

FLORIDA STATE UNIVERSITY

Research

IN ♦ REVIEW

GIANT LEAP

FSU'S QUARTER-CENTURY
COMING OF AGE

Mission in Magnets
Aging in America
Quark Quest
Bringing Up Baby

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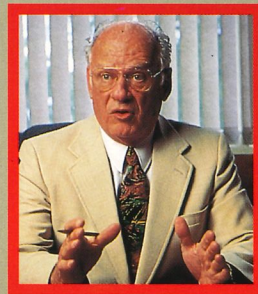
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COVER STORY

12 In 1997, Florida State University will celebrate its 50th anniversary as a coeducational university. But the progress wrought by the most recent 25 years best tells the story of the university's remarkable emergence as a major center for research and graduate training.

A Talk with Bob Johnson

No campus administrator knows that story better than Bob Johnson, FSU's research chief since 1968. His candid appraisal of things offers insight into what it takes to build a creditable enterprise in research and scholarship.



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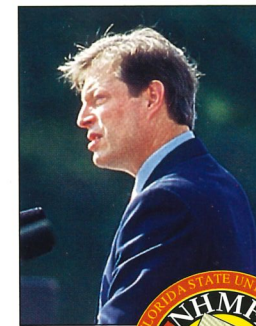
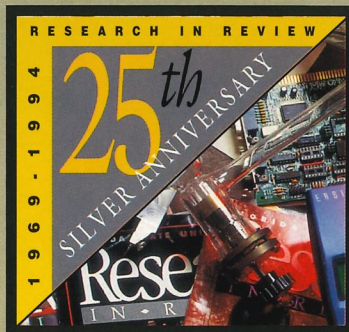


It may be the most subtle social revolution in American history. We're living longer than ever, and the profound consequences of that fact are only now beginning to dawn on government, if not you and me.

by Kim MacQueen

Turning 25

Surely *one* of the things it takes is a good research magazine. At least that was Johnson's thinking in 1969, when he started this one. *Research in Review* turns 25!



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Four years ago, FSU seized a scientific dream of an opportunity. Today, the world's most ambitious assault on the frontier of knowledge in high-field magnetism is officially under way in Tallahassee. by Frank Stephenson

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Is America throwing its children away? A Florida State child development expert offers an old-fashioned antidote for what he describes as a poison that is killing our kids' futures. by Ron Wiginton



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Florida State University Research in Review (USPS 072-360) is published by the Office of the Vice President for Research, Florida State University, with editorial offices at 100 Sliger Building, Innovation Park, Florida State University, Tallahassee, Florida 32306-3067.

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Abstracts

PERISCOPE ON CAMPUS LIFE AND RESEARCH



ILLUSTRATION: BRUCE HALL

Branson in the Center for Educational Technology.

High Court Agrees With Sandy

Last April, FSU President Sandy D'Alemberte made a 30-minute appearance before the U.S. Supreme Court, arguing that judges have the right to bar abortion protesters from interfering with public access to women's health clinics. In June, the high court ruled 6-3 in D'Alemberte's favor, a ruling widely hailed as a victory for abortion-rights activists.

A well-known defender of First Amendment rights, D'Alemberte took an unpaid leave of absence from his new post to represent a Melbourne abortion clinic serving low- and moderate-income women. Before being named president last fall, D'Alemberte had signed on to take the case on behalf of the Aware Woman Center for Choice. The clinic had sought, and won, a court order to keep anti-abortion protesters at least 36 feet from its property line, a buffer zone set by a state circuit judge. Following litigation brought by abortion foes, Florida's Supreme Court subsequently ruled in favor of the Melbourne judge's injunction.

But last year, a federal appeals court in Atlanta ruled the injunction a possible violation of free speech and ordered a federal trial court in Orlando to entertain a suit aimed at overturning the circuit judge's decision.

"They (abortion protesters and their legal counsel) are trying to shut off any right to choose for poor women in the area who need medical treatment," D'Alemberte told reporters in April. "This is purely an issue of health and public safety."

Following an oral argument in June, the justices ruled 6-3 that the Melbourne judge did not violate the free-speech rights of anti-abortion demonstrators by creating the 36-foot buffer zone around the clinic. The court then tempered that decision, however, by ruling 8-1 that the Florida judge went too far when he barred protesters from approaching patients within 300 feet of the clinic.

As part of his preparations for the case, D'Alemberte—a former dean of FSU's law school and past president of the American Bar As-

▼ An anti-abortion protester blocks the entrance to Aware Woman Center for Choice in Melbourne, Florida



PHOTO: UPI/BETTMANN

Taxol Patent Nets \$5.8 Million

For a start-up operation, FSU's new Research Foundation has found plenty to keep itself busy during this, its first full year of operation. Charged with administering the university's licensing and patenting operations, among other things, the private foundation recently released year-end figures that show how valuable FSU research and creative activity can be in the marketplace.

Far and away the biggest payoff in FSU research history is revenue from a licensing agreement the university has with Bristol-Myers Squibb. Since 1991, the pharmaceutical giant has had an exclusive right to use patents held by FSU on a method for partially synthesizing the cancer-fighting drug taxol. The method was developed by university chemist Dr. Robert Holton.

At the end of the last fiscal year, June 30, Florida State had received \$5.76 million from Bristol in what amounts to advances on royalties,

foundation officials say. The drug company reportedly is just now beginning to gear up for full-scale production of taxol based on Holton's synthesis.

"At this point, it's hard to predict where this agreement will take us, because everything depends on how taxol's future develops as a worthwhile anti-cancer agent," said Dr. Michael Devine, associate vice president for research and foundation secretary. "But at the moment, things look good. We feel confident that this licensing agreement will continue to be a significant source of revenue for Florida State for years to come."

Other revenue collected last year from FSU innovations include:

- \$97,183 from commissions on sales of products such as T-shirts and neckties using photographs produced by Michael Davidson, a microphotographer with the National High Magnetic Field Laboratory; and

- \$45,507 from royalties associated with the Job Skills Education Program developed by Dr. Robert

sociation—spent days undergoing mock interrogation by law students and lawyers posing as justices. The abortion-clinic case was D'Alemberte's second appearance inside the nation's highest legal chambers.

"It's an awe-inspiring setting, and it's easy to get caught up in the history of the place," said D'Alemberte of the courtroom's majestic setting, replete with marble columns and velvet, gold-tasseled curtains.

In a 1992 case, the court ruled against D'Alemberte's plea to introduce evidence that may have proven the innocence of his client, a Texas death-row inmate.

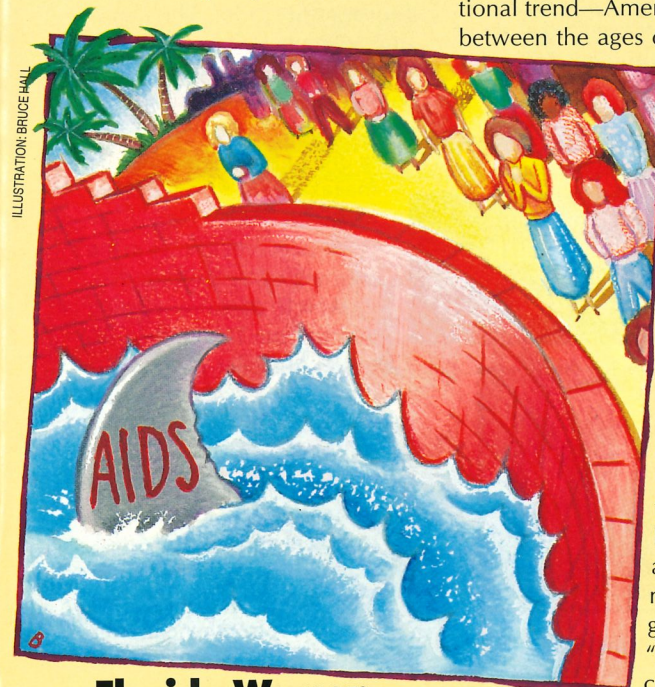


ILLUSTRATION: BRUCE HALL

Florida Women and AIDS

This fall, FSU researchers launched one of the nation's first, large-scale research projects aimed at reducing the risk of AIDS among women.

The four-year, \$1 million project, funded by the National Institute of Child Health and Hu-

man Development, will involve about 450 women in the Miami area. Dr. Dianne Montgomery, dean of the School of Social Work, serves as the project's lead investigator.

Montgomery says that Miami was selected because women in Dade County—particularly minority women—are becoming HIV-infected by their male partners at alarming rates. This year, Miami public health officials reported that of all HIV cases among Dade County women, among Hispanics 56 percent were infected by heterosexual contact; among blacks, 51 percent and among whites, 33 percent. The numbers reflect a national trend—American women between the ages of 15 and 25 are now the highest risk group for HIV infection, according to the Centers for Disease Control and Prevention in Atlanta.

"Florida leads the nation in heterosexually transmitted HIV infection among women," Montgomery said. "Our main focus is on testing an intervention program designed to prevent HIV infection among culturally diverse women at risk."

In pilot studies begun last year, women aged 18 to 45 who were chosen to participate in the program were asked to meet in small groups once a week for six weeks. During each of their two-



PHOTO: RAY STANWARD

▲ The East Wing of Florida State's new University Center, surrounding Doak Campbell Stadium, opened this fall. The building is slated to be finished and fully occupied by mid-December. Construction has just begun on the West Wing, to be ready by Summer 1996.

hour group sessions, group leaders encouraged the women to consider which of their behaviors may be putting them at risk for AIDS. Leading such discussions isn't easy, Montgomery said. "The whole subject of AIDS and sexuality is taboo among some cultures. Some of these women still don't see themselves as being at-risk."

The preliminary studies revealed a series of problems that had to be solved before starting the project. A main obstacle was getting women to come to the group sessions. Food, day-care, transportation and comfortable settings such as churches are now provided as enticements. Partici-

pants also are paid, with perfect attendance for the entire project netting each participant about \$190.

"We've learned what serves as an incentive to some women, and that's important because we can tell other agencies out there working with these groups, 'OK, here's what's works,'" Montgomery said. "In all of this, no matter what turns out, we learn something."

Working with Montgomery are Drs. Isaac Eberstein and David Sly, both with the Center for the Study of Population, and Dr. David Quadagno, with FSU's Department of Biological Sciences.

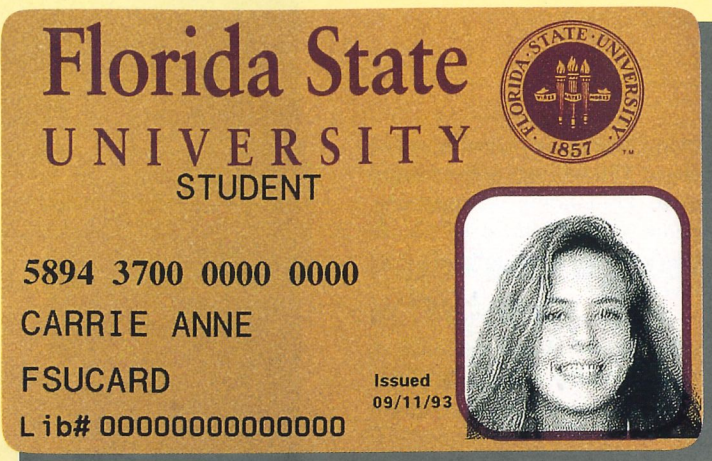
MCI Smart Card Move

Whether Florida State's football team remains number one in 1994 or not, the way FSU students pay for their game tickets is securely ranked in first place among U.S. universities. In fact, the way they pay for tuition, books, clothes, food and long-distance phone calls also has changed forever, and for the better. The new FSUCard provides instant electronic access to the university's administrative, financial, academic and information services both on and off campus, and is the first card of its kind in the country to pull it off, its developers say.

The card can be used by students, faculty and staff as a bank card, debit card, university I.D. card or long-distance calling card. It can be used to check out books from the library, as a key for getting into one's dormitory, as change for vending machines or for campus washers and dryers. You can use it to buy football tickets, pay for classes, get information about fees or schedules from FSU's mainframe computer or purchase goods or services at over 100 Tallahassee locations.

The card uses what's known in the business as "smart" technology: a magnetic strip that interfaces with the university's mainframe computer and allows credit-card reading machines to process the card in the same way as a Visa, MasterCard or ATM card. It acts as a key to so many different types of information that it sometimes confuses its users, who tend to think all that data is stored on the card itself, says Bill Norwood, associate director of University Computing Systems and the person generally credited with the card's development.

Instead, the card merely provides a link between the user and the university's main computer. When the FSUCard adapts chip technology during the first part of



1995, this type of storage capacity will indeed be available, and students will be able to do things like carry their transcripts, medical records and digitized four-color ID photos around on their cards, all of which will be accessible virtually anytime, anywhere.

The FSUCard will take another giant step forward in early 1995, opening up a multitude of other services only dreamed of until now: card users will be able to access their records through interactive kiosks located around town and send voice mail and faxes through the card's calling card platform, made possible through a groundbreaking agreement reached this summer with the communications company MCI.

A three-year, \$1.5 million grant from MCI helped establish the Card Application Technology Center (CATC) on campus, a unit Norwood directs. The center now serves as the base for all research and development aimed at expanding the card's capability, and as such the center already is recognized as the leader in the field. "We're the first college campus to offer this integrated card technology," says Director of Business Services Al Gilligan.

Interest from other university campuses is spreading rapidly, Norwood reports. The FSUCard already has been adapted for use

at the University of Northern Colorado and negotiations with a number of other campuses and organizations are well under way. More than a dozen universities have now visited FSU's campus for CATC seminars and more colleges, universities and organizations who want to get smart about smart card technology are on the way, he said.

International Quarterly
ESSAYS FICTION DRAMA POETRY ART REVIEWS
PREMIERE ISSUE



Europe in Transition: East and West
Volume 1, Number 1

Window on the World

Small literary magazines attempt to cover the spectrum of art and thought within their respective nations, but are often lost to the world outside them because of language, political

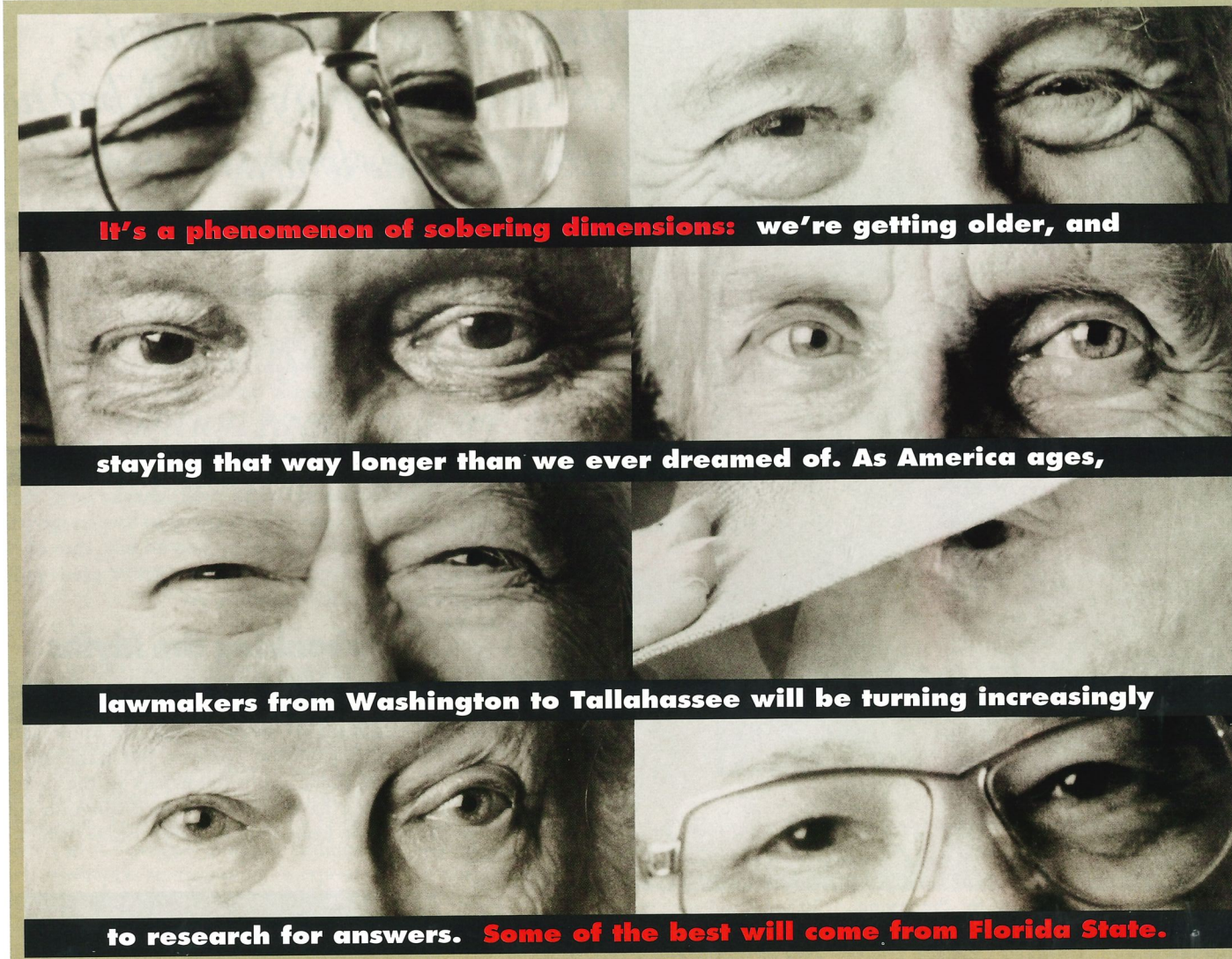
and cultural differences. There's a whole world of art and literature out there, and Florida State English professor Van Brock is compiling, editing and presenting it in beautifully printed volumes four times a year. His brainchild, *International Quarterly*, nearing completion of its first volume and one whirlwind trip around the globe, is an attempt to bridge the cultural gaps that keep us from understanding and appreciating our neighbors to the earth's four corners.

IQ's first three issues cover Europe in Transition: East and West; Asia, Australia and the Pacific; and the Middle East and Africa. A fourth, covering the Americas, is due out later this year. Each issue is stocked with fiction, essays, poetry, drama, reviews and painstakingly printed photos of fine art in full color. The magazine attempts to look at all cultures from their own vantage points, thereby escaping "the vestiges of our xenophobia," to quote one of the many nods the magazine has received from reviewers worldwide.

As poet Brock notes in the opening essay for Issue No. 2, which contains writing and art from Thailand, Indonesia, Australia, Samoa, India, China, Taiwan, Japan and Nepal (for a start): "The situations of writers and artists cannot be separate from the opportunity for self-realization in any culture. Artists entertain us and enrich our lives in multiple ways, but they are also the canaries whose silences warn us of poison in the air."

IQ's advisory council boasts a U.S. poet laureate, while the contributing editorial staff is a list of local and international luminaries. If you'd like to contribute, volunteer or subscribe, contact *International Quarterly* at P.O. Box 10521, Tallahassee, FL 32302-0521.

PHOTOS: RAY STANFORD



It's a phenomenon of sobering dimensions: we're getting older, and

staying that way longer than we ever dreamed of. As America ages,

lawmakers from Washington to Tallahassee will be turning increasingly

to research for answers. Some of the best will come from Florida State.

The Changing Face of Age

by Kim MacQueen

Congratulations. You're going to live. A good long time, in fact, according to the latest aging and demographic research.

If you turned 60 today, you could expect to see 90. If you're in your late 40s now, who knows? You might make it to 100, maybe

105. The birthrate has been in decline for the last decade, the huge baby boom generation is just now reaching middle age and all of us

are living longer than ever before.

Longer, certainly, than most of us ever planned for.

If you're like any American who figured they'd already seen middle age come and go, it might be time to ask yourself some hard questions. Are your retirement plans sufficient to see you through to the far side of 90?



"I think old age is something of a shock. So many of my friends had no idea they'd live as long as they did."

at the first sign of economic problems, often with severance packages that won't see them through the next few years, much less to the end of life. Health care, breathtakingly expensive now, will probably get more so, and decreasing numbers of employers are including health care as a pre-paid part of their workers' retirement packages. Add to this the plight of many grandparents who've been asked to help their children with financial problems, effectively making them parents again and whittling away what they might have saved for their last years.

"Here is the gut issue,"

Where will you live? Do you have enough money to carry yourself and your family through the next 40 years?

Sobering questions even for the young, considering the dramatic changes in store for aging in America. Consider:

- The U.S. Commissioner on Aging predicts that the number of elderly people nationwide will more than double in the next 40 years.
- By 2025, people over 65 will outnumber teenagers two to one, according to the Washington, D.C.-based Population Reference Bureau.
- By 2090, the number of people 80 and over—the "oldest old," the nation's fastest-growing age group—will double.

Now consider the apparent phobia that American society has about age. When people think of aging, they generally picture nursing homes filled with sick, burdensome, senile and dying people, even though nationally only five percent of older people live in nursing homes at any one time. The question of what happens to our minds and bodies when we age is generally avoided, almost taboo. Unless they're trying hard for the elderly as a target market, advertisers often steer clear of white-haired models even for ads touting arthritis pain-relievers or hair color designed to wash away the gray.

Elderly Americans are typically forced to deal with this stigma in the workplace. Businesses still routinely drop their older workers

opines Bentley Lipscomb, Secretary for the Florida Department of Elder Affairs. "We have extended life expectancy by 20 years and society hasn't changed to reflect that one bit. People just didn't plan on living as long as they are. That's a radical shift. It's going to be a whole different world."

Ready to help us get there and understand what's happening along the way is the Pepper Institute on Aging at Florida State. Founded in 1976 with a grant from the U.S. Administration on Aging and support from the university's College of Social Sciences, the institute's seven faculty members and dozen affiliate members coordinate all FSU-based research on the aging process with a special concentration on the social, economic and political environments that affect the way we age.

While most university-based research institutes on aging across the country deal mainly with the medical and psychological issues surrounding the aging process, the Pepper Institute's social-science focus has allowed it to emerge as a prominent leader in examining the public and political institutions that shape the lives of the elderly. The institute's working relationship with state government has established it as one of the clearer heads

in the increasingly raucous debate over long-term health care and quality of life for Florida retirees. Since there are more elderly here than anywhere else in the country and more are obviously on the way, the help has come none too soon.

"I tell the legislators, 'you spent 40 years convincing everybody to come down to Florida and retire...well...they're here,'" notes Lipscomb. "We're going to have to show the rest of the country how to take care of this problem, and Florida doesn't even understand it's a problem yet."

Debunking the Myths

The field of gerontology has been around U.S. universities since the '50s, and has contributed to much of what we know about getting older as a process. But in the last several years, many researchers in the field of aging have taken care to distinguish their work from that of gerontology, which is



BETTY YUHÁS, 83

"I've heard so many people say, well I'm going to wait until I retire and then I can do this, this and this. Then they retire and two years later they're dead."

"I am uptight when I see people fighting this health bill. Too many people have been deprived. I want everybody to be in a position to get at least the basic medical attention."

JOE LANG KERSHAW, 83



thought to approach aging largely in terms of loss: of vitality and independence, of memory, of family and friends, of youth itself.

For instance, it's widely thought that elderly people, almost as a matter of course, can expect to gradually but completely lose their mental capacity to senility, now more often referred to as dementia. But new findings by aging researchers are beginning to expose senility for what it all too often really is: a throwaway diagnosis. Aging research shows that fewer than 15 percent of people over 65 ever develop mental problems. Time and time again, normal garden-variety depression, everyday confusion and reactions to stress caused by loneliness, or by being shuttled off to a nursing home, is misdiagnosed as dementia.

"Senility has been a label," says Dr. Marie Cowart (Dr.P.H. Columbia), a Pepper Institute research associate and past director who avoids the term "gerontology" because of its negative connotations. She points out another perception problem; one that's just come to a head lately in the national media. "Older bodies don't metabolize medications

as well as younger bodies do. With the wide use of medications—and particularly using the same dosage for older as well as younger people—sometimes 'senility' may be drug overdose or incompatibility of two or three medications.

"A lot of people see an older person simply not functioning well, and they immediately think, 'oh, well, they're senile.' They jump to conclusions. I always say: think about a person you think is senile, and imagine if that person was 35 years old. If we treated older people as we do 35-year olds, labeling wouldn't be a problem."

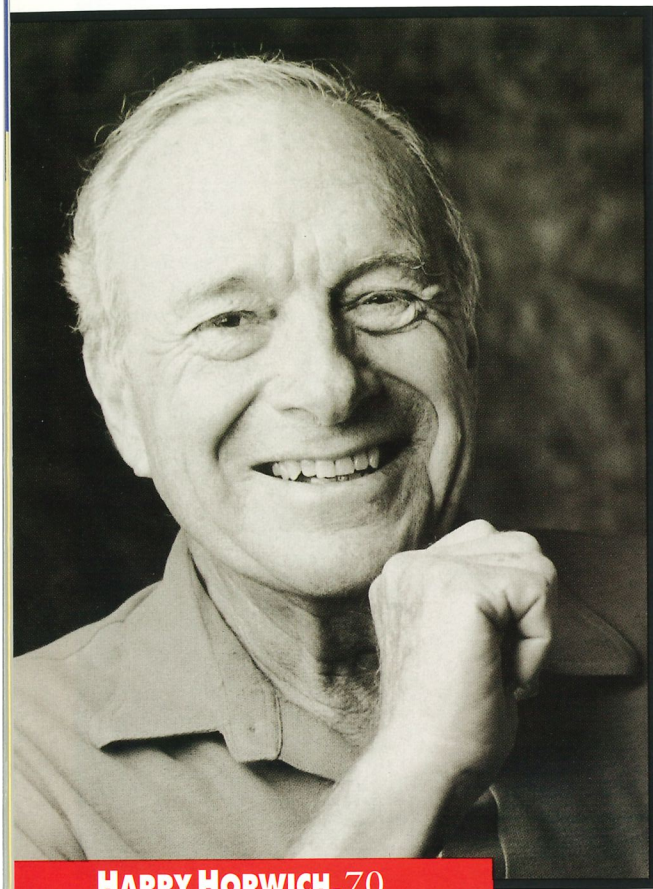
Cowart's viewpoint directly points up the stigma inherent in our outlook on age: that older people are treated differently, set apart from the rest of the population, that aging is often thought of as a problem rather than a natural progression, and that the whole issue is fraught with misunderstanding and fear.

To writers Betty Friedan, Erica Jong and Gloria Steinem, all of whom have authored books on aging in the past year, society's treatment of older people today mirrors its treatment of women before feminism. By setting aside older people as "untouchables," those of us who can't face the reality of aging don't have to.

"Seeing age only as decline from youth, we make age itself the problem," Friedan writes, "and never face the real problems that keep us from evolving and leading continually useful, vital, and productive lives."

Retirement Roulette

Since the advent of U.S. Social Security in 1935, American society has expected that after 65 an individual should be ready to retire from the work force. That 65th birthday, set arbitrarily by German chancellor Otto von Bismarck in 1884, was optimistic back then, when life expectancy peaked at 37 years. Given what we know of our current life expectancy, those numbers just don't mean anything anymore. If our senior citizens can expect to see 75 and have a good shot at 90, 60 starts to look—and feel—awfully young to them. They might not want to stop working—and they might not be able to afford to, either.



HARRY HORWICH, 70

"Until we improve education we're going to have problems with crime, ignorance, AIDS, drug use. All of these are interconnected."

"Accepting a pension and moving out of the labor force may seem like a great deal at the time," says Dr. Melissa Hardy (Ph.D. Indiana), the institute's director of research. She studies retirement, economic and age discrimination issues. "But then often you're looking at another 20 years of non-work ac-

counts a rosy picture of these "voluntary" retirements, which some workers feel under pressure to accept. A study of retired auto workers conducted in 1991 by Hardy and Pepper Eminent Scholar Dr. Jill Quadagno (Ph.D. Kansas) found that early retirement buy-outs offered by the auto industry stood

tivity. That's 20 years of dependence on these pension programs. And now, with the cost of health insurance skyrocketing, employers are trying to find a way to shift the cost onto the retirees."

Hardy also points out that businesses don't adjust pensions for inflation once the worker retires. So the longer they rely on a pension, the more fragile their financial situations become.

Institute Director Dr. John Myles (Ph.D. Wisconsin) notes that traditional employer pensions are being replaced by employee-driven plans such as 401Ks, which leave the saving and investing up to the employee.

"They may save it, they may spend it," he says. "We're concerned about the future of 401K plans because some of these people will be winners and some will be losers."

For many businesses attempting to escape financial straits by downsizing, retirement means getting rid of your older workers through pension incentives to save the extra money they cost in health care and salaries. Business then

"The children say, 'I have to make a living for me and my family and I can't take care of mom and dad now that they're older.' They're ready then to just push them off to someplace and they want the government to take care of them."

WILLIE PEARL PORTER, 83

out as not the best choice for the workers, but made some workers feel trapped between the option of early retirement and the risk of indefinite layoff.

"The problem now is that industry has bought people out at age 55 for economic reasons with \$25,000 retirement packages so they don't have to pay their salaries and continue their benefits," Cowart says. "Sometimes those early retirements are putting people who were mid-career managers into precarious situations. It's devastating."

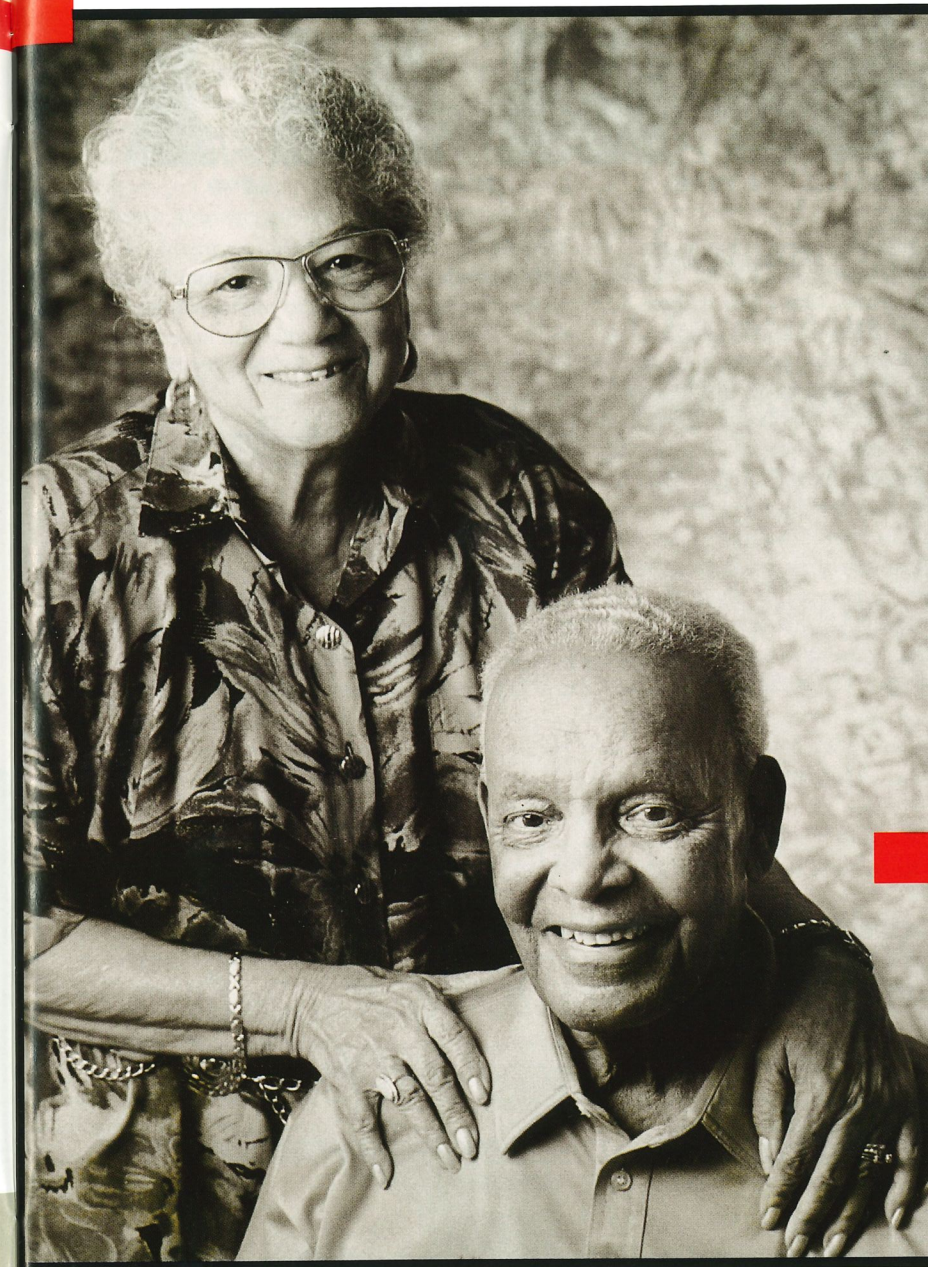
Myles also laments the fact that, though we've moved from being a heavy industry-oriented to a service-oriented marketplace, businesses' first response to economic problems still is to dump the older workers. Nationwide, only three percent of the work force is aged 65 or older; only 11 percent are aged 44-64. The prevalent notion in U.S. businesses is that older workers cost more to keep and train. While people over 60 have long asserted that they're able to learn just about anything a 20-year-old can and are often much more focused on their work, business has clung desperately to the cliché, "You can't teach an old dog new tricks."

The Social Security Blanket

Institute researchers agree: Social Security works. It's the most successful government program this country's ever had, they assert, and it helps keep 90 percent of this country's senior citizens alive. It might not be

"There is no 'problem' with health care for the elderly," suggested retired ophthalmologist Dr. Harry Horwich. "What we have is a problem in civilized management of our whole community. Crack babies are just as much in need of expensive and at times very wasteful health care as we are for our strokes. Until we learn how to improve our methods of education we're going to have problems with crime, problems with ignorance, problems with AIDS, problems with drug use. All of these are interconnected."

The thesis formed quickly: that unless we spend time educating our children and ourselves about how to respect, care for and help each other; until we provide children with the right information about the simple things, like love, marriage, decision-making and both growing up in and raising a family; we'll stay on a highway of accelerating costs and crime.



GILBERT PORTER, 87 *"Florida's one of the top states in the union and we don't have an education program that says that."*

Dr. Fred Seamon of FSU's Pepper Institute notes one of the most telling links between social support systems, education, crime and the elderly: after their release from prison, older inmates often go back to crime—just enough crime to get back behind bars. There are 3,000 of them in Florida now, more than triple the number in 1982.

"Some of those people don't need to be in there; they're completely harmless. But that's where their support network is," Seamon says. "A lot of them have no support on the outside. They have no way of getting their health needs taken care of."

Willie Pearl Porter, 82, a retired nurse and teacher now living in Miami, decried the decline of in-home education, which she said her generation took for granted.

"Families need to stay together," she said. "So many times kids come from one-parent families. The mother is so busy trying to make a living that she's not doing any teaching in the home. So they're out on the street at night."

"We need to start early letting young people know that old people are living longer now. They're going to have to take on the role of taking care of their parents. Something's going to have to be done."

Willie's husband, Gilbert, 85, is a retired Florida educator. "Not enough parents are sold on education," he said. "We've got to be sold on it. We've got to believe in it. If you can't speak up for education, you ought to keep your mouth shut. Don't block people who are trying to see that every generation of our children has a better chance." ■

enough for those trying to live on it; it might be too high of a deduction from younger workers' paychecks every week. But it works.

"The big question that we always get asked is, 'will Social Security be there for me when I get older?' And our answer is yes," Myles says. "It might be modified; some rules might change, but it will be there. It will have to be there because we can't live without it."

Social Security fuels a lot of the fires between younger generations and older people. Baby boomers and Generation Xers have often pointed their collective finger at the elderly, charging them with "using up all the Social Security" before they have a chance to get old. These comparative youngsters have been known to rail against senior citizens' restaurant discounts while they pay full price. But these "special breaks" for the elderly amount to little more than marketing techniques and symbolism, Hardy asserts, and give Social Security a bad name it doesn't deserve.

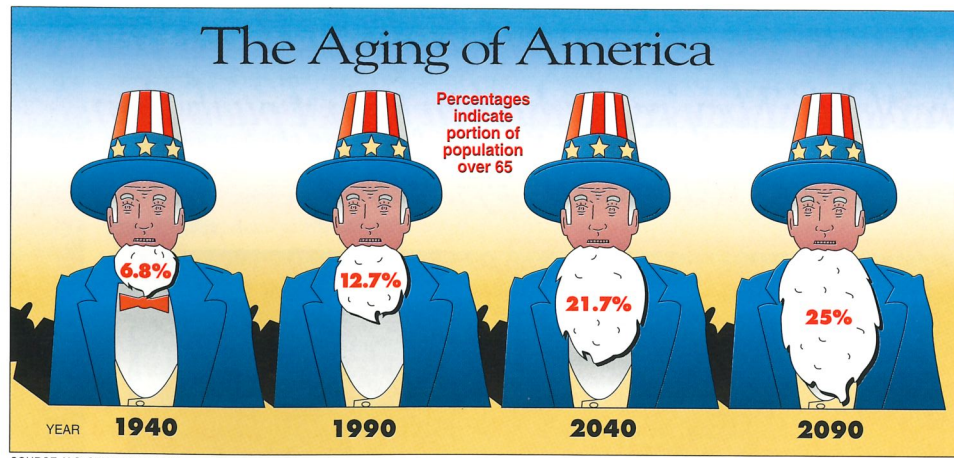
"The fact that so many elderly people are able to live on their own; that their children can count on that continued independence; is due to Social Security. It allows older people independence. It doesn't make them wealthy. It allows them to get by."

"Think about where we started—that gerontology centers focused on the negative aspects of aging. Now aging is portrayed in a much more positive way, as something that is not to be feared because people can count on certain givens. One of those givens is Social Security."

Both Myles and Quadagno, editor of *Aging, the Individual and Society* (Academic Press, 1982) and *The Transformation of Old Age Security: Class and Politics in the American Welfare State* (University of Chicago Press, 1988), study comparative social programs in the U.S., Canada, Australia and Europe and have found that the U.S. repeatedly lags behind these countries in most social policies. Myles contends that several European nations have for years faced the same issues in aging and social policy as the U.S. is now bracing for, and come through fine, all things considered.

"Many of these countries, such as Germany, have instituted much more generous programs and have a higher proportion of elderly, and they haven't fallen apart," he says. Still, in terms of U.S. social policy, "these issues are going to be around for the next 50 years. There's going to be lots to do for a long time."

If any one group gets the short stick in this debate, rest assured it's not the younger generations. It's more likely to be the women. Elderly women continue to outlive their husbands, and their claim to the family fortune is more likely to have been established through dependency. Hardy's research on income inequity shows they have the second highest rate of poverty, behind single mothers with children. And minority women



face a "double jeopardy." They're women, and they're minorities: that's two strikes.

"The more disadvantaged you are in terms of the way social and economic benefits are distributed, the higher your risk is going to be," Hardy explains. "You add one set of disadvantages on top of another. So the risk is higher for minority women than either African-American men or white women."

It's no surprise that minorities make up a disproportionate amount of the nation's poor. But institute research associate Dr. Fred Seamon (Ph.D. Florida State) has found that elderly minorities are shouldering a huge amount of the problems their children are

bally abused. They've had their Social Security checks, their credit cards, all their money stolen. I've talked with people who have literally had everything taken. Everything."

Florida's Health-Care Swamp

Even the healthiest of senior citizens will tell you that though they might be fine now, the subject of what they'd do if they ever needed long-term medical care—whether in their own home or a nursing home—is never far from their minds. Florida's elderly population is finding that though you can never re-



VIVIAN ALLEN, 77

"We're probably the first generation of people who are going to live much longer than the preparation for retirement ever anticipated. It's a whole different ball game in these years."

facing with drugs and crime. When their children lose their jobs and homes to drug habits, Seamon says, elderly parents often take them back in. Their grandchildren move in, too. Then these elderly peoples' pensions and Social Security checks, meant for one or two people, are expected to cover three generations under the same roof.

"Some of these people have been physically and ver-

ally be physically ready for this type of adjustment, you'd better be financially ready. And financial readiness is becoming next to impossible.

In one sense, Florida is no different than any other state: long-term care is staggeringly expensive. If you need in-home care, plan on spending an average of \$35,000-\$50,000 per year, researchers say.

If you still stay at home once your money is gone, state Community Care for the Elderly takes over. This program spends \$1,700 per elderly resident per year, and, as Cowart says, "It's just not funded to do a

good job. It's spread so thin that it probably hits about one percent of Florida's elderly population."

Currently, 9,000 Floridians are on a waiting list to receive care or changes in the appointed levels of care this plan is supposed to provide. The state agencies governing care for the elderly are swamped today—never mind what'll happen when the state's elderly population doubles.

Nursing homes are a different story. Studies show that most peoples' savings lasts an average of only 67 days once they enter a nursing home. Though Medicare is often thought to cover the cost of nursing-home stays, it in fact covers only two percent.

Medicaid covers up to half of this cost, but requires that you get rid of most of your assets first. You're allowed to keep no more

than \$2,000 in savings or other liquid assets, one car valued at under \$5,000, virtually no jewelry, and *sometimes* your home. Florida's Medicaid budget covers \$30,000 per person per year for Medicaid, the budget for which tops \$1 billion this year and is steadily rising at the rate of 20 percent per year.

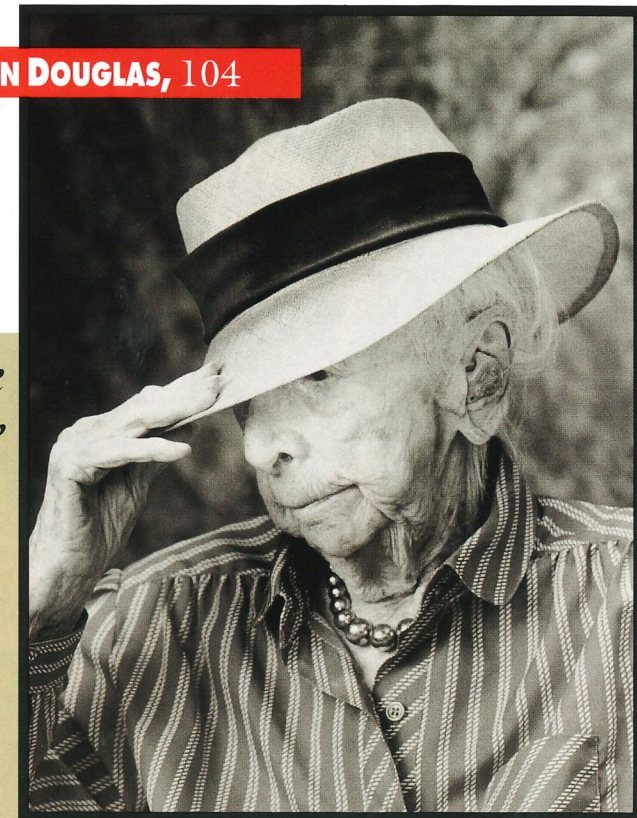
"You tell me why we're shuttling people

into nursing homes when it cost less for them to stay home and that's what they want to do in the first place," Lipscomb says. "What the people want costs much less than what the government wants to shove down their throats."

Hardy is only a bit more sanguine as she (continued on page 38)

MARJORY STONEMAN DOUGLAS, 104

The Everglades champion knew Claude Pepper well and said she "liked him fine."



Claude's Crusade

by Kim MacQueen

You have to wonder what might have happened with the health-care reform issue bandied about Congress this year had Claude Pepper been around. As this issue of *Research in Review* goes to press, President Clinton's effort to provide comprehensive health care coverage to all Americans is dead in the water. Those who knew the gentleman from Florida might vouch that if he'd been alive, so would the president's bill.

Pepper died in 1989 after a 60-year fight for the rights of the elderly that included a staunch defense of government programs designed to benefit Americans of every stripe. He proudly carried a well-earned reputation as a liberal to his grave. "Mr. Social Security," as Pepper was called, worked tirelessly in his post as chairman of the House Select Committee on Aging to promote such entitlements as Medicare, Medicaid

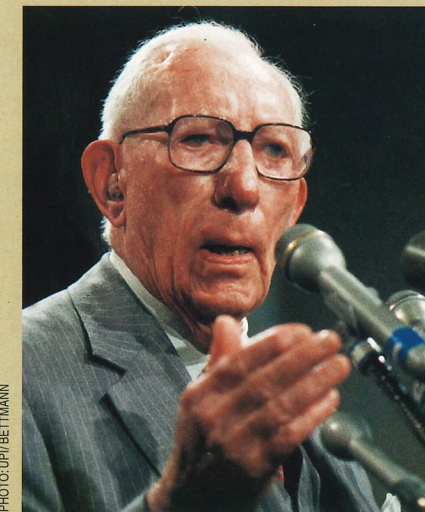


PHOTO: UPI/BETTMANN

and Social Security and keep budget-cutters' hands off them.

From his 1929 political debut as a pro-labor candidate until his death at age 88, Congress' oldest member racked up achievements in the form of a better life for workers and the disadvantaged. He was Franklin D. Roosevelt's right-hand man and one of the New Deal's most vocal supporters. A major advocate for government-funded medical research, Pepper co-sponsored legislation in 1972 to establish the National Cancer Institute and 11 more NIH institutes throughout his lifetime. He was the impetus for a bill condemning mandatory retirement for most workers in 1986 and pushed endlessly for add-ons to Medicare that would have covered long-term in-home care for the needy in 1988. Though this last measure ultimately failed, his speech defending it, as quoted in *Congressional Quarterly*, demonstrates the 'unabashed liberalism' that made him famous.

"I ask you, my colleagues, when you go home tonight and you close your eyes and you sleep and you ask, 'What have I done today to lighten the burden upon those who suffer,' at least you could say, 'I helped a little bit today; I voted to help those who needed help.'"

Claude Pepper's legacy is apparent in Florida State's Institute on Aging, which studies the political, economic and social environments that affect the way people age. The institute recently renamed itself to honor the late lawmaker. Institute Director Dr. John Myles notes that before he died, Pepper took a particular in-

terest in Florida State, decided to have his papers archived here and helped raise funds for the institute's eminent scholar chair.

"He was a prominent Floridian and, in terms of aging, he was a national hero," Myles said. "There has been a natural affinity and a very supportive link between our research and his career."

Pepper fought for the individual and made Florida a better place for all its citizens. But for all his achievements, those who knew him seem to choose the same sentiment to describe him: they liked him. Everglades champion Marjory Stoneman Douglas, at 104 one of this state's most distinguished senior citizens, knew Pepper well and said she "liked him fine." Gilbert Porter, 85, a retired Miami educator who worked on every one of Pepper's campaigns, recalled that "you couldn't help but like him."

Still, one can only conclude that had this Medal of Freedom winner had the health-care debate to sink his teeth into, things might have turned out differently. Likeable though he was, Pepper was a formidable foe on a battleground that he may have known better than anyone will again. ■



ILLUSTRATION: BRUCE HALL

ON TURNING

25

Nineteen-sixty-nine has to be the "Forrest Gump" of years: improbable, wistfully naive, a galloping riot of larger-than-life scenes that changed the world.

For the first time, humans stood on the moon. "Half-a-million strong" turned a three-day rock festival into the cultural icon of an entire generation. A small team of computer nerds in California got four of their machines to talk to each other, signaling the birth of today's information highway, better known as Internet. The New York Mets took the World Series.

And in Tallahassee, Florida State University came forth with *Research in Review*.

OK, so maybe the latter development escaped Walter Cronkite's attention that year. But from our corner, the event was nonetheless momentous in its own right. For the first time, Florida State University—at the tender

age of 22—felt it had something to say, in some detail, about its contributions to research and scholarship.

Newly installed director of research and graduate dean Dr. Robert Johnson started the publication on two premises: first, that research, in his words, "is the lifeblood of graduate education" and thus should be promoted through every means possible; and two, that public universities are obligated to tell taxpayers what faculty members do and why they do it.

Johnson was picking up on an emerging theme that a quarter-century later resonates strongly through American academe. Today, according to the University Research Magazine Association, at least 55 campuses nationwide publish magazines devoted exclusively to communicating their research to both internal and external audiences. Many of these

magazines have succeeded in distinguishing their respective campuses in ways simply not possible through other means.

Twenty-five years ago this November, Johnson's office produced Vol. 1, No. 1 of *Research in Review*. This eight-page issue carried three articles: a feature on the work of FSU biochemist Dr. Earl Frieden; an account of how FSU's annual funding fortunes for research had improved 49-fold in 13 years; and an article on educational research with the now quaint-sounding lead asking "Where is computer-assisted instruction headed?"

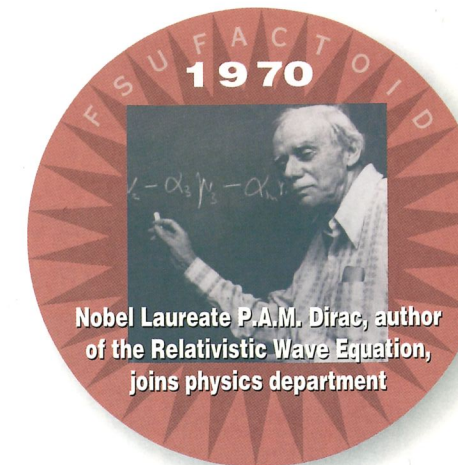
Introducing this maiden issue, and dozens thereafter, was founding editor Clifton Paisley, to whom supporters of this magazine owe a large debt of thanks. Paisley, now retired from FSU but still an active, and noted, writer of regional histories of North Florida, served as editor—with the exception of a two-year hiatus—until November 1980. In 1981, Paisley returned briefly to the post upon the sudden death of Anthony Neville, appointed editor earlier that year. For better or worse, since the spring of '82 the post has been filled by yours truly.

Thanks primarily to a faculty and administration that sees no reason why FSU should be obliged to take a back seat to other institutions when it comes to lauding its scholarly achievements, the magazine has undergone considerable changes in recent years, and we submit that most have been for the better. But if you follow the argument that the quality of publications produced by a major university should reflect the quality of what actually goes on there, as we do, then *Research in Review* still has a way to go to get where it needs to be, in our humble opinion. As Vice President Johnson's comments in this issue underscore, the simple fact is that on many academic planes, Florida State University has become a university to be reckoned with thanks to an extraordinarily hard-working and innovative faculty. Whatever level of success this magazine has achieved is but one more testimony to that fact.

Now that the magazine is well into adulthood, there is genuine cause for celebration. Since 1983, the publication has won more than 45 national, regional and state honors from peer groups in the publishing field. As a consequence, the university's name has been heard by influential leaders in higher education, in public relations and in business often for the first time outside of an athletic context.

We figure that alone should be reason enough to keep the lights on around here for awhile yet.

FRANK STEPHENSON, EDITOR



Nobel Laureate P.A.M. Dirac, author of the Relativistic Wave Equation, joins physics department

After all, he's been our 'Research Cop' for a quarter-century. Surely it's time we had

A TALK WITH BOB JOHNSON

Research VP, Former Graduate Dean (& Founder of *Research in Review*)

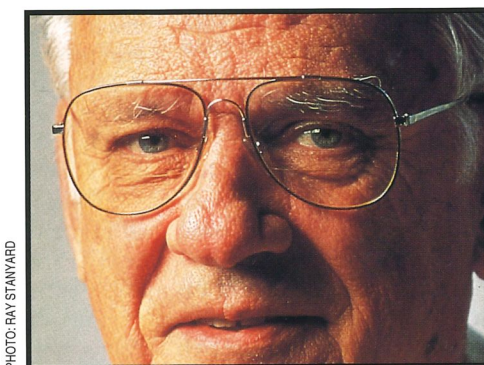


PHOTO: RAY STANVARD

Introduction

Twenty-six years ago in August, Robert Merrill Johnson walked onto a sweltering Florida State University campus to become head of a research program barely out of its teens. The head-hunting prize of then-president John Champion, Johnson had left a promising job in Washington with the National Science Foundation to take on what Champion called "the FSU challenge."

Five presidents and umpteen reorganizations later, Johnson is still at it. The challenge has changed over the years, mainly because the largely pastoral campus Johnson saw in 1968 is long gone. Fueled by a rapid rise in research funding, Florida State has taken on much of the look and feel of those big-time research institutions it has long aspired to be.

In his capacity as research chief and, until 1986, dean of the university's graduate studies program, Johnson has been front-row, center, for every step FSU has taken up

Introduction continued

the academic ladder for a quarter century. Today he stands as the only figure who—from the bird's-eye perspective of central administration—has witnessed what even FSU's most ardent critics concede is remarkable progress.

For such naysayers, certain realities are hard to dismiss: in 1969, FSU spent \$13.7 million on research and by the end of FY '95, that figure is expected to reach \$94 million, nearly a 600 percent jump. Space for research and academics has doubled in the period, and now approaches a million square feet. Graduate programs have grown by 40 percent, while the number of doctorate degrees offered rose from 49 to 65. Graduate enrollment has thus soared, jumping from around 3,680 in '69 to better than 5,500 for fall semester 1994.

So for Johnson, it's been a long career of steadily rising numbers, about the only thing that matters in the beastly competitive world of campus-based research. The faculty gets the credit, he says: "Without them, all the good administration in the world wouldn't have meant a damn thing."

But in looking back on his time in Tallahassee, Johnson allows that his hand has indeed helped shape the pace and direction of research growth, as well as the mechanics of how it's managed.

Few who know FSU would argue the claim. Since 1970, when he succeeded in getting the university's research accounting operations switched from the campus controller's office to his own, Johnson has been the unquestioned author and shaper of FSU research administration policy. Taking over an office that he says was "a shambles" in 1968, Johnson transformed the unit into what he calls a "one-stop shop" for faculty interested in pursuing research funding. Based on similar set-ups he'd seen around the country as head of a science development team at the NSF, the system was intended to maximize efficiency, cut waste and bring accounting procedures in line with national standards.

For the most part, the administration liked Johnson's idea. For the most part, the faculty hated it. To this day, Johnson bears the stigma of being the "research cop" who makes campus P.I.s (principal investigators) toe the line. No matter their credentials, all faculty are obliged to walk a well-defined, regulatory gauntlet laid down by federal and state mandates, and Johnson's 50-member Office of Research at Innovation Park is where the line begins.

But some of Johnson's biggest battles through the years have been over the issue of indirect costs—overhead monies legitimately applied to outside grants that support research. As head of research administration, Johnson enforces the collection of overhead, which until Florida's Sponsored Research Act

of 1964 went directly into the state's coffers. Since 1989, the state has allowed universities to keep 95 percent, a sum intended to be used to further the cause of research and creative activity. Johnson's office is responsible for managing these funds, through the advice of the Council for Research and Creativity, an all-faculty body Johnson organized in the early 1970s. Each year Johnson redistributes a portion (about 40 percent) of overhead monies to the various departments and uses the remainder as matching funds for faculty research proposals, to help run his office and for "emergencies." (In 1983, then-president Bernie Sliger borrowed \$1.8 million from the fund to neutralize a much-publicized deficit crisis.)

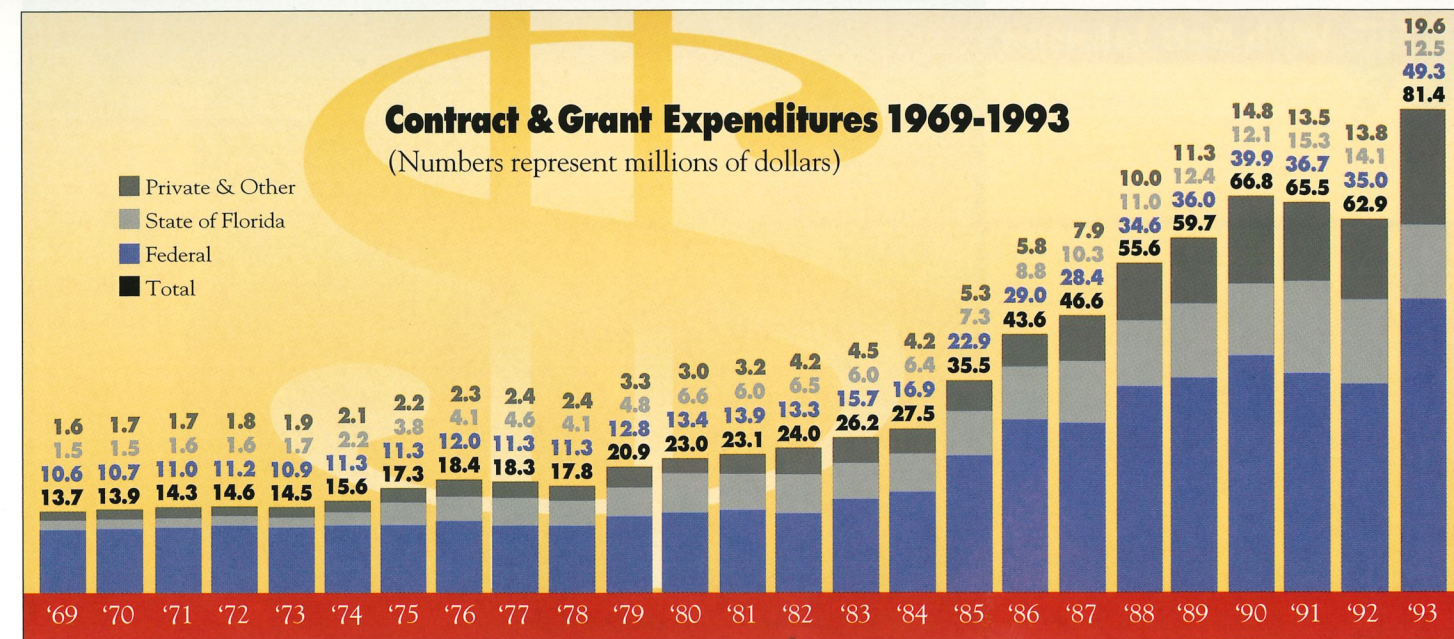
If *The Chronicle of Higher Education* can be believed, the issue of managing overhead funds is among the stickiest universities are obliged to face on a perennial basis. Lack of controls can, and has, led to major embarrassment for some schools. Stanford University, for example, is still feeling the effects of a 1990 full-scale federal probe of its overhead spending policies that revealed serious problems, including overcharging, frivolous expenditures and lax accounting. Uproar over the investigation led to the resignation of the university's president the following year. Johnson says this incident is mute testimony in support of the stringent policies he's put in place at Florida State.

Some of his heartiest critics of the past have swung toward agreement. "I've come to realize that Johnson does all the things a good research administrator is supposed to do," says one veteran researcher-turned-administrator who admits to a "major attitudinal shift" regarding FSU's research chief over the years. "He's taken us from not even being on the map to a Research I university, and he's kept us out of trouble with the feds and the state the whole way. The man knows his stuff."

There may be one observation about Johnson that gets a universal nod around campus. "Bob's a survivor," says one department head. "You'd be hard pressed to find anyone in American academe who's been at that level as long as he has. That's no mean trick."

Johnson says his longevity in the job is due to a combination of things, not the least of which is the ability to take criticism. But he credits his ability to speak the languages of the scientist, the bureaucrat and the businessman with much of his success. In 1954, the Detroit native left a fast-track career as an agent for an industrial chemical company in his home town to return to school (Michigan State University) to get a Ph.D. in physiology. As an assistant professor at Colorado State University, he got his first taste of administration while working on developing a research foundation for the school. He was soon to discover that he liked administering research more than actually doing it. Following his new career aspirations to the NSF, he got a chance to visit "hundreds" of campuses where he picked up ideas on how to run large, multi-faceted research programs. By the time he showed up at Florida State in '68, he was eager to take charge of a young research program and put his own stamp on it.

When he ticks off the things he's proudest to have stamped over the years, Johnson mentions first his work as dean of graduate studies. Early on, he led a charge to crank



SOURCE: FSU OFFICE OF RESEARCH

quality controls into FSU's graduate programs (a faculty-run graduate policy council he started still reviews all graduate programs every five years).

The first of a number of cooperative degree programs between FSU and the University of Florida also came at his urging, he says. Foremost among these is the Program in Medical Sciences (PIMS), a program which since its creation in 1971 has produced more than 500 physicians (nearly half of whom are now in primary care) whose medical training began at Florida State.

Johnson also likes how his policies governing the use of overhead funds have helped—as he puts it—"prime the research pump" around campus. Deans and department heads have used the funds "wisely," he says, in starting new programs, helping weak programs get strong and in polishing old ones.

But his greatest contribution, he believes, may be in how he's used matching money to help broadcast the story of FSU research to a worldwide audience. In 1984, such in-house capital helped leverage a \$100 million accord between the federal government, the Florida Legislature and private industry that founded the Supercomputer Computations Research Institute (SCRI), which up to that time was by far the single largest scientific research enterprise to land in Tallahassee. Johnson, Sliger, Florida's Board of Regents chairman Dr. Charlie Reed and other insiders both in Tallahassee and in Washington all agree that the successful development of SCRI played a major role in FSU's biggest coup of all, the NSF's 1990 decision to put the headquarters of the new National High Magnetic Field Laboratory in Tallahassee.

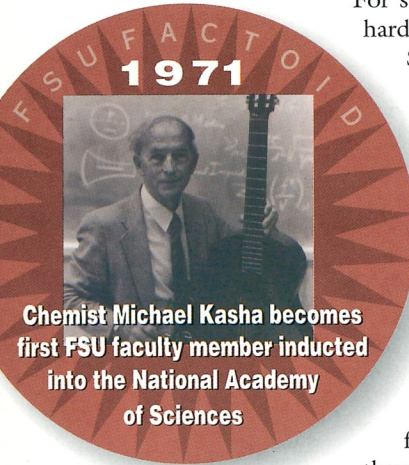
In 1986, a Johnson initiative spelled relief for scores of campus researchers throughout Florida straining to stay atop a steadily rising tide of federal accounting paperwork. Together with long-time

NSF friend Dr. Robert Newton, Johnson succeeded in getting the five major federal agencies to buy off on an experiment aimed at shortcutting the red tape required for P.I.s at all nine state universities and at the (private) University of Miami. Dubbed the Florida Demonstration Project, the proposal eventually proved so successful that it became the basis for a new policy that at least a dozen federal agencies now make available to universities throughout the country. Today, the Federal Demonstration Project is a boon to research on more than 80 participating campuses nationwide. Chiefly for his role in launching the idea, Johnson was lauded in 1989 by the Society of Research Administrators for "distinguished contribution to research administration," the national organization's highest honor.

During Johnson's FSU tenure, space devoted to research has more than doubled. No physical improvement, however, was as urgently needed as the Biomedical Research Facility completed in 1991. A highly critical USDA report on campus lab animal care in 1989 put FSU on notice that all of its life sciences programs were in real danger of being shut down. Johnson responded by generating and pushing through a proposal that built the \$5 million facility, a highly coveted research asset that vaults FSU life sciences research into world-class distinction.

Johnson says he's not given over to spending much time reflecting on his accomplishments at Florida State. He merely says he's "quite proud" of what he's done up to now and looks forward to opportunities to do more. On the occasion of the 25th anniversary of this magazine, which he started, Johnson agreed to talk about his time in Tallahassee.

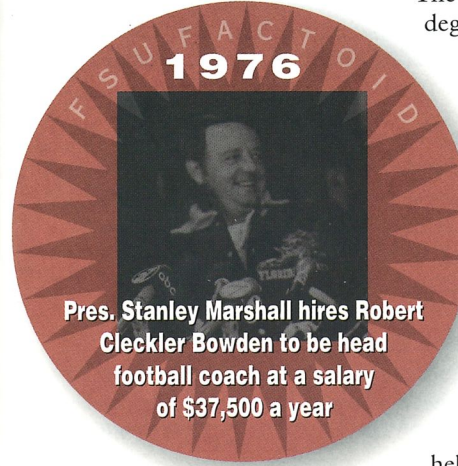
—FRANK STEPHENSON



1971
Chemist Michael Kasha becomes first FSU faculty member inducted into the National Academy of Sciences



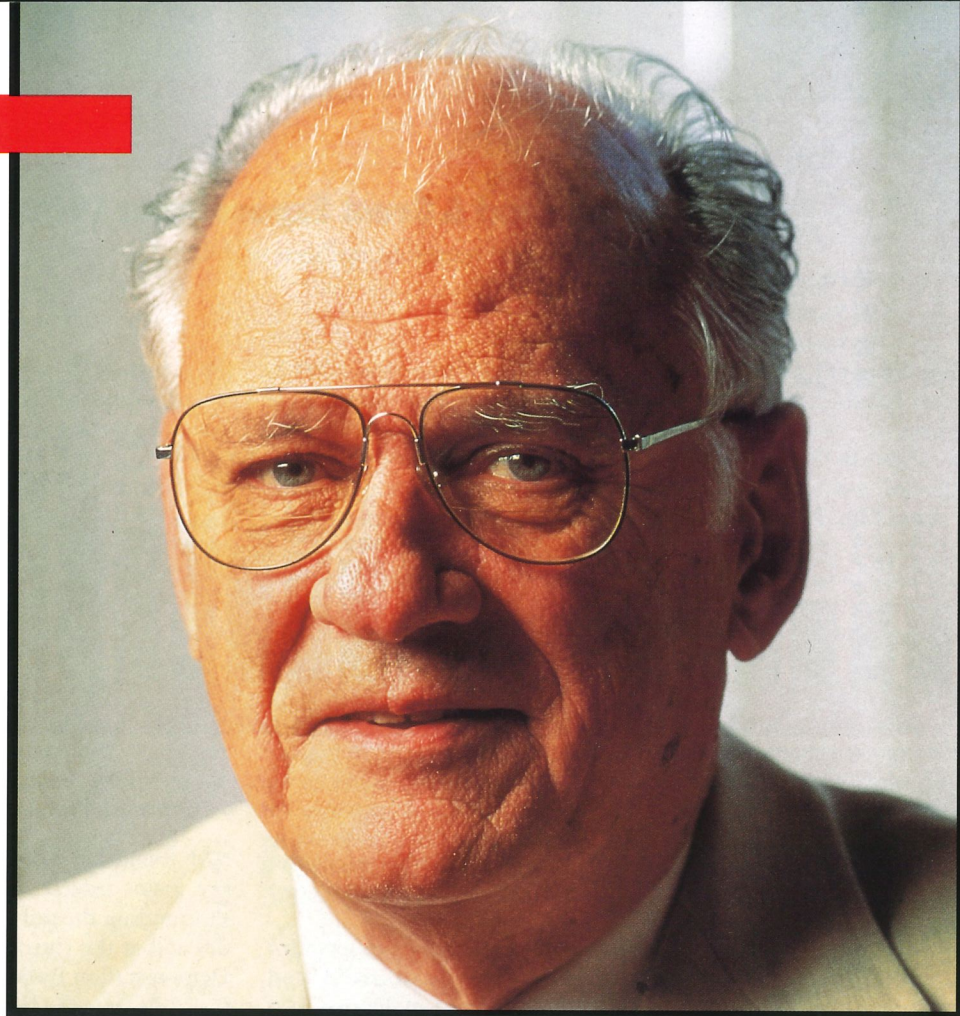
1975
Mike Shaara, member of the English faculty from 1959 to 1973, wins the Pulitzer Prize for his Civil War novel, *The Killer Angels*



1976
Pres. Stanley Marshall hires Robert Cleckler Bowden to be head football coach at a salary of \$37,500 a year



1976
FSU meteorologist Seymour Hess, working with NASA's Viking project on Mars, delivers the first weather report for the Red Planet



PHOTOS: RAY STANWARD

Interview

RinR: What was Florida State's research program like 26 years ago when you arrived on campus?

JOHNSON: On the administrative side of things, I couldn't believe my eyes. The staff had no records, they had no idea what they were doing. They were in the neighborhood of being a \$12 million program, but they had no fiscal controls, no idea how to manage anything. It was a shambles, pure and simple. By 1971, we had a \$5 million federal audit exception against us—that's money that couldn't be accounted for. We were faced with the prospect of having to pay the federal government back that amount, which would have devastated us. But by 1973, we got most of that corrected. Instead of \$5 million, we wound up owing the federal agencies about \$300,000, which we paid back over a three-year period. Since then, we've had good audits, both from Washington and from the state.

RinR: Even so, you've been criticized by faculty over the years who complain that your methods hurt their abilities to do research.

JOHNSON: I'd say that's one of the biggest things I've had to worry about over the years. While most faculty understand the necessity of maintaining control, some faculty have been upset with me because I enforce these policies, saying that this impedes their research. But without institutional control, this university could be severely criticized and possibly lose a lot of money. The simple fact is that when you're dealing with the federal dollar—the public purse—you are responsible to the public for what happens to it. Criticisms are coming from all over these days on how universities are spending public dollars. More and more regulations are being added every year, both by Congress and the state Legislature. And it's my job to enforce those regulations, whether I agree with them or not.

And there are some I don't like, believe me. Over the years, we've worked very hard with the federal government to get rid of onerous rules and regulations, and to a large extent we've been successful. But it seems like every time we get rid of one rule, three or four more new ones get added. It's frustrating. But we have to comply, and there are those who will never understand that.

RinR: Much has been made of the abuse of research overhead monies uncovered a few years back at Stanford University. We've never taken a hit like that here. Have we been on top of things or just lucky?

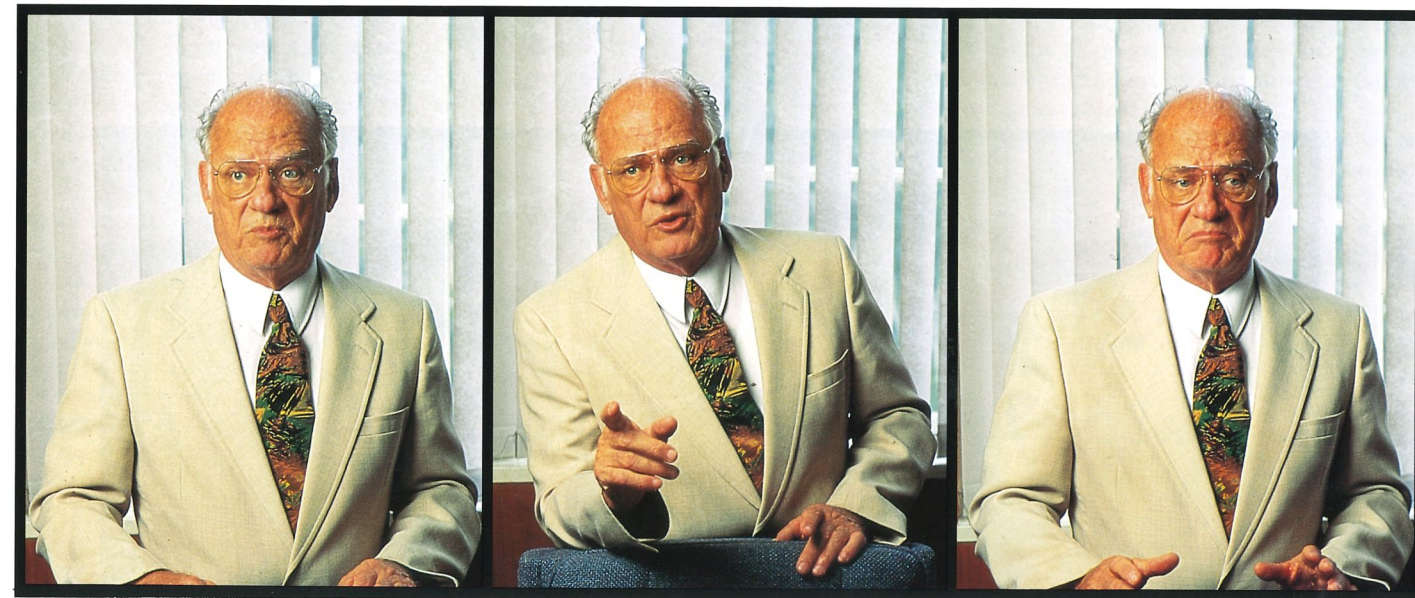
JOHNSON: You don't run a multi-million-dollar research program as clean as this one for as long as we have by being lucky. You do it by playing by the rules. Now there are times when you may have to *bend* a rule, but if you know what you're doing, you can do that without breaking any. No, we've never seen anything like Stanford and that's because we have policies in place that won't allow that to happen.

But I'll grant you the (Stanford) incident—and others—have helped give indirect costs (overhead) a bad name. We hear accusations all the time that it's not used properly, that it's not needed. But the fact is, indirect costs are true costs of doing re-



Bernard F. Sliger becomes FSU's 10th president on Feb. 7, succeeding Stanley Marshall

“ What's happened over the past 25 years is a result of some very good decisions in the '50s and '60s in bringing outstanding people here in the sciences. ”



search—a point I've argued for 25 years. Thanks to the vision of the Florida Legislature back in '64, we've been able to use overhead funds here at Florida State to help stimulate research and creative activity throughout the campus. Of all the overhead monies we receive, close to 40 percent goes back to the deans and department heads in one way or another. They are free to use that money as they see fit to develop their research programs. Also, the money that stays here with the Office of Research helps researchers and scholars two ways: it pays some of the costs of administering various services they want and need, and it provides matching funds as leverage for getting worthwhile programs off the ground.

RinR: The system you've built here, though, appears to be unique to the state university system. Fiscal control of research tends to be in the hands of university controllers' offices, as opposed to a separate office run by a vice president for research.

JOHNSON: That's true. But there are a number of universities around the country that basically do what we do. I think some of those picked up the idea from Florida State. Frankly, I like to think we've got the best system in Florida. A lot of people have wanted to copy what we've instituted.

We call it a “one-stop” shop. In other words, a principal investigator can come to this office and get help on finding grant sources, proposal writing and submission, accounting, legal advice, everything. It's all done right here, not in four or five different offices scattered around campus. The structure is very meaningful. For one thing, it puts the academic influence on decision-making where it belongs, on the expenditure of contracts and grants. At any rate, it seems to work pretty well.

RinR: Twenty-five years ago, FSU's entire research effort was a ghost of what it is today. What's made the difference?

JOHNSON: Credit has to go where it's due, and that's the faculty. What's happened over the past 25 years is a result of some very good decisions made in the '50s and '60s by the administration in bringing outstanding people here in the sciences. This established a base of quality upon which we could build. Without that, we wouldn't be where we are today. And of course, success in the sciences has triggered successes in all other areas, a fact not often realized.

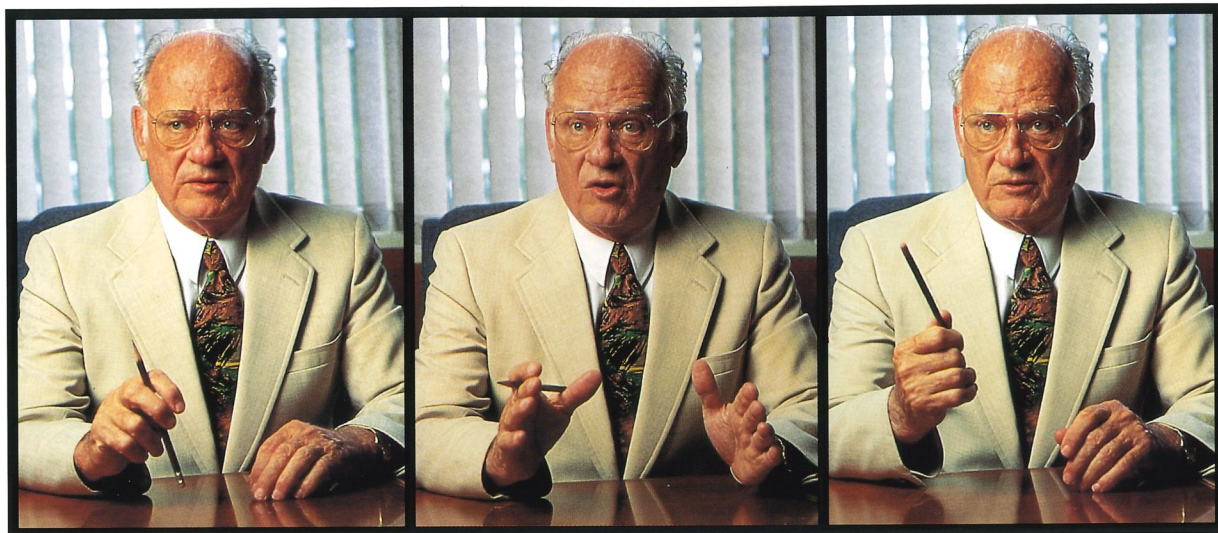
And the state was very instrumental, too. For example, in 1957 the state underwrote the Tandem (van de Graaff nuclear accelerator) research program in nuclear physics. That was a very wise investment, which has since paid for itself many times over. And since then, the state has remained faithful—the Legislature helped us get SCRI off the ground and certainly the Mag Lab, just to name a couple of examples.

But primarily, the real key to the success has been the faculty. The P.I.s (principal investigators) on this campus have done a magnificent job. Thanks to those good faculty members who can write proposals that get funded—that's been the difference right there. I could not be happier with the progress of our faculty. But we can't afford to become complacent. We need to be doing a lot better than we are, and



Theatre Dean Richard Fallon is tapped into the College of Fellows of the American Theatre Assn., theatre's equivalent of the National Academy of Sciences

“ On balance, we can hold our own with any university in Florida, or for that matter, in the Southeast. So why worry whether we look like those other schools? Let’s worry about what we look like as a quality institution. ”



we’re very capable of that. In fact, I think we have the capability of doubling our research funding, and by the year 2000. That’s my goal at least.

RinR: How realistic is that, especially with public pressure these days to beef up the quality of teaching, even up to the point of de-emphasizing research?

JOHNSON: I don’t think it’s unrealistic. It’s true that the political climate is changing. But without a goal, you’re never going to get anywhere.

RinR: Well, in 1992 the administration announced a goal of joining the top 25 universities in the nation by the turn of the century. More than a few believe that’s impossible.

JOHNSON: Impossible, no. Improbable, yes. It will take an incredible amount of money to do that. And I doubt that we can come up with enough money to make a major shift in our rankings. For example, if you have a chemistry department that ranks 25th nationally, and you want to move to 24th or 23th—just a notch or two—do you realize how many millions of dollars that’s going to take? Many millions, believe me. Now if

Florida State were to get more entrepreneurial, we could do a whale of a lot better than we are, not only in quantity but in the quality of our research programs. There’s no question about that. But it doesn’t help us to think in terms of being as well-funded as, say, Johns Hopkins, Michigan or California. These schools have been established far longer than Florida State, and you’re just not going to catch them, and there’s no reason to try. Look at the top 10 universities in this country—we’re not going to get there, period. We’re foolish if we think we are. But this really doesn’t matter. Florida State is a very good university, a well-recognized university that gets its fair share of (public) support. On balance, we can hold our own with any university in Florida or for that matter, in the Southeast. So why worry whether we look like those other schools? Let’s worry about what we look like as a quality institution.

RinR: You say we could be generating more research dollars. What should we be doing that we aren’t doing already?

JOHNSON: Well mainly, I’d say it’s changing some peoples’ attitudes about research. I think some of the deans and department heads

have been entirely too passive (on research) in the past. These administrators need to play a greater role in trying to bring in more research activity and increasing the quality of what they already have. I believe our new president and our interim provost feels the same way. We’ve simply got to get our key people more involved in research. Maybe one answer is to offer some kind of reward for deans, department heads and faculty who win research grants.

RinR: On quality vs. quantity of programs, what do you have to say on the argument that in these belt-tightening days we ought to get more serious about putting our resources where they would do the most good? Building on our strengths, letting go of weak or marginal programs, as it were? It’s an old argument that somehow never gains ground, but never goes away, either.

JOHNSON: Ever since my NSF days, I’ve favored quality over quantity. I like the idea of developing what we have first, before adding things. I don’t believe in being all things to all people, never have. But the political reality in any institution—not just academe—is that it’s always a lot easier to start a program than it is to get rid of one. There are several reports sitting on shelves around this campus recommending that certain programs be reduced or cut out altogether. Nobody has followed through with them. The problem is, of course, that nobody wants to get cut. The administration has to be willing to make the hard decisions.

RinR: But we’re hearing that a new era of accountability has arrived. How’s that going to affect things?

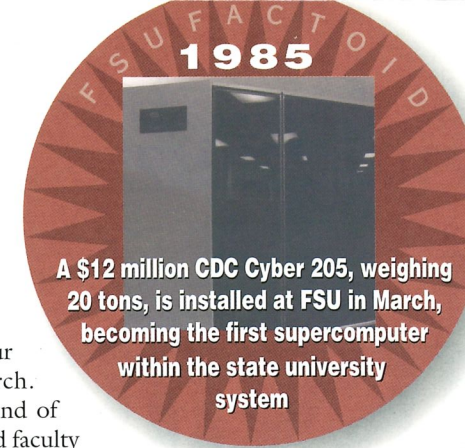
JOHNSON: Well, the situation is that faculty are being told that they need to be more productive—they have to either teach more, do more research, or do both—and with less resources. They feel squeezed. But there’s no doubt we’re in a self-examination period now and that corrections are going to be made. We might as well face up to it: faculty at this university are going to be forced to teach more or to do more research, because the perception is out there that we don’t work very hard. I’ve been fighting this for almost 40 years, but frankly I don’t see much change in the public’s thinking on the matter.

And now we’re being told that we’re the new “leisure class.” That’s nonsense. I’d like to see anybody in industry or government post the same hours some of these professors do. Most of our people don’t work a 40-hour week. It’s more like 60 or 80. Now we know everybody doesn’t work like that—there’ve been abuses and it wouldn’t be honest to claim otherwise. But that’s true in any profession. Most of these people work extremely hard at what they do.

But the sad fact is that we’ve done a very poor job of selling our profession to the public. Since we work on the public purse, we’re obliged to answer that perception. We’ve got to realize that we’re no longer isolated from the community. They’re paying our salaries, and we’ve got to be accountable to them. There’s nothing wrong with accountability.

RinR: But what about claims that faculty are doing too much research and not enough teaching?

JOHNSON: Again, this whole issue rests on a lack of public understanding about the role research plays in higher education—another theme I’ve preached for decades. We strive for a balance in research



and teaching because we are convinced that the two go hand in hand. Every teacher needs to be a scholar, with regular scholarly activity, whether its in the laboratory or the library, whether its publishing a new scientific theory or publishing a book of poetry. A good professor, regardless of discipline, won’t just teach. They *can’t* just teach. They’ve got to do creative things for their own development. And to say that a university is only a place to teach students is ridiculous.

Now some researchers don’t want to teach, we recognize that. That’s not right, either, and that’s one of the things that’s going to change. On the whole, I think we’ve kept a pretty good balance between the two at Florida State. But it could be better.

RinR: Some faculty members feel that they’re cut out of the research loop because their particular fields make it hard for them to get outside funding.

JOHNSON: It’s true that not every faculty member can get outside support. But that doesn’t mean that individual can’t do research. Research should never be thought of as being restricted to funded work. Publishing a paper, article or book is research. But some people *can* get outside research support and either don’t know it or just don’t try. Frankly, if a professor isn’t trying to grow in his or her profession, and be a better teacher by doing creative activity or research, then I don’t think we want to keep them.

RinR: What’s been the key for Bob Johnson surviving in this job so long?

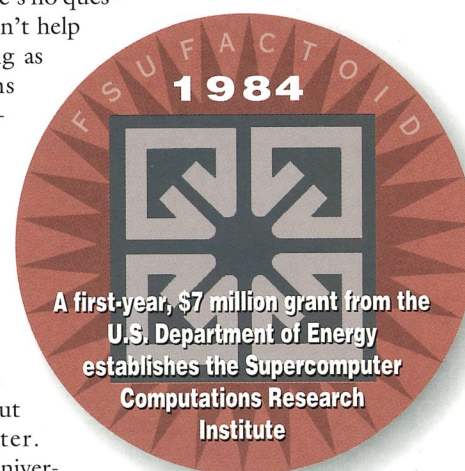
JOHNSON: For one thing, having a good staff around you. I’ve been extremely fortunate to have had some good people who’ve been with me a long time. I’m very grateful to every one of them—I owe them a lot, and they know it.

Also, I guess my philosophy has had something to do with it, and that, basically, is this: everything’s on the table. I tell people: ‘Here’s the way I think, here’s the way I’m going, criticize me if you like, and I’ll work with you.’ There’s never been anything under the table, no hidden agendas. We’ve had faculty input in just about everything we’ve ever done. We’ve laid everything on the table where everybody could see it and discuss it—or cuss it—if they wanted to.

And you have to be able to laugh at yourself, not take yourself too seriously. Apparently it’s worked.

RinR: Surely there have been regrets.

JOHNSON: Oh, sure. I’ve made quite a few mistakes, had lots of failures, but I’ve learned from them. As far as major failures, I don’t know of any that have bothered me. Strangely enough, it’s the small disappointments that get to you after awhile.



Coming Attraction:

A Mission In Magnets

BY
FRANK
STEPHENSON

America's newest national lab is poised to become the world's leader in exploiting the power of the greatest magnets on earth.

THE NATIONAL
HIGH MAGNETIC
FIELD
LABORATORY



PHOTOS: RAY STANFORD

It seems as though you could've blinked and missed it. This fall, Florida State University is winding down what surely has to be the fastest four-year period in its 47-year history.

Only four summers ago, the world's scientific community got the sobering news that the federal government had decided to put the seat of its newest national laboratory—a multimillion-dollar research enterprise based on super-strength magnets not yet built—in, of all places, Tallahassee, Florida.

It was to be a start-up project of the first order, built literally from scratch, founded on little else than the government's faith in what the people in Tallahassee said they'd do if given the chance.

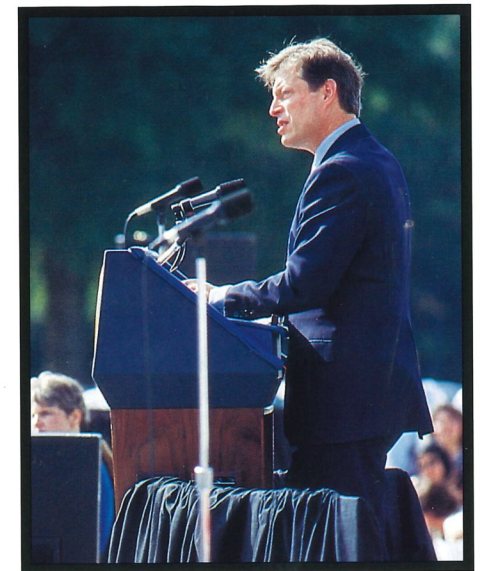
On June 22 of this year, an anxious crew of scientists and engineers at FSU's Innovation Park threw a switch that dumped enough power to light up 750 houses onto a made-in-Tallahassee magnet—and held their breath. Within minutes, the device did what it was designed to do—develop the greatest field-strength of its class ever recorded.

From start-up to a world record in just under 48 months. A not-insignificant segment of the world's science community found itself surprised once again.

"I think the whole world felt like we wouldn't be able to do this in 10 years," lab director Dr. Jack Crow opined. "But here, in just the beginning of our fifth year, we will have leapfrogged every magnet lab in the world."

The spectacularly successful testing of its first home-designed-and-built magnet in June

Vice President Al Gore's appearance at the Oct. 1 dedication of the NHMFL capped the lab's three-year construction phase at Innovation Park in Tallahassee.



—coming as it did right on schedule—stands as immutable proof that America's National High Magnetic Field Laboratory (NHMFL) has arrived. The event marked the scientific and technological apex of what has been an unrelieved storm of physical and intellectual activity at the lab's Innovation Park address since the fall of 1990.

The Shingle's Out

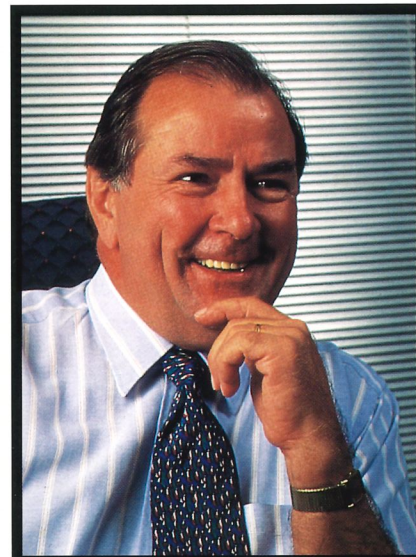
With Vice President Al Gore putting a proper imprimatur on things at the lab's long-awaited dedication ceremony in October, the operative phrase heard around Crow's office nowadays is "tell 'em what we've got." Now that the construction period has largely given way to the lab's all-important research phase, Crow has swung the lab's doors wide to

scientists the world over. A key purpose of any national lab is to put rare scientific instruments into the most capable hands out there, and Crow is now obliged to jump from being a construction foreman to a salesman.

"Now we've got a product, and it's our job to sell it," he told *Research in Review* in August. "Everybody who's been here is very impressed by what they see. But getting them here for the first time is the challenge. Once they're here and see these facilities, they usually walk away with their mouths open."

Even to the scientifically disinclined, the lab presents an imposing sight. Now with an in-house work force approaching 250, there's sufficient activity in most corners of the 287,000-sq.-ft complex

Jack Crow



"Once they're here and see these facilities, they usually walk away with their mouths open."

to create the aura of big-time research, which in this case isn't pushing things to say big-time *adventure*. Scientists—largely physicists, chemists and mathematicians—mingle with engineers and technicians in impromptu huddles called amid a chorus of whining machines in the lab's cavernous central workshop. Inner works of power distribution, cabling and mammoth-sized plumbing offer a visual symphony of stainless steel, copper and special alloys. Labs within labs brim with exquisite species of electronic and mechanical gadgetry—most of it spanking new. It may be the newness of everything, in fact, that helps prompt the jaw-dropping reaction Crow speaks of.

Barring the foundation, the outer walls and the roof, the building housing the lab's operational core bears little resemblance to the one put up in 1989 by Innovation Park's central authority as a home for a state testing facility. The building, which was never occupied, was given a floor-to-ceiling overhaul to accommodate its profoundly revised mission. Then on the southwest side, a 27,000-sq.-ft. addition was crafted to house a very special lab enterprise, the world's largest center for investigating magnetic resonance (MR), the phenomenon that has given rise to one of medicine's most powerful diagnostic tools—MRI (for *magnetic resonance imaging*).

Near the business end of the complex, where most of the lab's biggest magnets already are, or will be, aligned in concrete bays, a chiller plant throbs constantly, pulling down the temperature of a recirculating, deionized water supply to a steady 46°F. Thirty-six-inch mains carry the water to and from a million-gallon cooling tower outside.

Cold water—lots of it—is the key to much of what goes on at the lab. To build magnets hundreds of thousands of times stronger than the earth's own magnetic field, huge amounts of (continued on page 25)

BY FRANK STEPHENSON

'First Big Success Story' MAG LAB DRAWS \$5 MILLION ANALYSIS CENTER

The paint is barely dry at the nation's newest national lab, but already the Tallahassee-based facility has snagged a major new science initiative that should dramatically boost its—and Florida State's—profile in front-line science. This fall, the National Science Foundation announced approval of a \$5 million proposal to establish a center at the NHMFL devoted exclusively to research in the field of ion cyclotron resonance (ICR) mass spectrometry.

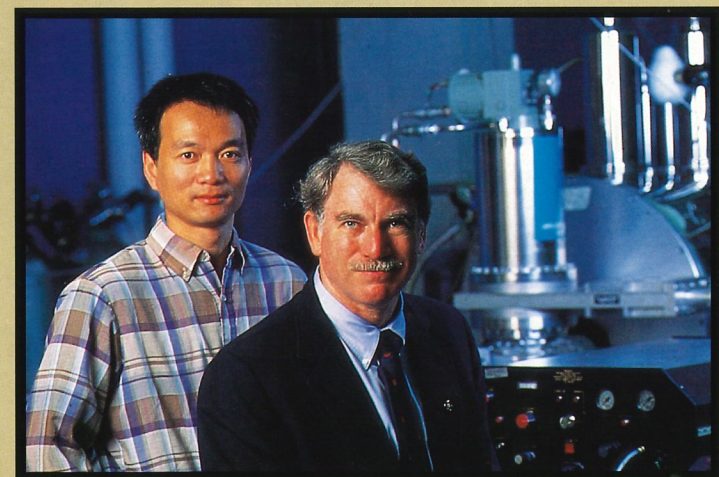
The award is the largest ever earmarked specifically for work in the rapidly growing ICR field, which is based on one of the most powerful technologies ever developed for identifying and characterizing molecules. The Tallahassee proposal beat out others submitted by MIT, Yale and California-Berkeley.

NHMFL director Dr. Jack Crow hailed the announcement as the lab's "first big success story" in adding to the wealth of scientific prowess already amassed at the Innovation Park site on FSU's campus. "This project is over and above the lab's original mission, but it fits perfectly into what we're trying to do here," he said.

Chief author of the winning proposal, Dr. Alan G. Marshall, transferred from Ohio State University last year to the Tallahassee lab on faith that the proposal would be funded. Marshall is a co-inventor, with Dr. Melvin Comisarow of the University of British Columbia, of a technique that in recent years has brought ICR, a phenomenon known since the early 1930s, into the forefront of high-performance chemical analysis technology. Marshall will direct the new program with support from co-principal investigators Dr. Shenheng Guan at FSU and Dr. John Eyles at the University of Florida.

Since the federal government picked Tallahassee to be the nation's prime proving ground for big-magnet technology in 1990, Marshall figured then that Florida's capital was where his future lay. As one of the most widely acclaimed ICR experts in the world, Marshall knew that the young field's future was tied to the development of high-field magnets. Cyclotrons are essentially hollow tubes that run through the cores of super-strong magnets.

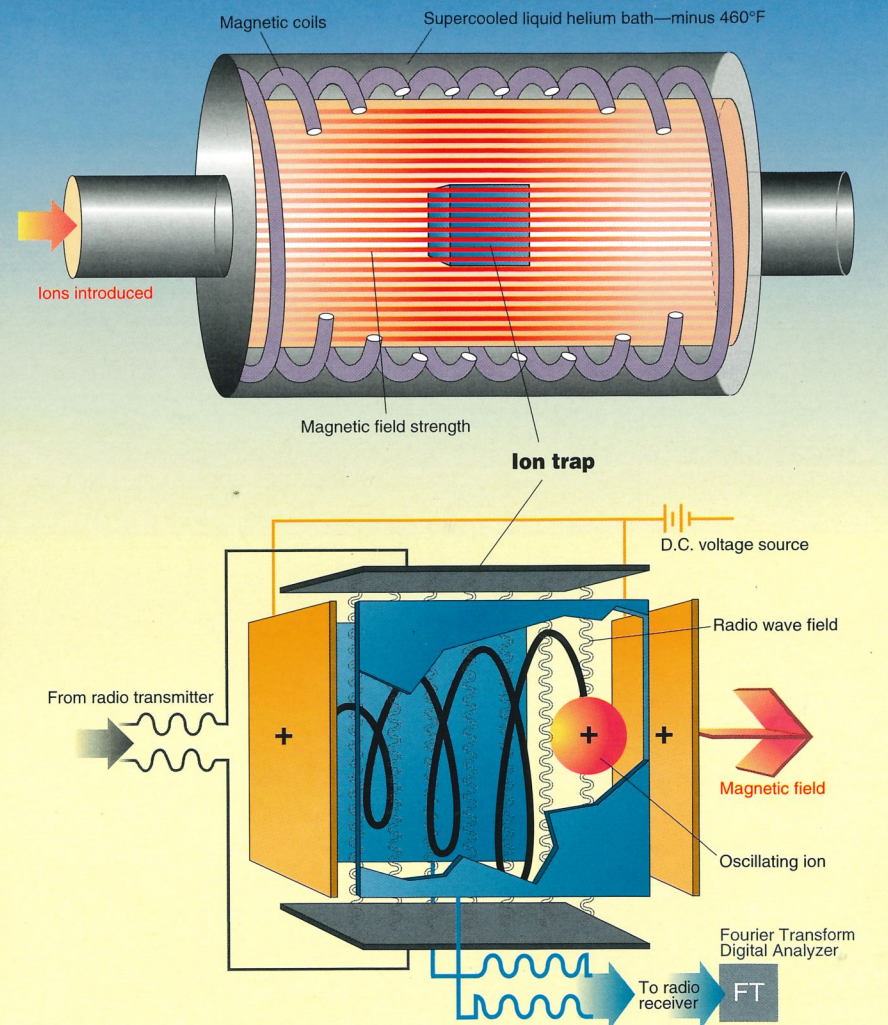
"This is going to be the world's best ICR lab, and very soon," said Marshall. "The grant will allow us to build a state-of-the-art facility right



▲ Drs. Alan Marshall (seated) and Shenheng Guan in the lab's new ICR facility.

At the heart of ICR technology is a discovery dating from the early 1930s that electrically charged molecules, or ions, can be trapped in a high magnetic field and made to rotate under a bombardment of radio waves. Ions trapped in a cyclotron (basically a hollow tube running through the core of a strong magnet) are forced into spiraling orbits by AM radio signals. The size and frequency of the orbits depends on an ion's particular molecular weight. As the ions pass close to detector plates, they induce distinctive timing patterns of charges which can then be analyzed to identify and characterize them. Fourier transform (FT) digital analysis techniques developed in 1973 by NHMFL chemist Dr. Alan G. Marshall and Dr. Michael Comisarow of the University of British Columbia revolutionized ICR by allowing many different ions—typically present in unknown compounds—to be analyzed all at once instead of one at a time.

ION CYCLOTRON SPECTROMETRY—HOW IT WORKS



away, and to maintain that level continuously. That's something you won't find anywhere else."

Until Marshall and Comisarow's work in the early 1970s, ICR was something of an interesting novelty among analytical chemists, who had much faster means available to them for identifying and sorting through mixtures of unknown compounds. Although crude in comparison to what cyclotron-based mass spectrometry could produce, test results obtained from ordinary "mass spec" machines were much quicker and easier to get, which led to the establishment of these instruments as the analytical method of choice among chemists.

Conventional ICR analysis was extremely slow and tedious because it required scientists to scan an unknown sample—which could have hundreds, even thousands of molecules of different weights and sizes mixed together—a slice of the radio spectrum at a time searching for telltale signals given off by the jumble of electrically charged molecules within the sample. Working at British Columbia, in 1973 Marshall and Comisarow developed a method based on Fourier transform (FT) techniques that made it possible to analyze all the signals from a complex ICR sample at once. The innovation meant that an experiment that might have taken a year could suddenly be done in a few minutes, and with results far better than ordinary mass spectrometry tests could produce.

Commercially produced FT-ICR units have now been available for some time, with more than 160 installations worldwide, Marshall said. The instruments are finding increasing use in industry and in basic research where extremely detailed analysis of substances is required. IBM

reportedly uses nine of the devices to check the quality of computer chips and data storage media. FSU's Guan, recently working on a pollution-control project for the oil giant Amoco, separated and identified for the first time dozens of sulfur-containing compounds out of thousands of chemicals in a sample of crude oil.

Marshall said the technique is by far the most accurate way to measure molecular or atomic weight ever developed. An experiment he ran recently to measure the mass of neon, for example, resulted in a figure 25 times the accuracy of previous estimates. The technique's extraordinary sensitivity is seen as an invaluable tool for gathering information about the molecular structure of new materials, biological agents such as DNA and drugs.

The NSF grant covers a five-year period in which the world's most powerful superconducting magnets designed for ICR use will be installed and tested at the Tallahassee facility. With every increase in magnetic strength comes a corresponding jump in the instruments' sensitivity, said Marshall. "Just as a glass prism spreads out the different colors of visible light to make a spectrum, a strong magnet spreads out the radio frequencies (used in ICR), making it easier to see ions (charged particles) of different mass."

The new center will be a collaborative effort initially involving 17 other scientists from other universities, government labs and industry around the nation, Marshall said. Five chemists from FSU and from the University of Florida already are engaged in joint projects using equipment supplied by the NHMFL and donated by Oxford Instruments, a magnet manufacturing company based in Oxford, England. ■



Magnet assembly technician Jim O'Reilly puts the finishing touches on a 27-T resistive magnet, the second designed, built and installed at lab headquarters this year. Finished, the unit contains three concentric coils consisting of 1,600 copper plates, all precisely punched with two million holes to allow water flow. Before assembly, each hole must be checked for burrs, which can cause electrical shorts and thus magnet failure.

PHOTO: RAY STANYARD

RESISTIVE MAGNET

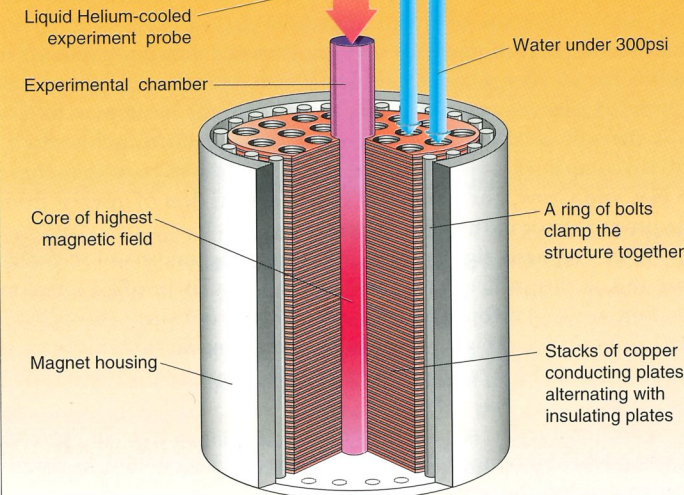


ILLUSTRATION: BOB CELANDER

Resistive magnets are one of three types of magnets to be developed at lab headquarters in Tallahassee. So-called because they resist electrical current, and thus give off heat during operation, resistive magnets must be constantly bathed in cold water to function at high levels. Other types slated for study are superconducting magnets, which operate in a super-cold environment produced by liquid helium and nitrogen, and hybrid magnets, which incorporate both resistive and superconducting designs in one unit.

electricity must be applied in a relatively small space—none of the magnets now on line at the lab is bigger than a car engine. Such massive power coursing through stacked copper plates—the magnets' "coils"—causes a fierce amount of resistance expressed as heat. In the June experiment, a magnetic field 600,000 times greater than Earth's was created on the strength of 13.5 megawatts of power poured into the lab's first resistive (heat-inducing) magnet. Nearly 2,000 gallons

per minute of chilled water, under 300 pounds of pressure, surged through the device and literally kept it from melting.

Director Crow said that the June triumph has helped quiet much of the criticism that arose in 1990 when the National Science Foundation decided to shift the bulk of funding for its high-field magnet development program from its traditional home at the Massachusetts Institute of Technology to Florida State. Fears that the move would doom MIT's 35-year-old Francis Bitter National Magnet Laboratory have abated somewhat since then—Bitter is in line for continued NSF funding through 1995, with the likelihood of renewed contracts after that. Part of the reason is that the MIT group is now heavily involved in collaborative projects with the NHMFL team at FSU.

For starters, since MIT is a world leader in the design of so-called "hybrid" magnets—giant-sized marriages of resistive and superconducting magnet technologies, the Boston group is helping build a super-hybrid model that is scheduled to be installed at FSU next year and running by September. This 14-ton, 21-foot-tall Goliath is being designed to develop a magnetic field rated at 45-Tesla, a measurement indicating strength. (By contrast, the world record set by the FSU team in June with a conventional resistive magnet was 27-T, snapping a 25-T mark held by the Max Planck Institute in Grenoble, France. Outside of highly controlled experiments in which colossal Tesla numbers are reached with the aid of high explosives (work exclusively conducted by NHMFL's western partner, Los Alamos National Laboratory in New Mexico) a strength of 45-T, when achieved, will set the world record for stand-alone magnets of any kind, says Crow.

"Right now, Grenoble is just starting to design their 43-T and Japan, the next leading competitor, is starting a 40-T," said Crow. "So with our 45-T on line next September, we will be in a position to go well beyond everybody else in the world (in terms of raw power) and therefore the science coming out of here should be well beyond everybody else, too."

Science is Job One

Lab scientists didn't waste much time celebrating the fact that their new 27-T magnet actually worked just as its designers said it would. Within hours of start-up, a group of physicists led by Dr. William Moulton of FSU used the device for an experiment in *nuclear* (there are several types) MR—the first such investigation ever attempted at such a high field level.

Since June, the lab has designed, built, installed and tested two other large resistive magnets—another 27-T along with a 20-T—and a 30-T is scheduled to be on line by the end of this year. Also by

January, installation of the lab's first large-scale, superconducting magnet—a 20-T machine built on contract with an English magnet design company—is expected to finally usher in the science phase of the lab's NMR program, delayed somewhat because of difficulty in obtaining high-end equipment and in signing a bona fide, world-renowned expert to run it. This summer, Dr. Geoffrey Bodenhausen, director of the NMR

program at the University of Lausanne (Switzerland), assumed the reins of the young program, joining a stellar line-up of talent drawn to the lab in recent months (see box).

The frenzy to acquire machines and personnel, of course, signals a resolve to stop talking about science

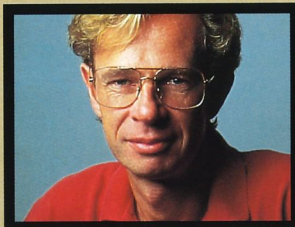
◀ **Lab technicians and engineers have ample elbow room in the lab's cavernous central workshop.**



PHOTO: RAY STANYARD

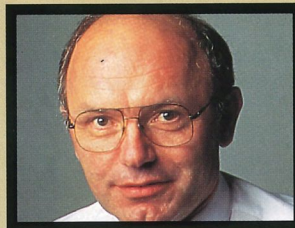
'94'S NEW FACES

Some of the brightest lights in science are showing up at NHMFL headquarters. Considered preeminent in their fields are these three researchers who joined the lab this year.



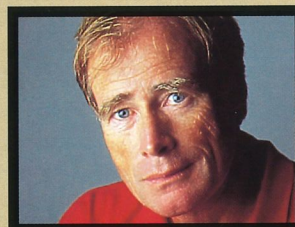
GEOFFREY BODENHAUSEN, director, NMR Facility

specialty: magnetic resonance *previous post:* director, Institute of Organic Chemistry, U. Lausanne, Switzerland *training:* Ph.D., Oxford, England



LOUIS-CLAUDE BRUNEL, director, ESR Facility

specialty: electron spin resonance *previous post:* physicist, High Magnetic Field Laboratory (Max Planck Institute), Grenoble, France *training:* Ph.D., U. Lyon, France



ZACHARY FISK, experimentalist

specialty: condensed matter physics *previous post:* professor of physics, U. Cal-San Diego and Los Alamos National Laboratory *training:* Ph.D., U. Cal-San Diego

and start doing it—a matter much on the mind of director Crow, obviously. He's been encouraged by the interest shown by a number of university groups—Louisiana State, UCLA, Boston, SUNY-Buffalo and several German institutes—who've already shown up for preliminary work in such areas as high-temperature superconductivity and other aspects of materials science. As word gets out about what the lab has to offer, Crow expects an increase in the number of campus-based science groups applying for time on the facilities, which—as is the rule at all national labs—is free to qualified, public users. Private companies, especially those involved in proprietary work, have to pay, said Crow, but he doesn't expect a great deal of interest from the private sector in the initial going.

"Our emphasis right now is on convincing university scientists that this facility will enhance their research. To justify long-term funding, we've got to develop a customer base out there that is writing to the NSF and saying 'for goodness sake, make sure this place is properly funded.' We've got to get them screaming if the product isn't available."

The "product" is soon to become appreciably better. In September, the NSF announced that the lab had won a \$5 million competition to develop the world's largest center for research in the field of ion cyclotron mass spectrometry, a new, high-end offshoot of NMR research that poses revolutionary changes in fundamental studies of chemicals, biological tissue and manmade materials (see page 22). Crow regards the news as the lab's "first big success story" in the pursuit of uses for high-field magnets in science and industry, the lab's fundamental reason for being.

The Main Attraction

"New research related to the production and use of magnetic fields can be expected to lead to important applications in technology, such as new devices for the computing industry, new materials with exceptional strengths, and major advances in medicine...The U.S. cannot hope to maintain scientific and technological leadership if it turns its back on such an important field."

he words come from the a final report of a panel of experts convened by the National Science Foundation in 1988. Panelists were charged with determining the intrinsic worth of research in super-high magnetic fields and how exactly U.S. work in the area stacked up against competition from Europe and Japan. The panelists obviously found things lacking in the American initiative and strongly recommended a stepped-up emphasis on what they concluded was an area of vital national interest.

Ergo, the NSF reexamined its funding priorities for high-field research and issued a national call for proposals basically aimed at building the world's preeminent center for magnet research in America. An unlikely bid by FSU—backed up by a pledge of \$60 million in state dollars over a five-year-period (matched by \$60 million from the NSF)—emerged as a strong contender right off the bat. The unusual proposal called for a partnership between Florida State, the University of Florida and New Mexico's Los Alamos National

Laboratory, a plan designed to capitalize on strengths in materials science, cryogenics, biotechnology, both theoretical and experimental physics, and advanced computing already in place at these three sites.

Crow and his chief administrators keenly remember the wails of protest that erupted in 1990 over the NSF's subsequent decision to place its bet on the Florida plan. The implication—that serious research can be done only in the Northeast or on the Pacific coast—has most assuredly helped keep the Florida group focused and on task. Crow says the results are everywhere one cares to look.

"Not only are we on schedule with most of our (construction) commitments, but we're actually ahead in a few key areas," he said. "Our original schedule called for the installation of the 45-T (hybrid) in 1997. We're going to have it up and running in September of '95—two years early on that one."

A shortened timetable for getting such super-magnets on line has been a consequence of an engineering tour de force that produced quality infrastructure unlike any he's seen, said Crow, who added that he's seen them all. Design and performance of the lab's massive, 40-megawatt power supply—the largest ever hitched to a magnet lab in this or any other country—and the facility's elaborate, yet super-quiet cooling system exceeded all specifications, and in some cases by a factor of 10, he said.

The magnet that set the 27-T record in June not only hit its mark, but amazed its designers with its reliability. In September, the magnet was still running strong after more than 200 hours of operation. By contrast, lesser magnets at MIT's Bitter lab are routinely replaced after 150 hours, said one lab engineer.

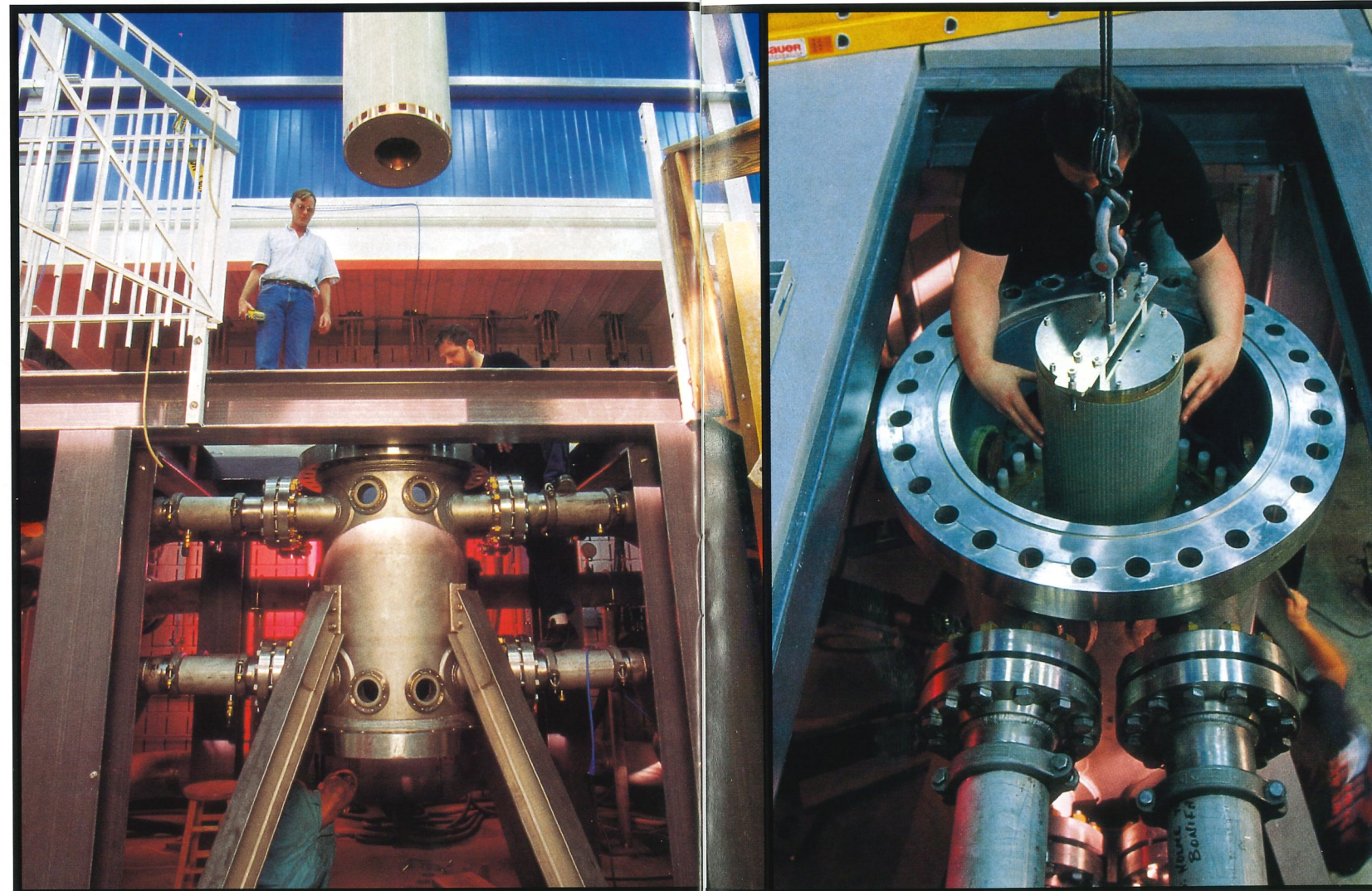
The Force is With Us

◀ **The main core of 27-T magnet No. 2 is lowered into place Aug. 2 by lab engineers. Three days later, the magnet met and surpassed specs in its first test. This device is the twin to the NHMFL unit which set a new world record for resistive magnets June 22.**

Now that they're confident they've built the best facility for magnet research on the planet, Crow's team is anxious to see what it will do. Science at the lab's New Mexico affiliate, as is well known among magnet designers, has been under way for some time. That effort, directed by Dr. L.J. Campbell, is pursuing studies of ultra-high magnetic fields—far beyond anything within reach at Innovation Park. These super-short-lived fields are generated by carefully designed devices which use high explosives to force the creation of fields in the 100-T to 200-T range. No practical uses for such self-destructive machines have yet been proposed, yet for scientists the research offers intriguing insights into magnet theory, the fuel that drives the whole endeavor in high-field science.

So far, magnet science at the University of Florida centers on applications of high fields in research involving superconductivity, the phenomenon—now restricted to super-cold environments—whereby electricity flows with no

"The U.S. cannot hope to maintain scientific and technological leadership if it turns its back on such an important field."



PHOTOS: RAY STANYARD



ILLUSTRATION: BOB CELANDER

by Ron Wiginton

Bringing Up Baby

Parents who don't put their children at the center of their worlds will only have themselves to blame for what's coming, warns this researcher.

Do something nice and see what happens. Collect canned goods for the needy. Help an elderly person change a flat tire. Volunteer at the local library. Inevitably, someone older than you will say something like this: "you must have been raised right."

Being "raised right" is a classic American apothegm. But we know its meaning better its definition. If asked, we might talk about strong family values and morals, a solid but not dogmatic religious background, and loving parents who made us brush our teeth at night before tucking us into bed with a prayer and a lullaby. Ozzie and Harriet stuff. Sometimes we might define the term by those who are its opposite: The ones raised wrong, the children and adults who fill our jails and prisons, the frantic voices on the other end of the child-abuse hotline.

But even if we know what it means and understand the potential for disaster if we don't do it well, raising our children "right"

has become a pragmatically slippery ideal for much of contemporary society, a lost paragon that one Florida State University researcher believes may never be retrieved unless there is a moral rebirth in American homes.

"Raising children is the most important thing we do in our society," says Dr. Murray Krantz, an FSU child development specialist and author of a new book, *Child Development: Risk and Opportunity* (Words Work, 1994). "If we did a better job raising them, ultimately people would be healthier, brighter, more productive, more creative, more loyal, more everything. Unfortunately, that's not what most of us are doing."

Krantz (Ph.D. Penn State) has been studying child development for nearly 30 years (including four years as a day-care operator), and what he has found won't let even Ozzie and Harriet off the hook: Even children from traditional nuclear families have a high risk of failing in school and in life if their parents fail to make them their top priority, from conception to graduation. Poor-quality day-care and too-busy parents

have eroded the foundation children need to be successful, he says.

"Every genetically normal child has the potential to be the next Einstein or Martin Luther King Jr.," he says. "It is our commitment to them that makes the difference, that allows them to reach their full potential."

A quick look at criminal statistics (juvenile crime in Florida has increased 74 percent since 1983; prison admissions have doubled), or education report cards (36 percent of all 17-year-olds in Florida cannot compose a letter using basic English grammar) reveals that a lot of kids are not reaching their full potential. While politicians and others react by building more prisons or by condemning America's overworked educational system, Krantz says the blame rests squarely at home.

"I don't believe the school system fails our kids," he says. "I believe the kids fail the school system. I have known thousands of teachers, well-meaning, hard-working, very dedicated, but the kids are not listening to them, and it looks like we may never get them to pay attention. When they walk in the door, they are not ready to learn. They have an attitude."

And Krantz is quick to point out that they don't learn this attitude at school: they bring it with them from home.

"We might call a kid slow, but he or she wasn't born that way," he says. "They got that way. Then you got kids on the other end who are so-called 'gifted.' They aren't gifted. The gift was that they got an enormous amount of stimulation early in life.

"There is an almost one-to-one relationship between what we do with our kids during the first few years of their lives as parents, and what happens in their teen-age years and beyond."

Due in part to economic necessities and increasing gender equality in the work force, the traditional nuclear family (dad works, mom stays home to care for the kids) has nearly eroded away in this country. According to the U.S. Census, 1987 marked the first time that a majority of mothers of infants under one year old were working outside of the home.

But if both Mom and Dad are at work, who's watching the kids? Studies show that nearly 90 percent of all infants under the age of one are being cared for in a home environment, either by a relative, family friend or professional nanny. But once they reach their first birthday, children are more and more likely to find themselves in cramped day-care facilities, often under the care of untrained personnel. While the long-term impact of day-care on child development is still being studied, early research indicates serious problems:

Day-care children are disproportionately more demanding, independent, disobedient, aggressive and "bossy" than children who stay at home.

Twenty or more hours a week of non-parental care significantly increases the risk of insecure infant-mother attachments.

Eight-year-olds who had attended a "minimal standard day-care" facility full time since infancy showed poorer academic performances and lower standardized test scores than children who had experienced part-time care or exclusive parental care.

Most kids who attend day-care full time will spend over 2,000 hours a year (about half of their waking hours) in the care of someone other than their parents. This adds up to 10,000 hours over the first five years of their lives.

In addition, Krantz notes that in "bad" day-care facilities, staff turnover is extremely high, meaning that some children may have from 30 to 50 different caregivers before entering kindergarten.

Care or Dare?

OPTING FOR DAY-CARE IS MORE OF A PARENTAL DILEMMA THAN YOU MIGHT THINK.

The best day-care is often homemade. But if you must enroll your child in a day-care center, FSU child development authority Dr. Murray Krantz says there are steps you can take to find the best and highest-quality center available.

"At its best, day-care is just okay," Krantz says. "But at its worst, it's devastating."

The primary impact of day-care is that it reduces the family's effect on the child. At a high-quality center, that reduction of parental involvement can be offset by sensitive caregivers who are genuinely involved with your child's emotional, physical and intellectual development. But at a below-standard center, the caregivers are under-trained individuals who may offer your child, at best, nothing more than a relatively safe place to play.

"Growing up with mom or dad—spending all those hours with a loving, caring person—is the ideal situation for a child's full potential to be realized," Krantz says. "The best substitute is an extremely talented, well-trained nanny. But if you have to use a day-care, you need to buy the very best you can get."

Finding the best is the tricky part. Based on nearly 30 years of research into child development, plus nearly four years as a day-care operator, Krantz has come up with some precautions for parents considering a day-care center:

Ask about the ratio of children to caregivers; below 10-to-1 is ideal. Meet every staff member and ask questions about their training and how long they have been at the center. "Don't be afraid to watch their emotions. You don't

"When they spend these thousands of hours in the company of disinterested, unresponsive and unaffectionate caregivers in uninteresting and unstimulating environments," Krantz says, "damage to their cognitive and social-emotional development is inevitable."

The result is that many kids will be emotionally and intellectually unprepared for school. They will defy authority and they will look only to peers for approval while avoiding any strong relationships with adults. This is a pattern, Krantz says, that often is a prelude to school drop-out, juvenile delinquency and adult crime.

While kids in high-quality day-care (highly trained caregivers, low turnover and low adult-to-child ratio) have not demonstrated these same risks, there is a shortage of such facilities in America. And even when available, they are usually out of the price range of the middle-class parents who constitute most two-career families.

But low-quality day-care is not the only

problem Krantz sees with child-rearing in the '90s. Because both parents work during the day, a child often receives very little positive attention from the people he or she most depends upon for that attention.

While many sociologists have argued that this attention deficit can be made up with "quality time," Krantz says that idea is a myth, that parents are often too overwhelmed at the end of the day to do more than fill their children's basic needs.

"Let's say you pick up your kids from the day-care center at 5:30 p.m., or maybe you have latch-key kids who have been home all afternoon unsupervised. What happens next? Somebody's got to cook, and then everybody eats, someone cleans up, and then the parents have worked all day and they want to relax, maybe watch

TV, and the kids have to do their homework and get their baths over with. Before

"By preserving the family the down and their economy up, on pedestals. The American

have to be a psychologist to know a healthy, caring personality."

Turnover at the center should be the biggest concern. "Ideally, there will be no more than one or two caregivers during your child's entire time at the center. In a below-standard center, sometimes it changes every month."

Visit the center several times before enrolling your child. Attend at least two different times of the day and note the consistency of the staff. "Visit often, without notice. Sniff around."

Talk to other parents at pickup time to assess their satisfaction with the center. Make certain the center is licensed by the state. Examine the center for cleanliness, safety devices on outlets and cabinets, and age-appropriate toys and equipment; ask to see the plans for emergencies.

After enrolling your child, monitor his or her physical and emotional condition. If it's good day-care, kids should want to go and they won't be happy to leave.

Most importantly, Krantz says, don't be naive about the situation. "Don't ever believe that anybody is going to be completely and fully dedicated to bringing out the best in your child's personal development," Krantz says. "You have to watch them like a hawk. They have to know that you're a strong advocate for your child.—R.W."

you know it, it's time for bed. I'd argue there's no room in that life for so-called quality time."

Despite the negative picture his research has painted, Krantz allows that even very busy parents can create a loving, nurturing environment for their children if they undergo a "rebirth of morality" in which their priorities are rearranged: kids must be at the top of the list.

"It ought to be a long-term, absolute commitment," he says. "For most people, I don't think their children are the number-one priority, and I'm not sure they ever were in our society."

He calls it his "pie-in-the-sky" scenario, and he admits that it may be unrealistic. But he predicts that if society could somehow be

Japanese have managed to keep crime "The Japanese style is to put the kids style is to build more cell blocks."

Dr. Murray Krantz

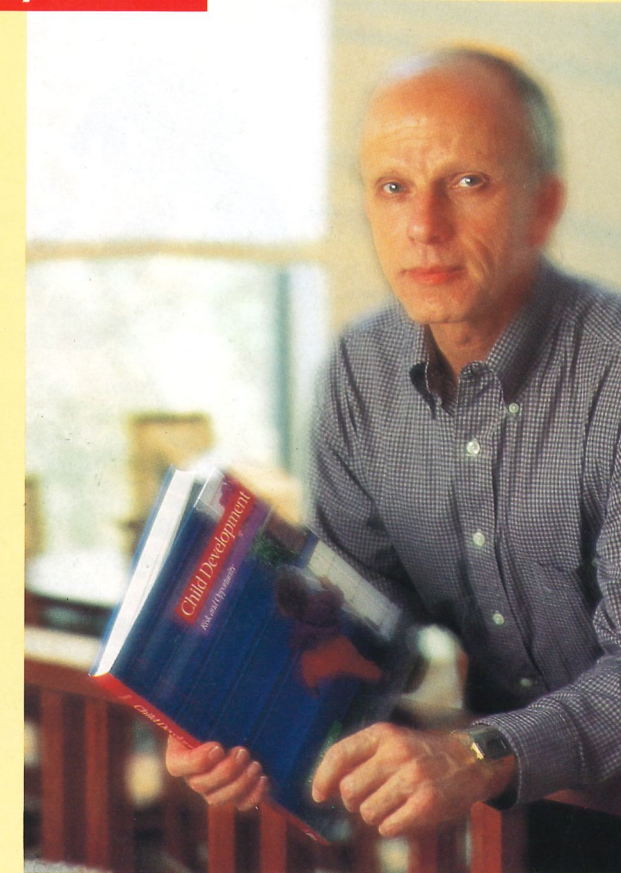


PHOTO: RAY STANFORD

reorganized so that careers, politics and social concerns are all put in the back seat, behind the kids, then society would be a better place for everyone.

"I think we could cut our crime problem by 90 percent," he says. "If someone committed a crime, we would all gasp. There are other countries where it pretty much is that way, like in Japan. They take their kids seriously over there, and they aren't afraid to walk from the house to the car at night."

By preserving the family, he says, the Japanese have managed to keep crime down and their economy up. "The Japanese style is to put the kids on pedestals. The American style is to build more cell blocks. We have chosen to clean up the mess rather than prevent it in the first place."

Krantz, 51, has raised three children with his wife, a family therapist in Tallahassee. He thinks he is a good dad, "and now a good grandfather," but he admits that he made some mistakes. He agrees that parenting is not an easy job, and good parenting is even

harder, but he does offer some suggestions:

Wait Until You're Ready—Krantz says too many people, because of their "absolute insistence on living the middle-class lifestyle," have had to put their work above all else. He suggests that people wait until they are reasonably financially secure before having children. "Is that too radical of an idea?" he asks. "Can you be pragmatic about it? Wait until you're in your 30s, when you're more financially stable. Have kids when they can be the most important thing in your life because that's what they deserve and that's what they need."

Demand High-Quality Day-Care—No child under the age of two should ever see the inside of a day-care facility, no matter how good it is ("That's something that just must be done."), but if you have to use day-care for older children, Krantz suggests that you use the best possible facility available (see separate story, above).

(continued on page 40)

Race TO THE Top

BY ANN MORRIS



Imagine trying to find an object 10 billion times smaller than an atom—a fragment of matter so tiny that it cannot be seen, isolated or even directly detected by the most sophisticated machines on Earth.

Physicists have good reason to believe that such an inconceivably minuscule object exists, and they're convinced they can find it despite the fact that the odds are decidedly stacked against them. First of all, the object only existed naturally at the very instant the universe was created. The only way to find it now is to conduct monstrously tedious and expensive experiments whose odds of uncovering it are about a trillion to one.

But it's this sort of confounding challenge that these researchers—known as high-energy physicists—live for. Marshaling the forces of some of the most powerful scientific instruments known to man, they are determined to pluck this primordial speck from the deep, subatomic landscape where it's been hiding since the Big Bang.

Actually, in a sense they don't have much of a choice. These scientists are in hot pursuit of the so-called "top" quark, a theoretical linchpin that helps hold together their fundamental assumptions about what matter is and how it's made.

TWO INTERNATIONAL TEAMS OF PHYSICISTS ARE BATTLING IT OUT TO BECOME THE FIRST TO DISCOVER ONE OF NATURE'S MOST ELUSIVE CREATURES—THE "TOP" QUARK. THE HUNT HAS AN INTERESTING FSU FLAVOR.

THE Top

Since the 1960s, such assumptions have rested on a theory—first proposed by Cal Tech physicists Murray Gell-Mann and George Zweig—that explains how matter and energy fit together at the subatomic level. This Standard Model, as it's called, predicts the existence of six fundamental particles called quarks. All but one—dubbed the "top" quark—has since been proven to exist. Without confirmation of the top quark's existence, the Standard Model falls apart—along with an abiding faith among physicists that what they've figured out so far is, in fact, the way nature works.

"Because of the symmetry of nature, the top quark has to exist," says Dr. Vasken Hagopian (Ph.D. Penn.), high-energy physicist within FSU's physics department. "If we didn't discover it 100 percent, then it would be a disaster; we would say 'Hey, we don't know what we're doing.'"

Hagopian is among 10 Florida State physicists, including four from the campus' Supercomputer Computations Research Institute (SCRI), and several graduate students who belong to one of two international research teams which have been engaged in a friendly competition to find the elusive particle for more than a decade.

The hunt is based on the grounds of the most powerful particle accelerator in the world—the Fermi National Accelerator Laboratory (Fermilab) at Batavia, Illinois, just outside Chicago. The two competing groups, called CDF and DZero (the FSU physicists work with the DZero group)

each contain more than 400 researchers representing about 40 universities and research institutions worldwide.

Fermilab is now the sole contender in the race to catch the top quark. Other labs in Switzerland, Germany, Japan and the U.S. were forced to drop out as the energy levels needed to detect the top grew ever higher, finally eclipsing their capabilities.

"Because of the symmetry of nature, the top quark has to exist. If we didn't discover it 100 percent, then it would be a disaster."

Most physicists at Fermilab, however, believe they are closing in on the top, and the race may be over in the next few months.

Readers who follow such scientific quests, however, can be forgiven if they thought the race already *was* over—and that the CDF group had won. On April 26th of this year, the CDF group announced at a press conference that they finally had evidence pinning down the top quark's place in the family tree of elementary particles. This evidence consisted of a dozen "candidate events"—strong experimental clues pointing to the real thing—although CDF scientists conceded at the time that half of these could be nothing more than interesting back-

ground noise. Although the CDF physicists insisted that their data was not statistically strong, publications all over the world heralded the event as the discovery of nature's last hidden building block.

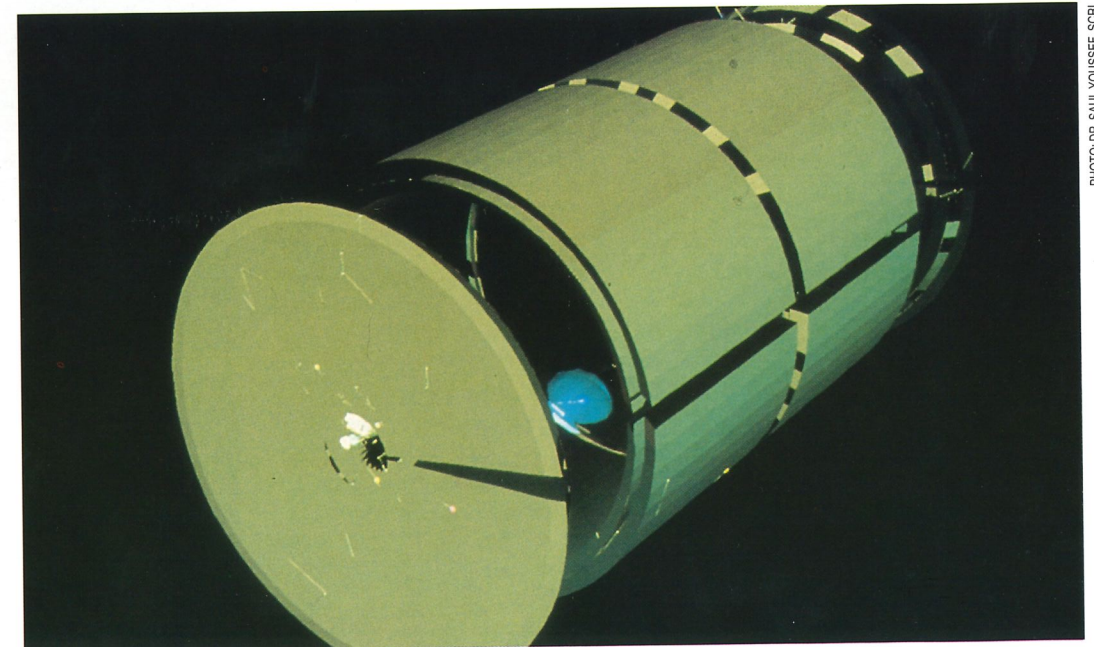
The announcement surprised many of the DZero physicists. Florida State DZero team member Dr. Harrison Prosper (Ph.D. Manchester, England) felt that the press con-

ference was somewhat premature, given the rather small amount of candidate events the CDF group had collected. "It's not that I have anything against press conferences *per se*," he said. "It's just that it seems to me that one should go to the world and say something when one has something to say."

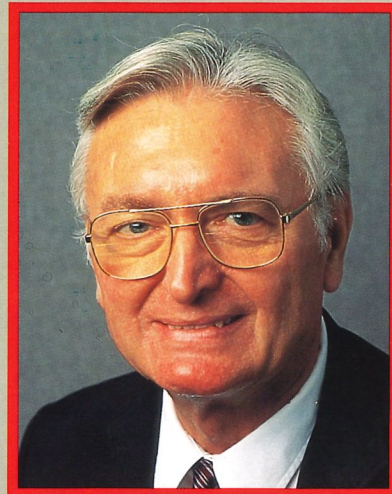
The DZero group, which has not been collecting data as long as the CDF team (DZero began the search in 1992), hopes that soon they will have a large enough pool of strong candidate events to announce that they, too have evidence for the top quark.

"In one year's time...we may well have more than four times as much data (than the CDF group now has)," said Prosper. "And I

▶ **At the core of the 5,000-ton DZero detector is a device called a calorimeter, simulated here through the use of SCIAN, visualization software produced by SCRI. The device measures the energy given off by colliding subatomic particles traveling at nearly the speed of light.**



Dr. Joe Lannutti



A Brief History of HEP at FSU

The high-energy physics program (HEP) at FSU was started by Dr. Joseph Lannutti (Ph.D. Berkeley) in 1957. Fresh out of graduate school when he arrived at FSU, Lannutti was hired to create a program that would bring diversity to the FSU physics department, which at the time was primarily centered around nuclear physics.

"It was a very difficult thing in the department to grow high-energy physics," said Lannutti, who now is also an associate vice president for research. "During the early years here there were more nuclear physicists than high-energy physicists, but still they were afraid I was going to take over the department. Now, we have about as many high-energy physicists in number as nuclear physicists."

In the past 37 years, Florida State's HEP program has grown to include some 36 physicists and has become one of the strongest

groups of its kind in the country. It has participated in large-scale collaborative efforts at other national and international laboratories around the world.

Roughly half of the high-energy physicists at FSU are in the Supercomputer Computations Research Institute (SCRI), which was actually created to supplement the needs of high-energy physics research. "High-energy physics has always been the biggest computer-user on campus," says Lannutti. "HEP needed more computational power, so that was what motivated the big push for SCRI."

Despite HEP's successes, Lannutti has had to struggle to obtain adequate funding for the ever-expanding program, a difficult thing to do given the enormous scope of high-energy physics research. "It's a constant battle to stay alive," says Lannutti. "It may look easy, but much of my life has been spent in sleepless nights worrying about what's going to happen."

Funding obstacles notwithstanding, the FSU high-energy physics program continues to increase in stature and expertise, maintaining a strong commitment to basic research and international collaboration. Such large-scale collaborative research, says Lannutti, provides an additional benefit—it fosters a spirit of cooperation and community among scientists around the world. "We have a large mixture of citizenship," says Lannutti. "Since it involves a lot of people, it becomes a large social experiment, too." —ANN MORRIS

happen to believe that with that much data there's a real possibility of being able to obtain about 10 or so events which are gold-plated—really very, very clear. Rather than go off to the press and say 'well, we've sort of discovered the top quark,' we'll be able to say we've discovered it, and that will be much more exciting."

How to Catch a Quark

Not many scientists can say that they conduct their research by obliterating the system they study, but that is exactly how the DZero physicists go about their work. The scientists feed streams of protons and antiprotons (particles just like protons but with opposite charge) into a gigantic underground, stainless-steel ring several miles in circumference. The protons and antiprotons, which travel in opposite directions, are magnetically accelerated around the ring until eventually they reach nearly the speed of light. At this point the whizzing particles are smashed into each other, producing a shower of even smaller particles that fly off in every direction. Somewhere in this particle "debris," physicists hope, is the trace of a top quark.

Like prospectors from the Old West, the physicists sift through the subatomic silt created during a proton-antiproton collision, hoping traces of the top quark will emerge.

And, more often than not, what actually turns up is merely fool's gold—events that look like the tracks of the top quark but aren't, or ordinary events that have been known for some time.

Up to a million proton-antiproton collisions can occur each second, but since only a fraction of these will yield unusual particles (perhaps one a second), the all-important collider detector, which lies on the accelerator ring and is where the collisions (called events) take place, is responsible for weeding out the ordinary, uninteresting collisions, and preserving the unusual ones for later analysis. The detectors can't actually see the particles themselves. Rather, they recognize each particle's characteristic electronic "signature"—the energy trail the particle leaves as it spins into oblivion.

The problem is, the top quark doesn't have its own unique signature, because it decays into other particles (such as electrons) roughly *one-billion trillionth* of a second after it's produced. So physicists must search instead for the signatures of the decay

products the top quark leaves behind, sort of like detectives searching through a suspect's garbage for clues.

Unfortunately, one of the possible decay products of the top quark is a particle called a neutrino, and neutrinos (which are thought to have no mass—a measure of weight) are



Dr. Sharon Hagopian

When Worlds Collide: Recreated here through the power of SCIAN software is a real collision between streams of protons and antiprotons, as measured by a calorimeter inside the massive DZero detector during a recent Fermilab experiment. Green and brown lines depict the paths of different particles produced by the collision.

PHOTO: DR. SAUL YOUSSEF, SCRI

virtually impossible to detect. What's more, there are many processes, called background events, which mimic what physicists believe is the top quark's decay pattern. All the noise, of course, further complicates an already confoundingly complex search.

"The problem is that in these particular experiments there aren't enough constraints," laments Prosper. "There are too many things that we don't measure, which means we don't have full information and therefore it is quite impossible to say categorically that this particular event is due to top quark production. All one can do is calculate probabilities," says Prosper.

In other words, forget the "Eureka!" The discovery of the top quark will be hard won, the result of accumulating evidence bit by fragile bit, proving that the top quark appears statistically more often than one would expect to see it from background events alone.

The upshot of all this is that in two years of collecting data almost continuously, out of the 20 million collision events that have been recorded, the DZero group has found only seven which are likely top quark candidates. And only one of these candidates is considered "gold-plated"—meaning that the only plausible explanation is that the top quark really has been there.

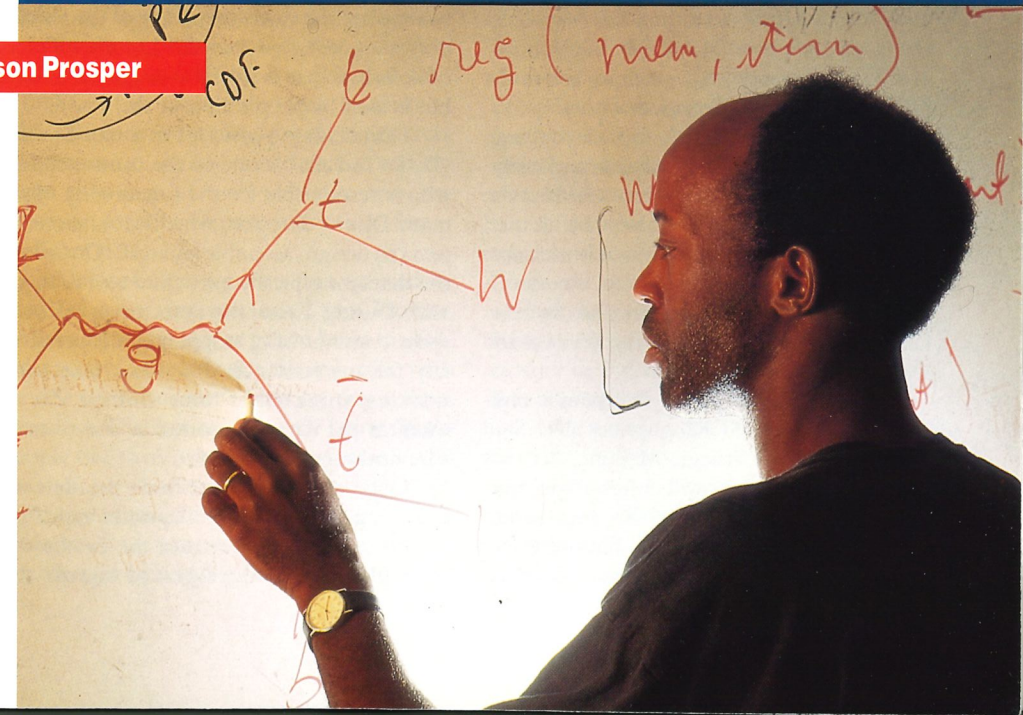
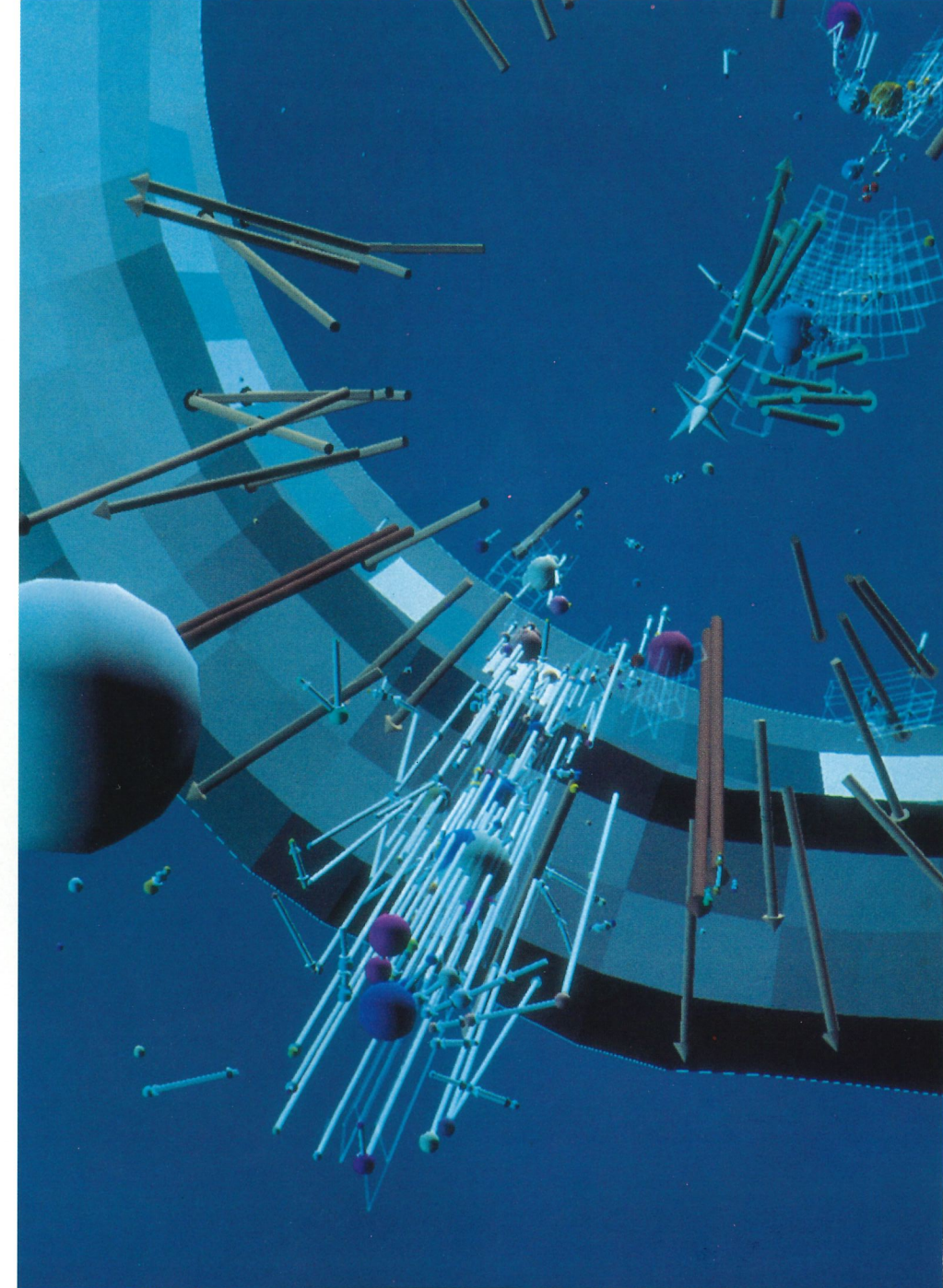
Dr. Harrison Prosper

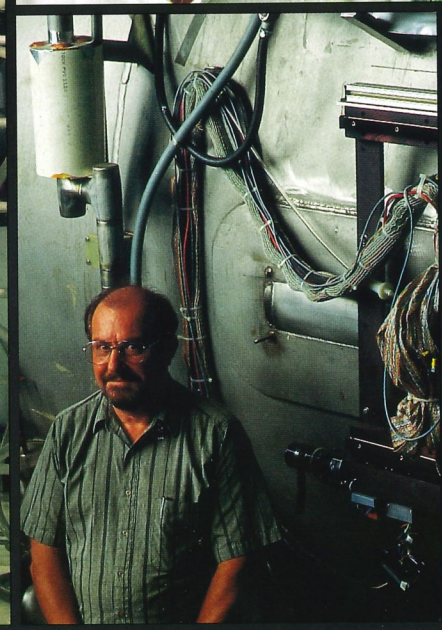
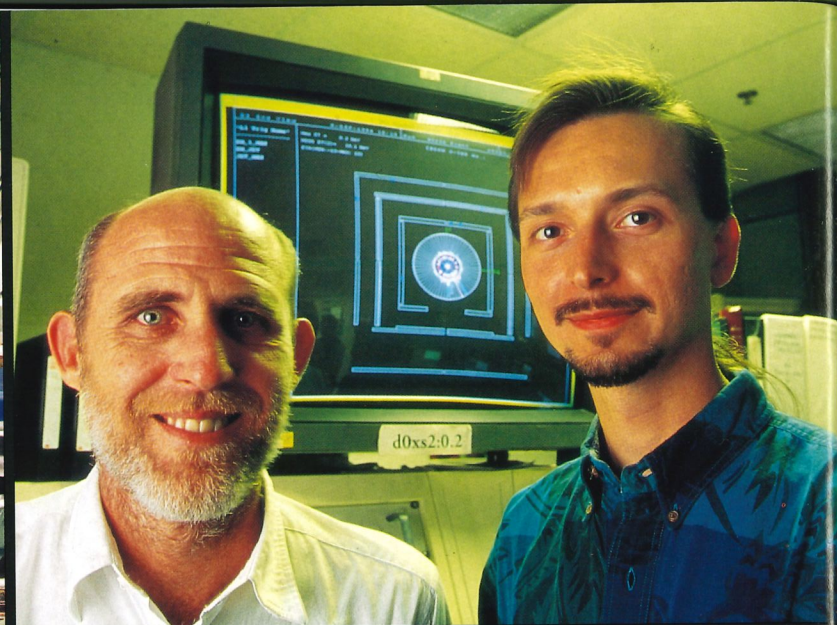
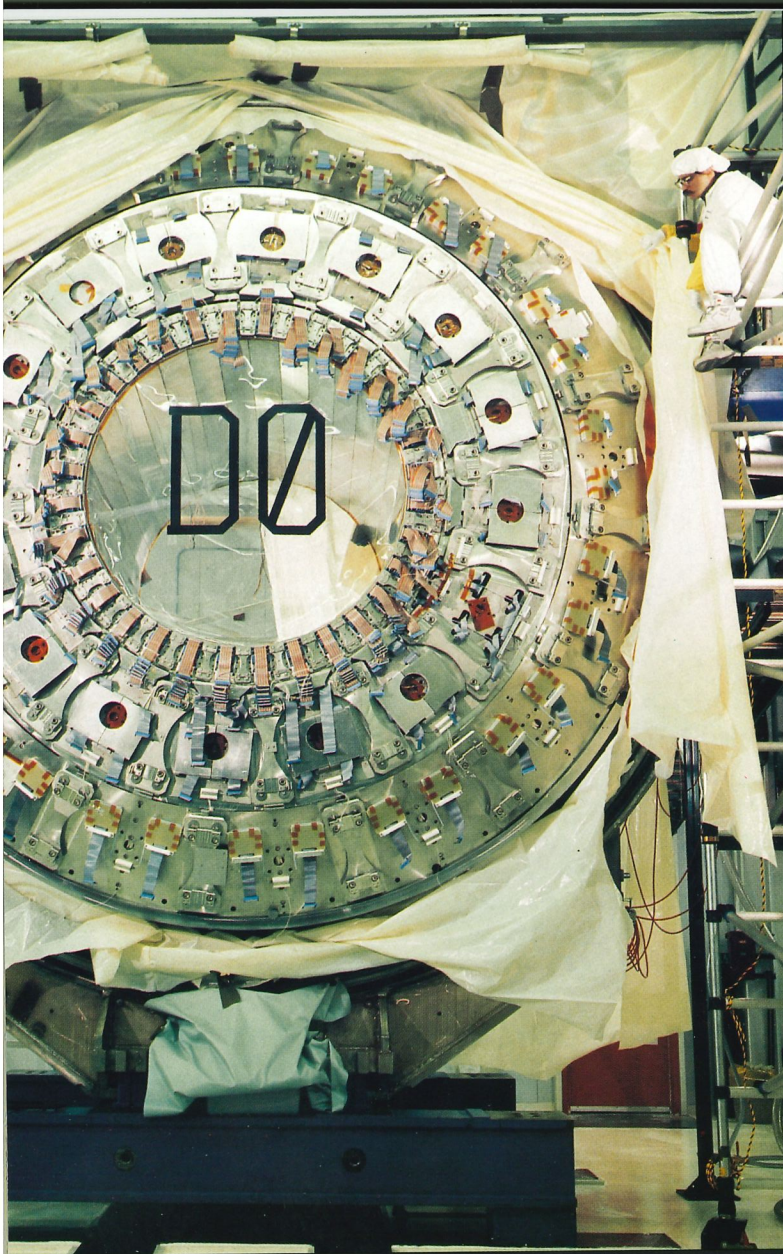
The Work at Hand

Given the paucity of genuine top-quark evidence, physicists' ability to recognize what all possible traces might look like is of the utmost importance. To help them, physicists create mammoth computer programs that can simulate what's going on inside of the 5,000-ton DZero collision detector. As it turns out, much of this simulation is played out on computers at Florida State. Prosper, who is deeply involved with simulation and analysis programs, emphasizes the importance of this work.

"The energy of these particles is not measured with infinite precision...and sometimes

PHOTO: RAY STANVARD





AT FERMILAB

Left: A "clean room" worker attends to the central calorimeter modules being readied for the DZero detector, installed in 1991. The detector itself required 10 years of design, assembly and testing.

PHOTO: FERMILAB VISUAL MEDIA SERVICES

Top: Drs. Stephan Linn and Robert Hirosky, both SCRI scientists

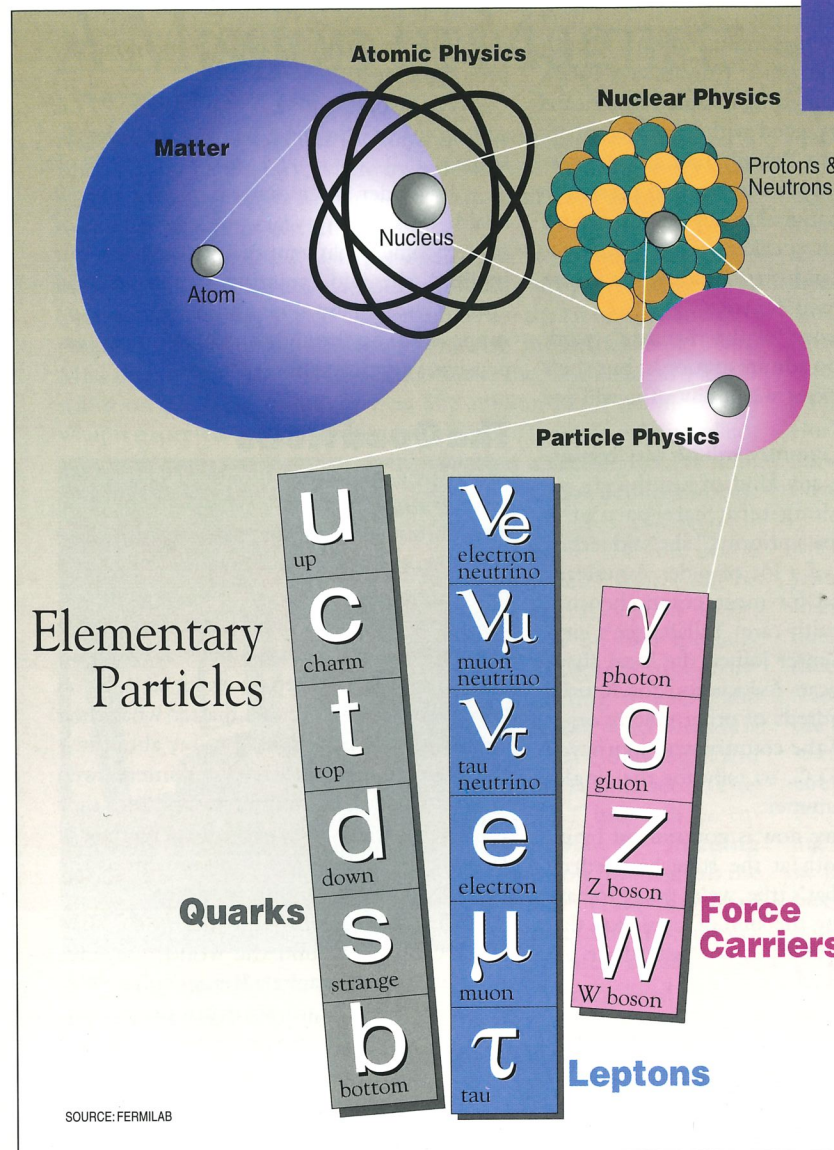
Bottom right: Dr. Henryk Piekarz, FSU physicist

PHOTOS: RAY STANDARD

Since Englishman J.J. Thompson discovered the electron in 1897, the race has been on to find the ultimate constituents of matter.

An Elementary Chronology

- Fifth century B.C.** — Greek philosophers Democritus and Leucippus propose that all matter is composed of tiny units called atoms
- 1803** — John Dalton formulates the first practical atomic theory
- 1897** — J.J. Thompson discovers the first fundamental particle—the electron
- 1905** — Albert Einstein formulates the special theory of relativity
- 1911** — Ernest Rutherford discovers the atomic nucleus
- 1927** — Niels Bohr presents the first successful model of the hydrogen atom
- 1930** — E.O. Lawrence builds the first successful circular particle accelerator, with a diameter of four inches
- 1932** — C.D. Anderson and S.H. Neddermeyer discovers the first antimatter particle, the *positron*, predicted by P.A.M. Dirac
- 1932** — In one of the first nuclear accelerator experiments, J. Chadwick discovers the *neutron*
- 1937** — C.D. Anderson and S.H. Neddermeyer discover the *muon*
- 1964** — Murray Gell-Mann and George Zweig propose that protons and neutrons are composed of *quarks*
- 1964** — The *omega minus* particle—a combination of three "strange" quarks—is discovered at Brookhaven National Laboratory
- 1977** — Evidence for the "bottom" quark is found at Fermilab
- 1983** — "W" and "Z" particles are discovered at CERN, Europe's leading particle physics lab



the directions are not correctly measured," he said. "So a big bulk of the work, especially the work done here (at FSU) is to try to improve the efficiency with which we can find a particular class of top-quark reactions."

Physicists from SCRI also play a large role in DZero detector simulation and analysis. They have written software for the DZero Collaboration that is now being used by experimenters worldwide. A simulation program called GEANT, which was developed by the CERN laboratory in Switzerland, has been adapted to fit the needs of the DZero group.

"One of the problems that people typically have," says SCRI physicist Dr. Saul Youssef (Ph.D. Carnegie-Mellon), "is that physicists or engineers will design some complicated piece of geometry that they would like to be put in the detector...but there's no way for them to test it in advance. So what

we did is write a piece of software that is able to simulate the consequences, and the translation is a general one; so this becomes a piece of software that is useful not just in DZero but is used by people all over the world."

Florida State physicist Dr. Susan Blessing (Ph.D. Indiana) is one of the team members who is responsible for the functioning of the giant DZero detector, which took about 10 years to design, assemble and test. One run of the detector typically lasts close to a year, she said. During a run, the detector operates almost continuously, stopping only occasionally for maintenance. Physicists take turns working three eight-hour shifts a day to monitor the data as it comes in and to make sure nothing goes wrong.

Once the data taken from the detector has been stored onto magnetic tape, the physicists try to reconstruct the events that took place from the digitized signals that

were actually recorded. Although their primary goal is to find evidence of the top quark, physicists like Blessing also keep their eyes peeled for any other unusual events, labeled "new phenomena," that might have taken place.

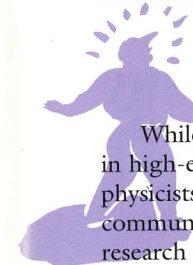
"In physics, most of the interesting stuff are things you never expected," says Hagopian. "We're trying to make sure that even the unexpected is caught."

Life After Top

Since the search for the top quark began over a decade ago, scientists have become awed by what the evidence has revealed about what—in theory at least—surely ranks as one of nature's most bizarre creations. Scientists now believe that the top quark's mass is about equal to that of an atom of gold. If so, this would make the

top quark by far the heaviest of all fundamental particles.

Some physicists believe that because of its improbably large mass, the top quark must be connected in some way to the mechanism that *causes* mass. Investigating that mechanism, say high-energy physicists, could open the door to a whole new era of physics. Proof of the top quark's existence, when it comes, will thus be an invitation for physicists to tackle yet another riddle—the origin of mass itself.



Why We Should Care

While the thought of forging new paths in high-energy physics is pretty heady stuff, physicists remain plagued by an inability to communicate the importance of such basic research to the public.

"We're not planning to produce new

forms of electricity or solve the ozone-hole problem," says Hagopian.

But some physicists feel that not all of their colleagues are this candid, that they tell the public what they think it wants to hear just to win funding for their research. In fact, some are convinced that it was exactly this sort of over-sell that was the downfall of the Superconducting Super Collider (SSC).

"Many of the arguments that we used for the SSC were very specious," says Prosper. "Arguments like, 'we've got to build the SSC because we'll have wonderful spin-offs, we'll be able to cure cancer'....It's condescending, actually. The fact is, there are many bright people out there who are not scientists, who understand what it's all about, and it's quite right that some of them were very put off by these kinds of arguments."

Instead of looking for practical applica-

tions, which usually turn up on their own anyway (the popular computer network World Wide Web, for example, was an offshoot of high-energy research at CERN), Prosper and others feel that investigating fundamental aspects of our universe is a worthy endeavor in its own right. Indeed, this kind of inquiry is hardly new—the search for the structure of matter began with the ancient Greeks.

So the discovery of the top quark can be seen as both an end and a beginning—a link between present and future that will bring closure to one set of theories while opening doors to others.

"The whole thing," says Youssef, "really is about answering simple and very interesting questions about the world—what is it made of and how does it work? That's really what it's all about, and finding the top quark is a modest step towards that." ■

The Changing Face of Age

continued from page 11

looks at the future of long-term care in Florida.

"There will be an increasing need for home care assistance for people who don't need 24-hour care. As long as you can make an initial investment in a full-service retirement community and pay the couple thousand dollars in rent every month that it tends to cost you, you can be taken care of. But that's only available to a small portion of people who are going to need assistance."

Pills vs. Bills

Increasingly, studies are finding that even those who have adequate insurance are faced with mounting bills for long-term health care they can't pay. It's a fear that stretches across both age and economic boundaries and fuels a huge mistrust of the existing health-care system.

"It used to be that, when you got older, you just went to the mom-and-pop rooming house down the street, and it didn't cost too much to do that," Cowart said. "Then came corporatization, the mom-and-pop operations closed, and we began to see larger facilities owned by the for-profit sector, owned by multinational chains. Corporatization has accelerated costs because it's introduced competition where previously it wasn't part of the health-care environment."

Cowart admits that the corporatization of the health-care industry has helped standardize and improve conditions for patients in nursing homes across the country. The picture of nursing homes used to be one of bedsores, catheters and patients tied to their wheelchairs, parked in front of the TV. Now patients are being trained in safety and avoiding incontinence, and their rights are protected by omnibus councils. But such improvements have come at a high price. People now pay through the nose for these types of facilities.

"It's really a real-estate business," Cowart says. "Nursing homes change hands from year to year, and just the mortgage fees as they buy and sell the properties is enough to cause a tremendous increase in the cost. I think corporatization of the health care system has been our downfall."

Cowart has most recently worked with Quadagno to evaluate the long-term care

part of the Clinton Administration's Health Care Reform Plan, which Cowart says goes a long way toward assuring disabled Americans the coverage they need without differentiating by age and so doesn't fuel any generational fights. As this issue went to press, the institute held a national policy conference on the subject, with speakers from academia, government and industry, to study the future of long-term care in America.

Cowart is proud of the institute's work and of the Clinton administration's, but she's not optimistic about when any of it will see the light of day.

"I think this country will be very conservative in passing any kind of health-care reform, and the long-term care part of it doesn't seem to be a priority," she said, echoing the feelings of a lot of older Americans who have pushed for more comprehensive, less expensive health care. Tallahassee's city-funded Senior Center joined the local chapter of the American Association for Retired Persons and hundreds of other elderly organizations around the country who journeyed to Washington D.C. to rally for the single-payer plan this summer.

"What we have now is government by interest groups, both at the state and federal level. As long as that's true, we're going to have a hard time passing the kind of legislation that does the best for the people. Instead we get

Even those who have adequate insurance are increasingly faced with mounting bills for long-term health care they can't pay

laws that do the best for the corporate sector."

Serious health-care reform, if and when it comes, won't be complete if it doesn't address what has become a national concern among the elderly—how much health care is too much? So much more is possible in medicine now than when today's elderly were growing up that many are troubled by the ramifications of so-called "miracle-medicine." Many are skeptical whether today's wonder drugs and super surgeries will improve the quality of their lives or just postpone the inevitable until it exhausts their finances.

Dr. Henry Glick, an institute research associate and author of *The Right to Die* (Columbia University Press, 1992), told *Research in Review* last fall that "It's clear that the majority of people want to be able to avoid being kept alive through heroic mea-

sures. Almost no one wants a technologically prolonged death."

West Coast native Vivian Allen, 77, is among many who struggle daily with the dilemma.

"I wonder if, by extending our overall health by so many years, we aren't kind of overreaching what nature intended for our bodies," she said, pointing to her artificial knee. "How many times is an older person supposed to go through very painful, very expensive, very miserable repair jobs?"

The Good News

If there is a bright side to getting older, it's that more and more people are bucking the stereotypes of decline, winking at the very narrow conventions that define old age and then living out the rest of their years more or less as they please. They're healthier, more involved and content to either relax and enjoy retirement or keep working as long as they feel like working, no matter what their friends, kids or society have to say about it.

Most of the senior citizens interviewed for this article didn't bother to wait until they got older to finally kick back after a lifetime of working. They thought of retirement as the next logical step in a long, active life.

"I'm grateful for the privilege that I had of traveling all around the world," says retired teacher Betty Yuhas, 83. "I've heard so many people say, well, I'm going to wait until I retire and then I can do this, this and this. Then they retire and two years later they're dead. They didn't accomplish anything."

Retired ophthalmologist Harry Horwich, 70, explains a personal philosophy embraced by a lot of elderly people: "There's an old saying that you have to have

something to do, someone to love and something to look forward to. All these things are attainable at any age."

If you're smart, conventional wisdom says, you don't let age get to you. You develop a strong support system. You keep learning, growing and surviving, and if anybody tells you to act your age, you tell them to take a walk.

Cowart's research has shown her that the changing face of age is an opportunity to extend one's enjoyment of life considerably beyond what previous generations ever imagined possible.

"Think about the fact that in 1935, when Social Security was passed in this country, 65 was near death. Now 65 is *beginning*. We're not just living longer, we're living better. We're healthier. We're staying productive. I think that's pretty exciting." ■

A Mission In Magnets

Continued from page 27

resistance. Superconductivity plays a key role in research at UF's MicroKelvin Laboratory, where investigations of the nature of exotic materials such as heavy fermion alloys are conducted at some of the lowest temperatures ever created.

Magnets immersed in hyper-cooled baths of liquid helium or nitrogen can run for years without consuming any power, a phenomenon that has led high-field magnetism out of the laboratory and into practical applications in science and industry, the best example being MRI technology. As an NHMFL affiliate, the University of Florida will soon be able to equip its new \$58 million Brain Institute with what is expected to be the most powerful MRI system ever installed,



▲ Testing magnets' copper plates for consistency in strength and smoothness is the job of assembly technician Dianne Burns, shown here subjecting a plate to 95 tons of pressure per square inch.

PHOTO: RAY STAINYARD

according to Dr. Tim Cross, deputy director of lab's NMR program. The core of the system, which will be operational in 1997, will be two specially designed superconducting magnets, the first of which already is on the drawing board in Tallahassee. This 12-T unit will be capable of imaging whole, live animals the size of rabbits or small dogs and in unprecedented detail, Cross

said. Dr. Tom Mareci, head of UF's Center for Structural Biology, said this machine, along with a 4-T instrument that will be capable of imaging whole human brains and spinal cords, will represent the most sophisticated MRI diagnostic lab in the world. Brain Institute researchers expect to be able to use the lab to develop a novel technique known as *in vivo spectroscopy*, which allows scientists to examine the chemistry of live bodily organs without harming or disturbing them in any way, Mareci said. Once perfected, such a tool could be invaluable in the study of brain function and in treating brain and spinal cord injuries, he added.

But it's clearly at Innovation Park where most of the consortium's frontier science will be conducted. Much of what excites scientists familiar with high-field magnetism is the potential this largely unexplored phenomenon has for advancing fundamental knowledge of how molecules interact to form things. When any material—be it natural, manmade, organic or inorganic—is exposed to tremendous magnetic energy, the submicroscopic beehive of atomic activity within it begins to slow down. This brief hiatus in normally frenzied atomic behavior presents an opportunity for scientists to study such things as how atoms aggregate as molecules and how these, in turn, associate with other molecules to form a gas, liquids such as blood or crude oil, a piece of plastic or steel—in short, anything—and often in stunning detail. Boosting the power of magnets for such work is akin to cranking up the magnification power of a microscope or telescope—one's ability to see details (resolution) becomes increasingly more acute.

Such a powerful analytical tool poses all sorts of uses in science

and technology, but none are now more obvious than in the global quest for high-temperature ("high-TC") superconductivity. The 1988 NSF panel, in fact, plainly suggested that the key to achieving high-TC superconductivity—making the phenomenon work at normal temperatures—lies within high-magnetic field research.

Recognized as one of the true holy grails of science, high-TC superconductivity is a supreme challenge relegated almost exclusively to the study of new materials. This is where the NHMFL headquarters is expected to shine. Crow & Co. have succeeded in recruiting some of the world's best minds in materials science and in particular, superconductivity. The Nobel Prize that the lab's chief scientist, Dr. Robert L. Schrieffer, shared with two other physicists in 1972 honored his contributions to the fundamental theory underlying the phenomenon. Heading the lab's theory group is Russian-born Dr. Lev Gor'kov, whose pioneering work in superconductivity theory won him his native country's highest science honor—the Lenin Award in Physics—in 1966.

Of course, superconductivity won't just be studied at the lab—it will be put to increasing use in the magnets scientists will use there for years to come. The entire family of magnets slated for use by the lab's Institute for Advanced Studies of Magnetic Resonance are superconducting, many of them commercially available this year for the first time—a testimony to how fast the technology is growing. Such resources will be shared by the institute's three in-house programs: the NMR group headed by Bodenhausen; the ESR (for electron spin resonance) group headed by Dr. Louis-Claude Brunel, lured from Grenoble; and the ICR (ion cyclotron resonance) group headed by Dr. Alan Marshall. Research here will be given over entirely to finding the limits to which these three related analytical techniques may be taken in determining the molecular and atomic structures of various materials, both natural and manmade.

Closing the Deal

With the stage now pretty much set, Crow is starting the show with a plan to make the lab an even bigger attraction for researchers. He's seeking private funding to build a 15-unit guest house on the lab's premises to accommodate visiting research groups. The idea is intended to complement a state-funded, \$1.2 million annual visitor program that pays salaries to distinguished visiting scholars who want to spend extended periods—of up to a year—in Tallahassee.

Having on-site living quarters readily available to rank-and-file users, most of whom would not qualify for support through the state's visitor program, would help overcome one of the lab's admitted disadvantages—its distance from traditional research hubs in the Northeast and on the West Coast, says Crow.

"Research funding is tight everywhere, so for people coming from around the country, we can't have them spending a lot on housing and transportation. That's just another impediment for them to come here, see what we've got and use it."

An axiom of salesmanship, Crow is learning, is that one does whatever it takes to steer the customer to "yes." National laboratories may represent some of the country's most prized assemblages of scientific hardware and personnel, but they fail utterly when they insulate themselves from the scientific community at large, Crow feels. To prevent that, he vows to make the nation's newest scientific gem as accessible as possible to students, scholars and to industry as well to keep ideas fresh—even to take risks, if that's what it takes.

"People are just beginning to hear about us, and there's a learning curve involved," he said. "But that's to be expected. The word is getting out about what we've got here, and we're confident that when people see it for the first time, we won't have to worry—this incredible place will sell itself." ■

Bringing Up Baby

continued from page 31

Build a Sense of Authority—Create for your children a structured, non-arbitrary sense of respect and authority. This is not simply blind obedience. “Authority means being the kind of person that your children will spontaneously respect. You can do that by sharing emotions. You want to be good at some things and your kids should know about it. You can become an authority by showing power and skill and by being consistent with rules of structure that are not arbitrary.”

Be There Emotionally—This is what Krantz calls the “most critical element” to good parenting. “We can talk generalities about communication and respect, but what really being a parent is all about is the shoot-from-the-hip, day-to-day kind of interaction: Getting them in and out of the car seat, changing their diapers, being there when the kid falls down and gets hurt. If you’re not there (as when the child is in day-care), you are not going to pass that test. But even if you are there, there are a lot of stupid things you can do. You can be condescending or degrading to your children in everyday situations. Sometimes all it takes is a wink in the morning for the kids to know you care.”

Get Educated—Research indicates that most parents base their parenting skills on recollections of their own childhoods and by watching television, Krantz said. “If people are learning anything about child development by watching sitcoms, then we are in a lot of trouble,” he declares. He suggests authoritative handbooks that can give parents a “reasonable expectation” if they do something this way or that way. While his book is designed for the college classroom, he says it could serve parents well. “The difference between me and Dr. Spock or others is that I have one foot deeply imbedded in the science and research and the other foot trying to translate that research into practical information.”

Don't Think it's Too Late—Krantz suggests that it's “never too late” to get to know your kids. “I hate to use the word salvage, but that is basically what I mean. You're not going to change mistakes you already made, like that jungle gym you always said you would build in the back yard but never did, but don't sit around bemoaning what you should have done.”

The vague issue of family values has be-

come a hot topic in America, thanks in part to the last Republican administration and former Vice President Dan Quayle's public feud with Murphy Brown, a fictional TV character who had a child out of wedlock. Parental leave, flextime work schedules and a “parental bill of rights” have all been debated in Congress, and President Bill Clinton has a chief advisor on the family, William Galston, as a member of his Domestic Policy Council.

Krantz endorses all of these efforts to make families a top priority for American policy makers, but his agenda is slightly different than that of other pro-family proponents: instead of focusing so rigidly on the family structure, he would rather America put more emphasis on children—period.

“A number of groups believe we can, and should, turn the clock back to the nuclear family, but I believe the nuclear family was a myth to begin with,” Krantz says. “Sure, you had mom and dad at home, together, but I'm not so sure that was always very good for the children.”

One of those groups looking for a return to a more traditional family structure is the Council on Families in America, a research and public-policy organization whose membership includes Galston, Clinton's family advisor. The council represents a broad political spectrum, but it is steadfast in its position that a return to the traditional two-parent family is the cure to much of America's problems.

Instead of focusing so rigidly on the family structure, he would rather America put more emphasis on children — period.

“It is absolutely the key to our future,” says Dr. David Popenoe, a Rutgers sociologist who founded and now co-chairs the Council. “Even if you pour all the money in the world into programs for single-parent families, there is no indication they will ever make it as well as a two-parent family.”

Krantz, however, says there also is no indication that a two-parent family can be successful in raising children if those parents are not committed to their children.

“Two parents? Why not three?” asks Krantz. “Two is what we grew up with and is thought of as the ideal, but that may have been 30 years ago. It's just not that way anymore. I don't think the pendulum will ever swing back, or even if it should. We have to deal with what we have now. And what we have is a lot of single-parent families that can be very successful with raising children.”

Popenoe says it is true that two people do not automatically become good parents by simply being married and living together, but he adds that Krantz is flirting with a Utopian dreamland by suggesting one parent can be as successful as two.

“Sure, I'd agree that the child only needs one parent if that parent is absolutely devoted and has the skills and financial security to make that kind of commitment,” Popenoe says. “But that's unrealistic and Dr. Krantz should be more cautious about making that kind of statement. He should know that their chances are not nearly as great if that parent has a spouse of the opposite sex.”

The push for the two-parent nuclear family has brought Popenoe and other pro-family organizations under attack as being anti-feminist or anti-homosexual. While Krantz does not endorse the concept of homosexuals raising children, he also doesn't condemn it.

As a researcher, he says he is reluctant to make any statement since there have been no extensive studies of homosexual families. But he admits to having the same kind of reservations about it as he would about kids being raised by parents of mixed race. “Raising children in that kind of environment is not necessarily bad, but it does complicate a child's life and I believe raising children is hard enough without adding that additional complication,” he says.

However, he says the quality of care is the main issue. “Making a commitment to your children is far more important than any other issue,” he says. “If two people of the same sex can make that commitment, the child might be better off than in a traditional family where there is no commitment.”

While the Council on Families in America and other groups are pushing for new policies to promote marriage counseling and revision of the tax code to give married couples with children more favorable treatment, Krantz is not very optimistic that these proposals will be approved any time soon.

“I actually see things getting worse,” he says. “Our streets are going to have to be scenes of constant terror before we do something. We seem to be more worried about health care or the crime bill than we are about our kids.”

The trick, he says, is to believe—in kids, in the potential of kids, and in the possibilities that such beliefs may foster.

“We just need to be there for our kids when they need us,” he says. “We need to constantly remind ourselves that there is absolutely nothing more important for ourselves and for society at large.” ■

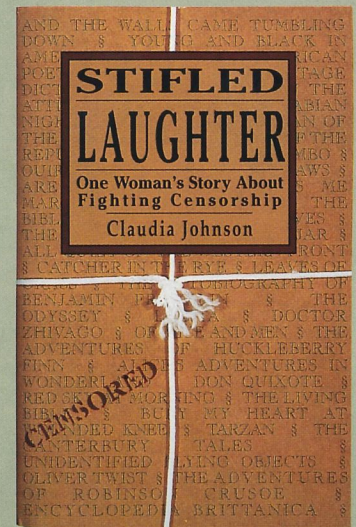
Reviews

RECENT WORKS BY FLORIDA STATE UNIVERSITY FACULTY

Devilspeak

Stifled Laughter. By Claudia Johnson. 192 pages. Golden, CO: Fulcrum Publishing. \$19.95.

An impassioned speaker storms the stage, throws his arms and eyes heavenward, praises Jesus and decries the devil while his audience shouts amens. But instead of the Bible, this speaker waves a copy of Steinbeck's *Of Mice and Men*. He pronounces it vulgar and the author “filthy-mouthed,” and wants it banned. The scene, from Claudia Johnson's *Stifled Laughter*, is a Suwannee County, Florida School Board meeting that sounds for all the world like an old-time, late-night, country tent revival.



Sitting on the quieter side of the room with her incredulous family, Johnson recounts blow-for-blow this last and most colorful in a series of confrontations with teachers, textbook committees, parents, lawyers and school boards that marked her years-long censorship fight in rural North Florida—where, she writes, “Christ meets corruption.” *Stifled Laughter* is the chronicle

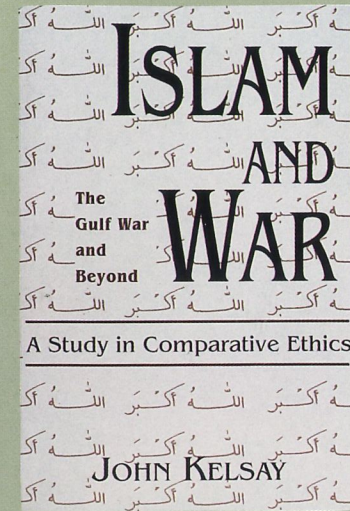
of her struggle to keep classic works—*Lysistrata*, Chaucer's “The Miller's Tale” and *Of Mice and Men*—in area high schools, a battle against parents who found the works “super crude” and wanted them banned forever lest they corrupt young minds.

It was a close, dirty battle fought in classrooms, boardrooms and backyards. Johnson, screenwriter in residence at FSU's undergraduate film school and a consummate dry wit, pointed out the dangers inherent in banning any book, and, when that didn't work, simply used the humor analogy: Chaucer is funny, pornography isn't. In return, she and her two anti-censorship cohorts were decried as “meddling ladies,” “slithering liberals” and, occasionally, “devils.” Johnson's friends warned her to keep her college education and Ph.D. work a secret, lest her rural opponents hold it against her, and those opponents invited her to leave town more than once. In the meantime, she developed a knack for honing her arguments, knowing her enemies and looking over her shoulder.

Johnson's “comedy of terrors” won her a PEN/Newman's Own First Amendment Award last year, as well as taking up five-and-a-half years of her life and leaving an indelible mark. *Stifled Laughter*, which Fulcrum has nominated for a Pulitzer Prize, is an intensely funny, very personal memoir about the fight and how it changed the author's family, work and the way she looks at the world.

War Etiquette Islam-Style

Islam and War: A Study in Comparative Ethics. By John Kelsay. 149 pages. Louisville,



KY: Westminster/John Knox Press. Paperback, \$14.99.

The war in the Persian Gulf is over, the New World Order supposedly in place. But still there are questions. They're the same questions that Americans, Kuwaitis and those watching worldwide asked at the time U.S. planes bombed Baghdad: exactly what right did Iraq have to annex Kuwait? Was it religious imperative or a ruthless grab for power? How could Saddam Hussein be so vilified by Americans, yet lauded by his own people at the same time? What are the long-term implications of the war in the Gulf?

Persistent ethical questions surrounding the Gulf War exposed a blind spot in academia's view of international relations: the apparent lack of sufficient cross-cultural or comparative analysis that would have helped Americans, steeped as they are in Western traditions, to better understand what was going on from an Islamic perspective. In his latest book *Islam and War*, associate professor of religion Dr. John Kelsay provides the answers. This ethics scholar also asks us to consider a few things about Muslim culture that might have slipped

through all the political analysis aired on TV at the time.

For instance, Kelsay writes, Western and Islamic traditions suggest distinctive ways of evaluating the justice of the Gulf War—in fact of any war. It's a dichotomy of the highest order: contemporary Western thought holds that religion can never be a just cause for war, while Islam contends that religion is the *only* just cause for war.

Even so, Americans scoffed when the Iraqi leader used the religious term “jihad” to describe his struggle with allied forces. Saddam Hussein is a secular leader, yet he relied on Islamic religious terms to justify his aggressions. He simply used religious symbols and rhetoric made famous in the 1950s by his idol, Arab religious leader Gamal Abd al-Nasser, to relate to his own cause. His connection with Islamic tradition, however tenuous, was sufficient. Followers of Islam appreciated his furthering *their* cause—to show Christians and Jews that Islam is the true way of the world—even though he did it, as we say here in the States, by any means necessary.

Kelsay also examines the now famous idea of a new world order and finds it a worthy goal, but that in its current American incarnation this philosophy is also “more rhetoric than reality,” until it takes into account the fundamental cultural differences between East and West. As he notes in the book's final chapter: “The ways in which Western and Islamic cultures understand their current context hinders their ability to accommodate each other's religious and political interests, precisely at a time when technology, economics and environmental concern make it impossible for them to avoid one another.” —KIM MACQUEEN



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