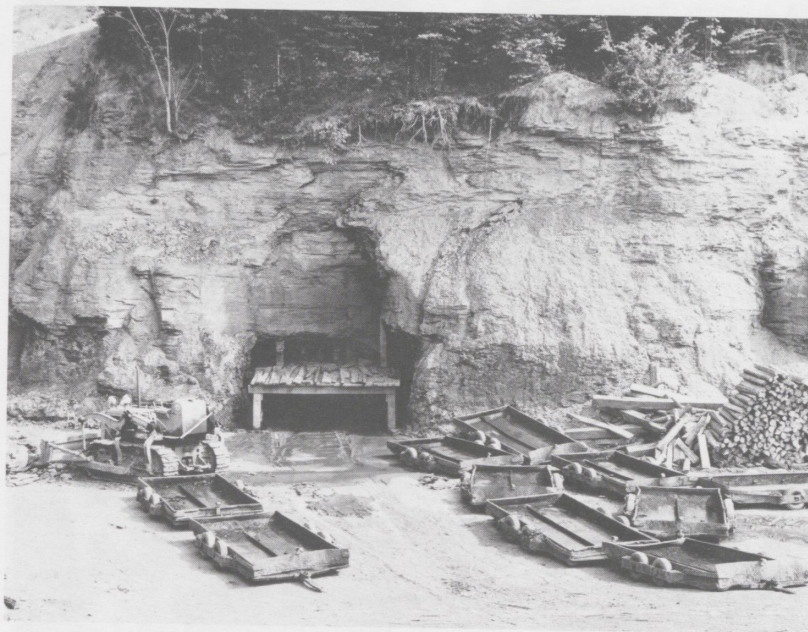
An on-going project in these geographic regions includes recording coal resources by coal bed, thickness category, reserve district, and county. From this information, the Survey produces coal bed maps indicating the areas of outcrop and general thickness. Then tabulations of coal resources are made and reports summarizing the resources and geology are published.

"It's not enough to determine the amount of coal in the ground and where the largest deposits are," said Cobb. "We must also determine the quality of the coal, because market value is determined by the quality." From this project, coal quality and location are prepared and placed on file at the Survey offices. "Most of the maps are used by people interested in finding out the value of coal prospects to buy or sell or if there are sufficient resources to open a mine," Cobb said. "Large corporations usually have their own geologists who do testing and make their own final reserve determinations about the feasibility of prospects. We (the Survey) help people use the maps and reports to find data useful in coal exploration, but we do not make final coal reserve determinations for them."

Currently, the Survey's largest coal research effort is directed toward determining a variety of information concerning coal in the Eastern Kentucky Coal field. This project is funded through the Kentucky Energy Cabinet.

Other Survey research includes a grant from the U.S. Geological Survey to collect and contribute data to the National Coal Resources Data System. This data base system, developed and managed by the U.S. Geological Survey, includes national coal reserve estimates, as well as coal quality information.

A continuing research contract from the U.S. Geological Survey supports the Survey's sampling, analysis and compilation of data from Kentucky coals. The data resulting from this



project will eventually become part of the national coal resource data system.

Another Survey project, also funded by the U.S. Geological Survey, includes producing an inventory of underground mined-out areas in Western Kentucky which are not currently identified in the Kentucky Department of Mines and Mineral's archives of mine maps. "This effort is important in refining our estimates of state-wide coal resource studies," Haney said.

In order to collect data, the Coal Section of the Survey employs seven full-time professional geologists and 20 student geologist interns and maintains a separate office in Henderson, Kentucky, to offer the same services more conveniently to the Western half of the state. "In economic terms, the Survey's research is clearly important when you look at the amount of money the state receives through revenue taxes, as well as the individual salaries coal-related employment brings," said Stanley.

Coal revenue taxes generated by

regular collection from July 1983 through January 1984 were over \$102 million, according to the Kentucky Department of Revenue. Although this was a slight decrease from the same period in 1982-83 of \$105 million, it still represents a healthy sum for use by the state, primarily in support of highway construction.

The same tonnage of coal which generated the 1982-83 revenue provided direct employment for 54,750 miners.

"For a large percentage of the population, the economic future of coal controls the economic future of the people," said Cobb. "And the information the Survey has is vital in shaping that future. The coal industry will probably always follow a boom and bust cycle. Even if the short-term benefits are unpredictable, the long term benefits are positive."

Coal and the energy research going on at UK will benefit the state now, next year, and in ten to 15 years. These energy related research programs are geared toward the future in examining how Kentucky can best use its coal resources.

Activating A Tumor Killer

A diagnosis of cancer is not a mandatory death sentence anymore. More than 55 percent of the diagnosed cancer victims recover from the disease with treatment of one or a combination of surgery, radiation therapy and chemotherapy.

A fourth treatment may soon be added due to advances in immunology research some of which are going on in the laboratory of University of Kentucky Microbiology and Immunology Chairman Dr. Alan Kaplan.

Kaplan's research is aimed at examining the changes signaling maturity in cells known as macrophages and the cells' effectiveness in combating tumor growth.

As a whole, macrophages are a group of cells which respond to a class of compounds called biologic response modifiers—agents which augment a host's immune system to enable it to more effectively deal with tumors or foreign substances like bacteria or viruses.

Individually, macrophages are cells in human tissues that begin life as potential infection fighting cells called monocytes in the blood system. When they migrate toward the infected tissue they take on different characteristics and mature to become macrophages.

In normal circumstances, macrophages are key cells in resistance to infection, but they do not kill tumor cells. However, if the macrophages are activated, they acquire the ability to destroy tumor cells.

Macrophages, even when activated by biologic response modifiers, are only effective against small numbers of tumor cells, Kaplan said, and it is unlikely that biologic response modifiers, such as macrophages, will be the primary mechanism for treating tumors. But, he said, in conjunction with other methods, they may be very effective in causing the elimination of small numbers of tumor cells in multiple places. For example, after the surgical removal of a tumor, some tumor cells could have escaped and lodged in several other body sites.



By Tawny R. Acker

Activated macrophages have been shown in animal systems to be very effective at destroying those types of small tumor nodules, Kaplan said.

One aspect of macrophage anti-tumor activity that Kaplan's lab is studying is how macrophages kill tumor cells. One mechanism that Kaplan discovered while working with colleague Dr. Kevin Conolly at the Medical College of Virginia was that activated macrophages cause tumor cells to divide in an irregular fashion. Normally when cells divide they disperse their genetic information equally between their progeny.

However, when tumor cells divide in the presence of activated macrophages, the tumor cells are unable to package their genetic information properly. As a result, Kaplan said, "The tumor cells rapidly die, like they are committing suicide."

Another aspect that Kaplan's graduate assistant, Joan Strawson, is currently studying is how hydrogen peroxide, which is made by activated macrophages, may kill tumor cells.

Kaplan's research also involves studying the signals which increase the ability of macrophages to prevent infection and kill tumor cells. These experiments involve analyzing their ability to kill bacteria or tumor cells in tissue cultures outside of the body. One factor controlling this change appears to be the process of adherence. If the cell begins to adhere or stick to a glass surface (or what could be a cell in the body tissue), it begins to mature, Kaplan said. "And knowing this we study macrophages in teflon-coated bags so they cannot adhere and we can analyze the stages before maturity and the signals that allow maturity," he explained.

Kaplan's lab was the first to discover that when a macrophage becomes activated it acquires a surface protein which identifies the stage of maturity and predicts a macrophage which will kill tumor cells. His research demonstrated that by examining the changes in the proteins or molecules on the surface of the cell, researchers can study the signals which cause changes in the overall function of the cell. "As a cell matures, it changes its clothes, the surface proteins," Kaplan said. "We make antibodies against surface

"As a cell matures, it changes its clothes, the surface proteins. We make antibodies against surface proteins so at any particular phase, we can identify the state of maturity and analyze it."

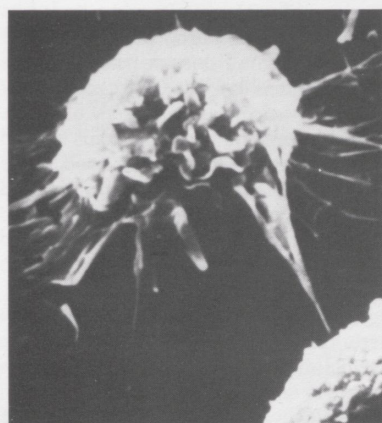
—Professor Alan Kaplan

proteins so at any particular phase, we can identify the stage of maturity and analyze it."

He is currently trying to develop a monoclonal antibody that will identify the changes in the macrophages' activities. "Monoclonal antibodies represent an exciting, new technological development in immunology which allows researchers to have a mechanism which produces an unlimited supply of antibodies," Kaplan said. The antibody Kaplan is experimenting with would act as a gauge allowing Kaplan to measure the anti-tumor activity of each macrophage. "If we could measure

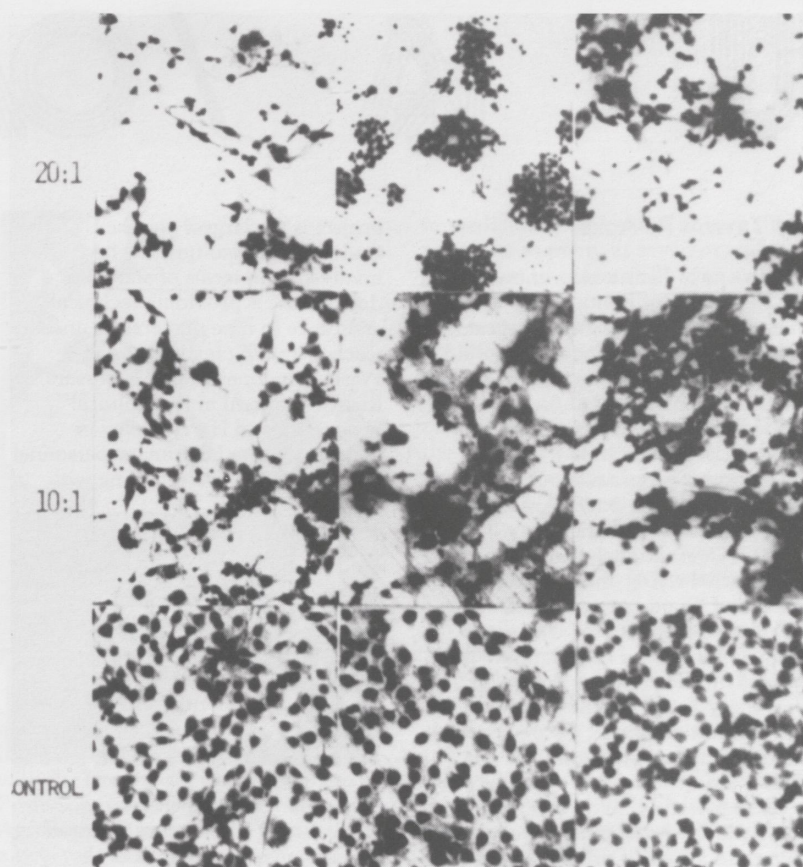


Scanning electron micrograph of macrophages attacking a tumor cell. The sphere-shaped macrophages are the clusters on the tumor cell.



An even greater magnification of an activated macrophage attacking a tumor cell with a stinger-like probe.

the correlation between the surface changes and the macrophages' ability to kill tumor cells, it would only take a couple of hours versus the two days it usually takes to make this kind of



These microscopic pictures portray the effectiveness activated macrophages have in destroying tumor cells. The black dots across the bottom panel are tumor cells prior to the presence of activated macrophages. The top two panels show the destruction of those cells growing in the presence of activated macrophages.

distinction," he said.

Several substances activate macrophages including some substances which work at least in part by inducing interferon, a substance which inhibits virus infection.

The idea of the immunological system being involved in regulation of tumor growth arose in part from observations of physicians and pathologists in the early part of the 20th century. They observed that tumors which were getting smaller in size were frequently associated with bacterial infections and the presence of cells from the immune system. These observations actually led to attempts at treating cancer with bacterial extracts.

"The use of many chemicals which

today are called biologic response modifiers are really a refinement of the experiments of our earlier colleagues," Kaplan explained. "We seek to find and/or synthesize compounds which are able to augment the immune response without the deleterious side effects that the earlier bacterial extracts had.

"I believe where we will see most of the advantages from macrophages and other cells in the immune system is when they are harnessed in conjunction with other forms of cancer therapy, such as surgery, chemotherapy and radiation. Biologic response modifiers hold the promise of providing a new weapon in the treatment of cancer. The continued development of this research and other new and exciting approaches to cancer treatment will only occur with the continued support of a knowledgeable public and an enlightened federal government." Kaplan's research is funded by two grants from the National Cancer Institute and one from the National Foundation for Cancer Research.

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By Tawny R. Acker

"No one in Peoria may know about the University of Kentucky's international development program, but they know us in Indonesia," said Dr. Tom Ford, director of UK's Center for Developmental Change.

Ford's assessment of the current state of UK's international development program should also include, Thailand, Saudi Arabia and the Dominican Republic.

"UK's international development efforts are thriving and will continue to expand," said James Y. McDonald, executive director of the University of Kentucky Research Foundation. "It's an area of great interest to the University as the benefits, both to UK and the host countries, become more and more apparent," explained McDonald.

UK is presently involved in ten international development programs in various stages of progress. These fall under the auspices of the Office of International Programs for Agriculture, the Center for Developmental Change and the University of Kentucky Research Foundation.

Initially, UK's international development program began in Indonesia in 1956 through a grant from USAID (United States Agency for International Development) for developing educational programs for Indonesian educational facilities. One project was an institute for technological education at Bandung and an institute for agricultural education and research at Bogor. The project involved professors and staff from the UK colleges of Agriculture, Arts & Sciences, and Engineering. The Kentucky team provided specialists in engineering, physical and agricultural sciences, curriculum development, and educational administrative policies. Assistance was also provided in developing future building and campus planning.

Since that initial program, UK has been involved in several Indonesian-aid projects. The current Indonesian

project is the largest one the UK College of Agriculture has been involved in in terms of staff and dollars. UK is providing technical assistance to nine universities and two teacher training institutions in Western Indonesia. UK professors, Russell Brannon in Agricultural Economics and Harry Bailey in Agronomy, are the primary personnel involved in the project along with



English language teachers, and specialists in curriculum and staff development. As a result of the project, approximately 18 staff members of Indonesian institutions will come to UK or other U.S. universities for doctoral study and 53 will do likewise at the master's level.

Thailand is another country where UK has had considerable activity. In 1967 UK was requested by USAID to assist the Thai Ministry of Agriculture and Cooperatives in establishing a regional research center which would service the 16 provinces comprising Northeast Thailand. During the course of that project, which lasted until 1975, UK helped select 118 Thai agricultural specialists to come to the U.S. for training, many at UK. Twenty-two UK faculty members served at the research center for periods of two years or longer and seven professors served short-term tours of one to three months to provide assistance on specific problems, such as establishing a program in agricultural machinery and equipment maintenance, improving an irrigation system, establishing a meat science laboratory and consulting on veterinary science research.

UK's current Thailand contract involves the College of Agriculture providing assistance in upgrading agricultural production in a rain-fed area of Northeast Thailand. The results of this project will be used in initiating similar projects in other parts of the country. The UK personnel involved include Drs. John Ragland, Agronomy, and Craig Infanger, Agricultural Economics, as well as specialists in the agricultural extension program.

One UK professor who worked on the initial Thai project is Herbert Massey, Jr., now the director of International Programs for Agriculture at UK.

Agriculture is one of UK's strongest areas in international development. Since the 1950s, the College of Agriculture has been involved with 21 international projects. Before 1975, each was handled individually, but passage, by Congress, of the Foreign Assistance Act in the late 70s included a section, called Title XII, that more or less decreed that land grant universities had a responsibility to participate in the U.S. government foreign aid programs in agriculture and food. It was partly anticipation of the passage of this act that led to establishment of UK's Office of International Programs for Agriculture. The passage of this act was also responsible for renewed interest in international development among UK's agriculture staff, said Massey.

"We are interested in international development projects because agriculture is an international activity—a large percentage of our agricultural produce is sold abroad,



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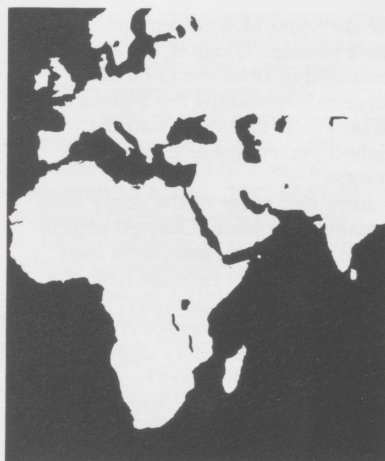
and we also import many agricultural products," Massey said. "It is important from this standpoint that we offer students and faculty an opportunity to become more knowledgeable about agriculture around the world."

"Another aspect is that many of us feel the world can only be a better and more stable place if most people are reasonably well-fed. Part of this can be helped through agricultural development."

"In a very general sort of way agriculture is the underpinning of any economy and, for most of the world's underdeveloped countries, agriculture is a prerequisite for substantial development. We all should have an interest in having all people able to produce for themselves, rather than being a drain on the rest of the world's resources."

"International projects are not the easiest kind," Massey said. "It takes a great deal of coordination from an administrative point of view. You have to decide if your faculty has the resources, including time, as well as expertise to compete for the project, and then make sure the faculty members are willing before the grant application is even written. After writing the proposal and being awarded the grant, the real work begins. Projects never progress exactly as they are planned. Every problem becomes magnified. Even a phone call to an official from another country becomes a problem—with time changes and overseas operators."

"And, of course, when our faculty travel to the country, they suddenly are exposed to a very different culture and faced with massive amounts of red tape which result from the project being subject to regulations and procedures from the host government, the U.S. funding agency and UK. These rules and regulations can be stifling but they are manageable if a feeling of mutual trust and respect can be developed among the host institution, the U.S. government and the UK people involved in the project."



Massey is currently involved in administering a number of international contracts including one with the Dominican Republic where Professor Grant Thomas of UK's Agronomy Department is working on a two-year assignment. "We have been focusing on the reduced tillage in farming systems to gain more understanding of developing cropping systems that could be used on hilly soil," he said.

The Dominican Republic project may yield some information helpful to Kentucky farmers, Massey said, because their concerns are similar to those expressed by farmers in hilly sections of our state.

International development projects attract a certain type of faculty member, one who is not only very interested in challenges, but who is willing to live in a foreign country for several years. Often those involved with international development are some of the most talented faculty—on the cutting edge of their fields, according to Mike Reed, UK Agriculture Economics professor.

Reed, as part of a team with UK Agriculture Professor Warren Lacefield, coordinates an intensive training workshop on international development for all interested UK faculty, staff and students. He explained, "International projects are not like other projects, because

immediate results cannot be seen. 'It may take as many as seven or eight years, just to successfully plan and implement an international project, and another similar time period to see the effects,' he said. "Unfortunately, there is often a great deal of impatience on the part of the host country and the donors—both look at the U.S. and say 'Why can't it be like this?' But you must be aware of the situation. It is sometimes like plotting the technology of the 1980s in a country that is functioning at about the level of the U.S. in the early 1900s."

Despite the difficulties there are rewards other than those related to helping with food production and the economy, Reed said. "Faculty and students receive the opportunity to travel and participate in cultures that most will only read about. And that does not include the friendships that result from these interactions."

Massey's office is filled with photographs of foreign friends met through international development and he said he corresponds monthly with many of them.

"It's a good feeling," said UK Agriculture Professor Eldon Smith, "When you return to a foreign country with friends there. When I went to Thailand on my second visit, it was like old-home week. I received so many dinner invitations, it was like a vacation to see friends."

However, it does not necessarily take foreign friends in a foreign country to make a visit resemble old-home week. On a trip to Thailand and in a hotel restaurant, Smith and Massey unexpectedly met a former UK economics professor. All were there because of various international programs. "Suddenly, the world didn't seem like such a big place," Smith said.

And the world will also be a better place, because international development is aimed at improving the lives of citizens in developing countries, said McDonald. "And there is no more worthy mission for a United States university."

Research Briefs

Sitting Safely

"Mommy! Billy is climbing up the back of your seat again! He won't sit still!"

"Pull him back onto the seat please, honey."

As the car swings around the bend towards home, Jill grabs her baby brother and firmly plants him beside her. Billy looks up at her and giggles. Suddenly the car veers - a CRASH! resounds, and the two are hurtled toward the front windshield.

In this hypothetical case, not unlike many real accidents, the use of safety restraints could have prevented injury or death. "There has been a lot of documentation where children have been prevented injury because they were in safety seats," said Kenneth Agent, research engineer at the Kentucky Transportation Research Center. To decrease the number of injuries and deaths caused by the failure to use safety seats, the Kentucky legislature enacted a mandatory usage law in July of 1982 which requires the use of a "restraint system" for children 40 inches or less in height. Kentucky State Police sponsored the KTRP in a study of child safety seat usage after the law's enactment, to determine its effectiveness.

Agent and Joseph Crabtree first surveyed safety seat usage a few months before the passage of the law. Agent then compared the results with a survey he took after its enactment. To obtain the necessary information, KTRP's data collectors stood at intersections with traffic lights or stop signs, looking for cars which carried children under four. In "occupant restraint surveys" they recorded the number of children in safety seats, the brands and models of the seats, and whether or not the restraints were used properly. The drivers' ages and whether they were wearing safety belts were also recorded.

The statewide child safety seat usage rate observed one year after enactment of the law was 22.7 percent, representing a "statistically significant" increase compared with

the surveyed 14.4 percent before the law's passage. Usage of the seats increased in 18 of the 19 cities surveyed, remaining the highest in the larger cities. Lexington had the highest percentage of usage - 43.4 percent.

Improper usage of the safety seats remains a problem. Only 50 percent of the child safety seats were used properly, a slight increase from the previous survey. Generally, this was because the child was not correctly strapped into the safety seat. Some infants were incorrectly faced in the seat, lying forward instead of backward.

Even though usage of seats has increased since the new law, it is still considered too low, Agent said. In his research report he suggests that the law should be amended to "strengthen its influence on usage." The law should include all children under the age of six, allowing those who have outgrown their safety seats to switch to safety belts seats, he said. Presently there is no penalty for violating the law. Agent suggests implementing a fine of \$15 to \$25 to make the law enforceable. Since his suggestion was made, a bill proposing a penalty for violation of this law has been put before the legislature.

Although it may be too late for Billy and others like him, many children have been spared injury and an early death with the increase of safety seat usage. If the child is accustomed to safety restraints, using them can become a habit, "especially if the parents start making them use safety belts after safety seats," Agent said. According to him, if the child spends the first few years using a safety seat but then does not switch directly to a belt, it is not as likely that the child will regularly use safety restraint later in life.

Education on safety restraint is geared to younger children, Agent said. Most of it is done through the school system. Lt. John Lile of the Kentucky State Police is organizing a publicity program in Kentucky schools. Kindergarteners through

fifth-graders in selected cities will be in contests which urge everyone in the family to use safety restraints. "The new generation is seeing a lot more literature on the safety belt," Agent said, "so they'll be more apt to use it than the older generation."

—Carolyn Edwards

Markey Gift Ensures Cancer Center

At their January meeting, the University of Kentucky Board of Trustees accepted the largest single cash gift in its history. The gift, in the amount of \$4,877,776, was given as part of a \$5 million grant of matching-funds committed by the Lucille Parker Markey Charitable Trust. It is earmarked for the completion of a comprehensive cancer treatment and research facility now under construction at the UK Chandler Medical Center.

"We are extremely pleased to accept this outstanding donation," stated UK President Otis A. Singletary. "Most importantly, we appreciate the opportunity to continue working toward a goal shared by the University and Mrs. Markey: to provide an ever heightened standard of life, education, and care for Kentuckians."

Phase I of the Lucille Parker Markey Cancer Center, the patient care component, was begun in July 1982 and will be completed in 1985. It will feature 28 specialized cancer treatment rooms for patients, a chemotherapy treatment unit, and a neutron therapy suite.

The gift from the Markey Charitable Trust ensures completion of Phase II, the research component of the cancer center, which will offer 25 highly specialized and modern cancer

research laboratories in a centralized location. The research building, named in honor of Dorothy Enslow Combs, is to be completed in 1986.

During her lifetime, Lucille Parker Markey contributed more than \$5 million to the development of a premier cancer center for Kentuckians. Remembering this goal in her estate, she bequeathed \$641,800 to its continued pursuit. With this latest gift, the generosity of Mrs. Markey, late owner of Calumet Farm, has reached almost \$11 million.

All construction of the emerging cancer center at the UK Chandler Medical Center has been made possible through gifts and donations from private benefactors. At an estimated cost of \$17 million for the initial two phases of the cancer center, contributions were raised through the efforts of the Ephraim McDowell Cancer Foundation in Lexington, Kentucky.

"It is our intention to honor the generous support of Mrs. Markey and many other concerned Kentuckians by establishing the Lucille Parker Markey Cancer Center as a benchmark facility; one which will be a model for other 'centers of excellence' at this University and, perhaps, other institutions as well," noted Peter P. Bosomworth, M.D., chancellor for the UK Chandler Medical Center.

—Sandra Gray Thacker

TAPing Drunk Drivers

Wipers swipe back and forth, partially clearing off the stream of water which pounds on the windshield. A blurry nothingness, speckled with flashes of light, rushes by the windows. The driver sluggishly leans forward, grasps a bottle, and tips it to his lips. Finishing the liquid in one gulp, he throws the bottle to the back seat. He looks up, squints his eyes, and tries to focus on the curving yellow lines.

Drunk driving is one of this country's most serious health and safety problems. Over the past ten years approximately 25,000 highway deaths each year have involved

alcohol. The problem has reached the level at which an estimated one out of two Americans will be involved in an alcohol-related accident in his or her lifetime.

In the spring of 1982 the Kentucky State Police's Highway Safety Standards Section awarded grants to set up alcohol enforcement programs in areas with high rates of alcohol-related accidents. The Lexington-Fayette County area was identified as being in need of such a program. The Lexington-Fayette County Traffic Alcohol Program (TAP) began operation on May 1, 1982 and will continue through September 1984.

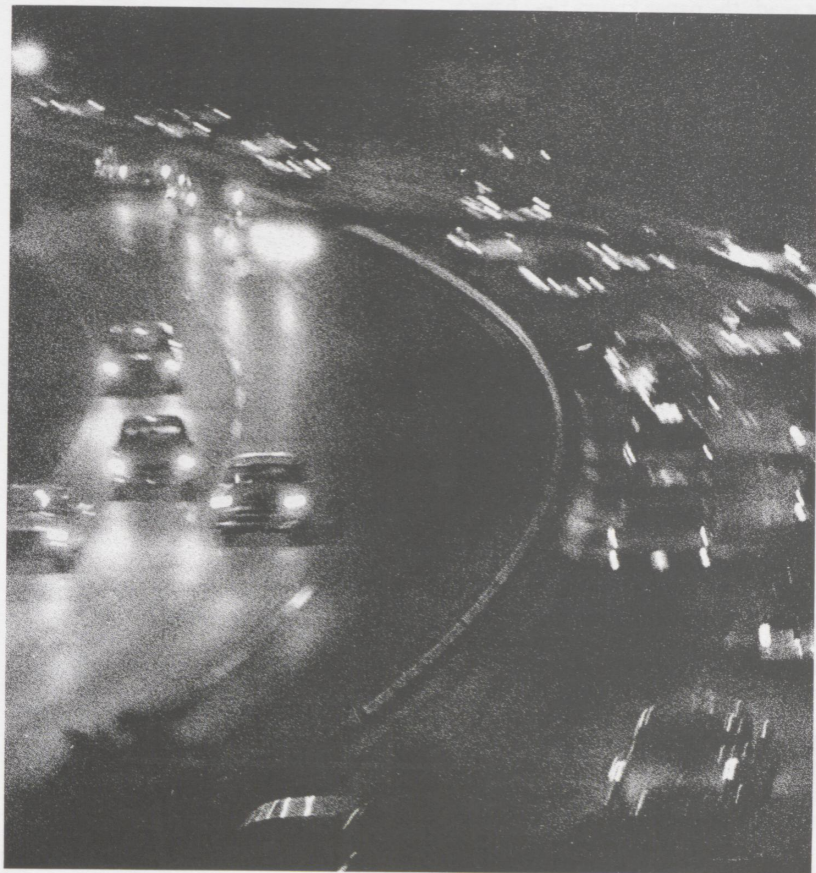
TAP is working to reduce alcohol-related accidents with strict enforcement of DUI laws, which in Kentucky are against "operating a motor vehicle while under the influence of intoxicants." Fifteen to 20 police officers are on the TAP patrol from 10:30 p.m. to 3:30 a.m. every day except Sunday night and Monday mornings. These officers have attended 40 hour a week training sessions to help them better identify

drunk drivers and to familiarize themselves with their legal rights and with the rights of the people they stop for suspected DUI violations.

TAP also consists of an alcohol education program to increase community awareness of the problems created by drinking and driving. Sgt. Larry Ball, project director of TAP, has helped organize alcohol education programs in the schools. He has also spoken about TAP with many civic groups and University of Kentucky campus organizations. Alerting the public to the seriousness of drunk driving is one way TAP hopes to reduce the number of alcohol-related fatalities and injuries in car accidents.

Ball said in the beginning the program was the object of a great deal of complaint. Arrests for drunk driving had increased from approximately 30 to 400 a month, which created quite a stir. Ball said some people accused police of marking tires and sitting outside bars just to boost arrests. "Whenever you

CONTINUED PAGE 30



RESEARCH BRIEFS continued

make a change, you can expect a similar type of outcry," he said. "You see a backlash to it. People were used to doing the same things for years and not being arrested." Lately the program has received few complaints. "It's become more accepted that the police are out there," Ball said.

Researchers at the UK Transportation Center have been assigned the task of evaluating Fayette County's TAP. With funds from the Kentucky State Police, Principal Investigators Jerry G. Pigman and Kenneth R. Agent have studied accidents, arrests, adjudications, cost effectiveness, and public opinion to compile an interim report on the first year of the program. The final report, which will include a comparison of Fayette County's TAP with other Kentucky enforcement programs, should be completed by September.

Since the program began Pigman said the public's "perceived risk" of being arrested for drunk driving has increased. "Anyone who watches T.V. or reads the paper knows they have a good chance of being arrested if they drink too much and then drive."

The researchers compared the two-year period before TAP with the first year of TAP to study accident data. They discovered that alcohol-related accidents decreased by 21 percent overall. In the hours of TAP enforcement, the accidents decreased 29.7 percent. Alcohol-related fatal and injury accidents decreased by 22.5 percent.

Arrests of drivers for DUI increased, especially during the special TAP enforcement hours. DUI arrests increased from 929 to 4,427. Those who were arrested had a lower blood-alcohol level than before TAP began.

According to this research, the total cost of the program for its first year of operation was \$1,195,400. Benefits and income for TAP came from DUI fines and reduced accident costs. The researchers also found that direct revenue from fines and court costs alone would cover 92 percent of the estimated cost.

"The object is not to create arrests," Ball said. "Arrests are remedial and time consuming. It's to get people to quit drinking and driving. Our goal is to keep people from getting killed."

—Carolyn Edwards

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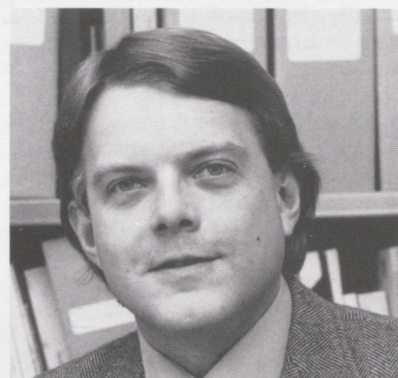
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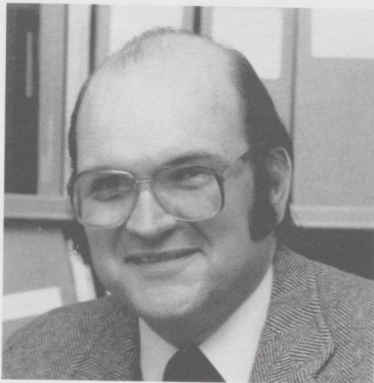
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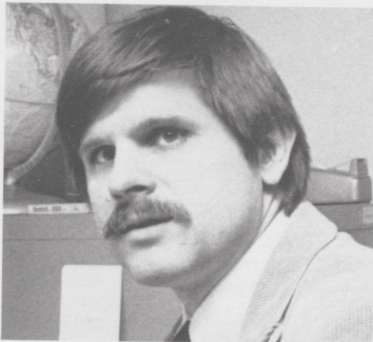


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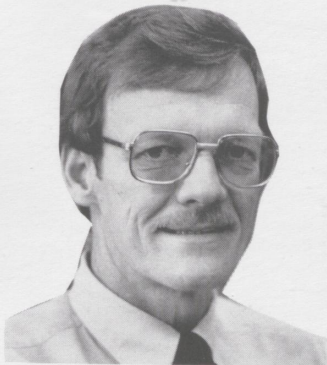
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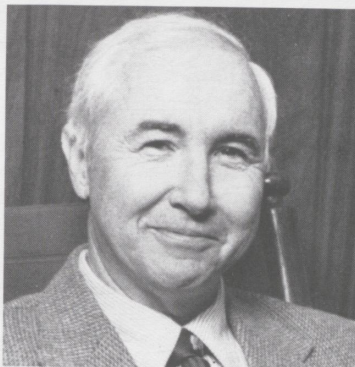
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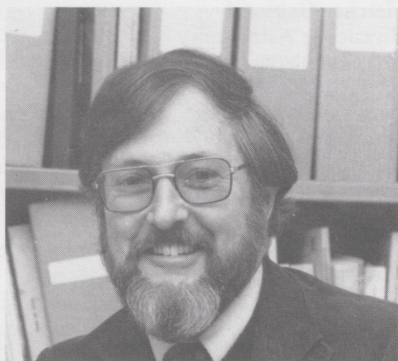
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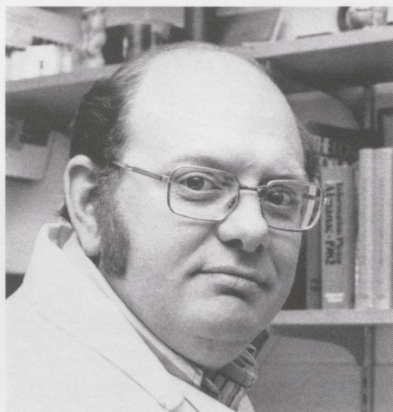
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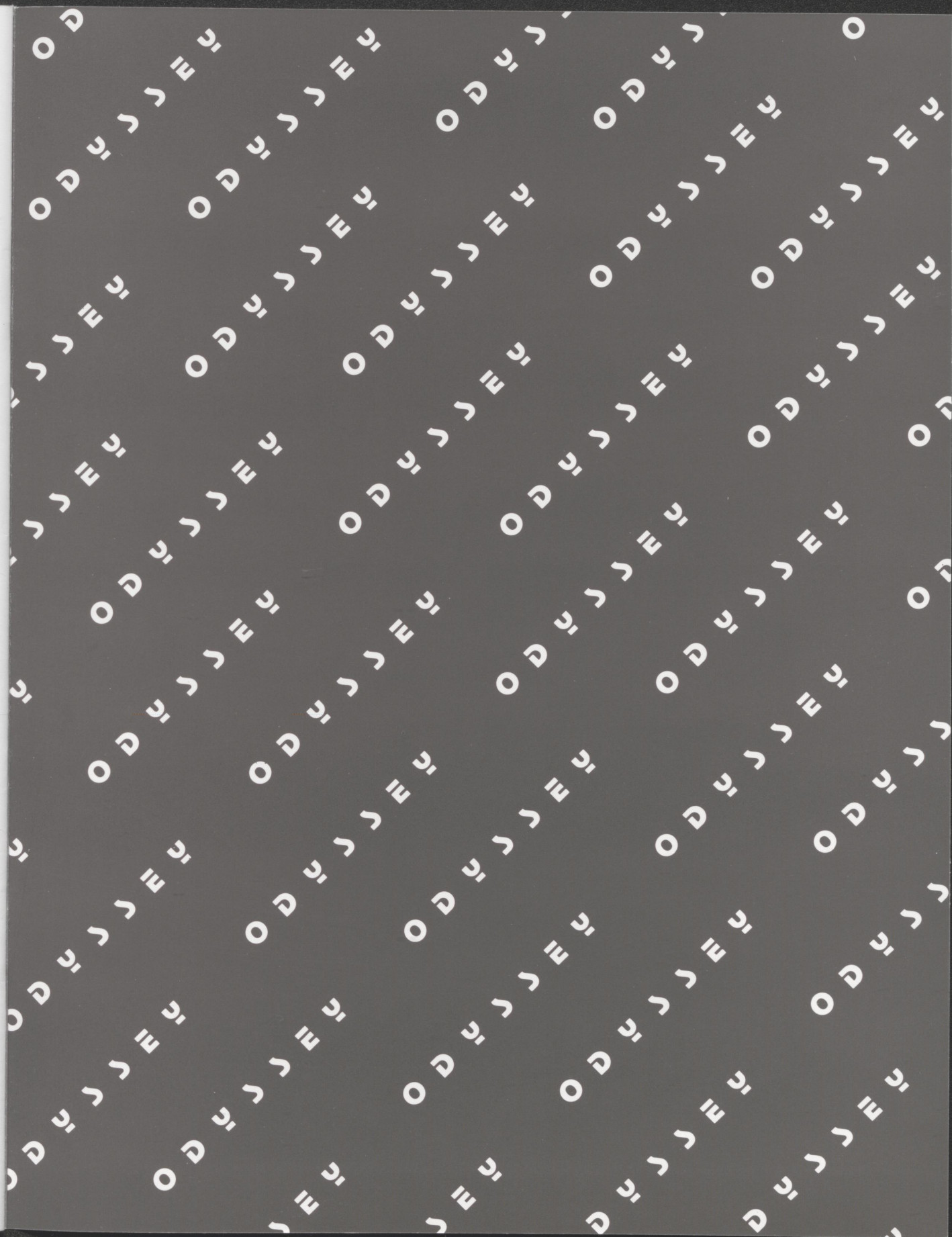


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