



WASHINGTON
UNIVERSITY
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Magazine



Travels in South America:

*Summer Language Institute in Colombia and
a Visit to Magnificent Machu Picchu*



Buenos días, Señor Presidente

Summer is a time for travel, a time to pack a light bag or a knapsack (summer clothes don't take up much room) and go exploring the wide world. In this issue of *Washington University Magazine* we report on one group of travelers who visited the continent that lies to our south. They were participants in the Summer Language Institute in Colombia, a thriving program now in its third year, modeled on

the much older and highly successful Summer Language Institute in France.

This year Herb Weitman, WU's director of Photographic Services and the associate editor of this magazine, accompanied the 19 student participants and the program director, Ray Williams of the department of romance languages. He has brought back images of what the students experienced in that distant land so that all of us can vicariously take part in their sense of discovery. The photo on this page shows WU students meeting with Belisario Betancur, the president of Colombia.

But Herb did some discovering on his own as well. Pursuing a life-long fascination with the ancient remains of our human cultural heritage, he traveled further south into Peru where he explored the ruins of the famous mountain palace of the Incas, Machu Picchu. We think that something of Herb's sense of wonder comes through in the striking photographs he has taken.

David Browman of the anthropology department, WU's leading Andeanist, has written an article explaining the significance of the photographs and relating them to the research he and his students have done.

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Inca children show off a pet lamb. The Emperor ordained the shape and color of their headgear centuries ago as a means of identifying different tribal groups. The styles remain unchanged to this day.



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O P E N E R S

Meet Dean Rosett

Richard Rosett is a man who likes to leave things better than he found them. During the nine years he was dean of the University of Chicago's Graduate School of Business (1974-1983), enrollment rose by 50 percent, the faculty increased by one third, and endowment doubled. Moreover, asserts Rosett, "There was clear improvement in the *quality* of the faculty, even though the faculty was already good."

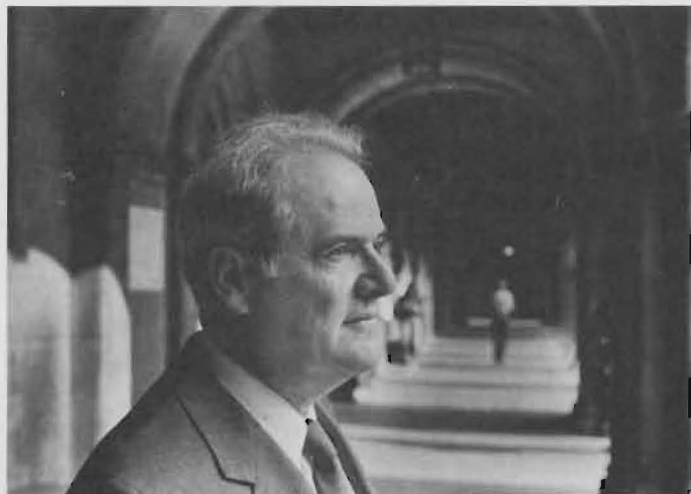
Now, as dean of the Faculty of Arts and Sciences at Washington University, Rosett will have yet another opportunity to improve something that is already excellent. And he has high expectations for success. "I believe that Washington University is poised for

another great step forward," he says. "The resources are definitely here."

Rosett holds a bachelor of arts degree from Columbia University and the M.A. and Ph.D. degrees in economics from Yale University. He has studied and published in a variety of economic areas, working extensively on the effects of public policy on household decision-making and on health care.

He has served as a consultant to the RAND Corporation, the departments of Health, Education and Welfare, and Housing and Urban Development. He has been a member of several corporate and not-for-profit boards of directors, including McGraw-Edison, Marshall Field, and National Can Corporation.

In announcing the appointment, Chancellor William H. Danforth said, "A committee under the chairmanship of physics professor Martin Israel searched the nation for the most able individual for the position. I am extremely pleased to be able to appoint a proven academician and academic leader to one of Washington University's most important positions."



Richard Rosett

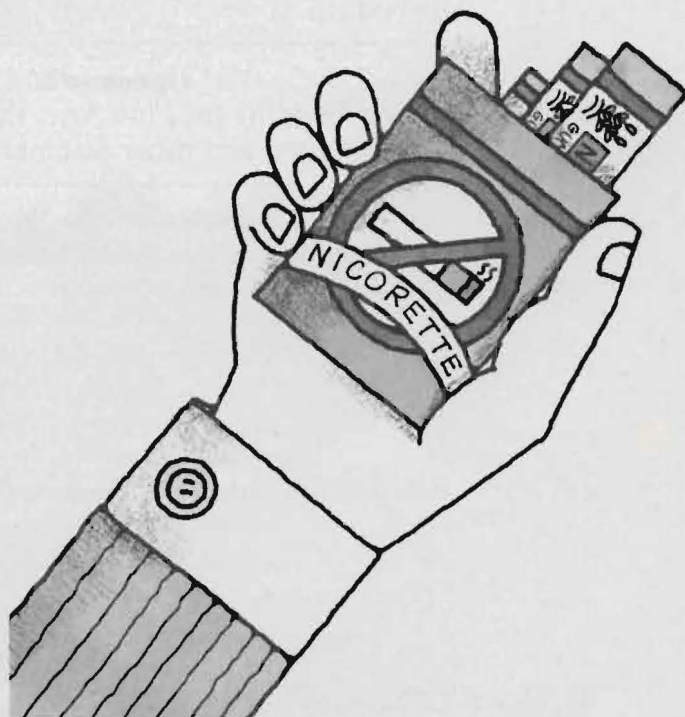


ILLUSTRATION BY LINDA SOLOVIC

Gum Helps Smokers Quit

Kicking the smoking habit can be an agonizing experience. Vision disturbances, headaches, depression, extreme irritableness, insomnia may all accompany the sudden withdrawal of nicotine, the active ingredient in all tobacco products. The symptoms can be so bad that they can discourage the most highly motivated quitter. Even high intelligence and superb will power may be of little value when pitted against the irresistible urge to puff. Sigmund Freud, for example, who certainly ought to have known better, continued to smoke cigars long after contracting cancer of the jaw and undergoing numerous painful operations. Other smokers, less famous but no less incorrigible, have foolishly flouted lung cancer and emphysema because of an inability to

persevere through the living hell that accompanies nicotine deprivation.

Now St. Louis-area physicians trying to help their patients stop smoking can refer them to a special program that uses nicotine gum to wean participants away from cigarettes.

Washington University School of Medicine in St. Louis offers its Stop Smoking Program for smokers whose efforts to quit may have been hampered by a physical dependence on nicotine. The program is directed by Kevin McCusker, M.D., assistant professor of pulmonary medicine at the School of Medicine and a physician at Barnes Hospital, a sponsoring institution of the Washington University Medical Center.

McCusker participated in clinical trials at the

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medical school for Nicorette, the nicotine chewing gum that received federal approval this spring for marketing in the United States. The gum is available only by prescription, and is not recommended for pregnant women or for people who have recently had heart attacks or who have severe arrhythmias.

"Our clinics use the traditional therapies to help smokers deal with social and psychological dependence on cigarettes, and nicotine gum to help with the physical addiction,"

McCusker said. "The nicotine gum is used solely as an adjunct to help smokers who are already motivated to quit."

Participants in the program must be referred by a physician. Each clinic consists of a 10-member group that meets weekly for eight 30-minute sessions. The program has a success rate of from 40 to 60 percent. More information about the Stop Smoking Program is available through McCusker at the Division of Pulmonary Medicine at Washington University.

Kresge Challenge Grant

The Kresge Foundation of Troy, Michigan, has issued WU a challenge grant: we'll give you \$650,000 if you can raise an additional \$3,822,000 in restricted gifts by June 15, 1985, to finance the building of the new sports and recreation complex. The athletic complex will be the first major expansion of the University's sports and recreation facility in more than 50 years. It will provide an additional 70,000 square feet of space, 10 new courts for handball and racquet sports, and a new swimming pool.

Chancellor William H. Danforth says, "The challenge grant comes at a critical time in our fund raising for this project. It is a great stimulus because it is absolutely essential to raise the additional funds needed to complete the project in order to qualify for the Kresge grant. We are immensely grateful to The Kresge Foundation for its

generosity and interest in Washington University."

The Kresge Foundation is an independent, private institution which awards grants to institutions in the area of higher education, health care, the arts and humanities, social services, science, conservation, religion, and public policy.

In 1984 it awarded \$35,335,000 to 128 charitable and non-profit organizations in 35 states, District of Columbia, and Canada.

The majority of these grants were awarded for projects involving construction or renovation of facilities. Most grant recipients had raised initial funds toward their respective projects before requesting foundation assistance. Grants were then authorized on a challenge basis.

John R. Barsanti, Jr., a trustee of Washington University, will head a committee to seek the remaining funding.

Beckmann

I'll never forget the look he gave me. He almost burned me up with his eyes."

Walter Barker, then a student at the WU School of Art, remembers the reaction of his teacher, the German expressionist Max Beckmann. The year was 1948 and Barker had come to invite Beckmann to a show of student work. Out of misplaced modesty, he made the mistake of implying that the show was inconsequential, hardly worth the famous artist's attention.

"Never say that your own work is not important," Beckmann declared sternly. Then, dressed in tie and tails, he left the formal reception that had been organized to commemorate his own retrospective exhibit and made his way to the basement of the St. Louis Art Museum to inspect the

efforts of his students.

Barker, now a professor of art at the University of North Carolina at Greensboro, will be exhibiting his work along with that of four other artists in a show at the Bixby Gallery called "Five Students of Max Beckmann." The show, which runs from September 30 to October 21, draws attention to Beckmann's presence on the Art School faculty from 1947 to 1949. It also coincides with a major Beckmann exhibit at the St. Louis Art Museum from September 7 to November 4, honoring the 100th anniversary of Beckmann's birth.

"He was the last great heroic artist dealing with a heroic subject matter," Barker says. "Washington University has had some fine artists on the faculty, but Beckmann was very special."



Wood cut of Beckmann by Walter Barker

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LINC, First Personal Computer

No upwardly mobile executive would be without one, the article you are reading was composed with one, and an entire generation knows Charlie Chaplin only because his image is used to hawk one.

Some have people names like Franklin, Osborne, and MacIntosh. Some have corporate names like Exxon, Zenith, and IBM. Some have otherworldly names like Televideo, Zobra, and TRS-80.

But not long ago, there was only one personal computer. Its name was LINC and it was developed by a team of computer scientists at MIT's Lincoln Labs. One member of this team was Charles Molnar, now head of the Institute for Biomedical Computing at Washington University.

Twenty years ago, scientists desperately needed a small computer to help them with their work, but nothing was available. The megaliths that dominated the computer landscape in the 1960s were wildly expensive, but, more importantly, these multi-million dollar systems were simply inappropriate for most laboratory applications. Researchers who wanted the use of a computer but not the hassle were left helpless. "Our development group was filled with people who were very intolerant, impatient, and frustrated," says Molnar, "but also very creative."

The design had to satisfy several basic criteria: It had to be easy to program, easy to communicate with while in operation, easy to main-

tain, and able to process biotechnical signals directly. Its price tag had to be under \$25,000, the amount a lab director could spend without higher approval. And it could be no taller than a man. "This consideration was purely psychological," recalls Molnar. "We had to keep it from being the least bit intimidating."

Soon afterward, a handful of LINCs were placed in the labs of researchers all over the country. One went to the Central Institute for the Deaf, the speech and hearing department of Washington University. Maynard Engebretson, who was then part of a team studying the way sound is processed in the ear, says that with LINC,

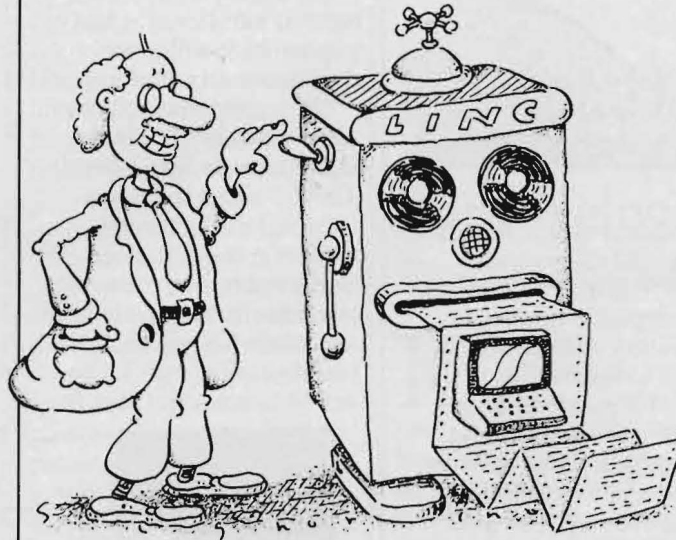


ILLUSTRATION BY SLUG SIGNORINO

The first LINC computer went on line in 1962. Though bulkier than today's personal computers, it was small enough to fit comfortably in the corner of a crowded lab—a revolutionary achievement at the time. And, for the first time, researchers could use computer analysis to help direct an experiment in progress. "Knowing a couple of days later what you should have done is absolutely useless," says Molnar. "The opportunity has passed and you usually can't go back and start over. LINC gave the researcher much more control."

researchers could more accurately measure minute voltages, record responses, and even graphically display data. "LINC could show us in a matter of minutes what we once waited months to see," he says.

Donald Blough, now professor of psychology at Brown University, compares having LINC to having an octopus for a research assistant. "LINC could do it all," he says. "It could handle so much that it enabled our research to move in completely different directions. We began trying things we would have never

dreamed of had it not been for LINC."

Just as LINC was beginning to turn researchers on to the wonders of personal computing, the entire LINC development team, more than 20 scientists, migrated from MIT to new facilities at Washington University. Molnar cites an uncertain future at MIT and an attractive environment here as reasons for the move. And so, in 1964, Washington University became the center for LINC lore and for the burgeoning LINC network. Perhaps WU's biggest contribution was the LINC Assembly Program, created by Mary Allen Wilkes. It made programming about 100 times faster, giving researchers a level of control over their experiments that was impossible a scant five years before.

LINC dramatically advanced biomedical research throughout the scientific community. "The penetration into medical laboratories by LINC and its descendants is now very complete," says Molnar. "Last time we counted, about 10 years ago, there were 150 computer installations in the Washington University Medical Center alone."

Though nearly all the original LINCs have been replaced by newer, faster machines, some are still in operation. "It's difficult, even today, to find a design as crisp, elegant and efficient as the LINC," laments Jerry Cox, professor of computer science at Washington University. "I heard that they recently decommissioned the LINC at the Central Institute for the Deaf. They said it was nearly trouble-free during all those years. It's the passing of an era."

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John Zaborsky

Zaborsky Honored

John Zaborsky, Washington University professor and chairman of the Department of Systems and Mathematics, has been elected a member of the National Academy of Engineering, one of the highest honors in the engineering field.

A native of Budapest, Hungary, Zaborsky has taught at the Royal Hungarian Technical University, where he earned a doctor of science degree in 1953. He came to WU in 1956 and has been a department chairman since 1974.

Zaborsky's current research concerns the operation and control of America's interconnected power systems. Zaborsky's goal is to assure continuous electrical service and find ways to prevent such irregularities as blackouts, brown-outs, and power surges.

"Certainly, there are many causes for these problems; they are very complex," says Zaborsky. "That's what makes this work so challenging."

Art School at Lewis Center

I could be bounded in a nutshell, and count myself a king of infinite space," mused Prince Hamlet. A profound thinker the melancholy Dane may have been, but it is clear that he was not a visual artist. To paint, sculpt, print, or photograph you need space, real space with real dimensions, and preferably generous ones. A nutshell simply will not do.

And yet a nutshell is precisely what the Washington University School of Fine Arts has felt itself to be bounded in of late, or rather a series of nutshells. Besides the headquarters in Bixby Hall, there were six satellite sites in various locations spread over the city and county.

Now at last, the six satellite sites will be consolidated under one roof, and quite a roof it is. The new Art School building is the Lewis Center, a handsome classic revival design at 725 Kingsland Avenue in University City. The building was finished in 1910 and is on the National Register of Historic Places, but those facts alone do not begin to convey a sense of the Lewis Center's historical significance, or of the appropriateness of the School of Fine Arts finally finding a home there.

The building is named for Edward Gardner Lewis, the young insecticide salesman who blew into town in 1896 and in ten years became a millionaire women's magazine publisher and the founder of University City. Lewis had the building designed to house the Academy of Fine Arts of his

projected People's University of the American Woman's League. He never completed the other buildings, and the People's University was abandoned in 1912 when Lewis' empire collapsed and he left in disgrace for California.

In 1915 the building was purchased by the University City School District to house its junior and senior high schools. The senior high school moved to a new building in 1930, and the district's administrative offices moved in with the junior high school. The building was named "Luther T. Ward Junior High School," re-

the School of Fine Arts, heard about the available space and soon worked out a deal with the development company. McCormack, Baron, and Associates agreed to renovate portions of the building according to the Art School's requirements. The University will rent 28,000 square feet of the building for seven years with an option to buy. Another 1,552 square feet will become a commercial art gallery, and the remainder of the building will be converted to one and two-bedroom apartments. The University will provide a shuttle bus service to the



Dean DesRosiers at the Lewis Center

maining in operation from 1936 until 1949. The administrative offices remained in the building until September 1982.

Then in 1983 McCormack, Baron, and Associates purchased the Ward Building from the school district with the intention of rehabilitating it and renting out sections to commercial enterprises. Roger DesRosiers, dean of

Lewis Center in synchronization with day and evening class schedules.

If that ill-fated visionary Edward Gardner Lewis could see what had become of his Academy of Fine Arts, it seems certain that he would approve.

A TRAVELER IN TWO WORLDS

by Daniel Gewertz

Kenneth J. Cooper's quest for understanding
leads to journalism's highest award.

To have won a Pulitzer Prize in journalism at the age of 28 is proof that one is not only talented, but dedicated, hard-working, and disciplined as well. And yet, in Kenneth J. Cooper's case, the prestigious award tells only part of the story. Since early adolescence, Cooper has been a man on a quest, a quest for understanding. His purpose—to comprehend the ways in which racism is perpetuated in our society. His Pulitzer, awarded for two series of articles published in the *Boston Globe* investigating the workings of racism in Boston and other American cities, is almost a side-effect, not a culmination, of his central mission.

Cooper grew up in Denver, the son of two postal clerks. While attending an all-black inner-city junior high school, he was asked one afternoon to come to school on Saturday to take a special exam.

"It turned out they were about to integrate Graland Country Day School, an exclusive private school attended by the children of some of the corporate barons of Denver," Cooper recalls. "I became one of the first three black graduates of that school. Socially and academically it was an enormous shock. The other students weren't used to seeing us, and I was certainly not used to being around white students as peers."

The move from the all-black public school to the very rich almost all-white private academy was the first of

Cooper's journeys between white and black America. It was not only Cooper's first experience associating with whites, but a total immersion into the white ruling class that Cooper would spend much of the next 15 years analyzing and writing about.

The experience at Graland persuaded Cooper to travel further into the region of the white power-elite. Cooper attended Phillips Academy in Andover, Massachusetts. His stay there lasted one-and-a-half years. "Even now," he says, "I have mixed feelings about Andover. I went there to prove that I was equal. I probably studied harder there than anywhere else, including college. It was out there in the woods, an all-male school with very strict rules. It was inconvenient to do anything else *but* study," he laughs.

After several disappointments, Cooper left Phillips. "It was a difficult, lonely environment," he admitted. "And finally I got fed up with being turned into a preppy. I was trying to dress like a preppy, think like a preppy. But I ultimately decided I must be crazy. Here I was pushing myself trying to prove I was equal. But the declaration of Independence begins, 'All men are created equal,' so why did I have to prove anything?"

So after four years in schools catering almost exclusively to well-heeled whites, Cooper returned to Denver to attend an all-black, urban, public high school.

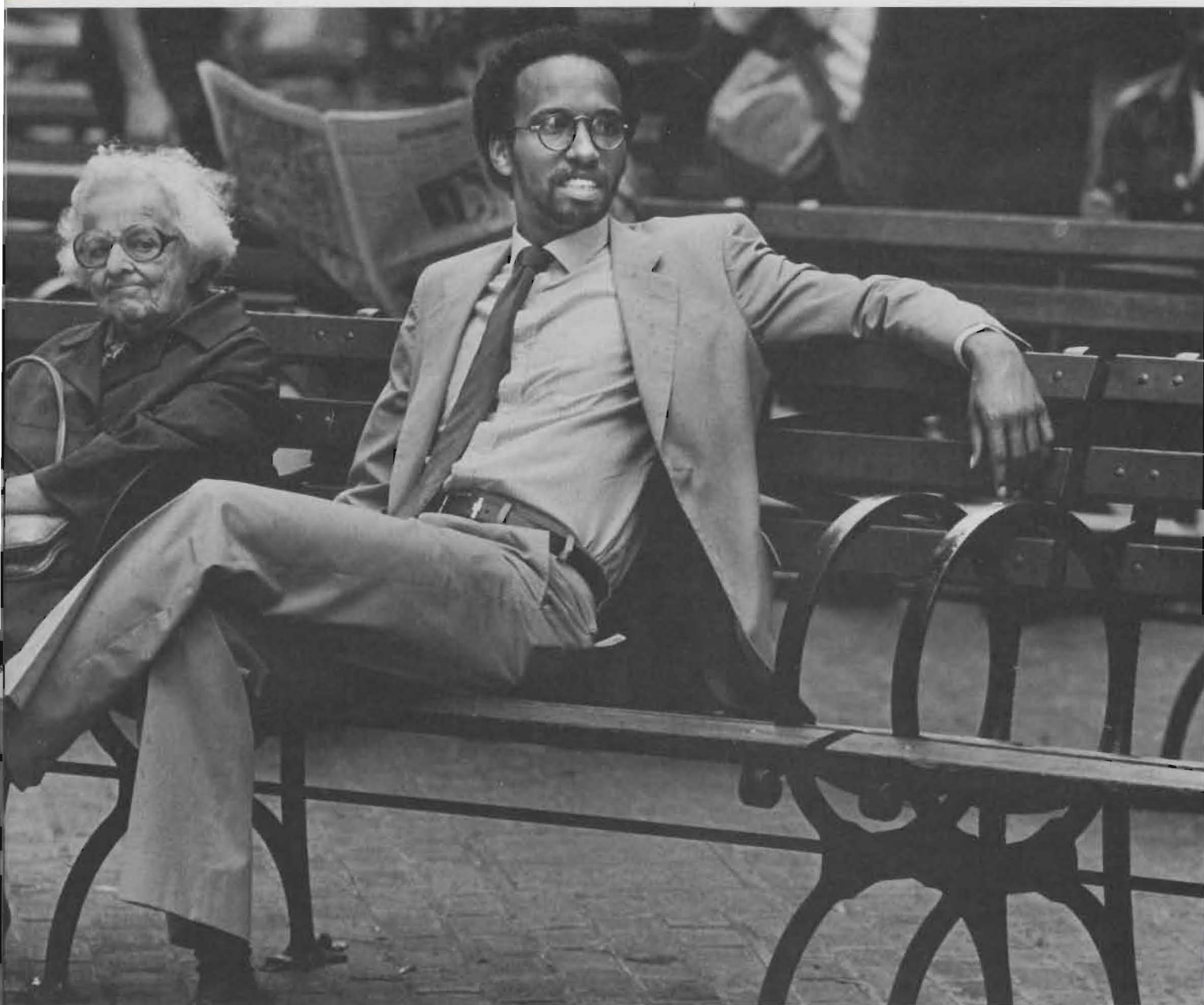


Kenneth J. Cooper with a friend.

After a period of intense suspicion from peers who accused him of 'acting white,' he managed to fit in.

So far, Cooper was a young man with some unusually varied experiences under his belt, but no framework to put them in, no outlet to express the perceptions, the questions, and the anger that occupied his mind. Those missing pieces fell into place during his years at Washington University.

Cooper chose WU because it was urban, integrated, and within walking distance of a black community. Although WU was only about 10 percent black, he felt that was ample. "There was a very



vibrant, supportive, energetic network among black students and teachers—black forums, speakers, drama. Washington University,” Cooper says simply, “was one of the best choices I ever made in my life.”

And despite the fact that WU had no journalism department, Cooper decided that reporting was in his future.

His first piece for *Student Life* was, typically, a story that Cooper identified with intensely. “I wrote an op-ed piece that challenged some financial aid policies that I thought didn’t make much sense, based on a personal issue that was affecting me. The upshot was

they changed the policy. A compromise was worked out.”

Cooper’s first year at WU not only acquainted him with the power of journalism to affect events; it gave him a taste of political power as well.

“By a fluke, I was elected president of the student government at the end of my freshman year,” he says. “I hadn’t even known freshmen were eligible. But a student adviser was trying to put together a black/white coalition to run the student government. The idea was to challenge the fraternity-sorority white society that traditionally controlled things. People knew me from

dorm councils and student groups as someone unhesitant about speaking my mind. So I was his choice.”

What was predicted as a landslide election for his white male opponent turned completely around when the other candidate was quoted in *Student Life* as making a rather crass and chauvinistic generalization about the personal appearance and sexual behavior of feminists. The feminist movement had become strong on campus. Cooper won by two-to-one margin.

Directly after graduating from Washington University in 1977, Cooper was hired by the black weekly newspaper

he had been interning with, *The St. Louis American*. "I immediately became half the news staff. I wrote, copy-edited, did lay-outs, filed photos, and did everything but sell advertising, which I refused to do. It was there that I formed my approach as a journalist. I like to get as close as possible to the community level where lives are affected. And I try not to rely on the phone too much. By doing as much research as possible first-hand there's something intuitive that gets satisfied."

From the small black weekly, Cooper leaped all the way to a position with the *St. Louis Post-Dispatch* eight months later.

"I've been very lucky. I've had this knack for being at the right place at the right time. I covered a story for the *American* about an apartment complex where the *Post-Dispatch* personnel director lived. He liked my piece, got me an interview, and I got the job."

But Cooper's luck seemed to end at the *Post-Dispatch*. A promised promotion to a night general assignment position was two years overdue. For one solid year Cooper spent every spare moment, including weekends and vacations looking for another job.

"I was taking a nap one day, when the phone rang. A *Boston Globe* editor with a striking New England accent asked me if I wanted to come to Boston for an interview. They had had my materials for seven months. I didn't even know they were considering me. Of course I said yes."

When the *Globe's* editors planned a series of in-depth stories on economic racism in Boston, Cooper, who by this time was in charge of the school beat, was the logical person to cover the topic of racism in the universities.

At first, Cooper resisted. "I wasn't sure what the *Globe* was up to, if they were really sincere about the project, or if they really knew how to do it. I wondered if the *Globe* fully understood the institutional character of racism."

Finally, the editors convinced Cooper that they were serious about telling the story as it was and were willing to devote the resources to get the job done.

Cooper was allowed six full weeks to devote himself to a single story. He collected data from 30 area colleges, interviewing faculty members, deans, and affirmative action people at a half-dozen universities. "When I approached my subject, I just didn't want to say there are too few black professors on campus. I talked about why, and the institutional process that went on in those hiring decisions. It took a lot of work to get to the right people, the ones who had the insight and were willing to talk to a reporter."

The overall conclusion of the seven part series was that, as feared, Boston is perhaps the worst big city in America for blacks to find a job and get a promotion.

The second series of articles surveyed different aspects of racism in six other American cities. Cooper was assigned Philadelphia, where he looked at how easily people of different races traveled from one neighborhood to another, and Miami, the only American city arguably more racist than Boston, where he studied the black economic situation.

Cooper's knowledge of Boston racism comes, not only from research, but from first-hand experience. "I wasn't in this town two months when I was called a nigger on the street. That had never happened in St. Louis. When I went to the Hill to an Italian restaurant, I never worried that I'd be threatened, or even treated discourteously. They were happy to take my money. I'm angry that there's a beautiful view of the ocean in South Boston, but to take in that vista I have to worry about my safety."

Yet Cooper is planning to stay in Boston as long as his *Globe* position remains challenging. Nor does he feel that Boston's racial situation is hopeless. "The Mel King campaign for mayor got black people a lot of respect. I think

the city is moving in a more enlightened direction. I think there's a new mood in the city where people are saying—'hey, cut it out, this bad stuff doesn't make any sense.'"

And how does Cooper feel about winning the Pulitzer Prize? "It was ecstasy," he says. "It took me several weeks to float down to earth. For weeks it was difficult to get any work done. I looked at the list of Pulitzer winners in the *Almanac*. Some pretty distinguished company."

Since the award was announced in April, there've been a string of Chamber of Commerce banquets, an award from a black community group, and speeches to students. "When I get an invitation to a school, I go. If letting kids see a real live black journalist inspires them to become one, I feel good about that."

And the future? Cooper looks forward to writing more in-depth magazine features, becoming a foreign correspondent, and writing a book about black issues. Presently he is covering the Massachusetts State House for the *Globe*.

If there was a single occasion this year that must have seemed like a juicy triumph to the 28-year-old journalist, it was the Pulitzer Award Ceremony at Columbia University.

"This was the very first year the Pulitzer Committee actually had a ceremony. And the guy running the affair just happened to be Joseph Pulitzer Jr., the publisher of the *St. Louis Post-Dispatch*, the paper I used to work for!"

It was the paper that did not promote a young reporter named Kenneth J. Cooper just a few short years ago.

Daniel Gewertz is a freelance journalist and radio personality living and working in Boston, Massachusetts.

Photo of Cooper by Stan Grossfeld, chief photographer for the Boston Globe and 1984 Pulitzer Prize winner for his photos of Lebanon.

Palace in the Clouds

by David Browman



Machu Picchu at dusk

Machu Picchu is one of the world's greatest archeological ruins, but it was just a small part of the vast Inca empire.

Nearly two miles above sea level, Machu Picchu was a refreshing summer retreat for Inca royalty. Today archeologists are finally discovering its secrets.

Machu Picchu is one of a series of Inca vacation villas spaced about every 10 miles along the Urubamba Valley in Peru, near the Inca capital of Cuzco. It is one of the most spectacular remaining Inca sites. Yet we can be fairly sure that it was a relatively minor palace because the Spanish *conquistadores* failed to refer to it by name. Moreover, unlike other larger Inca sites, which the Spaniards systematically tore down stone by stone, Machu Picchu was ignored. Thus one can only wonder at the former glories of the Inca Empire if a site as awe-inspiring as Machu Picchu was only a minor summer palace.

The Inca Empire was larger than the Roman Empire, but short-lived. Initial expansion of the Inca began in A.D. 1438. Less than 100 years later, in 1532, the infamous treachery of Pizarro brought the empire to a close. A small band of Incas held out until 1572 in the Vilcabamba area, which includes Machu Picchu, and for some years it was believed that Machu Picchu might have been a secret "lost" city belonging to this last remnant of the empire. This romantic idea has not withstood the test of research, and we now know Machu Picchu to have been a secondary palace, most likely constructed and occupied between A.D. 1490 and 1530.

The 216 buildings of Machu Picchu sit in the saddle between two sharp peaks, Machu (or Greater) Picchu with an elevation of 10,000 feet and Huayna (or Lesser) Picchu with an elevation of 9,050 feet. The illustrations here do not convey the almost vertical ascent to the site from the Urubamba River 2,000 feet below. It is this breathtakingly steep incline that contributes to the magnificence of the panorama; it is also obviously a major reason why the site survived undisturbed until its rediscovery in 1911.

Credit for the rediscovery goes to Hiram Bingham, the Yale history professor who later became governor of

Connecticut and then served in the U.S. Senate. He first arrived at the site on July 24, 1911. However, more recent research indicates that the site had been reported by Charles Wiener in 1875. Wiener, whose explorations were commissioned by the French government, did not visit the ruins himself but only recorded information from natives of the area. The earliest written reference specifically to the ruins is in a bill of sale dated August 8, 1776, which lists them as part of a parcel of land being transferred from one hacienda to another. This earlier documentation notwithstanding, it was Bingham who enthralled the Western world with his photographs in *National Geographic* and subsequent publications, and it was Bingham to whom most of the credit must be given for preserving the ruins so that they are today the most famous archaeological site in all of South America.

Bingham became obsessed with the ruins, and as the years went by, made grander and grander claims for them. He argued that Machu Picchu was both "Tampu-tocco"; the legendary home of Pachacuti Inca Yupangui, the first Inca Emperor, and the secret mountain retreat of Vilcabamba, the last of the Incas. That neither of these claims is true does nothing to diminish the splendour of the ruins.

A popular recent explanation for the Spaniards' omission of the site from their early chronicles was that it had been abandoned prior to the Spanish conquest. In support of this, archaeologists point to the three stone building styles, which are clearly pre-Columbian, and to the fact that there are no artifacts of European origin to be found at the site. Bingham had earlier used this same evidence to argue that Machu Picchu was the lost Inca citadel of Vilcabamba.

Much of Bingham's materials are in storage at Yale. I had the opportunity while working at Harvard to investigate several of the burial lots. Burial #61 contains a glazed plate. The use of glaze



was a technology introduced by the Spanish. Burial #26 contains an aryballoid (a large, two-handled pot used for ceremonial corn-beer consumption) with colonial glaze. Further search of Bingham's notes turned up mention of a fragment of iron, cattle bones, and peach pits found with burials—all of which are European in origin. This new information allows us

The structure at left is the "Hitching Post of the Sun." The trapezoidal window at right is a typical feature of Incan architecture.



to date the occupation of Machu Picchu to the end of Inca Empire, but makes it clear that some residents of the site were still living there (and being buried there) after the Spanish conquest.

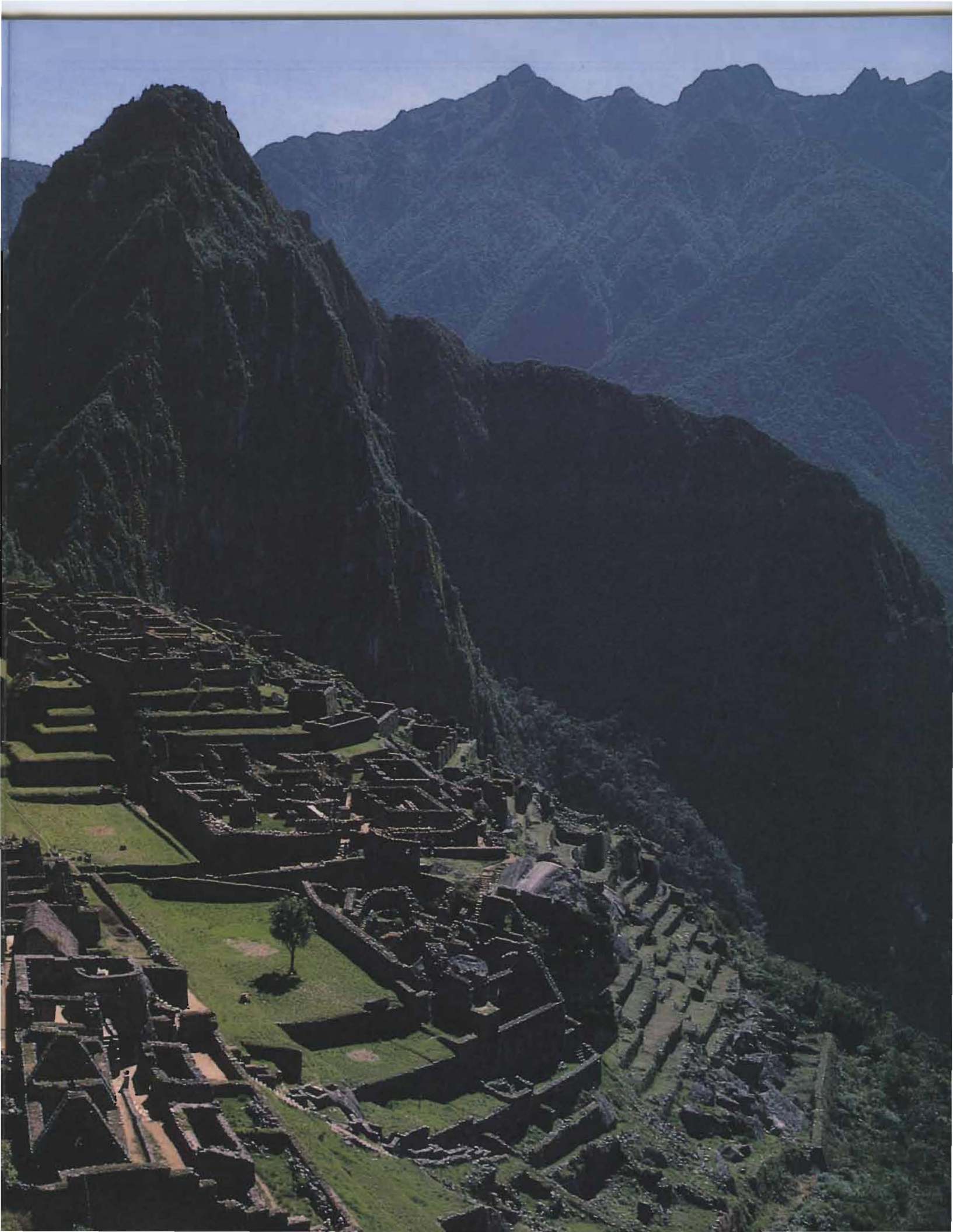
Machu Picchu may have had enough agricultural land to grow most of its own food. There are several sets of agricultural andenes or terraces near the site, and the largest complex of 40

terraces lies within the site itself. Under a multi-cropping regime, there was sufficient land to have supported up to an estimated 1,000 people.

What sorts of food was grown on these terraces? Corn, one of the prestige foods of the Inca, was almost certainly a major crop. Each Inca foot soldier and each Inca retainer received rations of *chicha* or corn beer, much in the same

fashion as English sailors were issued rations of rum. The staple food of the Andes, however, was potatoes. Botanical evidence indicates that potatoes were first domesticated in the south central Andes, and our recent Washington University expedition in the nearby Lake Titicaca area indicated that as early as 1000 B.C., freeze-drying of potatoes was used as a preservation







Agricultural terraces. The "watchman's hut" at top overlooks both the terraces and the major approachway to Machu Picchu.

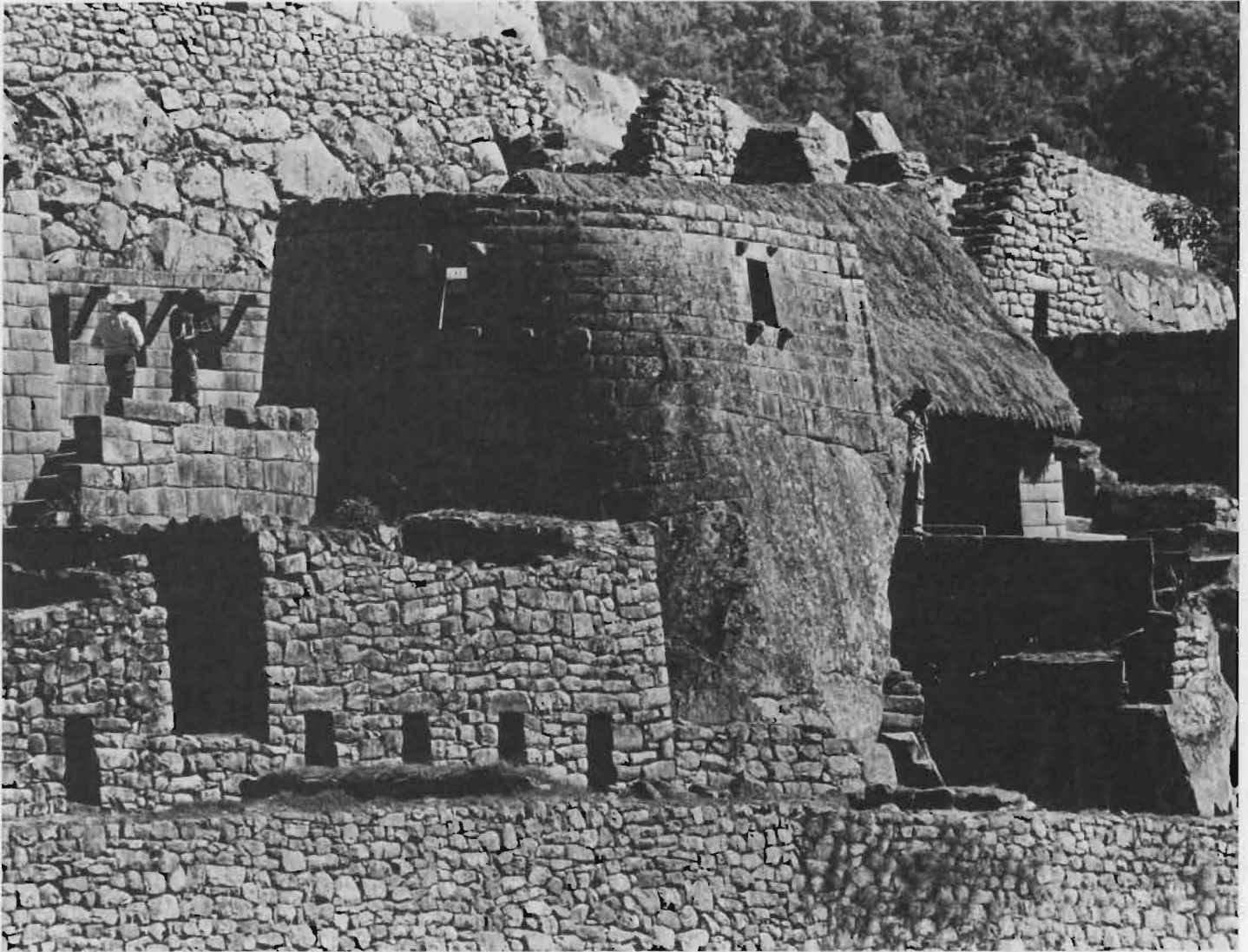
technique. Some authors speculate that the terraces might also have been utilized for growing large quantities of coca leaf, the source of cocaine. Our current research indicates, however, that coca leaf production on a large scale began after A.D. 1550, which was about the same time that large numbers of Indians were conscripted to work the silver mines of the Spanish Conquerors.

The major vehicle for transporting merchandise to Machu Picchu was the "ship of the Andes" or llama. Llama caravans regularly traveled the Inca Royal Highway system, provisioning and integrating a state six times larger than the Aztec Empire of Mexico, which existed at about the same time. Llamas were domesticated in the Andes perhaps as early as 8000 B.C., and our work in the Titicaca Basin area indicates that llama caravans were traversing well-established routes in the southern Andes as early as 1500 B.C.

The division of Machu Picchu into two sections is a typical Inca trait, which persists in the Indian villages of the Andes today. The site is constructed along a granite ridge and several of the stairways and portions of the buildings are cut into the living stone. Three modes of stone construction are utilized—all without mortar. The most important buildings are constructed of complicated, irregular blocks. The bulk of other royal structures are of rectangular ashlar laid in courses. Residences are often gabled houses with roof pegs on the exterior wall near the top of the gables to tie down both the rafters and thatch—a necessary precaution in the windy Andes. Storage buildings and outlying structures are of *pirka*, or unmodified field stone set in mud.

The polygonal bonding style is particularly intriguing, as it involves the fitting together of huge, irregularly-shaped stone blocks. At Machu Picchu one such stone contains 32 angles. It and similar stones up to two and a half tons were man-handled along these

The Temple of the Sun. The stone pegs surrounding the windows were used to secure a sighting device for determining the solar equinox.



sheer slopes to be integrated into the royal buildings.

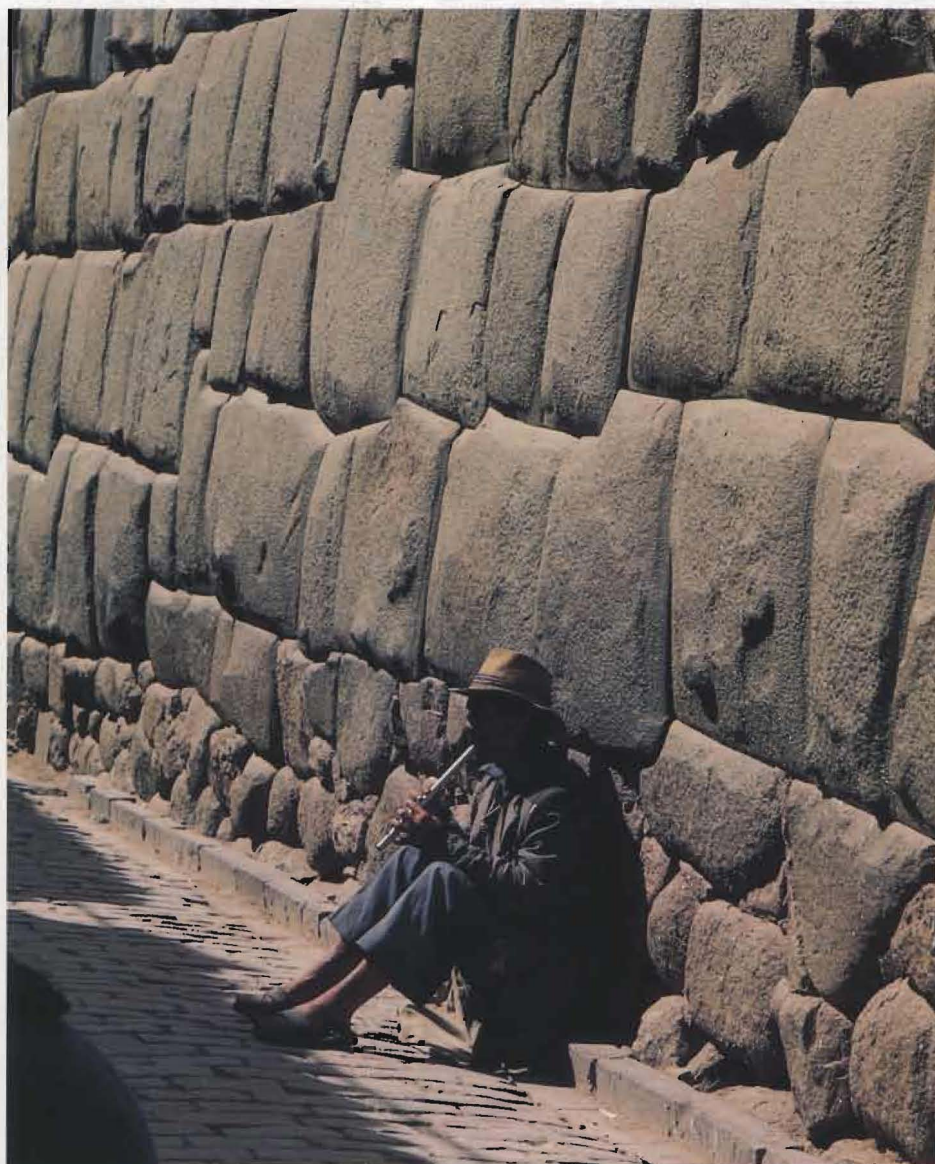
The Temple of the Sun is the major religious sanctuary of the Hanan or upper sector of Machu Picchu. In 1982, astronomers from Stewart Observatory, University of Arizona, demonstrated that during the 15th century the altar configuration and the center of one window lined up to within 2 minutes of a degree of an arc with the rising winter (June) solstice Sun. The alignment is such that it allows not only observation, but accurate prediction of the solstice.

The second major window is in perfect alignment to allow prediction of the zenith sun. Astronomical predictions of solstices and equinoxes are obviously very important for the agricultural cycle. But more important for the Inca was the state theology that held the Inca ruler to be the sun-god incarnate, a living deity.

We see this same solar emphasis at a companion religious sanctuary in the Lurin or Lower sector of the site, called Intiwatana. Intiwatana means "hitching post of the Sun." Here, the Inca ruler,

as chief sun-priest, caught the sun in its north-south movement each half year, and, after metaphorically tying the sun to the hitching post, reversed its direction.

Under the Temple of the Sun is a carefully sculpted and crafted burial cave. In this cave and others Bingham recovered 163 burials, identifying 150 out of the 163 as female. Why such a high proportion of women? We know that special guilds of female weavers were important in the production of royal clothing for the Inca ruler. Perhaps



A man in the Inca capital of Cuzco plays a quena, a native, pentatonic flute.

in a summer palace there was more emphasis on luxury goods. Thus the high percentage of female burials may represent closely the actual sex ratios of palace retainers at Machu Picchu.

The precise dwelling of the Inca ruler in this summer palace complex is uncertain. However, most archaeologists believe that the building constructed of irregular, fitted, stone polygons repre-

sents the type of architecture elsewhere restricted only to Inca royalty. This structure is also associated with a plaza at the end of the 239-step royal fountain and bath stairway. Since water control was a specific religious obligation and function of the Inca ruler, this association adds further evidence to the hypothesis that this building was the royal dwelling place. From a strictly aes-

thetic viewpoint, the spectacular vista commanded from this location would mark it as the best location for the royal chambers.

An unusual feature of the architecture of Machu Picchu is the amount of labor expended on quarters for retainers and other support personnel. Such well-constructed retainer quarters are a feature of administrative centers belonging to the early expansion of the Inca empire, as at the provincial capital, Huanaco Pampa, as well as in older parts of Cuzco. This feature lends credence to the argument that Machu Picchu was built early in the Inca period, that is prior to A.D. 1500.

The research we are now doing at Machu Picchu and elsewhere enhances our understanding of Inca astronomical skills, technology, science and agronomy. While we can no longer see Machu Picchu as a secret lost city, our new understanding of it as a minor palace of the Inca polity even more clearly underscores the grandeur of the Andean empire that the Spanish wantonly destroyed. The beauty of the trapezoidal palace rooms, the fascination of the interlocking stairways and the maze of interlocking rooms, and the spectacular setting of this "Western White Horse" of the Inca ruler make it one of the most inspiring archaeological ruins in the world. It is understandable that my students spend the academic year eagerly awaiting the opportunity to return to Peru and continue their research projects at Machu Picchu and related sites.

David Browman, professor of anthropology at Washington University, specializes in Latin American archaeology. He has conducted field investigations in Bolivia, Peru, and Mexico, as well as in several U.S. states. He is particularly interested in the origins of domestication of plants and animals in these areas.



Washington University

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Remarks of the Chairman

This past year at Washington University has been one of the most interesting and exciting in my memory. It was only in 1978 that the idea of the Commission on the Future of Washington University was crystalized. Now, just six years later, we have not only laid out our plans but are well on the way to bringing them to fruition.

Over half of the recommendations of the task forces of the Commission could be acted upon; but many were costly. Anyone with a faint heart might have been content to wait, to proceed slowly and cautiously, perhaps try to complete some of the recommendations by the end of the century—but not the then Chairman of the Board, George H. Capps, or the Board of Trustees, not the Chancellor nor the deans nor the faculty nor the students and certainly not the alumni and friends of Washington University. We realized that excess caution would lead to mediocrity. We all accepted the challenge. The ALLIANCE FOR WASHINGTON UNIVERSITY was conceived and, in the spring of 1983, announced. Now we are two-thirds of the way toward our goal of \$300 million. We can be very proud of this achievement.

I admire more than I can say the people of Washington University who have made this accomplishment possible. I include, of course, the trustees who have perceived the challenge, who prod when necessary, and on whose leadership rests the success of the campaign; the deans and faculty on whose dreams and hard work all plans and all eventual success must rest; the students who give us confidence in the future; and the alumni and friends who work for our institution and who contribute so generously to our cause. Our program to assure that Washington University in St. Louis remains a premier independent institution is fully under way and the momentum is strong; nevertheless, the coming months and years will not be easy. We have a long way to go. It will take the dedicated efforts of us all to succeed, but I am sure we shall.

During the year there have been several changes at the Board level.



W. L. Hadley Griffin, Chairman, Board of Trustees.

The newest trustee elected in May is William E. Cornelius, President and Chief Executive Officer of Union Electric Company. Pursuing an interest in military history and a commitment to the liberal arts, he received a Master of Liberal Arts degree from University College this past spring. He also received the University College's Dean's Award for University Service. He and his wife, Ginger, have two daughters and one grandson.

John W. Hanley, who recently retired as Chairman of the Board and Chief Executive Officer of Monsanto Company, resigned from the Board of Trustees in December. His leadership and wise counsel will be missed. In the decade he served on the Board, he was a forceful member and made a number of significant contributions. He served as Chairman of the School of Medicine Task Force and the very important Finance and Planning Committee of the Schools of Medicine and Dental Medicine and of the Public Relations Committee. He led the fund-raising drive that established the Center for the Study of American Business. A leader in forging cooperative relationships between business and universities,

he guided Monsanto through the establishment of a biomedical research contract with Washington University, the most important such agreement ever made between a U.S. company and a private university. Hanley and his wife, Mary Jane, will devote their time to the Hanley-Hazelden Center for the treatment of chemical dependency in West Palm Beach, Florida.

In May, two members of the Board, David S. Lewis and Hubert C. Moog, who have ably served the allowable number of years, were elected emeritus trustees. Lewis, a member of the Board since 1971, is Chairman of the Board and Chief Executive Officer of General Dynamics Corporation, Moog, Chairman Emeritus of Moog Automotive, Inc., has been a member of the Board since 1978. Both will continue to participate actively in the life of the University and the Board.

What does not change, but seems to intensify, is the devotion of Board members individually and as a group to the tasks that lie before us. With characteristic enthusiasm and energy, George H. Capps is effectively guiding the efforts of hundreds and thousands of volunteers in his role as General Chairman of the ALLIANCE FOR WASHINGTON UNIVERSITY. Ably and energetically assisting him are two key leaders: Richard F. Ford, Chairman of the Capital Resources Executive Committee, and Zane E. Barnes, Chairman of the Annual Programs Executive Committee. Other Board members, alumni leaders and friends have taken on many varied assignments, determined that this important campaign will reach and surpass its goals.

In all, the 1983-84 year has been a remarkably good one for Washington University and for all those associated with this great institution. Can next year be better? With friends and alumni such as those who have proved their devotion thus far in our campaign, it can and it will!

*W. L. Hadley Griffin
Chairman
Board of Trustees*

Comments by the Chancellor

The academic year 1983-1984 has been one of accomplishment. I look back with profound gratitude for all those who have made the accomplishments possible. Our planning started six years ago with a careful and thorough look at Washington University's past and present. More importantly, we identified our potential and our challenges.

All of us who took part realized that we were about something important. We recognized that American higher education is essential to the strength and vitality of our nation. The nation needs what we have to offer—a thriving, independent, intellectual community from which come well educated men and women. From our institutions also come the intellectual underpinnings of our cultural, economic, and political life as well as those that underline our approach to the world community.

We began our self-study with a deep sense of responsibility for an important American institution. We soon realized that to stand still was to fail to meet our obligations. We saw that if we planned wisely, if we built on our already strong foundation, and if we seized our opportunities, we could build a Washington University that would be one of the premier institutions in the world. Here was an opportunity and a challenge worthy of the best efforts of serious individuals.

From the first we knew this challenge meant work and sacrifice. We knew that accepting it would be expensive. As the National Commission on Excellence in Education aptly stated: "Excellence costs. But in the long run mediocrity costs more." Money alone would be insufficient to create and sustain a great institution. But without money there would be no chance for success. The goal for our campaign—the ALLIANCE FOR WASHINGTON UNIVERSITY—was set at \$300 million, the highest figure ever for a university campaign between the coasts.

ALLIANCE Campaign Progress

On May 3, 1984, only one year after announcing the campaign, we reported that gifts and firm pledges exceeded the \$200 million mark. I had known from long experience the generosity of Washington University's alumni and friends, but this achievement surprised even me. It is a remarkable testimony



William H. Danforth, Chancellor.

to the vision and unselfish commitment of alumni and friends, of business and industry, of foundations and agencies.

It is a tribute also to the ability and dedication of the Washington University community. Accomplishments of this magnitude do not happen without a tremendous commitment on the part of many people. I am grateful to the members of the Board of Trustees and especially the chairman, W. L. Hadley Griffin, for leadership. Their vision and energy have been an inspiration. Without them we would still be in the planning stage. The Alumni Board of Governors, led by Robert L. Harmon and Henrietta W. Freedman, has been wonderful. I am grateful to all the volunteers, 3,200 men and women who have dedicated their time and effort toward the ALLIANCE campaign under the general chairmanship of the indefatigable George Capps and the able leadership of Zane Barnes and Richard Ford. The numbers are impressive. The men and women behind the numbers are the unsung heroes and heroines of this campaign. Working side by side with faculty and staff, they have devoted countless hours and accomplished a great deal.

Most especially my thanks and admiration go to the 42,000 alumni, friends, corporations, and foundations who have made 127,000 gifts and firm

pledges totaling \$201.7 million. Eight of these gifts are for \$5 million or more; 35 are for \$1 million or more. There are, of course, many smaller gifts, every single one of which counts a great deal.

ALLIANCE Goals

The success of all these individuals is reflected in the progress toward more specific goals:

- The campaign goal for operating expenses is \$100 million. We have obtained \$73.9 million for this purpose. The category includes unrestricted gifts which provide the margin of excellence for the University as well as gifts for scholarships and for special programs including, importantly, faculty research.
- The capital goal for endowed professorships, scholarships, and new buildings is \$200 million. We have now received \$127.8 million toward that goal. Two of our largest building projects are nearing completion: The Clinical Sciences Research Building is scheduled to open in the fall of 1984; two of the three towers have been named, one for Spencer T. Olin and one for Ida McKinney. The new athletic facilities will be ready before the end of the fall semester. In addition, the groundbreaking of the John E. Simon Hall (new home for the School of Business) was celebrated last October. The structure is scheduled for completion in the fall of 1985.
- The Danforth Foundation Challenge Grant, a three for one matching program, requires the University to raise \$135 million in qualifying funds between January 1, 1982, and December 31, 1987. Thus far, gifts to the ALLIANCE qualifying for matching funds total \$81 million.

A Devotion to Excellence

While caught up with the herculean efforts of the ALLIANCE campaign, we could never forget our real goal—a great university—or, phrased another way, a community of teachers and learners devoted to excellence. I am very proud of the University's progress in the last year. For example:

Washington University continued as one of the leading research universities of the nation. This is most evident in the fact that most research is supported

by external agencies and since most awards are made on a competitive basis, the usual overall indicator of volume and quality is the amount of research support from outside sources. In the 1983-84 fiscal year, a time of tight research dollars, Washington University received \$87.9 million, an increase of 18 percent over the preceding year. The federal portion, \$693 million, was an increase of 11 percent over the preceding year.

The pioneering industry-university relationships with Monsanto, Mallinckrodt, and McDonnell Douglas, reported in previous annual reports, continue to do well. Working with Monsanto scientists, Drs. Steven Adams and Gerald Gallucci, Dr. Philip Needleman and his Washington University colleagues isolated a new hormone from the heart that regulates the body's salt and water balance. The potential implications of this discovery are very great. Also, scientists working in cooperation with McDonnell Douglas have developed new techniques for purifying the insulin-secreting cells located in the pancreas.

A new center for political economy was initiated under the leadership of Professors Douglass North and Kenneth Shepsle to understand better the interaction between political and economic events.

A highlight of the year was the opening of the exhibition of "The Beautiful, the Sublime, the Picturesque: British Influences on American Landscape Painting." This exhibition, bringing together works of American and British landscape artists, was made possible by the support of the new Hortense Lewin Art Fund, generously donated by Tobias Lewin.

With the aid of a generous gift from Edward L. Bowles, the Bowles Laboratory of the Institute for Biomedical Computing was opened on the fifth floor of Lopata Hall. The center, led by Professor Charles Molnar, contributes immeasurably to bringing sophisticated computing to biology and to medicine.

Faculty Recognition

Many faculty, a few of whom are mentioned below, received recognition.

Two professors, Gerald Fischbach and Joseph Varner, have been named to the National Academy of Sciences,

bringing the University's membership in this body to 16. Fischbach has made pioneering studies of embryonic nerve and muscle cells maintained in tissue culture. Varner's field is plant biology.

Viktor Hamburger and Rita Levi-Montalcini, two faculty emeriti, received the 1983 Louisa Gross Horwitz prize for fundamental research into how cells develop, differentiate, and maintain themselves.

John Zaborsky, professor of engineering, was elected to the National Academy of Engineering.

James Jones, Jr., professor of Romance languages, has been named a Chevalier de l'Ordre des Palmes Academique by the French Ministry of Education. He is one of the youngest individuals ever to receive this honor.

Ghislaine Crozaz, professor of earth and planetary sciences, was awarded the Antarctica Service Medal from the National Science Foundation for her contributions to exploration and scientific advancement as a member of the meteorite collecting team in 1981 which found 375 meteorites.

Michael W. Vannier of the Department of Radiology received the 1984 Lindbergh Award from the American Institute of Aeronautics and Astronautics for his applications of computer-aided design technology to reconstruction from radiographic data.

Guido Weiss, Elinor Anheuser Professor of Mathematics, was selected for the 1984-85 Distinguished Scholar Exchange Program by the Committee of Scholarly Communication with the People's Republic of China.

Virginia V. Weldon, Deputy Vice Chancellor for Medical Affairs, received the Smith College Medal given because she exemplifies "the true purpose of liberal arts education."

Eli Robins, Renard Professor of Psychiatry, received a Distinguished Service Award from the National Alliance for the Medically Ill for his contributions to the "rational and empirical understanding and treatment of serious mental illness."

Earl Shepard, professor emeritus of orthodontics, was awarded the Distinguished Service Award of the American Association of Orthodontists.

Eugene Bricker, professor of surgery, was elected chairman of the American Surgical Society, perhaps the most distinguished post in American surgery.

Four faculty were honored at Founders Day for outstanding teaching: Leonard Green of the Department of Psychology, Norman Katz of Electrical Engineering, William Matheson of Comparative Literature, and Jess Yawitz of the School of Business.

Student Honors

Washington University students have also been active and productive and have received a number of honors.

A team of three students, Paul Burchard, Richard Stong, and Edward Shpiz, took second place in the 44th William Lowell Putnam Mathematical Competition. Edward Shpiz, who last year also placed among the top five finalists in the nation, has been awarded the William Lowell Putnam Fellowship for Graduate Studies in Mathematics.



Jerry Bolas, Director of the Gallery of Art (left), with Tobias Lewin at the opening of "The Beautiful, the Sublime, the Picturesque: British Influences on American Landscape Painting," an exhibit funded by the Hortense Lewin Art Fund.

ics at Harvard. This accomplishment marked the sixth time in the last eight years that Washington University has placed either first or second in the nation.

The Washington University College Bowl team, consisting of Andrew Zupan, A. Katherine "Kate" Toomey, A. Stephen Beach, and Michael Cadwalader, took second place in the national televised competition.

Agnelli Quinones, a freshman in the College of Arts and Sciences, was selected to attend the Nobel Prize ceremonies in Stockholm as a guest of the Nobel Foundation.

Elizabeth Ann Erickson, a junior in the Washington University School of Engineering and Applied Science, won the Society of American Military Engineers' ROTC Award for Academic Excellence.

Patricia R. Bruce, a graduate student in the Department of Psychology, received the 1983 award for outstanding research from the Division on Adult Development and Aging of the American Psychological Association.

A team of Business School students, Rubi Gonzalez, Steven Baker, and Russell Shaw, missed first place by only a slim margin in this year's McIntyre Commerce Invitational Tournament.

Visitors and Guest Lecturers

The 1983-84 year saw a continuous parade of distinguished visitors.

Literary figures included Maya Angelou, poet and writer; John Ciardi, poet, essayist, and translator; Czeslaw Milosz, the Polish born essayist and novelist and winner of the 1980 Nobel Prize for literature; Peter Matthiessen, writer of *The Snow Leopard*; and Mary McCarthy, author of *The Group*, *Birds of America*.

Noted public figures included alumnus Clark Clifford, adviser to presidents and former Secretary of Defense; Sir Robert Megarry, Vice Chancellor of the Royal Courts of Justice of Great Britain and Wales, who delivered the annual Tyrrell Williams Lecture; Karl Carstens, President of the Federal Republic of Germany, who spoke at the University's 130th Founders Day celebration; Edward R. G. Heath, MBE, MP, the former Prime Minister of Great Britain, who delivered the seventh annual David R. Calhoun, Jr., Memorial Lecture. Other distinguished



Students in front of Brookings Hall which houses the Administrative offices of the University.

intellectual leaders included Elie Abel, journalist and professor of communications at Stanford, who delivered the James S. McDonnell Lecture for Youth; Henry Steele Commager who addressed the Fall Honors Assembly; William E. Leuchtenburg, historian and educator, who delivered the Thomas C. Hennings Memorial Lecture; and Noam Chomsky, linguist and social commentator.

Finally, a friend of Washington University, Carlos Fuentes, Mexican novelist, historian, and diplomat, returned to the campus for a full semester as visiting professor of literature and history. He delivered an outstanding series of lectures on the Latin American novel in historical perspective.

New Appointments

The year saw important personnel changes.

I was pleased to announce the appointment of Ralph Morrow as Provost of Washington University. Provost Morrow has had a long and distinguished career at Washington University, most recently serving as Dean of the Faculty of Arts and Sciences.

Richard N. Rosett, former professor of business economics at the University

of Chicago, was appointed to replace Ralph Morrow as Dean of the Faculty of Arts and Sciences, one of the University's most important positions. Dean Rosett is an experienced and able administrator, having served as Dean of the University of Chicago's Graduate School of Business and chairman of the Department of Economics at the University of Rochester.

The Task Ahead

Ahead lies the hardest task—bringing to reality the recommendations of our task forces which made up the Commission on the Future of Washington University. We are continuing what was set in motion six years ago—raising not just \$300 million, but preparing a university for the current and future needs of our region, the nation, and the world. We are building, with marvelous support, a university that sets the highest standards of teaching, research, and service. I thank all of the greater Washington University community for bringing us so far. I look forward to what we together will surely accomplish in the future.

William H. Danforth
Chancellor

Faculty of Arts and Sciences



Ralph E. Morrow
Dean
Faculty of Arts and Sciences
Provost Designate

This annual report, my sixth to the Washington University community, is my last. Owing in large part to the well-directed efforts of a search committee of members of the faculty, student body, and administration, chaired by Professor Martin H. Israel of the Department of Physics, Richard N. Rosett assumed appointment as Dean of the Faculty of Arts and Sciences effective July 1, 1984. Dean Rosett, as Chancellor William H. Danforth aptly stated in announcing the appointment, "is a proven academician and academic leader...." An acknowledged contributor to the development of economic theory as well as to several fields of applied economics, Dean Rosett also holds appointment as professor of economics. From 1967 to 1974 he effectively chaired the Department of Economics at the University of Rochester, and he comes to Washington University after serving eight highly successful years as Dean of the University of Chicago's illustrious Graduate School of Business.

Faculty Appointments

Concurrent with Dean Rosett's appointment, three departments will begin the 1984-85 academic year under new leadership. In anthropology, Professor Patty Jo Watson has as her successor to the chair of the department, Professor Robert L. Canfield; in the Department of English, Professor Stephen N. Zwicker assumes the mantle relinquished by Professor Daniel B. Shea; and in psychology, Professor Ira J. Hirsh, former director of research at the Central Institute for the Deaf, succeeds the late Thomas T. Sandel as chairman. Professor Hirsh, a member—of the National Academy of Sciences, also was named Edward Mallinckrodt Distinguished University Professor of Psychology and Audiology, effective July 1, 1984. Another appointment which deserves mention is that of Edward N. Wilson as dean of the Graduate School of Arts and Sciences. Dean Wilson, whose appointment began on July 1, 1983, is a mathematician. His background of experience includes ten years as a Washington University faculty member and terms as acting chairman of the Department of Mathematics, secretary of the Council of the University Faculty Senate, and member of the Arts and Sciences Faculty Council.

Faculty Honors

Limitations of space forbid an exhaustive recitation of the honors garnered by members of the faculty and student body during the year but the following are representative. In October, Viktor Hamburger, Edward Mallinckrodt Distinguished University Professor Emeritus of Biology, Rita Levi-Montalcini, professor emerita of biology, and Stanley Cohen, formerly of Washington University and now at Vanderbilt, were recognized by Columbia University in the award of its Louisa Gross Horwitz Prize. The Prize was earned by the three for their path-breaking discoveries of the processes by which cells develop, differentiate, and maintain themselves. In May, the University of Uppsala, Sweden, also added Professor Hamburger to the galaxy of eminent scientists on whom it has conferred an honorary doctorate. The announcement of new members of the National Academy of Sciences brought news of the election of Joseph E. Varner, Charles Rebstock Professor of Biology. Professor Varner is the eighth member of the faculty of Arts and Sciences and the fourth in the Department of Biology to hold membership in the Academy. Professor James F. Jones, Jr., joined three of his colleagues in the Department of Romance Languages who previously have been similarly honored—Professors Emeriti Elizabeth Schreiber and Isidore Silver and Professor Michel Rybalka—when the French Ministry of Education in April named him a Chevalier de l'Ordre des Palmes Academiques.

Student Awards

The string of successes scored by Washington University entries in the William Lowell Putnam undergraduate mathematical competition continued unbroken this year. In the competition, which involved nearly 350 colleges and universities across the United States and Canada, only the California Institute of Technology compiled a higher score than the Washington University team composed of Paul H. Burchard, '84, Edward A. Shpiz, '84, and Richard A. Stong, '85. Since 1976 Washington University has finished first three times and second three times in the Putnam competition, the best cumulative record of any college or university in the United States and Canada. In the second annual com-

petition for Andrew W. Mellon Graduate Fellowships, a program which is designed to insure the flow of talent into teaching and research in the Humanities, the University again was successful. The awardee this year is James B. Rives '84, who graduated with a concentration in classics. Also among those whose accomplishments were recognized in a national fellowship competition was Thomas J. Peckham '86. Peckham, who will serve the Council of Students of Arts and Sciences as its president in 1984-85, is the recipient of a Harry S Truman Scholarship, an award aimed at encouraging students toward careers in public service.

ALLIANCE Campaign

Last year's annual report highlighted the announcement of the ALLIANCE FOR WASHINGTON UNIVERSITY and remarked that the campaign "holds the prospect of achieving important objectives in the Arts and Sciences." It is very satisfying to be able to report a number of significant gifts in fulfillment of this prospect. Upwards of \$1 million was added to the endowment of Arts and Sciences by a bequest from the estate of Arthur E. Hoskins. A munificent gift by George W. Freiberg, Ph.D., '17, endowed the George William and Irene Koechig Freiberg Professorship of Biology. The first to hold the Freiberg Professorship is Roy Curtiss III, chairman of the Department of Biology. The Monticello College Foundation contributed \$1 million in assets to the support of the Spencer T. and Ann W. Olin Fellowship program which rapidly is assuming place as one of the premier women's fellowship programs in the nation. A gift of \$2.5 million to the McDonnell Center for the Space Sciences by the McDonnell Douglas Foundation brought to \$10.25 million the total which the Foundation has contributed to the Center since the founding of the latter in 1974. The continuing generosity of the Foundation, together with the pioneering achievements of faculty members in the space sciences, have made the McDonnell Center one of the foremost enterprises of its kind in the country. It also is gratifying to report that the Arts and Sciences membership in the William Greenleaf Eliot Society increased by 40 percent during 1983-84 and in the Century Club by 15 percent.



A view of the walkway between Olin Library and the Quadrangle.

Reserve School Status

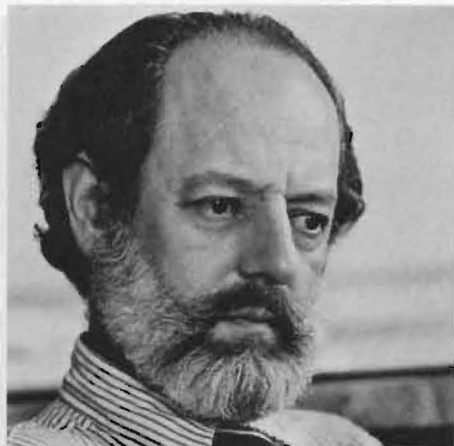
The Arts and Sciences completed its first year as a reserve unit with the budget in balance. In order to accomplish this result, however, it was found necessary to make transfers from accumulated reserves. A year of experience has served to underscore the point that the vindication of the decision to move Arts and Sciences to reserve status will require, besides vigilant watchfulness over expenditures, great efforts to secure external support for research and training, effective presentation of the uniqueness, centrality, and importance of the Arts and Sciences to alumni contributors, patrons, and benefactors and, especially, heightened success in attracting and retaining talented students, particularly in the College. In connection with the last, several recent developments fill the future with promise. The first is the establishment of the position of dean of Admissions. The second is the appointment of Robert M. Hedrick as dean of Admissions. Hedrick, a native St. Louisan who holds his baccalaureate degree from Duke, comes to his new position from the University of Virginia. The third is the formation of a council of deans and other administrators for

the purpose of effecting improved coordination between the activities of the Admissions Office and the undergraduate colleges of the University. The fourth is administrative reorganization to the result that the Office of Admissions will report to the dean of the Faculty of Arts and Sciences.

Professors Emeriti

At the close of the academic year, five members of the Faculty of Arts and Sciences advanced to the ranks of emeriti. They are Joan M. Garrison, associate professor of physical education; Richard M. Hazelton, professor of English; Florence E. Moog, Charles Rebstock Professor of Biology; Nelson Wu, Edward Mallinckrodt Distinguished University Professor of History of Art and Chinese Culture; and Betty Yue, associate professor of Chinese. Together they have given over 115 years of teaching, research, and service to the betterment of Washington University, a record which offers a secure base for predicting that their contributions will not abate.

School of Architecture



Constantine E. Michaelides
Dean
School of Architecture

A dedicated faculty, a high quality student body, and a supportive staff have made 1983-84 another productive and creative year in the continuous development of the School of Architecture. I am deeply grateful to them, as well as to our alumni and many friends of the School for their interest, efforts, loyalty, and continued support.

This was our first year under the reserve status. It is obviously too early to say much about it based on such a short time experience, and it will probably be a number of years before all parts of our new relationships to the rest of the University, under the reserve status umbrella, are studied in detail, understood, and fine tuned. We have high hopes, of course, that the reserve system within the framework of the ALLIANCE FOR WASHINGTON UNIVERSITY will assist the School in achieving its objectives, including the endowment of professorships as well as increased funds for undergraduate and graduate financial aid.

Degrees and Enrollment

During the 1983-84 year, we conferred 31 Master of Architecture degrees. Thirteen of these degrees were dated December 1983, an indication of the flexibility of the graduate program. We also conferred eight Master of Architecture and Urban Design degrees. Bachelor of Arts with a major in Architecture degrees were also conferred on 46 graduates by the College of Arts and Sciences during the year. This was the second year since continuing education became an administrative responsibility of the School of Architecture. As a result we also conferred eight Bachelor of Technology degrees. time enrollment stood at 326, including 197 undergraduates and 129 graduate students. This was higher than the previous fall and slightly below our ceiling. This total included 106 women, 58 international students, and 31 minority students. About 21.5 percent or 70 students were Missourians.

Current enrollment trends are of concern to us. Among others, the high cost of education and the repercussions of an unstable economy on the architectural profession have an effect on our applications and enrollment. As a result we are expecting next fall the smallest freshman class in recent years.

On the other hand, however, graduate applications and the expected yield for next fall are on the increase. This increase is the result of the activities of our Graduate Admissions Office which, among others last spring, sponsored a weekend design charette, inviting upper class applicants to the School for an eight-hour design competition and other weekend activities. A total of 30 applicants participated, many from out of town, and we are very pleased to know that an unusually high percentage of those who participated will be entering the School in the fall.

We will continue to monitor developments in this area very closely. Maintaining our total enrollment in the 300 plus range is very important to the School, as this number provides the "critical mass" of students which supports flexibility, choice, and richness in our professional program.

Faculty Activities

In March, we were very pleased to see the first copy of Professor Irving Engel's book *Structural Principles*, published by Prentice-Hall. This publication will fill a gap at the national level in textbooks appropriate for architectural audiences covering the fundamentals of structures. The book is the result of years of labor and development. Many of its chapters and problems were tested by our alumni who were Engel's students since the early 1970s.

A \$56,000 National Science Foundation grant to Affiliate Assistant Professor Dave van Bakergem through the Urban Research and Design Center will enable the School to develop an earthquake information dissemination system utilizing an interactive videodisc program. The program will address architects, engineers, and city officials who need to consider potential earthquake damage in their planning and design activities.

Professors J. W. Fitzgibbon and U. Kultermann will be spending the fall semester of 1984 on sabbatical leave of absence, in St. Louis and New York respectively, devoting their time to research and writing.

We are also very pleased to announce the promotion of Associate Professor Irving Engel and Associate Professor Thomas L. Thomson to professor of architecture effective July 1, 1984.

Five years ago Professor Joseph D.

Murphy returned to the School to teach a spring semester course: Drawing the Architectural Landscape. Since then students and faculty have benefited and enjoyed his presence and talents. An indication of this was the warm and joyous send-off organized by the students last April, after Professor Murphy had indicated that this would be his last spring semester in the School. We wish him well and know that we will stay in touch.

Visiting Faculty

Our visiting faculty program continued its important presence in the educational activities of the School with both new persons from other parts of the world and the United States as well as a return visit. During the fall semester, we hosted Visiting Architect Kunihiko Hayakawa from Japan, Visiting Assistant Professor Joan Blumenfeld from Boston, and Visiting Associate Pro-

fessor William Curtis from the United Kingdom. Visiting Architects Luca Maraini and Martin Spuhler, both from Switzerland, as well as Visiting Assistant Professor Heinrich Hermann from Austria, spent the spring semester with us. Visiting Professor Neave Brown from the United Kingdom paid us a return visit for the duration of the academic year. At this time we have completed arrangements for next year's visits with colleagues from Los Angeles, New York, Switzerland, and the United Kingdom.

Although a separate program from that of our visiting faculty, the Monday Night Lecture Series, under the orchestration of Associate Professor Elliot Littman, added another exciting year in its long history. The list of contributors also included Robert Mangurian from Los Angeles; Diana Agrest, James Wines, William Pedersen,

and Susana Torre from New York; Gyorgy Keves from Budapest; Anthony Vidler from Princeton University; William Gass from Washington University; and Jerzy Soltan from Boston.

Other Events

To honor George E. Kassabaum and his contributions, the William Greenleaf Eliot Society of Washington University commissioned H. Richard Duhme, Jr., professor emeritus of Fine Arts, to create a bust, which we are honored to announce will be housed in Givens Hall. In preparation for its permanent placement, we are currently remodeling and restoring the original Forsyth Boulevard entry hall to the building, planning for a dedication date sometime after classes resume next fall.

Together with six other institutions in the United States, the School of Architecture was included in the April 1984 issue of *DOCU-BULLETIN*, a Swiss magazine of building documentation. The article titled "Alma Mater Americana: Architecture Schools in the USA" and written by Dominic Marti, a Swiss architect, reviewed the state of the art in architectural education in the United States.

Alumni Activities

Alumni have been actively supporting the School in many parts of the country and in many different ways—especially in their participation in the Architecture Annual Fund. We are grateful to acknowledge that the average gift this year has reached \$95, significantly above past experience. We are also grateful for the increasing number of restricted gifts which this year so far have included two gifts of \$100,000 each and a number of pledges of annual support for four or five years.

We are also thankful to those several alumni who let us know that they have provided for the School in their wills, and we are sure that there are many others who have not told us about those plans yet.

The School is taking a major step forward in its fund raising, and it is very important to continue to build on this momentum.



Leslie Laskey's sophomore architecture students displayed a three-dimensional interpretation of Picasso's "Guernica" for their final projects.

School of Business and Public Administration



Robert L. Virgil
Dean
School of Business and
Public Administration

The Business School made measured progress in all the major phases of its operations during 1983-84. Three years ago the Business Task Force recommended that the development of a business school of the highest quality attainable be a high priority of Washington University in the 1980s. This vision and the Task Force's various recommendations continue to be the Business School's beacon for the future.

The progress made during the past year is the result of the dedication, ability, and effort of the people of the Business School—faculty, students, staff, alumni, friends. I am deeply grateful to those members of the Business School community who deserve the credit for the year's achievements. The highlights of their accomplishments are as follows:

Executive M.B.A. Program

Following two years of study and planning the Executive M.B.A. Program was launched very successfully under the direction of Professor C. William Emory. This two-year program, the only one of its kind available in the St. Louis region, is intended for mid-career managers who have at least seven years of experience and who are sponsored by their organizations. Classes meet weekly on alternate Fridays and Saturdays and intensive one-week sessions begin and end the year. The charter class of 33 students spent the week of June 3 in Washington studying business and government first hand and is looking forward to a trip to Japan next spring as part of its study of international management. Admissions and enrollment for the second Executive M.B.A. class starting in the fall are on target. Overtime, the Executive M.B.A. will lead the School's expansion in management education.

Student Enrollment, Placement, and Financial Aid

Enrollment in the School's other programs was at or near record levels in 1983-84: 388 in the B.S.B.A., 212 in the full-time M.B.A., and 279 in the part-time M.B.A. In addition, we began again to admit students to the Ph.D. program following a freeze of about four years.

Commencement exercises saw 94 B.S.B.A.s and 155 M.B.A.s receive their degrees. Following 1982-83's difficult placement environment, 1983-84 was

the strongest placement year in recent memory. Ninety percent of the 117 M.B.A.s and 75 percent of the B.S.B.A.s registered with the placement office accepted employment with 80 different companies across America, enrolled in graduate school, or are otherwise accounted for. Positions in banking and other financial institutions again was the area of highest interest, with public accounting, corporate financial analysis, marketing, and retailing also strong. Fifty percent of those students placed have joined St. Louis firms, as the School continues to be a major importer of managerial talent to the region. The range of M.B.A. salaries was \$15,000-\$42,500 with a median of \$29,500; for B.S.B.A.s, the range was \$17,000-\$25,800 and the median, \$19,800.

No area is receiving greater emphasis than admissions, as the School strives to build the quality of its student bodies. In the increasingly competitive and tightening market for students, the School continued to make gains. The applicant pool for B.S.B.A. freshmen grew 9.3 percent to 470 applications. The 112 young men and women expected in the fall 1984 freshmen class are from 22 states and Puerto Rico. They have an average SAT of approximately 1170, as compared with the national average of just under 900. Fifty-four percent were in the top 10 percent of their high school class and 76 percent, the top 20 percent. An entering full-time M.B.A. class of 115 is expected in the fall; the median GMAT percentile and undergraduate grade point continues to be up, and nearly 60 percent of the class will have had a year or more of work experience.

Financial aid constitutes a significant budgetary item for the School. Almost 60 percent of the B.S.B.A.s and 74 percent of the full-time MBAs will receive aid in 1984-85 in some combination of scholarships, work-study employment, and loans. Committed to having a diverse student body, the School is able to provide financial aid to deserving students because of the generosity of its alumni and friends. A wonderful term endowment of \$150,000 for B.S.B.A. scholarships from Melba Seay went into effect in 1983-84. CPI Corporation has committed \$250,000 over five years for scholarships beginning in 1984-85. The School's Scholars in Business program now has 122 named scholarships.



Groundbreaking ceremonies for John E. Simon Hall; pictured from left to right are: Dean Robert L. Virgil; Charles F. Knight; Chancellor William H. Danforth; W. L. Hadley Griffin; and George H. Capps.

Faculty Appointments

The year saw substantial progress in the continuing effort to find and develop the highest quality faculty; in 1984-85, the regular full-time faculty of the School will number 36. Nicholas Dopuch, editor of the *Journal of Accounting Research*, was named the first Hubert C. and Dorothy R. Moog Professor of Accounting in January, the School's second endowed chair. Joining the faculty as assistant professors were John J. Binder (finance), William Blozan (marketing), Morton P. K. Pincus (accounting), and Gregory B. Waymire (accounting). Appointed beginning this fall are Barry R. Weingast, formerly of the Department of Economics and the Center for the Study of American Business, as associate professor of political economics (with tenure); Louis H. Ederington, senior research associate in finance and associate director of the Institute of Banking and Financial Markets; Assistant Professors Jacqueline S. Pownall (accounting) and C. M. Sashi (marketing), and George Bittlingmayer, visiting associate professor of business and public policy.

The School is strongly committed to scholarly research and teaching competency on the part of the faculty. Reflecting the quality and promise of this faculty, the School's interactive academic environment, and the high level of support provided the faculty for

research and development, scholarly output of the faculty was at a high level. Concomitantly, the reputation of the faculty among peer business schools continued to grow.

John E. Simon Hall

The most spectacular development of the year was the start of the marvelous new building for the Business School. The exterior, inspired by the gothic style of the original campus, will be in red granite and white limestone. Within, it will provide everything in physical facilities that the School may reasonably need as it enters the 21st Century.

Ground breaking occurred on October 7 in a festive ceremony attended by more than 700 persons. At a reception on April 5, Chancellor Danforth announced that in recognition of a magnificent commitment by John E. Simon, the new building will be given in his name. A distinguished St. Louisan who has been most generous throughout his lifetime to Washington University and other institutions, Simon was General Partner from 1928 to 1974 of I. M. Simon & Co., the third oldest continuous member firm of the New York Stock Exchange.

The new building is expected to be completed by the early fall of 1985.

Gifts and Pledges

Fueling the School's progress in 1983-84 and its high aspirations for the future is the splendid generosity of our alumni

and friends, in both annual support and now the School's capital campaign as part of the ALLIANCE FOR WASHINGTON UNIVERSITY.

The annual fund for 1983-84 reached the record level of \$868,159. Thirty-five percent of the School's 7,075 alumni participated in giving in 1983-84, compared to 32 percent a year ago and 28 percent five years ago. Membership in the Business Century Club stands at 1,477, compared to 1,163 last year. The School has 257 members in the William Greenleaf Eliot Society, 62 new members having been registered during the year thanks to the outstanding leadership of Oliver Goralnick and his co-workers. This record of annual giving is a tribute to the dedication and hard work of President Sam Fox (BSBA '51), Vice-President John K. Wallace, Jr. (MBA '62), and their more than 100 volunteer associates on the various committees of the Alumni Association Executive Committee.

The School's goal in the ALLIANCE FOR WASHINGTON UNIVERSITY is at least \$31 million—\$15 million for endowment, \$13 million for the building, and \$3 million of annual giving. Volunteers are hard at work, and there are gratifying early results. As of June 30, the School had pledges committed of over \$22 million.

School of Dental Medicine



George D. Selfridge
Dean
School of Dental Medicine

A high priority at the School of Dental Medicine in recent years has been the improvement and expansion of the School's research program in basic sciences. Emblematic of our progress in this area was our recent qualification, for the first time in years, for a Biomedical Research Support Grant from the National Institutes of Health. This "seed money" grant is given only to institutions that have won at least three other NIH research grants for a specified minimum dollar amount. Our fine, young biomedical research faculty had previously secured almost a half-million dollars in NIH research grants, thus insuring our qualification. In becoming eligible for a Biomedical Research Support Grant, we join three other components of the Washington University community which qualify for such a grant; the School of Medicine, the University's Hilltop campus, and Jewish Hospital of St. Louis.

Another example of the increasing excellence of our research staff is the fact that two staff members—Philip Osdoby and Zvi Bar-Shavit—are investigators for The Arthritis Foundation. It is unusual to have two such investigators on a relatively small faculty such as ours.

Our biomedical faculty recently was augmented by the addition of Paul H. Schlesinger, assistant professor of cell biology, who comes to us from the University's School of Medicine. Recruiting also is under way for a physical anthropologist. Our new faculty members will conduct ongoing research in collaboration with appropriate departments at the School of Medicine and the Hilltop campus of the University.

Student Recruitment

The search for an adequate number of qualified dental students is a pressing problem for every dental school today and we are no exception. The problem is illustrated by the fact that in 1976 a total of 14,807 individuals submitted applications for admission to a U.S. dental school or schools. In 1983 the number of individuals applying to all U.S. dental schools was down to 7,128. The student recruitment problem is indeed pervasive, but due to the untiring efforts of Richard Brand, director of admissions, and Marie Liddy, who coordinates our recruiting program,

we are holding our own. Their skillful work produced almost 1,000 applications for our 1984 entering class. Since the class will number about 72 students, this again gives us a very adequate applicant pool from which to select the most promising young men and women as class members. The number of applicants was a decline of about six percent from last year, but this decline is in line with national trends and does not cause us undue concern. Our ambitious student recruiting efforts will continue.

Administrative Changes

Several administrative changes have taken place at the School. Charles Waldron, who wears several hats, will become assistant dean for student affairs. Waldron also has been appointed chairperson of our new Department of Diagnostic Services, which includes divisions of radiologic services, patient admissions, oral medicine and pathology, and laboratory services. Arnold Kahn, who continues as director of research for the School, has been given the additional responsibility of assistant dean for biomedical affairs. O. L. Shoemaker asked to be relieved of his administrative duties as chairperson of the Department of Removable Prosthodontics and has been succeeded in that post by Charles M. Johnson. Shoemaker will continue to teach as a full-time member of our faculty.

Two major administrative vacancies have been admirably filled. Robert G. Thompson is our new assistant dean for clinical affairs, joining us from the U.S. Navy Dental Corps in which he had served as an officer for 30 years. And Richard Jay Smith has been appointed chairperson of the Department of Orthodontics and professor of orthodontics. Smith has been director of the Postgraduate Orthodontic Program at the University of Maryland Dental School. In addition to his dental training and postgraduate study in orthodontics, Smith has master's and doctoral degrees in anthropology from Yale University, which means he is unusually well-qualified to lead our department to new levels of excellence in cranio-facial research.

Faculty Appointments and Changes

Other key additions to the full-time faculty in recent months have included: James M. D'Amico as assistant professor of oral and maxillofacial surgery and director of undergraduate education in the Department of Oral and Maxillofacial Surgery; Robert D. Lowe, clinical associate in oral diagnosis and radiology; Michael K. Shrout, adjunct instructor in oral diagnosis and radiology; and John P. Sahrman, assistant professor of orthodontics. Sahrman previously had been a part-time faculty member, but has increased his participation to full time.

We recently bade farewell to three valuable faculty members. Retiring from full-time teaching were James W. Carson, associate professor of removable prosthodontics and past chairperson of that department, and Jerome G. Spielberger, professor of oral diagnosis and radiology and chairperson of that department for the past six years. L. Wallace Miltenberger, adjunct assistant professor of anatomy, has resigned to return to Utah, where he previously had practiced dentistry for a number of years. Carson, Spielberger, and Miltenberger have given much to our School; our best wishes go with them.

Strong and Distinguished Faculty

Two of our younger faculty members have received significant honors. Kathryn Atchison, adjunct assistant professor of oral diagnosis and radiology, has been awarded a Robert Wood Johnson Foundation fellowship for two years' study of dental health services at the UCLA Medical Center in Los Angeles. Five such fellowships are awarded nationally each year on a competitive basis. Nicola Partridge, a postdoctoral fellow in cell biology, was offered an International Research Fellowship by the Fogarty International Center of the National Institutes of Health. Partridge has declined the honor because she had meanwhile accepted another support fellowship provided by the government of her native Australia.

We, perhaps, have been too reticent in the past about publicizing the high standard held by members of our faculty in the dental profession. Some recent examples: Samuel E. Guyer is serving for the fourth year as chair-

man of the Examining Committee for the Missouri Specialty Board in Prosthodontics and Harold R. Schreiber is serving his sixth term as chairman of the Missouri Periodontic Specialty Examining Committee; Sam Holroyd is a member and past chairman of the American Dental Association's Council on Dental Therapeutics and serves on the National Dental Board Examination Committee on Pharmacology; Thomas Schiff has been elected an active member of the American Academy of Dental Radiology and also was named a consultant to the American Dental Association's Council on Dental Therapeutics in the field of preventive dentistry; Robert E. Bedell, recently retired from our faculty after



Dr. Arnold Kahn overseeing research in one of the Dental School labs.

many years' service, is president of the Midwestern Society of Orthodontists; Marshall Manne and Jerome Spielberger have been inducted into the American College of Dentists; Manne is president of the Midwest Society of Periodontology and Jules M. Snitzer is serving his 12th consecutive term as secretary of the Society.

These and many other members of our faculty continue to distinguish themselves with the publication of books and articles in professional journals and with presentations before major dental and scientific meetings. The faculty of the School of Dental Medicine is very well-regarded by its peers in the profession. We consider it to be the strongest faculty in the long and honorable history of our School.

Career Options Conference

Dental students and faculty members from many dental schools came to Washington University in mid-April for our Conference on Career Options for the Dental Graduate. The full-day

conference offered speakers from a variety of dental career fields, including the presidents-elect of the American Dental Association and the American Association of Dental Schools. The conference was conceived and directed by our indefatigable Harriett Steuernagel, who officially retired several years ago after long service as School Librarian, but still is an active member of our staff as director of Career Counseling.

ALLIANCE Campaign Response

We are pleased and encouraged by the response of alumni and friends of the School of Dental Medicine to the ALLIANCE FOR WASHINGTON UNIVERSITY. As of this writing, about \$200,000 has been contributed toward our goal of \$400,000 to endow student loan funds. We are seeking \$1.4 million in new and increased gifts in support of our annual operations and have secured about \$1.1 million toward that goal. Somewhat slower progress is being made toward our third goal: \$600,000 for a new library and learning resources center. I am working closely with the University's development staff on the campaign, and we are very hopeful that all major goals will be reached or surpassed before the ALLIANCE campaign ends on December 31, 1987.

Use of Computers

The computerization of the School is moving ahead. An IBM System 38 computer has been installed and a computer services department is in operation with two qualified programmers on staff. Basic programs for a clinic management information system are in place, and we hope that clinic transactions can be recorded on the computer by January 1, 1985.

Meeting the Challenge

The School of Dental Medicine has had a good year and looks forward to a challenging period of continued improvement. My deep thanks go to our marvelous students and faculty, our dedicated administrators and staff, our ever-loyal alumni and generous friends. They are responsible for what has been accomplished. With them rest our hopes for the future.

School of Engineering and Applied Science



James McKelvey
Dean
School of Engineering and
Applied Science

The following are some of the highlights for the 1983-84 academic year:

- The number of B.S. Engineering degrees granted increased from 269 last year to 292, the largest number since 1950.
- The number of Master's degrees granted rose to 121, surpassing the previous record of 102 in 1982.
- Contributions from friends, alumni, and corporations for current expenditures rose to \$1.2 million, another record.
- The fifth floor addition to Lopata Hall, which provided an additional 7,000 square feet of space, was completed in November and dedicated as the Bowles Laboratory of the Institute for Biomedical Computing.
- The year's financial results show that expenditures were about \$70,000 in excess of income, thereby reducing the engineering reserves by that amount.
- The freshman recruiting campaign for the class entering in the fall of 1984 was successful. The class is nearly identical to those of previous years in terms of size, geographic distribution, and academic strength.
- Research funding, which has been depressed for the past several years, showed a major gain with more than \$5 million in new grants and contracts being received, compared to \$3 million last year.
- Approval was granted to the Department of Technology and Human Affairs to expand its scope by adding a new degree, Master of Science in Engineering and Policy, and to change its name to the Department of Engineering and Policy.
- The Engineering Technology Division developed a new program in Technical Computing which will be offered for the first time in the Fall Semester 1984.

Enrollments and Degrees

During the 1983-84 academic year the School granted 292 engineering baccalaureate degrees, the largest number since 1950; 121 Master's degrees, an all-time record number; and 15 doctoral degrees. The Engineering Technology Division granted 41 baccalaureate degrees in engineering technology.

The undergraduate enrollment continues to tax the capacity of the

faculty and facilities in the departments of electrical engineering and computer science, even though the overall engineering undergraduate enrollment is within the capacity limit for the School of Engineering as a whole. The demand for well-trained people in electrical engineering and computer science continues to be extremely strong and, given the current excitement of high technology, these fields continue to exert a very strong attraction for talented young people.

The School of Engineering will continue its policy of restricting admissions to control overall enrollments in the range of 1,000 to 1,100 undergraduate students, and will continue to admit freshmen without requiring a prior commitment of a major. During the coming year admission of transfer students, and perhaps students in the Three-Two Program, will depend to some extent upon the choice of the student's major, with a limited number being admitted to computer science or electrical engineering.

Overall graduate enrollments were relatively unchanged from last year. The increase in Master's degrees reflects growing interest in the B.S.-M.S. combined degree program of the School and in professional degrees, such as the Master of Construction Management. At the doctoral level there has been relatively little change in enrollment, both at WU and nationally, for the past decade.

Enrollments in the Engineering Technology Division remained steady at about 400 students. The engineering technology programs are designed for part-time students and hence are offered in the evening hours. Majors in electrical, mechanical, and structural technology, as well as industrial production management and geodetic science, are offered. The Division also offers a pre-engineering curriculum for those students seeking ultimately to transfer into an engineering degree program. Considering the growing importance of computers to industry the Division will offer for the 1984-85 academic year a new degree program in Technical Computing.

Among the Faculty

Because of the shortage of engineers trained at the doctoral level, there continues to be a serious national

shortage of individuals qualified for engineering faculty positions. As a consequence there is strong competition to attract and retain the highly skilled and talented people needed for faculty positions.

The Washington University School of Engineering has fared reasonably well in this competition. At the start of the 1984-85 academic year it has 73 regular professional rank faculty members, compared to 66 at the start of the 1978-79 academic year. During the past year the School made seven new faculty appointments, but there were also seven retirements and resignations from the faculty, so there was no net gain in size.

During the past year there were three promotions to the tenured faculty: Thomas H. Hahn in the Department of Mechanical Engineering, Babu Joseph in the Department of Chemical Engineering, and Frederick Rosenberger in the Institute for Biomedical Computing. There were also two promotions in rank: John K. Russell was appointed to associate dean and John K. Gohagan to professor in the Department of Engineering and Policy.

Dr. John Zaborszky, chairman of the Department of Systems Science and Mathematics and a distinguished pioneer in the field of systems science, was honored for his many contributions to this field by his election to the National Academy of Engineering, one of the highest honors that can be bestowed upon an engineer in the U.S.

Student Recruitment

The freshman class of 1984 was quite similar to those of the recent years. The class size was in the target range of slightly over 200, and the indicators of academic ability—class rank in high school and SAT scores—were practically unchanged from previous years. About 80 percent of the class graduated in the top 10 percent of their high school class. SAT scores are about 690 math and 600 verbal. Geographic distribution is essentially unchanged with about 21 percent of the students being from the St. Louis area. Women constitute 21 percent of the class and minorities 8 percent.

The 1,100 applicants to the 1984 freshman class is down from 1,300 the previous year, the first significant decline in applications in the past decade. These figures indicate that the

national competition for the limited pool of highly talented young people is now far more rigorous and the School must respond with an enhanced recruitment effort in this coming year.

The Three-Two Program under the leadership of Assistant Dean Franklin Johnson attracted over 60 new students, a record number. There are now 92 liberal arts colleges associated with the School of Engineering in this highly successful program. Dean Johnson retired at the end of the academic year. His successor is Robert Ridgway, who comes to Washington University from the American Chemical Society where he was manager of the Office of College Chemistry. Prior to this he was professor of chemistry at Rollins College, one of the School's associated liberal arts colleges.



Professor William Pickard (right) with a student in the Electrical Engineering Instructional Lab.

Placement

Job placement of the graduating seniors was far easier this year than last. The demand for engineering graduates in all disciplines was much stronger, with chemical engineering showing a significant improvement over its depressed state of a year ago. A large percentage of the graduating seniors seeking industrial employment had job offers by commencement and the prospects for the coming year are for increased demand, particularly in the electrical engineering and computer science areas.

Department Changes

This spring the engineering faculty granted the Department of Technology and Human Affairs approval to expand its scope by offering a new degree, the Master of Science in Engineering and Policy, and to change the departmental

name to the Department of Engineering and Policy. Research and teaching in the department are centered on such broad-based problems as meeting energy demands, maintaining environmental quality, and effectively using bioresources, problems that combine technology and policy issues. The department's undergraduate program leads to the degree Bachelor of Science in Engineering and Public Policy, an ABET accredited engineering degree.

Bowles Laboratory

In the late Fall of 1983 the Bowles Laboratory of the Institute for Biomedical Engineering was dedicated in honor of Dr. Edward L. Bowles, B.S.E.E. '20, a distinguished alumnus of the School of Engineering. The Bowles Laboratory occupies the new fifth floor of Lopata Hall and provides about 7,000 square feet of space for advanced computer-related research and development directed toward applications in medical science and practice.

Grants and Gifts

The year-end financial results showed that the School's total expenditures of about \$17 million exceeded income by \$70,000. This deficit will be covered with funds in the engineering reserve. The deficit was not unexpected and was due primarily to the reduced level of sponsored research, which has been relatively weak over the past several years. Sponsored research is now showing a relatively strong recovery—new grants and contracts during 1983-84 amounted to more than \$5 million, a significant improvement over the depressed level of \$3 million during 1982-83.

The School of Engineering received more than \$4 million in gifts and bequests during the 1983-84 academic year. Gifts for current expenditures, from alumni, friends, and corporations amounted to about \$1.2 million. Life income gifts total \$487,000 and gifts for endowments were \$380,000.

The major gift received during the year was a bequest from the estate of Harold D. Jolley amounting to \$1.8 million and designated for a new building which will bear his name. Additional bequests from the Jolley estate will be forthcoming in the future. It is anticipated that it will be several years before construction of Jolley Hall will start.

School of Fine Arts



Roger I. DesRosiers
Dean
School of Fine Arts

Once again, the successes of the students and faculty at the School of Fine Arts have demonstrated that the educational process works remarkably well. The School continues to attract outstanding students whose potential is limited only by the opportunities available to them, and to attract new and visiting faculty whose credentials as professional artists are unquestioned. The support of our alumni and friends continues to grow at an encouraging rate, and we have made substantial progress in improving our physical environment.

The Challenges Ahead

As a School charged with the preparation of professional artists, however, we face a challenge based on a paradox of our society. The product of the artist—the exhibition, the music, dance, or theatrical performance—enjoys unparalleled popularity; attendance at such events rivals that at sporting events. On the other hand, contemporary society does not place accordingly high market value on the skills of those whose creative energies feed the people's hunger for things artistic.

Our challenge as a School, beyond our educational mission, is to demonstrate, not merely to our natural constituency, but to all of society, what is already felt, if not known: that the arts are essential to the quality of life to which we all aspire. What good it would speak of our society, then, if we could report that those who made art were more in demand than those who made weapons of war! It would be my pleasure in a future year to announce that graduates of all programs had fared as well as the 1983 graphic design graduates, all reported gainfully employed one year after graduation.

The Lewis Center

Also this past year, the School secured the Lewis Center in nearby University City to complement Bixby Hall as a home for the School of Fine Arts. There is truly a cause for celebration for achieving this long-sought-after potential benefit for the residents at the School. This will consolidate seven separate, distant, and limited physical facilities into two excellent ones. The impact will result in more fully nurtured creative energies for many years to come.

Lewis Center's 32,000-plus square feet will house the undergraduate and graduate majors in sculpture, graphic communications, photography, ceramics and glass, and multimedia, plus core 3-D design for freshmen and sophomore students. The total renovation of this historic landmark building includes many of the latest safety and energy-efficient devices applied to art processes. For instance, the giant ceramic kilns, designed and fabricated by Associate Professor David Hershey and his advanced students, are equipped with computerized fuel-feed systems which will increase efficiency by 300 percent while providing maximum protection against hazards.

Faculty Appointments and Activities

Important as these mortar and bricks are, the people of the School are even more so: After more than 35 years of effective service to the profession and students, Virginia Fel'Dotto has been appointed emeritus professor of art. The discipline of fashion design, which Professor Fel'Dotto ably led, remains a vital and remarkably effective component of the School, and there is optimism that the future will be equally bright. The program's record is one of the remarkable accomplishments of alumni who win national professional acclaim year after year. The faculty is enormously proud to have recruited Associate Professor Henry Swartz to lead the fashion design program.

Faculty additions for 1984-85 also include Visiting Assistant Professor of Art (drawing) Martin Schmandt and Visiting Professors of Art (painting) Margo Margolis and Peter Flaccus. The pattern for faculty appointments at the School has proven to be exceptionally effective over the past several years including both rotation and a healthy dose of stability. The widely diverse proclivity among the faculty's disciplines and interests means the depth and breadth of their professional activity annually defies cataloging. One-person exhibitions in Germany and Paris by William Quinn; in Athens, Greece, by Edward Boccia; in New York City by James McGarrell; in Chicago by William Kohn and Kim Strommen, exemplify the much longer list of

faculty accomplishments through exhibition, consultation, writing and speaking, and jurying of exhibitions.

Conferences and Course Offerings

The School, with key leadership provided by Professor James Sterritt, hosted the 47th Annual Conference of the Mid-America College Art Association in St. Louis during October 1983. More than 800 college artists and art scholars were in attendance for the three-day conference.

The Fine Arts Institute, which provided classes for adults who wish to improve career options and enrich their lives through the visual arts, is widely expanded. Certificate Programs are offered in Graphic Communications and in Fashion Design. Courses in photography and wood furniture design are being offered for the first time during the fall semester 1984.

There are also newly approved options for B.F.A. and M.F.A. students. Photography is now available as a graduate emphasis. Glassblowing, which

has been one of the School's best-kept secrets, has formally become one of the high-energy options. Create Studio—the problem solving, student-run shop which contracts to provide clients with professional design services—is widely known for its brilliant track record in the St. Louis community. Its list of former clients reads like a St. Louis business world and not-for-profit institutional “who’s who.” The unique educational concept embodied in Create Studio for the past 12 years is being replicated by Create Media, which will deliver video services, and by Create Photo. The opportunities provided by “Create” allow students to apply the art of design, illustration, typography, photography, or video and take them beyond theory and studio practice.

Reserve School Status

This was the School's first year as an independent financial unit (a reserve school) within Washington University. Due primarily to the support of friends and alumni whose generosity exceeded

the goals established by the FY84 budget, there is approximately \$100,000 improvement over the anticipated impact on School reserves. The establishment of the Lucy M. and Stanley L. Lopata Graduate Fellowship exemplifies the outstanding generosity which has befallen the School this past year. The single most important goal for continuing the pattern is being able to attract an outstanding student constituency, and making scholarships and other financial aid resources available to students is critical to that goal. The new Lopata Fellowship immeasurably improves our ability to attract gifted students. And this fellowship, which will surely become as important a tradition as the Fred Conway Scholarship, is a tribute to the faculty and students who dedicate time and energy so productively.

The good credits earned this year at the School of Fine Arts belong to all. The year's performance provides optimism for a creative and promising future.



Professor Virginia Fel'Dotto pictured with one of her fashion design classes.

School of Law



F. Hodge O'Neal
Dean
School of Law

The 1983-84 academic year at Washington University School of Law was a time of unusual intellectual excitement. Three new members joined the faculty. In addition, faculty and students had an opportunity during the year to work with and exchange ideas with three distinguished visitors from other law schools and an unusually talented practicing lawyer who took a leave-of-absence from her firm to teach here.

Faculty Appointments

The new members who joined the faculty are Bruce H. Mann, Roy D. Simon, and Stanley L. Paulson. Before coming here, Mann taught for four years at the University of Connecticut and for two years at the University of Texas. A specialist in legal history, he has an extensive academic background in history as well as law. He holds the Ph.D. degree in history and the M.A. degree in philosophy from Yale University and the J.D. degree from Yale Law School. He also holds the A.B. degree and M.A. degree in history from Brown, where he was elected to Phi Beta Kappa. Simon is an experienced litigator, having been associated with leading Chicago firms. He holds the B.A. degree from Williams and the J.D. degree from New York University, where he was editor-in-chief of the *New York University Law Review*. Paulson, already a tenured member of the Department of Philosophy at Washington University, joined the faculty of the School of Law under a joint appointment with the Department of Philosophy. He holds a Ph.D. in philosophy from the University of Wisconsin-Madison and a J.D. degree from Harvard. He has served at various times as a research fellow at Harvard Law School, the Center for the Study of Law and Society, University of California, Berkeley, and the Faculty of Law at the Free University of Berlin. Later he spent two and one-half years in residence with the Faculty of Law at the Free University of Berlin.

Visiting Faculty

The John S. Lehmann Distinguished Visiting Professor of Law for 1983-84 was Pierre R. Loiseaux of the University of California at Davis, a nationally known expert in commercial law and bankruptcy. Also visiting for the 1983-84 academic year were two other able teachers, Gary C. Leedes of the Uni-

versity of Richmond and Gerald P. Johnston of the University of Kentucky.

Of special interest to members of the practicing Bar was the appointment of Shulamith Simon, a partner in the St. Louis firm of Husch, Eppenger, Donohue, Elson & Cornfeld, to the position of Distinguished Visiting Professor of Applied Lawyering Skills. Ms. Simon took a leave-of-absence from her firm to teach with us full-time during the spring semester of 1983-84.

Students

A class of 223 students selected from 1,385 applicants entered in the fall of 1983. The students came from 115 colleges and universities and 34 states and Puerto Rico. Women constitute about 33 percent of the class and minorities about 4 percent. Despite a steady decrease the last few years nationwide in the number of applications to law schools, the academic credentials of entering students at this school improved for the fourth straight year. The median Law School Admission Test (LSAT) of the class entering in 1983 was 646 on the old LSAT scale and 37 on the new scale, as compared with 632 on the old scale for the class entering in 1982, a substantial improvement. The median grade-point average (GPA) of the class entering in 1983 dropped slightly to 3.2 as compared with the 3.3 median GPA of the class entering in 1982. Law school applications here and throughout the country continue to drop, and to drop sharply. One of the important challenges confronting this school in the immediate future years will be to maintain the quality of the incoming classes of law students in the face of the declining pool of applicants.

The school continued its tradition of excellence in the National Trial Competition. The student advocates representing Washington University advanced to the national finals. Competition in the finals is limited to a small circle of schools which survive rigorous regional eliminations. Of the over 200 student teams from around the country which originally competed, fewer than 25 are selected to advance to the nationals. This is the fourth consecutive year that Washington University has achieved the distinction of reaching the national rounds of arguments.

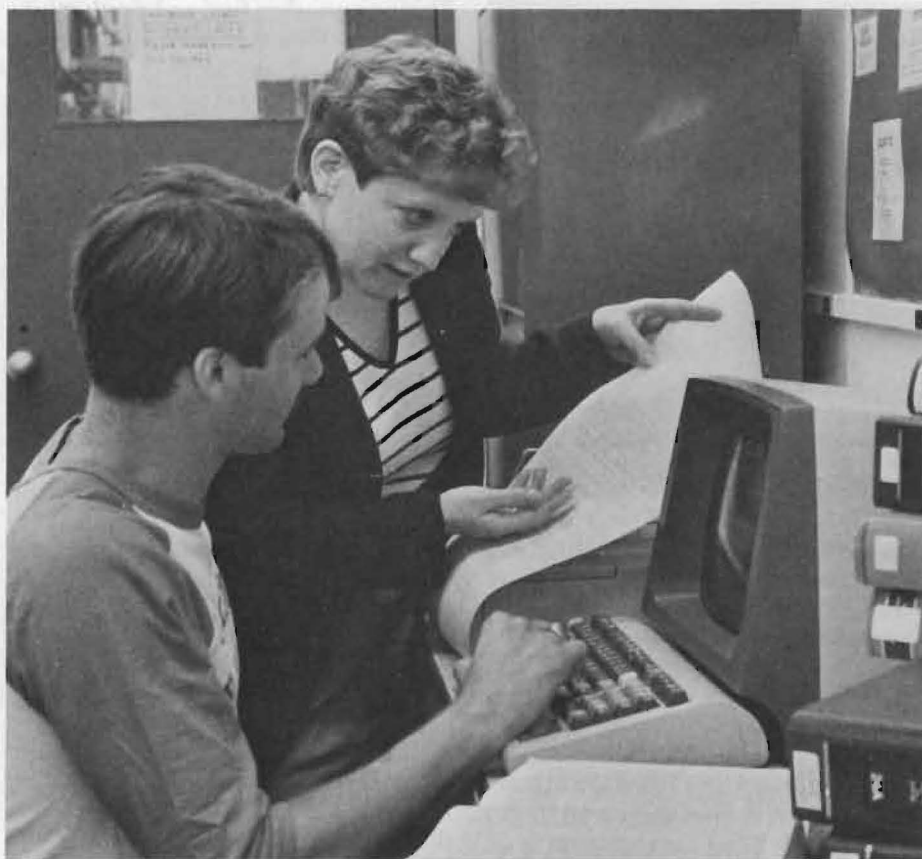
Law Library

The Freund Law Library continues to grow as it keeps pace with the ever expanding body of law. At the end of June 1984, the library's volume count was approximately 300,000 and was increasing at about 10,000 volumes a year. The library now has WESTLAW, the computer based legal research system of West Publishing Company, as well as LEXIS, the other leading computerized legal research system.

In 1983 the library signed a "Resource Sharing Agreement" with St. Louis University Law Library. This agreement formalized a practice that had developed at the two libraries of extending research services to each other's students and faculty. The agreement also states mutually supportive collection development goals, thus reducing duplicate book purchases.

Practical Lawyering Skills (Clinical) Programs

Over the past few years, the School of Law has added several new course offerings which increase opportunities for students to develop competent lawyering skills. Included are the popular judicial lecture/demonstration series, "The Anatomy of a Lawsuit," and the research and writing courses which are offered in conjunction with the first-year Torts course and continue through upperclass writing seminars and participation on the school publications. The practical skills curriculum also includes several planning and drafting courses, such as Corporate Planning & Drafting, Estate Planning & Drafting, and Land Use Planning; a systematic progression of litigation simulation courses; the new and innovative Pre-trial Practice and Procedure course; Moot Court (Appellate Practice and Procedure); and the clinical practica: Civil Clinic (at Legal Services of Eastern Missouri), Mental Health Clinic (at State Hospital), Criminal Clinic (at the State Public Defender offices and U.S. Attorney's office), the Judicial Clerkship clinic (at State and Federal Appellate Courts), and the Congressional Clinic (in Washington, D.C.). These practical lawyering skills courses, coupled with an increased but carefully monitored utilization of local practitioners and judges as adjunct professors, have greatly increased the



Peggy McDermott instructs a student on how to use the WESTLAW and LEXIS systems for legal research.

interest of local jurists and members of the Bar in the school's educational program.

Alumni Events

The interest and support of alumni have been most gratifying. Alumni gatherings in Chicago, Los Angeles, Washington, D.C., and Atlanta were well attended, and this year's Annual meeting of the Law Alumni Association, held at Otto Erker's home in St. Louis' Central West End, was one of the largest and most impressive alumni events in recent years. Clark Clifford, LW'28, was the principal speaker. A highlight of the evening was the recognition of Christian B. Peper, LW'35, and Fred L. Kuhlmann, LW'38, as Distinguished Law Alumni Award recipients.

Our alumni continue to be extremely generous. Alumni contributions exceeded the previous year's record total by more than 31 percent. Robert Goldenhersh, LW'47, chaired an Eliot Society Committee which recruited 25 new members, bringing the number of law graduates in this University-wide Society to more than 100.

Through the ALLIANCE FOR WASHINGTON UNIVERSITY, the school has received record support from persons outside the alumni body. Most notable was the establishment by William R. Orthwein, Jr., of the William R. Orthwein Professorship in memory of his father, a member of the law class of 1905. Orthwein's ALLIANCE gift constitutes the single greatest contribution ever made to the school's endowment. Other noteworthy additions to the endowment this past year are generous contributions for scholarships by W. L. Hadley Griffin, LW'47, and the G. Duncan Bauman Law Scholarship Fund, established by friends of the former publisher of the St. Louis Globe-Democrat and member of the law class of 1948. The school is also enjoying generous support from two prominent St. Louis firms, Thompson & Mitchell and Stolar, Heitzmann, Eder, Seigel & Harris, which are sponsoring the Fall and Spring Competitions of the law school's Wiley B. Rutledge Moot Court Society.

Washington University Libraries



Charles D. Churchwell
Dean
Washington University Libraries

This was another fine and productive year for the libraries of Washington University in many areas of their activities. It was also a year where new problems vied with old ones for finite resources to meet the ever increasing demands for information to support the faculty's creative teaching and pioneering research and scholarship. While much still remains to be done, this report shows that the libraries made significant strides during the year toward their mission of supporting teaching and research at Washington University.

The Libraries' Collections

Despite a slower rate of annual growth, some significant improvements were made in the collections this year, both in quantity and quality. Preparations are under way for a suitable program which will be held in early winter of this year to celebrate the addition of the two millionth volume to the collections. Oscar Handlin, Pulitzer Prize-winning author, noted American historian, and recently retired director of the Harvard University Library, has agreed to be the principal speaker to mark this important milestone in the history of the libraries of the University.

Of great importance also is the program which has been planned for the fall to celebrate the 20th anniversary of the University's superb Modern Literature Collection, which was greatly enriched this year by the addition of many of the manuscripts of such significant authors and writers as Stanley Elkin, Donald Finkel, William H. Gass, James Merrill, Howard Nemerov, Constance Urdang, and Mona Van Duyn. And the U.S. Department of Education again recognized the unique research value of the Modern Literature Collection by awarding the University a second grant of \$62,325 (the first grant was \$205,168) to complete the work of organizing the manuscript collections and making them more widely known and available to the world of literary scholarship.

While books, journals, newspapers, and manuscripts will continue to be primary sources of information for students and faculty for many more years, greater attention this year was nonetheless focused on the growing importance of microforms, video discs, videotapes, and electronic data bases as sources of information for teaching

and research. The nature and content of the libraries' collections changed somewhat during the year to adapt to the increasing influence of the electronic information age on libraries. It has become evident that the libraries must begin to use this new capability to provide students and faculty with quick access to information located throughout the world; this new capability moreover is becoming a permanent substitute for ownership of some traditionally printed library materials. The electronic information age is therefore being incorporated into the collection development philosophy of the libraries of Washington University.

Library Services and Access to Sources of Information

Faculty, students, and other users of the libraries received better library services and easier access to sources of information this year than perhaps at any other time in the history of the University. More attention to individual library user's needs and increased use of technology made these improvements, as well as service to a larger number of library users, possible. More than 700,000 persons entered Olin Library and borrowed about 140,000 volumes; another 206,000 were borrowed from the nine departmental and school libraries. No count was made of the many volumes that are used within the libraries but not checked out.

The reference staff answered almost 50,000 reference questions and they increased their use of seminars and classes to teach effective library usage; the special collections staff, besides classes and in-depth personal research assistance, provided over 200 written responses to questions received from students and scholars throughout the country and abroad. Over 1,500 photocopies from the manuscript collections were supplied to researchers in the U.S. and abroad. The libraries were again a net lender (2,798) in interlibrary loan transactions; we sent to other institutions 6,834 items and borrowed 4,036. Using primarily our libraries and services, the faculty wrote more than 1,000 books, chapters, journal articles, and reports. The libraries also served as a primary resource for the 25 national and international scholarly journals that are edited at Washington University.

While the use of technology permits the library staff to give better services

to students and faculty, it also allows students and faculty to gain easier and quicker access to information themselves. This was demonstrated in a spectacular way this year by the introduction of the University's Library User Information System (LUIS), a computerized catalog. Within a relatively short time after LUIS's introduction, students and faculty were sending an average of 3,200 queries per day to the catalog data base, indicating a high level of acceptance. Terminals are now on all five levels of Olin Library; this saves valuable time for students and faculty, and, for the first time, it places access to the same catalog in multi-locations and allows for simultaneous usage by as many persons as there are terminals. As more titles are put into the computerized data base, less use will be made of the card catalog, which will eventually be replaced entirely by LUIS. Funding is now being sought to extend this greatly improved service to all the departmental and school libraries at the University.

Advanced technology in the libraries also came this year to the aid of the visually impaired. The Xerox Company made a generous gift of a Kurzweil Reading Machine to the University. This is a "talking" computer which scans and converts to synthetic speech virtually any material printed in English. This allows visually impaired students improved access to scholarly or technical works not ordinarily available in braille or on tape. As with all the University's library resources, the public is also allowed to use the Kurzweil Reading Machine.

The Library Staff

The role of the research library, where primary emphasis is placed on ownership of sources of information, is gradually giving way to a view of the research library as a means for accessing information locally, nationally, and internationally through computers and telecommunications. The abilities and skills required to acquire, organize, preserve, and interpret printed sources of information are not diminishing during this transitional period; on the contrary, librarians and other specialists have to maintain these while at the same time gaining and honing new ones required to design, operate, and manage systems for creating and delivering information to students and

faculty. Besides coping with challenges posed by books, journals, and manuscripts, members of the library staff successfully helped students and faculty obtain important information that is stored in electronic data bases, on video discs, tapes, microforms, and micrographics. The library staff is also facing the new challenges posed by greater use of computers and telecommunications. While additions are needed in order to handle the varied and heavy demands placed on it by the University's rich teaching and research programs, the library staff, nonetheless, continues to improve the services provided to students, faculty, and the community of research and scholarship.

Library Facilities

Olin Library has served the University well for more than 20 years and can continue to do so into the next century with appropriate renovations. Two very pressing needs for renovation were discussed in last year's annual report. The first is the installation of compact shelving on Level 1 of Olin Library which will have the effect of increasing the capacity of this area from 261,000 volumes to 625,000. The second is the renovation of Level 5 of Olin Library in order to provide proper housing for all of the University's special and rare collections. At present many of these bibliographic treasures are housed in locations that are less than adequate for their protection and preservation. Neither of these renovation projects is of trifling cost but it is hoped that

among the results of the success of the ALLIANCE FOR WASHINGTON UNIVERSITY campaign will be the completion of both.

The Bookmark Society

A steering committee composed of members of the faculty and friends of the University assisted in the reorganization of the Friends of the Libraries of Washington University; the new organization is called the WASHINGTON UNIVERSITY LIBRARIES BOOKMARK SOCIETY. The Bookmark Society will function as a liaison between the Washington University Libraries and the St. Louis community. Members of the Bookmark Society are individuals who recognize the importance of an outstanding private academic research library in St. Louis and understand the critical role it plays in all facets of the city's life. In turn, the WU Libraries welcome their friends into an enriching environment of unique collections and stimulating literary events. The programs to celebrate the 20th anniversary of the Modern Literature Collection and the addition of the two millionth volume to the collections will be sponsored by the new Bookmark Society, and we look forward with keen anticipation to its future efforts and support to help keep the libraries not only one of the best and largest private library systems between the Mississippi River and California, but in the nation as well. A task to which the Library staff and the University remain committed.



Students and faculty using the LUIS (Library User Information System) have sent over 3,200 queries per day.

School of Medicine



M. Kenton King
Dean
School of Medicine

The \$55 million Clinical Science Research Building is nearly completed and is scheduled for occupancy in August. The 382,080-square-foot building will encourage cooperative research among clinical and basic sciences, as well as alleviate a critical shortage of research space for the School of Medicine's clinical departments: anesthesiology, medicine, pathology, psychiatry, radiology, and surgery. The 10-story structure, a joint effort of the School of Medicine and its clinical departments, has three distinct towers. In appreciation of donors' generous financial support, two of the towers have been named. The center tower will be called Olin Tower. Spencer T. Olin is an emeritus trustee and long-time benefactor of the University. The south tower is named for Ida M. and John E. McKinney. A gift in the McKinney's name was made in the form of a bequest by Bertha Rodgers, Mrs. McKinney's sister. In addition, Mrs. John Lehmann has provided special support for the building's third floor, which will be occupied by the Department of Surgery.

The CSRB's upper eight levels contain offices and large research laboratories. Animal care quarters, animal surgery, general lounges, and conference rooms occupy the three lower levels. A series of enclosed pedestrian bridges link the centrally located CSRB with Barnes Hospital, Jewish Hospital and Children's Hospital.

The new Children's Hospital on Kingshighway, between Parkview Place and Audubon, was dedicated in June. The \$84 million hospital facility with 500,000 square feet of space more than doubles the area in the old structure.

New services in the 235-bed facility include eight operating rooms and a 12-bed recovery area. Eleven diagnostic/treatment rooms house the radiology service, and there are two oral surgery areas. A complete rehabilitation service, as well as anesthesiology and pathology services, are included in the new facility. Parent sleeping space is provided in the expanded inpatient area, and there are 22 intensive care beds and 52 neonatal beds in the new hospital. Access to the hospital is significantly improved, with a roof heliport and additional parking spaces.

Finally, the Barnes Hospital emergency room, located in the Wohl

Clinic Building, is being completely renovated. When completed, access to the emergency room and patient care facilities will be greatly improved.

Students

In 1983-84, the School of Medicine received 45 applications for each of the 120 positions in the first year class. In 1969-70 there were 2,042 applicants; the total in 1983-84 was 5,519. The quality of these entering students remains outstanding: the overall grade-point average of accepted applicants was 3.63 on a four-point scale.

The addition of these new students brings our total enrollment to 546 and includes residents of 41 states and 10 foreign countries. Eighty-five of the 546 students are working toward a combined M.D./Ph.D. through the Medical Scientist Training Program. Candidates for the Ph.D. only, who register through the Division of Biology and Biomedical Sciences, have increased to 137. The number of students in post-doctoral education as interns, residents and fellows is 817. Enrollment in our seven allied-health programs rose from 309 to 316.

Seventy-nine percent of this year's graduating class accepted a residency with one of their top three choices.

Faculty Recognition

The high-calibre of faculty of the School of Medicine continues to be reflected in the ability of our students and the success of our graduates. Eight faculty members have been elected to the National Academy of Sciences (NAS), an honor accorded only to the best American scientists and engineers. Gerald D. Fischbach, M.D., Edison Professor of Neurobiology and head of the Department of Anatomy and Neurobiology, was one of only 60 newly elected to the NAS this year. Fischbach was recognized for his pioneering studies of embryonic nerve and muscle cells maintained in tissue culture.

Eugene M. Bricker, M.D., professor emeritus of clinical surgery, has been elected president of the American Surgical Association—the oldest and one of the most prestigious organizations for American surgeons. He is the second faculty member in the history of the School of Medicine to hold that office. The late Evarts Graham, M.D., chairman of the surgery department, presided over the association in 1937.

Benjamin D. Schwartz, M.D., Ph.D., associate professor of medicine and of microbiology and immunology, was named the new president of the American Federation for Clinical Research. Sidney Goldring, M.D., professor and head of neurological surgery, is serving as president of the American Association of Neurological Surgeons.

Major gifts

I am proud to say that four named professorships were added during the past year. Anonymous donors established an endowed professorship in endocrinology and medicine in honor of Drs. Irene E. and Michael M. Karl. Irene Karl, Ph.D., is a research professor of medicine, and Michael Karl, M.D., is a professor of clinical medicine. The chair is held by William H. Daughaday, M.D., chief of the Division of Metabolism and Endocrinology and director of the Diabetes Research and Training Center.

Joel E. Brown, Ph.D., is the first Bernard Becker Research Professor in Ophthalmology. The chair was created by friends, students, and patients of Bernard Becker, M.D., who for more than 25 years has been professor and head of the Department of Ophthalmology here at Washington University. Dr. Brown, who is widely respected for his work on the physiology of the retina, is a welcome addition to the faculty of the School of Medicine.

The Selma and Herman Seldin Professorship of Medicine and Pulmonary Diseases was announced in January. The pledge made by Mrs. Seldin and other family members will support the program of the chief of the pulmonary medicine division, John A. Pierce, M.D. As the first Seldin Professor, Dr. Pierce will continue his research in emphysema and his direction of the pulmonary division.

Paul R. Manske, M.D., has been named the first Fred C. Reynolds Professor of Orthopedic Surgery. Dr. Reynolds was a faculty member at the School of Medicine for more than 30 years, 17 of them as chief of the orthopedic surgery division. Dr. Manske is currently chief of that division.

The School of Medicine also received more than \$1 million from the estate of Marie Waltke. The gift has provided for the establishment of the Louis and Marie Waltke Memorial Fund for



Third-year medical students with Dr. Michael Karl, Department of Medicine.

Medical Education. The fund supplies financial aid for students of Washington University School of Medicine.

Research

In the national arena of federal research funding, the School of Medicine continues to fare well in spite of tighter governmental fiscal policies. Twenty-four Program Project and Center Grants infused nearly \$6 million into a wide variety of research projects. The McDonnell Center for the Study of Higher Brain Function received a five-year \$5 million renewal from the McDonnell Foundation. That foundation also generously supports research in the recently formed Center for Molecular and Cellular Neurobiology. Also, the research agreements between the School of Medicine and Monsanto, the Mallinckrodt Corporation and the McDonnell Douglas Corporation provide the framework for extensive biomedical research.

Transitions

The year has brought many changes in several of our departments. Carlton Cuyler Hunt, M.D., Edward Mallinckrodt Jr., Professor and head of the Department of Physiology and Biophysics, stepped down last September. He will continue his research on the sensory innervation of muscles at the College de France in Paris. Nigel Daw, Ph.D., professor of physiology and biophysics has been serving as acting head of the department.

The Department of Surgery appointed two new division chiefs. James L. Cox, M.D., was named professor of surgery and chief of the Division of

Cardiothoracic Surgery. Dr. Cox was formerly associate professor of surgery and director of the CORE cardiac surgery electrophysiology laboratory at Duke University Medical Center in Durham, North Carolina. William J. Catalona, M.D., professor of urology, was appointed chief of the Division of Urology. A specialist in cancer diagnosis and treatment, Dr. Catalona has recently evaluated the promise of interferon as an anti-cancer drug.

After more than 20 years as head of the Department of Pathology, Paul E. Lacy, M.D., Ph.D., Edward Mallinckrodt Professor, has stepped down from the position to concentrate full time on his research. A member of the National Academy of Sciences, Dr. Lacy has significantly advanced immunology, organ transplantation, and the continuing search for better diabetes treatments. Emil R. Unanue, M.D., succeeds Dr. Lacy in January 1985. Dr. Unanue is currently on the faculty of Harvard Medical School, where for the last 10 years he has been Mallinckrodt Professor of Immunopathology in the Department of Pathology. Dr. Unanue has been instrumental in showing the critical role played by macrophages, cells which activate the body's immune response to foreign invaders.

William Don Owens, M.D., professor of anesthesiology, has been appointed head of the Department of Anesthesiology after serving as acting head of the department for more than two years. A principal investigator of various anesthesia research projects, Dr. Owens also serves as medical director of respiratory therapy and co-director of the surgical intensive care unit at Barnes Hospital.

Daniel L. Hartl, Ph.D., has been named James S. McDonnell Professor and head of the Department of Genetics, effective September 1, 1984. Donald Shreffler, Ph.D., previous head of the department and a member of the National Academy of Science, had asked to be relieved of his administrative duties in order to concentrate on his research and writing. Dr. Hartl originally joined the medical school's faculty in 1981 as a professor of genetics. His research concentrates on how genes can transfer from one species to another and how much change occurs within these genes when a new species is formed.

School of Social Work



Shanti Khinduka
Dean
George Warren Brown
School of Social Work

The academic year 1983-84 commenced in a rather mixed fashion: the size of the incoming class in the Master of Social Work program was slightly larger than in 1982, but the overall enrollment was the lowest in over a decade. Minority enrollment declined; part-time enrollment increased. For the first time in recent memory, the School operated without any support from the federal government for student training. Consequently, there was unusually stiff competition among applicants for the limited financial assistance offered by the School. A landmark step to aid students was taken with the establishment of several new scholarships named in honor of Jane Addams, Mahatma Gandhi, Harry Hopkins, Martin Luther King, Jr., Mary Richmond, Richard Titmuss, and Whitney M. Young, Jr.

The Social Work Computing Facility

Recognizing the burgeoning importance of the computer in our society, as well as in professional work, the School inaugurated, in September 1983, the Social Work Computing Facility. This facility, located adjacent to the social work library, contains ten IBM Personal Computers, four on-line terminals directly connected to the Washington University Computing Facilities, and three dot matrix printers. Now students and faculty are able to check out and use word processing, data base graphics, spread sheets, and other programs much as they use a reserve book. A one-day workshop was held for social work agency executives in the community on management information systems. The Social Work Computing Facility, the only one of its kind in the country, is an integral part of the Learning Resources Center that also includes a social work library and a video center.

As in previous years, the video center produced several new video tapes. In collaboration with the Multiple Arthritis Center of the School of Medicine and the Arthritis Foundation, it produced a two-part series for cable television on Pain Management in Arthritis. It is now assessing the usefulness of community access cable television as a resource for offering usable information to a wide variety of groups in the community.

Faculty Research

Despite a less than solicitous external environment, the faculty were again quite successful in obtaining research funds to pursue their scholarly interests. The AARP/Andrus Foundation awarded Dr. Joel Leon, a newcomer to the faculty, an 18-month research grant to study how life span affects the economic well-being of the elderly. Drs. David F. Gillespie and Michael Sherraden received a research grant from the National Science Foundation to study networks of organized volunteers with reference to their preparedness to provide emergency communication and social services in the event of a natural hazard in the St. Louis Metropolitan area. Drs. Ronald A. Feldman and Arlene Stiffman continued their work at the Center for Adolescent Mental Health, supported by a grant from the Office of Human Development Services. Their research project on Group Activities for Individual Needs, funded by the National Institute of Mental Health, was concluded during the year. Assistant Dean David Cronin and Jo Mink received an award from the Office of Human Development Services for staff development programs on child abuse and neglect, permanency planning, and foster care for social service agency practitioners in Missouri, Iowa, Kansas, and Nebraska.

Strengthening Programs

The faculty devoted considerable energies to educational planning for the future. Two nationally known consultants were invited to review the Ph.D. program in social work with a view to further strengthening it. Dean Scott Briar, GWB '52, of the University of Washington School of Social Work, and Dr. Thomas Holland of the Case Western Reserve University School of Applied Social Sciences, after spending two days on campus during which they held meetings with Dean Edward Wilson of the Graduate School of Arts and Sciences, the Administrative Committee of the Ph.D. program in social work, and students and alumni of the doctoral program, have sent in their recommendations. These are going to receive serious attention by Dr. David F. Gillespie, chairperson of the Ph.D.

program, and his other colleagues on the Ph.D. Administrative Committee next year.

Continuing its tradition of offering an up-to-date curriculum, the faculty approved two new specializations for the M.S.W. program. The management specialization is designed for students who wish to prepare for management roles and responsibilities in social work practice. The health care specialization is designed for students who, irrespective of their particular concentration in a specific social work method, wish to practice in some aspect of health services.

A faculty task force, co-chaired by Drs. Enola Proctor and Michael Sherraden, began a comprehensive evaluation of the M.S.W. curriculum. After taking into account the traditions and strengths of the School, the expertise and interests of the faculty, the commitments and values of the social work profession, the requirements of the accrediting body, the needs of service agencies, the preferences of students, and other general market factors, this task force is expected to develop for faculty review the design of a curriculum that offers uniformly superior educational experiences to students in the classroom, as well as in the field practicum.

Another task force, chaired by Dr. Rita Numerof, identified the approaches and strategies of recruiting high quality students in an era of declining financial resources. Many of the recommendations of this task force have already been implemented. Others are receiving careful examination by the faculty and the Office of Admissions.

Guest Speakers and Participants

The Benjamin E. Youngdahl Lecture was delivered by Professor Richard A. Cloward of Columbia University, who spoke on "Political Mobilization and the Welfare State." The Morris Wortman Institute hosted a two-day program on Divorce and Remarriage: Implications for Family Therapy by Elizabeth A. Carter of the Family Institute of Westchester, New York. The Thursday Lecture Series again sponsored over 20 colloquia. Among many eminent participants in these colloquia were State Senator Harriett Woods; Councilwoman Ellen Conant; the president of the National Associa-



The Social Work Computing Facility contains personal computers, mainframe terminals, and printers.

tion of Social Workers, Robert Stewart; the director of the Division of Prevention and Special Mental Health Programs of the National Institute of Mental Health, Juan Ramos; and the president of the Monsanto Fund, William F. Symes.

Alumni Support

The Alumni Association cooperated with the School in numerous ways. It chose Virgil Carr, GWB '68, as the 1984 recipient of its Distinguished Alumni Award. Members of the Alumni Board participated enthusiastically in phonathons on behalf of their alma mater. Their role in the recruitment and placement of students, in advising the School with regard to its field practicum and the classroom curriculum, and in hosting social and educational programs for local alumni and current and prospective students was especially noteworthy.

ALLIANCE Goals

The School of Social Work ended the year in the black. The Annual Fund Program, chaired by Richard J. Modde, GWB '73, and ably assisted by an Advisory Committee comprising a number of leading GWB alumni in St.

Louis, raised more funds last year than in the preceding year. Nevertheless, the budget was balanced largely as a result of strict cost-control measures. In view of a near-revolutionary change taking place in the pattern of financing social work education in the United States today, the School must embark on new ways of obtaining resources from the private sector. Toward this end, a Capital Gifts Committee, with such highly respected and influential civic leaders as Carol Duhme, Lawrence Roos, Ethan A. H. Shepley, Jr., and Betty Sims, as members, and University Trustee James L. Johnson, Jr. as chair, has been formed. This committee, as part of the ALLIANCE FOR WASHINGTON UNIVERSITY, will spearhead the School's campaign to raise those essential financial resources that are critical for preserving the distinguished tradition of the George Warren Brown School of Social Work. We will salute this tradition in May 1985 by holding a two-day conference on Excellence and Effectiveness in Social Work Practice to celebrate the 60th anniversary of the founding of social work education at Washington University.

Financial Condition of the University



The University ended fiscal year 1984 with income in excess of expenditures and transfers. The income increased 12.6 percent over the preceding year, with the largest percentage increases being from private gifts, sales and services of educational activities, patient and laboratory fees, and endowment income.

Below is a brief analysis of total income and expenditures, operations of separate fiscal units, and University assets and investments.

Total Income and Expenditures **Income**

The University has four major sources of support for activities represented by its expenditures. These are:

Operating Revenue

Total operating income, primarily from payments by those who benefited directly from the University's operation, amounted to \$198,694,000. Student tuition and fees accounted for \$63,242,000. Patient and laboratory fees for medical services provided by faculty and staff amounted to \$52,014,000. Income from organized patient-care activities, such as the Edward Mallinckrodt Institute of Radiology, was \$37,770,000. The auxiliary enterprises, including residence halls, food service, and bookstores, had income of \$16,183,000. Sales and services of educational activities amounted to \$15,008,000. Current funds investment income was \$6,421,000, while other miscellaneous operating income totaled \$8,056,000.

Government Grants and Contracts

A large portion of the research done by the University is sponsored by grants

and contracts from governmental agencies, mostly federal, for specific sponsored projects. Total income from governmental sources expended in fiscal year 1984 was \$66,824,000, an increase of \$1,663,000 over fiscal year 1983. Scholarships and traineeships accounted for \$5,528,000 of the total and \$265,000 of the increase. In addition, 90 percent of the total \$3,198,000 student loan funds issued under the National Direct and Health Professions Loan Programs was funded by the federal government.

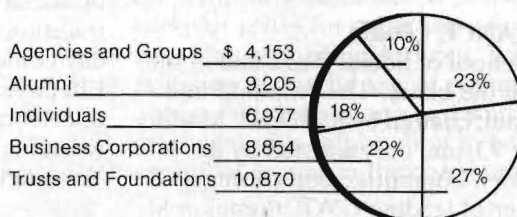
Private Gifts, Grants, and Contracts

Washington University received a total of \$40,059,000 in gifts and grants from private sources for various purposes. Major sources include alumni, individuals, business corporations, and foundations. The graphs below present a breakdown of the total gifts, grants, and bequests received by source and purpose. The total \$40,059,000 was divided as follows: \$20,307,000 for operating purposes which includes \$4,046,000 in unrestricted gifts and \$16,261,000 for sponsored research, other sponsored programs, and scholarships; \$16,595,000 for endowment; \$3,033,000 for plant; and \$124,000 for student loans. In the graph, \$578,000 in scholarships is combined with \$124,000 in loans for total "Student Aid" of \$702,000.

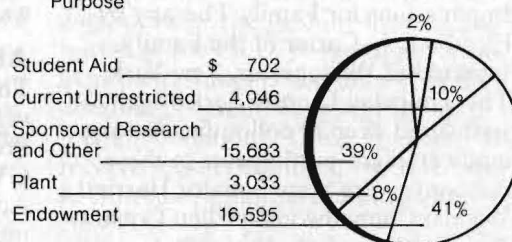
In addition to these private gift sources, the University also receives funds through private contracts for sponsored projects. In fiscal year 1984 these contracts amounted to \$8,189,000 which, when added to the \$16,261,000 referred to above, brings the total for sponsored programs to \$24,450,000. Of this total, \$3,799,000 is being held for

Private Gifts, Grants, and Bequests Received—\$40,059

Thousands of Dollars
Source



Purpose



future expenses on sponsored programs. The remaining \$20,651,000 was expended for current operations in fiscal year 1984 and, combined with the \$4,046,000 in unrestricted gifts, brings the total private gift, grant, and contract income utilized for operating purposes to \$24,697,000. The ten-year chart below reflects large unrestricted grant support from the Danforth Foundation for the years 1975 through 1977 and a large bequest in 1981.

Endowment

The investment of endowed funds resulted in \$21,889,000 of income used to support operating expenditures.

Expenditures

The total operating expenditures of Washington University in fiscal year 1984 amounted to \$282,154,000. In 1983 this figure was \$260,595,000. Approximately 67 percent of the increased expenditures was attributable to instruction and student aid. Research, primarily supported by outside agencies, accounted for another 16 percent of the increase, and 13 percent of the increase was in organized patient-care.

Included in operating expenses is student aid (scholarships, fellowships, and stipends), amounting to \$22,785,000 from University income and from governmental and private sources, but

excluding College Work Study and the State of Missouri Student Grant Program. The summary on page 29 reflects undergraduate financial aid for the past three years.

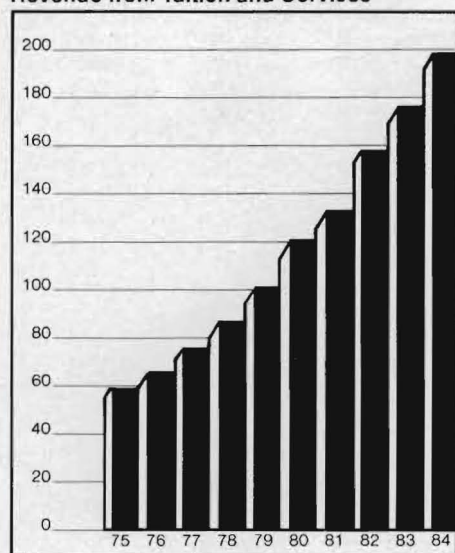
Student loans and capital expenditures for buildings are not expended from current funds—their sources are separate fund categories. All student loans issued during fiscal year 1984 totaled \$4,124,000, compared with \$3,083,000 in the prior year. Net capital expenditures for buildings were \$37,980,000. Investments in all physical facilities, including buildings, land, equipment, and library acquisitions, increased \$49,261,000.

Ten-Year Comparisons

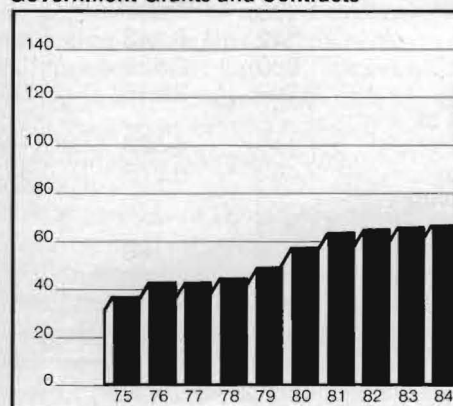
Millions of Dollars

Operating Income by Source

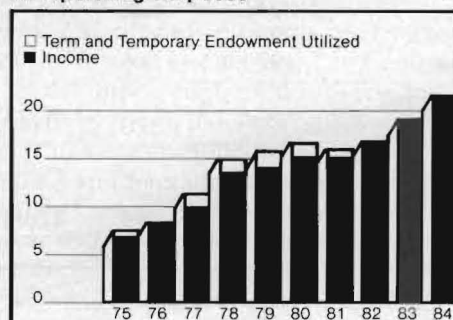
Revenue from Tuition and Services



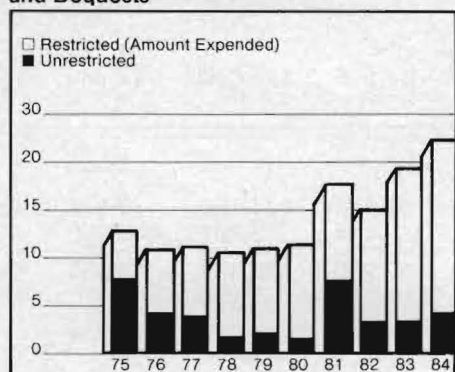
Income Expended from Government Grants and Contracts



Endowment Resources Appropriated for Operating Purposes

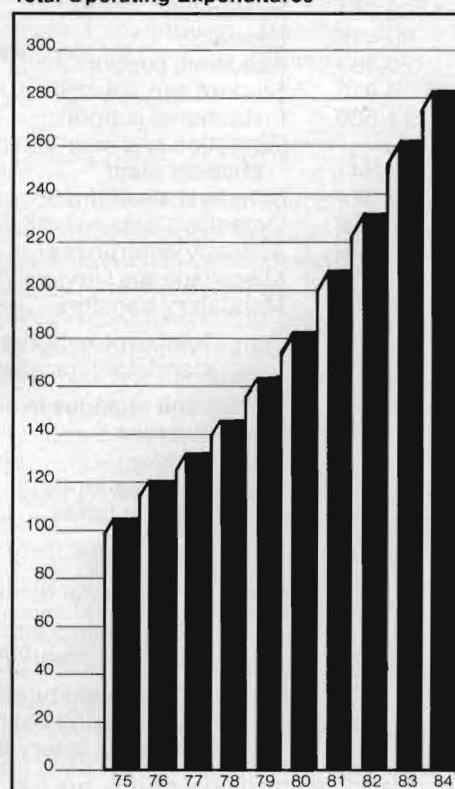


Operating Income From Private Gifts, Grants, Contracts, and Bequests



Annual Expenditures

Total Operating Expenditures



Summary of Current Funds Revenues, Expenditures, Transfers, and Changes in General Reserves for Separate Fiscal Units of the University for Fiscal Year 1984

Thousands of Dollars

Total	Central Fiscal Unit	Faculty of Arts and Sciences	School of Architecture	School of Business	School of Engineering	School of Fine Arts	School of Law
Revenues:							
\$ 63,242							
Tuition and fees	\$ 328	\$25,934	\$2,566	\$5,932	\$9,573	\$2,324	\$4,905
Government grants and contracts. (research, training, financial aid to students, and other purposes)	2,506	9,446	13	40	3,398	40	52
Private gifts, grants, and contracts	4,867	2,965	93	1,043	1,747	202	186
Endowment income (a) (b)	1,822	7,867	214	304	1,010	171	485
Current funds investment income	1,180	708	29	85	215	32	77
Sales and services— educational activities	978	1,227	14	54	916	19	5
Sales and services— auxiliary enterprises	14,013						
Patient and laboratory fees							
Organized patient-care activities— sales and services							
Other income and additions	1,134	97	11	47	214	1	49
\$312,104	\$26,828	\$48,244	\$2,940	\$7,505	\$17,073	\$2,789	\$5,759
Expenditures and mandatory transfers:							
\$108,961	\$ 698	\$18,525	\$1,708	\$3,352	\$ 7,994	\$1,433	\$1,956
Instruction	(20)	7,031	5	8	2,769		1
Research	242	6,343	389	1,552	1,395	468	1,961
Academic support	330	2,528	127	495	1,096	144	330
Student services	2,299	2,617	107	376	492	123	218
Institutional support							
Operation and maintenance of physical plant	(1,115)	4,523	159	634	1,328	311	584
Scholarships and fellowships	2,403	8,373	627	1,173	1,986	629	573
Organized patient-care activities							
Auxiliary enterprises	11,825						
Miscellaneous services	8	86					
Mandatory transfers	2,099	88		8	342		
282,154	18,769	50,114	3,122	7,598	17,402	3,108	5,623
Transfers and changes in general reserves:							
Transfers to:							
101				3	4		16
Student loan funds							
2,592	1,239	(655)		59		(225)	
Endowment funds							
9,824	1,331	122		12	345		
Plant funds							
15,627	4,992	(1,343)	(212)	(177)	(597)	(95)	6
Other reserves							
1,806	497	6	30	10	(81)	1	114
Changes in general reserves							
29,950	8,059	(1,870)	(182)	(93)	(329)	(319)	136
\$312,104	\$26,828	\$48,244	\$2,940	\$7,505	\$17,073	\$2,789	\$5,759
Total expenditures, transfers, and changes in general reserves							
(a) Endowment at market value with income for:							
\$464,569	\$148,453	\$52,995	\$3,264	\$7,171	\$17,786	\$3,364	\$9,558
Support of current operations							
21,343	10,056	1,534	88	114	3,707	203	385
Other purposes							
\$485,912	\$158,509	\$54,529	\$3,352	\$7,285	\$21,493	\$3,567	\$9,943
Total endowment							
(b) A portion of the Central Fiscal Unit Endowment							
Income is distributed to several schools.							

School of Social Work	School of Dental Medicine	School of Medicine & Related Activities	Computer Systems Laboratory
\$1,207	\$4,117	\$ 6,356	
406	376	49,732	\$815
73	431	13,090	
450	29	9,537	
40	116	3,922	17
49	14	11,713	19
		2,170	
	1,529	50,485	
		37,770	
15	128	6,360	
\$2,240	\$6,740	\$191,135	\$851
\$ 760	\$3,574	\$ 68,940	\$ 21
178	328	39,560	555
504	1,469	5,983	183
247	222	1,394	
133	285	4,936	
197	617	11,969	134
117	31	1,662	
		29,806	
		2,004	
	183	3	
	5	418	
2,136	6,714	166,675	893
3	25	50	
68		2,106	
(3)		8,073	(56)
6	(19)	13,044	22
30	20	1,187	(8)
104	26	24,460	(42)
\$2,240	\$6,740	\$191,135	\$851
\$8,202	\$1,800	\$211,976	
35	213	5,008	
\$8,237	\$2,013	\$216,984	

Summary of Undergraduate Financial Aid (Excluding Loan Funds)

Thousands of Dollars

Fiscal Year	Tuition Remission	Restricted Scholarships	College Work Study	Pell Grants	State of Missouri Grants	Total
1982	\$5,645	\$1,827	\$1,106	\$754	\$822	\$10,154
1983	6,442	2,212	1,100	685	822	11,261
1984	8,760	2,580	1,305	807	890	14,342

Operation of Separate Fiscal Units

The Trustees of the University have adopted a policy requiring each of the schools to operate as an independent fiscal unit. Under the policy, which is called the "reserve school system," each of the independent units is responsible for supporting its operating expenditures with its income, and each maintains its own individual reserves to which are credited any operating surpluses and to which are debited any operating losses. Historically such independent units have always maintained positive reserves although in individual years there have been occasional reductions in such reserves.

The Schools of Dental Medicine, Engineering, Law, Medicine, and Social Work have been independent units for a number of years, and the School of Business has been an independent fiscal unit for five years. 1984 was the first year of separate fiscal status for the Schools of Architecture and Fine Arts and the Faculty of Arts and Sciences. General University services and activities such as Olin Library are grouped in one fiscal entity presently referred to as the Central Fiscal Unit. The Central Fiscal Unit is reimbursed for services rendered to the independent units.

The Schools of Dental Medicine, Law, Medicine, and Social Work as well as the Central Fiscal Unit, ended the year with income in excess of expenditures. These schools, as well as the School of Business, achieved an increase in general reserves in fiscal year 1984. Transfers to plant funds resulted in a decrease in general reserves in the School of Engineering, and the Computer Systems Laboratory ended the year with a small decrease in its general reserves. As anticipated in the budget plans adopted by the Board of Trustees,

the Schools of Architecture and Fine Arts and the Faculty of Arts and Sciences utilized certain specific reserves and portions of quasi-endowment, called the Dean's Endowment, as part of their transition to the reserve school basis. Drawdowns on the Dean's Endowment for the Faculty of Arts and Sciences were \$655,000 and for the School of Fine Arts \$225,000, in both cases somewhat less than had been expected in the year's fiscal plan.

A summary of Current Funds Revenues, Expenditures, Transfers, and Changes in General Reserves begins on page 28.

University Assets

Institutions of higher education and other not-for-profit organizations keep their financial resources in the form of funds to comply with the wishes of donors and to account properly for government grants and contracts. A separate fund is established for each project or purpose. The thousands of funds for which Washington University is accountable are handled in four major groupings: current funds, student loan funds, endowment funds, and plant funds. With the exception of income from the investment of endowment funds, the ongoing operating expenditures of current funds may not be offset by resources of the other three fund groupings. The Summary of Assets, Liabilities, and Fund Balances as of June 30, 1984, presents the assets and any claims against them for the four fund groupings.

Current funds must be separated between unrestricted and restricted funds. The unrestricted current funds consist of revenues from the various income-producing operations of the University, plus unrestricted gifts and unrestricted earnings from endowment. Expenditure of these unrestricted



Summary of Assets, Liabilities, and Fund Balances as of June 30, 1984 Thousands of Dollars

	Current Funds		Student Loan Funds	Endowment Funds	Plant Funds	Total
	Unrestricted	Restricted				
Assets:						
Cash and securities maturing within thirty days	\$ 10,399	\$ 5,610	\$ 1,697	\$ 33,693	\$ 23,902	\$ 75,301
Investments at book value	29,672	16,007	2,050	393,908	25,426	467,063
Receivables	51,835	4,245	23,172	5,082	2,659	86,993
Plant facilities . . .					398,754	398,754
Other	6,207	622	466	12,474	1,437	21,206
Total assets	\$ 98,113	\$ 26,484	\$ 27,385	\$445,157	\$452,178	\$1,049,317
Liabilities and fund balances:						
Liabilities	\$ 26,652	\$ 613	\$ 312	\$ 14,974	\$ 98,119	\$ 140,670
Deferred undistributed investment income		34				34
Encumbered and committed reserves	51,201					51,201
General reserves	20,260					20,260
Balance of funds		25,837	27,073	430,183	354,059	837,152
Total liabilities and fund balances	\$ 98,113	\$ 26,484	\$ 27,385	\$445,157	\$452,178	\$1,049,317

funds is left to the discretion of the University. Other funds available for current operations restrict expenditures to a given department or school, or for special, designated purposes such as research in a specified field or by a specified person. Unrestricted and restricted funds are combined in the overview of current operations of the separate fiscal units presented previously. They are kept distinct in the accompanying Summary of Assets, Liabilities, and Fund Balances.

As of June 30, 1984, the total assets of the current funds were \$124,597,000, including restricted current funds of \$26,484,000 and unrestricted current funds of \$98,113,000. Accounts payable and other such liabilities against unrestricted current funds amounted to \$26,652,000. Another \$51,201,000 of the unrestricted current fund assets was encumbered or otherwise administratively committed for specific future purposes. The net uncommitted general reserves was \$20,260,000.

Student loan funds totaled \$27,385,000. The total student loan fund receivables was \$23,172,000, of which notes receivable from current and former students amounted to \$22,901,000. Outstanding loans to students included \$19,308,000 under the National Direct and Health Professions Loan Programs, which were 90 percent funded by the federal government.

The total assets of the endowment fund were \$445,157,000, including \$432,683,000 in cash and investments. The market value of endowment investments associated with each of the separate fiscal units is presented along with the summary of expenditures and income for each unit.

Plant funds totaled \$452,178,000. Of that amount, \$398,754,000 was invested in land, buildings, books, and equipment. Total borrowings for physical plant facilities as of June 30, 1984, was \$93,148,000, of which \$8,206,000 represents Housing and Urban Develop-



ment bonds for student housing and dining facilities; \$19,160,000 represents bonds issued by the Health and Educational Facilities Authority of the State of Missouri to partially finance the construction and improvement of certain educational facilities; and \$58,045,000 represents notes issued by the Health and Educational Facilities Authority of the State of Missouri, also to finance construction and improvement of educational facilities.

Investments

Income (interest, dividends, rents, etc.) from all investments for the year ended June 30, 1984 totaled \$43,450,000 compared to \$43,354,000 for last year. Endowment income for the same period was \$30,644,000 compared to \$27,773,000 for last year.

The market value of all investments (endowment, current, plant, student loans, etc.) including interfund advances (loans) and those securities maturing within 30 days totaled \$610,756,000 compared with \$601,378,000 for the preceding year.

The market value of endowment investments was \$485,912,000 on June 30, 1984 compared to \$470,668,000 the preceding year. A comparison of endowment investments over the past ten years is presented in the accompanying chart.

The increase in market value of endowment investments of \$15,244,000 is the net result of gifts, grants, and net transfers of \$25,838,000, realized market gains of \$21,738,000 and unrealized loss on the portfolio as of June 30, 1984, of \$32,332,000.

On June 30, 1984 the total investment portfolio was diversified as follows:

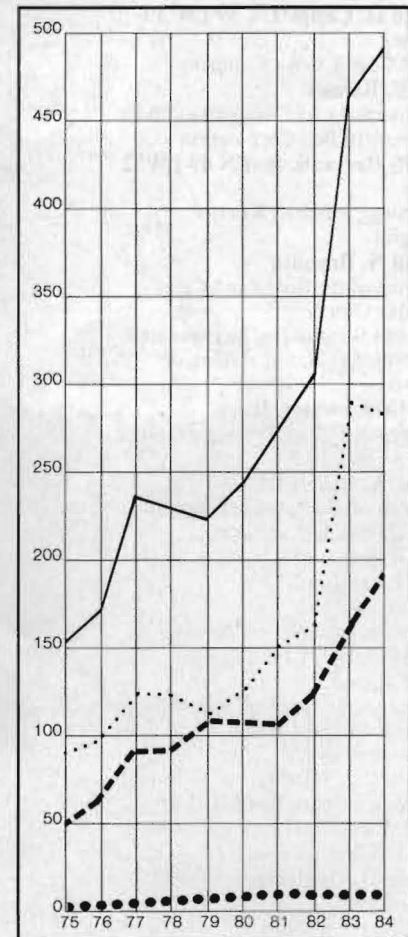
Cash and short-term securities	21.3%
Fixed income	30.4%
Equities	46.5%
Real estate and other	1.8%
	100.0%

Net income from securities lending was \$114,000 compared to last year's \$237,000.

Market Value of Endowment Fund Investments

Fiscal Years Ended June 30

Millions of Dollars



— Total
 ... Equities
 --- Fixed Income Securities
 ••• Real Estate and Other

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All addresses are St. Louis
unless otherwise indicated.

Colombian Wonderland

by Wendi Knapp



Senior Mark Bigler and sophomore Jennifer Schaffner spent a day helping Colombian farmers with their corn harvest.

How 19 Washington University students
learned fluent Spanish in six weeks and had the time of
their lives besides.

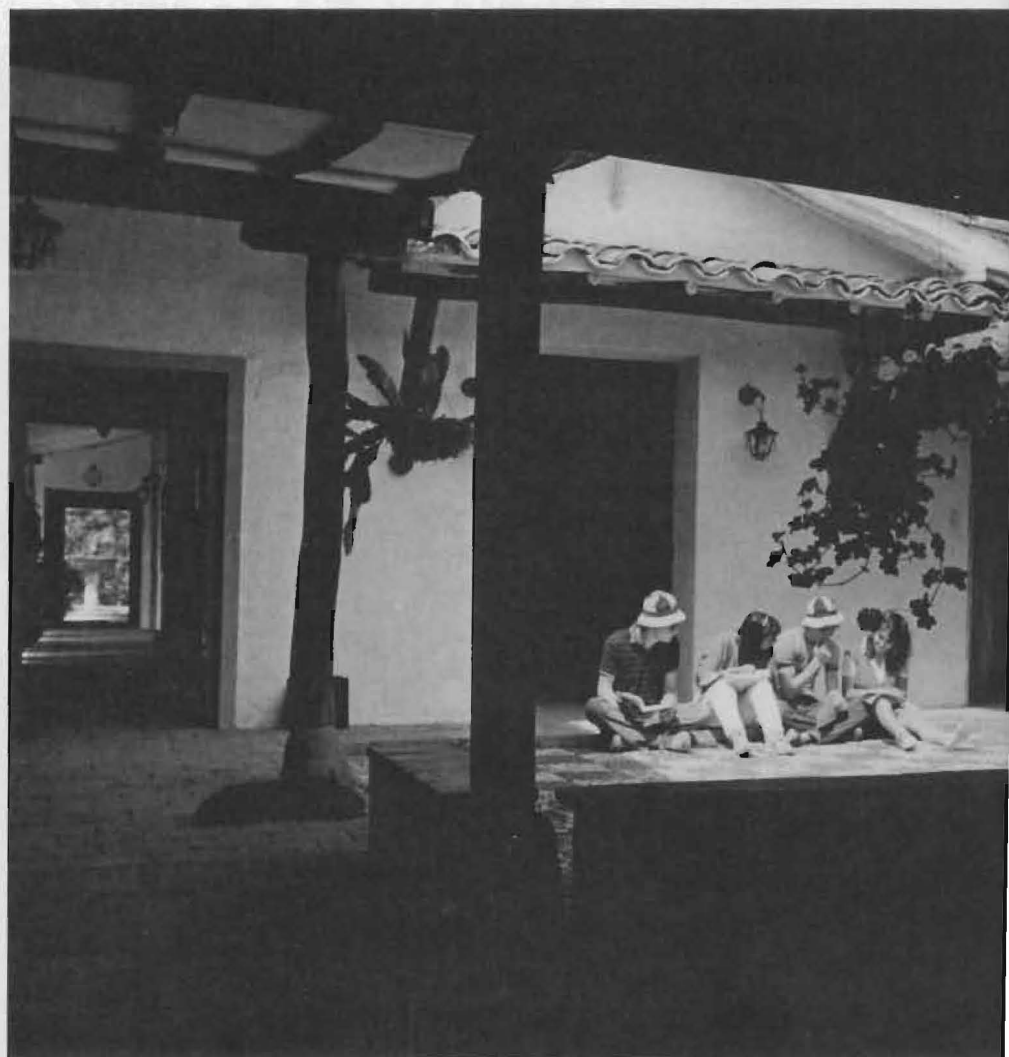
The Summer Language Institute in Colombia completed its third season this June. Nineteen Washington University students, after just one year of Spanish in the classroom, travelled to the Recinto Quirama, a conference center near the city of Medellin, where they took classes, met with prominent Colombian writers, and tried out their rapidly developing language skills on frequent trips into the surrounding country.

Ray Williams, associate professor in the Romance Languages Department and the director of the program, accompanied the students on their adventure. "The progress they make is amazing," he says. "At the beginning they're barely able to struggle through a sentence, and by the time they're ready to go home they're speaking fluent Spanish." Participants in the program were required to keep a journal in Spanish, recording the impressions that each day brought. We have chosen one such journal by sophomore Wendi Knapp to represent the Institute from the students' point of view. She has been kind enough to translate her entries into English for the benefit of our readers.

"There's no way I could have described what things were like by just saying, 'this happened, and then this happened, and then this happened,'" Knapp says in defense of her highly personal, imagistic style. We think her style is just right for what it sets out to capture—six weeks in another world.

Kansas City 5/13/84

Slowly, life comes and the warm water of my shower hits me as the dry, orange sun wakes the house. The plane leaves early for Miami so we eat our Raisin Bran quickly. Dad calls to check the flight. It's on schedule. All is well and clean as I kiss Aunt Bonnie and Father good-bye. Flying always makes me feel like a child, in awe, a feeling I guard. My child-self doesn't know what carries her and is completely



A quiet moment at the Recinto De Quirama

ignorant of what is to come. But still the plane carries her, and she lands safely to stay in a cool Miami hotel for \$12 with her friends. Clean, hot pavement outside while "Tootsie" plays on the hotel television. I fall asleep to the hum of the air conditioner.

Driving Through Barranquilla In A Bus 5/14/84

Barranquilla, city of Garcia Marquez, German Vargas*, port city of culture. Barranquilla, B for brown. Brown

buildings, brown streets, hot dusty brown people. The bus we ride in is a haven of color. The walls of the buildings scream with political graffiti while mad street people with matted hair scream back at them in a language I do not yet understand. It is as though I had showered and washed away my green lawn and red brick house. My sparkling American child-eyes can now see clearly what lies beyond the fence at end of the block where Mom says, "It's a bad neighborhood, don't you go



there." If I were to live in this city I would ride in the happy many-colored buses with jiggling rows of yellow dingle-bobs and patient stripes of blue and red. I would ride all the brown day with St. Christopher holding me safe. Then I would run home and sleep hard.

Luruaco, A Stop on The Road to Cartagena 3/14/84

I always like to think I know what's going on, and, if not, I pretend. They told us what was happening, of course—

these kids are selling mamancitas, arepas con huevos. I should've known. Soon we learn the flavor of this warm pancake-like food with a steaming sunny egg hidden inside. They're called arepas, and the mamancitas are green fruits hiding a soft grapefruit pink center that tastes like a sweet tart. Vargas, Williams, and Uribe* watch and laugh, as fathers laugh, while the children play in their new world and people sell us mangos and papayas. The night grows black and the warm little town still stirs

as we climb onto our bus and rest with English.

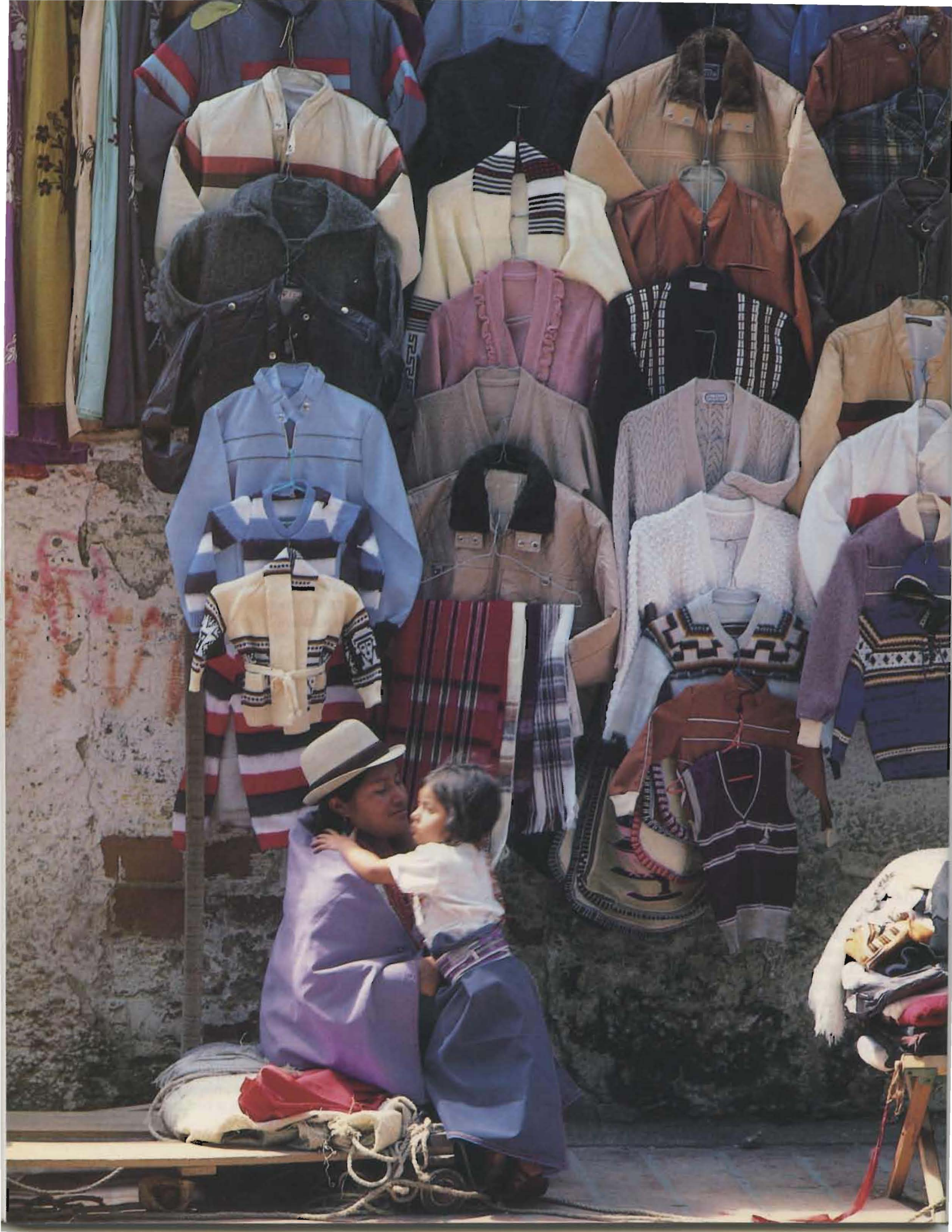
Cartagena 5/15/84

The air burns with gritty sand and the freshness of the morning leaves us. We bake ourselves on the beach with oils bought from the woman selling cool fruit balanced on her head. I meet Steph for the first time, but she understands another world, the world of Spanish, and I, tense and closed, struggle with the small talk of her friends. But we all feel the same hot salty air and our feet are scalded by the white hot sand. The afternoon grabs us at a quickening pace—faster, faster, faster. Street vendors and the happy shopkeepers peer at us. We walk the streets of parrot colors, Cartagena. Underneath this laughing city, hidden stones of black and green moan, tired and aged with hundreds of years on the edge of the earth. These old buildings command the preserved walled city of Cartagena while their offspring, the newer buildings, grow to surround them. For me, night comes in the sultry room of the Hotel Playa underneath the whirling ceiling fan. The room is beautiful. Tan wood, cool tile floors, and five white beds. I curse the hours on the beach and a back of pink-red against my white skin.

Parque Berrio, Medellin 5/17/84

The heart beats. Night falls. The sweet air of sunwarmed fruit and food enters me. I swim against the rush. Faces, thousands of faces. Below my eyes are children with countenances of a hundred years and hands that know the ancient art of survival. The young soft ones grasp tight the guiding hand that protects them. Lights sparkle as the black air of night pushes the yellow air of day aside. With each gust the city seems to breathe. Lights on. The pretty girls parade, buying beer and shoes, always shoes, red ones and brown ones. This city is alive!

*Garcia Marquez: Columbia writer, winner of 1982 Nobel Prize for literature. German Vargas: Colombian writer, considered the father of modern Colombian literature. Raymond Williams: director of Summer Language Institute in Columbia. Carlos Uribe: co-director of program.





A street in the old section of Bogotá.

Recinto De Quirama 5/18/84

Next day at the Recinto, we have class—one and a half hours. Conversation, breakfast, lunch, and dinner. In the night the campesinos (farmers) play vallonatos (music of Antioquia). Other guests teach us of romance, song, and dance. Under the doors and through the windows the gray mist of evening creeps in. Night sounds drug us. We learn the ancient religion of “tranquilo” practiced by the Buddhas of Antioquia. This discipline involves porches, cigarettes, and a thick dark night. Some of us are easily swayed. Others continue to

practice North American Neurotic. But they will come around. There is time. Long days with friendly cows. Nights with fires and chocolate. In the country we are with corn on the hills and square houses of red, green, blue, and white. The screams of dirty children cut the fresh day with playful malice.

Leticia, Amazonas, Colombia 6/1/84

The Hotel is aqua-colored, without windowglass. Curtains hang in an old lady's kitchen. Three beds for \$3. Beds of varied sizes wait with white sheets, flowered sheets, and yellow blocks of foam rubber (a pillow maybe?). Good thing no one sleeps

much here. We talk with people sitting on empty crates of Coca-Cola. Time for a drink. Juice in the Amazon—how incredibly exotic. Andy eats a hamburger. “The Little Drummer Boy” on the radio, in Spanish. “Wait! is it Christmas?” Steph assures me it's not. We watch cars motionless in the street. There is no gas in Leticia and the waitress says “no cheese.” The orange eye of the sun is now low. It looks across at us as the river ambles by underneath. Music, water, and magic. The air is thick with stale beer and cigarettes. We sing and smoke while our songs disappear into the jungle with wind. The jungle, a green monster, quietly creeps upon us.

An outdoor market in Medellín



Student Lauren Jensen sips a cup of Colombia's national drink

Leticia 6/1/84

Yesterday was easy. Today we're traveling with the Amazon; on its arm we come to where houses rest on skinny posts with people in bright clothes watching from doors and windows. I talk to the kid with the "Born to Party" T-shirt. He asks me why I have two holes in my ears. I tell him it is "the style." The children are fat with worms that share their food, and I grimace. But they are still laughing at my ears. We drink some Coke with men in the cement mission building. Leaving the village I wonder if I have worms sharing my food.

Bogotá 6/4/84

Walking, the dark streets command you. Passing the shops and taverns, you stare with wonder. The caverns of light spill over with hot, yellow laughter that hits the cool outside and is chilled to blue-black as it climbs toward the sky. Bogotá, capital of Colombia. The arepas on the street are the best. Yellow cornmeal patties, fried, with cool white cheese on top. We buy some from a dirty lady and her son. Bogotá, a tin can stuffed full and quickly closed tight with everyone screaming inside. The wind is chilly while we walk.

The gamines (street children) roam the streets for their dinner in gray clothes. *Just don't touch me.* Home, let's go home, it's getting late. The shrouded night people patrol the city. They see us. We must find a taxi. They're coming closer! *Just don't touch me.* The taxi is safe and the driver knows it. We pay for safety—500 pesos; it would have been 55 in the day. With time, the night is spent and the heavens swallow the distant heat of an evening past. Sleep comes in the security of heavy blankets and cool sheets.



Rio Claro, Magdalena Valley 6/7/84

We are supposed to be in Medellin, but the bus has broken down. The river is cool as it washes away my tiredness. Beau decides to dive off the cliff and I follow. My stomach lurches as I fall. Big blue butterflies, wet green ferns and trees surround me. If they asked, I'd stay forever. The wise old world is young. Inevitably time is invented. The bus is fixed. Reality turns the corner and the cool mist disappears, leaving me naked on the concrete.

Cali 6/8/84

In Cali, there is hot water. A modern city with shopping malls, lawns and beautiful people. In a sweet valley of cane is Cali. Roke, Carlos, and Flaubert show us the city like jewelers showing a gem. The night is dark, and from this mountain you can see the city flowing from the hills like candle wax, warm from the flame. Normal city—music, bars, Chinese food, lovers walking hand in hand, man and man, woman and woman, man and woman. Things are getting a bit confusing. Everyone's a "good Catholic" deep inside; it's just this sticky sugary air making our heads spin, green lights, signs flashing, scintillating, sensuous. I'm sure it will go away. They say once you have known Cali you feel different. I feel fine. But wait! Whose hand am I holding?

Going Home From Cali 6/11/84

The morning comes without sleep as we end our bus ride. Our breakfast falls like a rock. Beau, Steph, and I want a chiva (a colorful bus open to the air, carrying pigs, people, etc.). We talk of Germany and Texas while we wait. No chiva comes but we find a man in a bus. He laughs and says "Fifty pesos each to San Antonio." To San Antonio we go, no farther because the driver is ugly, he demands more. Finally, he takes one hundred pesos to carry us to Quirama. Then we walk the street to the Recinto. Steph drops the cheese that she bought in politeness for Don Alfonso, and it breaks. Beau is calm while I laugh in the center of the road.

Recinto De Quirama 6/15/84

Belasario Betancur, president of the Republic of Colombia, right here in the Recinto. No "plato típico" for him—the meal that weighs a ton with rice, pork, egg, avocado, beans, and cabbage. No, they feed Belasario fancy food. We listen to a president's speech, written by the president. I didn't know they did

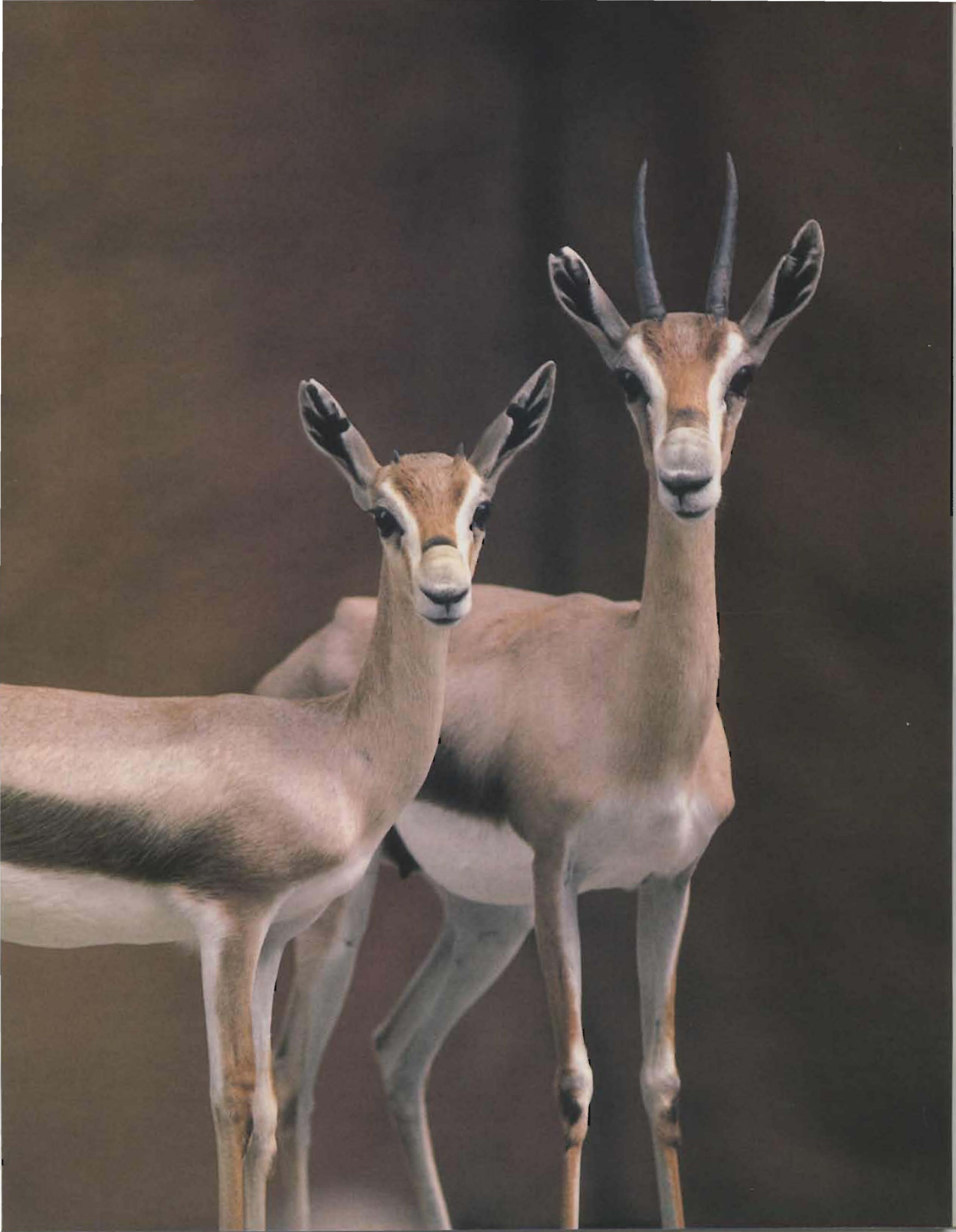


Wendi Knapp

that any more. We shake his hand, then eat lunch. This man writes his own speeches, reads literature, and eats lunch. Nobody will believe this back home. In the evening we worry about our tests and our projects a little, but soon dance like true Colombians. The night is warm and we are friends.

Kansas City 6/28/84

Ding. Ding. Ding. Shut that alarm off! I'm in the middle of a wonderful dream. I dreamed that another world was opened to me and I could speak Spanish. I met many new, friendly people, traveled the Amazon, even lunched with the President of some South American country... Colombia I think it was. Oh well, it had to end sometime and now I can't get back to sleep. Why does this hot shower feel so strange and new? There's a toilet seat; in my dream there were no toilet seats. My change spills out of the pocket of my jeans as I put them away—five pesos and one centavo. A wonderful dream it was. Today I drive home to Wichita.



Saving the Speke's

by Carol Baskin

Geneticist Alan Templeton has devised a breeding program that can save the Speke's gazelle and other threatened species.

A small but thriving herd of Speke's gazelle roam their enclosure at the St. Louis Zoo, unaware that their rescue from probable extinction offers hope for scores of other endangered species in captivity.

The fragile-looking animal, originally from an inhospitable plateau on the Horn of Africa, is one of the world's rarest antelopes. The Speke's bounds about on slender legs and gazes shyly at the world with large expressive eyes, but its most remarkable characteristic is its nose. When the gazelle snorts to sound an alarm, folds of skin in its nose inflate instantly. The surprising, almost comical effect is here one second, gone the next.

The Speke's is sure to survive now, at least in captivity, thanks to a bold but calculated program of managed inbreeding developed by scientists at Washington University and the St. Louis Zoological Park. When the program began in 1979, only a few gazelle remained, and all the animals had descended from the same father. The choice was dramatic: defy the taboo against inbreeding or watch the graceful creatures lose their showdown with extinction.

Thanks to a plan devised by geneticist Alan Templeton, Ph.D., professor of biology at Washington University, the Speke's gazelle is winning its struggle. And what's more, the plan can be used for any small population—25 or less—

of a captive species. That's a big departure from current genetic management, which has avoided inbreeding and requires at least 250 animals to maintain a healthy population.

The Washington University geneticist calls the inbreeding project "an act of desperation," but a choice preferable to the gazelle's extinction. Desperation in this case most definitely does not imply slapdash methods. Templeton and Bruce Read, assistant curator at the St. Louis Zoo, have backed their program with complex genetics tests and statistical analyses proving that inbred animals do not necessarily dwindle in vigor and number. But the scientists have also striven for practicality, insisting from the beginning on a plan that any zoo with carefully kept pedigrees can duplicate.

The Speke's gazelle became a candidate for this radical approach to survival through mostly man-made misfortunes. Its home is a desert plateau in northeastern Africa, on the border between Ethiopia and Somalia. Twenty years of warfare, compounded by drought, habitat destruction, and vast migration of displaced people have made it difficult to determine whether the gazelle still survives in its natural home. The last one seen in Africa was in 1973. Wildlife experts assume that, at best, the gazelle is endangered.

In 1969, Marlin Perkins, known nationally for his long-running "Wild Kingdom" television show, and then director of the St. Louis Zoo, started a breeding program with the only four

Speke's in captivity—one male named Greenie and three females—Iodine, Lisa, and Chicago. A decade later, the gazelle were far from flourishing. With matings between related offspring unavoidable, average birth weight had dropped, and only one in five newborns was surviving the first year of life—classic signs of what scientists call an inbreeding depression. Extinction was almost sure to follow.

Zoologist Read sought out Templeton, who had performed advanced genetic theory experiments with fruit flies in Hawaii. There Templeton studied the insect's natural adaptation to new genetic limitations. For example, he isolated an inseminated female and observed what happened when offspring matured and mated. "For a while they died...well, like flies," says Templeton. "Later they adapted and survived."

He determined that a species adjusts most rapidly to inbreeding when the maximum variety of genes is maintained. That requires quickly producing as many offspring as possible from available inbred parents and then making breeding choices so that the genes of the original animals are equally represented in the population.

Templeton's fruit fly experiments had duplicated in the laboratory a process that had already occurred with a few captive species. The reticulated African giraffe is one example—the 200 living in Australia today come from just three. And the European bison, once reduced

to only 12, now numbers in the hundreds. Both recoveries were the result of managed inbreeding programs, but in neither case had the process been adequately documented.

Examples of intentional inbreeding and adaptation also exist in the human species. The Tamils, a people of southern India, traditionally marry first cousins. Cleopatra was one of the last offspring of brother-sister marriages among the Ptolemies of Egypt, a family that had finally succeeded in eliminating most of the harmful genes from their dynasty.

Most species, explains Templeton, have a reservoir of genetic disease. A human without inbred ancestors, for example, carries an average of eight lethal genes for diseases that usually kill before puberty. But those diseases can't affect offspring unless a union brings together duplicates of the same deadly gene. Speke's gazelle, as it turned out, also bore eight harmful genes apiece. But with all the gazelle descending from the same male, there was no way to keep bad genes apart.

There is another factor at work, however, that mitigates this tendency toward genetic catastrophe. This is the "Adam and Eve effect," meaning that a randomly chosen male and female will represent an average of 80 percent of all the genes within a particular species. And given access to a maximum variety of genes, the evolutionary process naturally selects those individuals whose genetic code allows them to adapt most successfully to their environment. These are the individuals that will survive and pass on their genes to the next generation. The Adam and Eve effect doesn't actually counteract lethal genes, but it does maintain the greatest possible genetic variation. "And genetic variation," Templeton says, "is the raw stuff of all evolutionary change."

In managing a captive species, scientists can make inbreeding work for them. "Inbreeding forces evolution

along," explains Templeton, "leading either to a slightly altered version of a species, or extinction. Animals adapt to inbreeding if they can survive the natural process of genetic selection. We chose to avoid the gamble. For the sake of saving the Speke's, we directed its evolution."

The model on which they based their breeding decisions evolved out of Templeton's fruit fly research, but it was Read's detailed pedigree of the Speke's herd that provided the basic data to which the model could be applied. Without the more than 10 years of meticulously kept history of the gazelle herd—matings, birth weights, still births, spontaneous abortions, and age at death—the project would have been impossible.

Templeton took charge of deciphering the genetic messages by which each generation of gazelles registered the success or failure of the plan. As soon as each animal was born, he took a blood sample and isolated the gazelle's DNA, the complex molecule that carries an organism's individual genetic code. Using recombinant DNA technology, he then monitored the genetic variation in each new gazelle in order to check the accuracy of breeding decisions.

The scientists had to endure an initial period of disappointment. As the project began, many of the gazelle were either stillborn or died soon after birth. Nor did the deaths stop immediately, particularly while the lethal genes were being eliminated. But from the outset, survival improved consistently. "If we had done nothing, they would have continued to die at a high rate," Templeton says.

Now in its third complete generation since the last four captive Speke's were brought together in 1969, the gazelle herd is thriving. The current population numbers about 27—18 in St. Louis and the rest in other U.S. zoos.

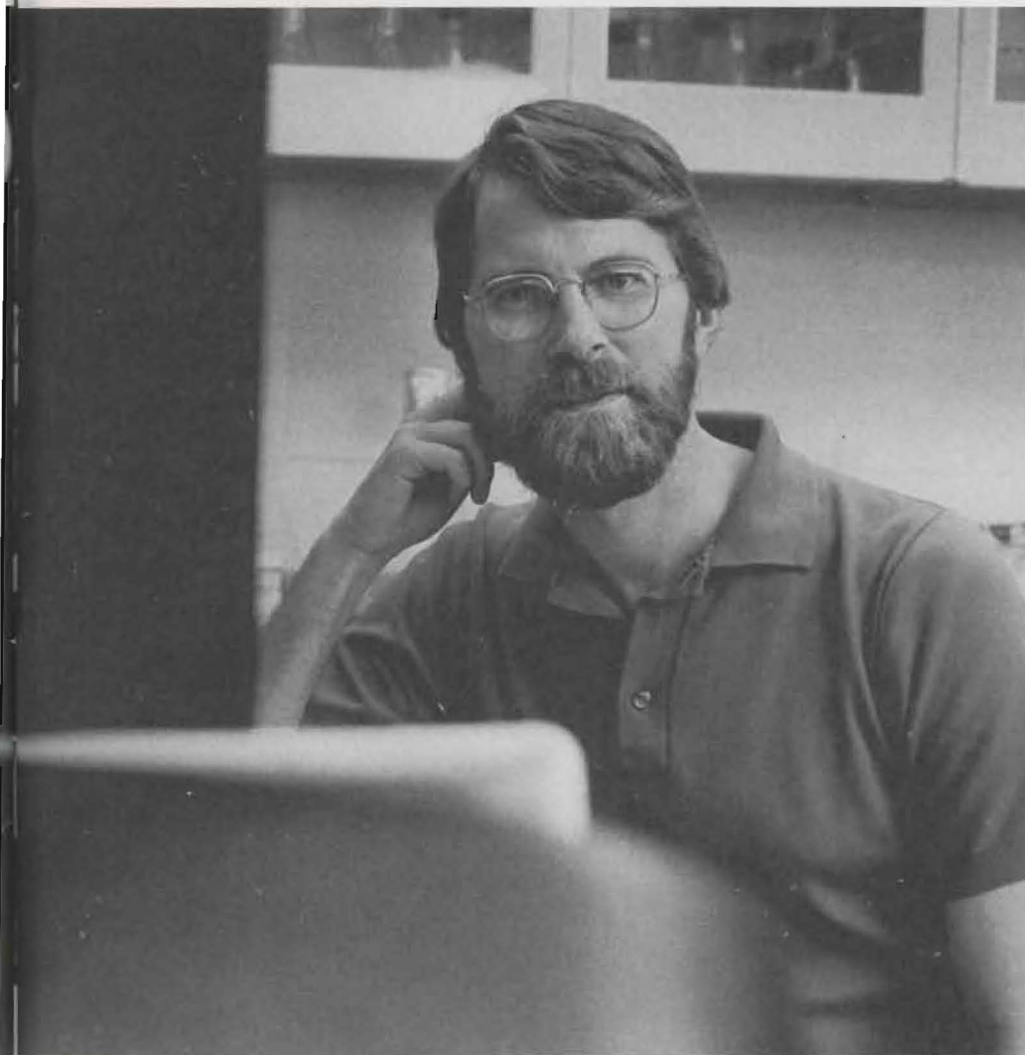
Today's herd—Hope, Diamond, Crawford, Simon and all the rest—don't look any different than their ancestors.



Alan Templeton

Besides the gradual elimination of lethal genes, their genetic alteration is slight. An inadvertent change, says Templeton, is the drift toward docility. Naturally, calmer animals do better in captivity, and to domesticate the gazelle would, of course, make the zookeeper's job easier. But if the gazelle is ever released into the wild again, the less domesticated it is, the better its chances for successful adaptation to its environment.

Whether the gazelle's original habitat can ever welcome the survivors home remains in question. "Human activity is



the greatest destroyer of natural habitat, and that destruction alone is why we're living in a period of mass extinction," says Templeton.

"We don't even know what a seemingly trivial species might mean to man's survival," Templeton talks of a variety of maize reduced to only a few acres in Mexico before researchers discovered its resistance to major fungal diseases affecting domestic corn. "If those last acres had been destroyed before the dawn of recombinant DNA techniques, the unique genes would have been gone

forever," he says.

Templeton is proud of his work with the Speke's gazelle, whether or not its survival is of immediate practical concern to human beings. "There is purpose in the vast diversity of living things," he says, "whether man has figured it out yet or not. Every time a species disappears, the world is a little poorer."

Templeton and Read are using their project's success to convince other zoos that managed inbreeding is a valid strategy for survival when only a small

number of animals remain. But evolution of human opinion has required careful attention too. Only two years ago, when he first presented results to a national conference on genetics and conservation, Templeton encountered skepticism. For years, inbreeding had been avoided in the belief that the practice would narrow the gene pool and kill off the species. After considerable debate, participants concluded that Templeton's data spoke for itself and that managed inbreeding has a place in species management.

By late this summer—when 36 conservation biologists, zoologists, and geneticists met at a conference sponsored by the Smithsonian Institution's National Zoo—the St. Louis Speke's herd had evolved from a source of controversy to a classic success story. The efforts of trailblazers Templeton and Read had produced a model whose positive results encourage others to follow. Herpetologists in Texas are using the program to save a rare variety of rattlesnake. A project to save the Siberian tiger is getting under way in Minnesota. And there are others.

"What we're saying is not falling on deaf ears," says Read. "Zoo managers now realize resources are limited—in animals as well as funds. Zoos are not only displayers of the species. We've become arks, protecting and preserving as many as we can."

The population manager of the National Zoo in Washington, D.C., has commended the work of Washington University and the St. Louis Zoo. "For species that are really down in numbers—and a lot of them are—this is very important," says Jonathan Ballou. "Now we know we don't need to give up. We can inbreed cautiously and still preserve the species."

This September the St. Louis Zoo received the Edward H. Bean Award for its Speke's breeding program, one of the most prestigious awards in the zoo field.

OF HOPE AND

by Joseph Schuster

During the next year, roughly 8,000 Americans will die from cancer of the kidneys. The number is not, perhaps, as statistically significant as the number of deaths from other, more prevalent types of cancer—as compared, say, with the 121,000 who will succumb to lung cancer, the more than 50,000 who will die from cancer of the large intestine, or the 38,000 from breast cancer. But 8,000 deaths is 8,000 too many as far as doctors are concerned.

Kidney cancer is also of special concern to the medical profession because it is so heartbreakingly deadly. Currently there is little that can be done to save most who develop renal cell adenocarcinoma, as doctors call the most common type of kidney cancer.

This helplessness in the face of the disease could turn to hopefulness in the next few years, however: preliminary research by doctors in the Division of Urology at the Washington University School of Medicine indicates we might—stress *might*—in the next decade, have an effective weapon for fighting kidney cancer.

“There is currently no effective therapy against renal cell adenocarcinoma,” says Timothy L. Ratliff, Ph.D., director of Urologic Research in the Division of Urology. “Roughly 70 percent of patients (with the disease) develop metastasis and die within five years.” (When a cancer metastasizes, it spreads into organs beyond that in which the disease originated.) The only method of treatment with any regular effectiveness is nephrectomy—removal of the cancerous kidney—but this has inherent limitations. In most cases the more obvious signs of the disease (such as blood in the urine) do not exhibit themselves until the condition has progressed into its later stages. By the time a diagnosis is made, the cancer has metastasized and the surgery would be useless.

But in recent laboratory tests with mice infected with the disease, Ratliff



Timothy Ratliff

SYNERGY

Timothy Ratliff has discovered that, in treating kidney cancer, one and one don't necessarily equal two.

and his associates at Washington University and Jewish Hospital have found a course of therapy that appears to have an 80 percent effectiveness against the renal cell tumor. Their experimental therapy involves two substances—interferon alpha-2 and alpha-difluoromethylornithine (DFMO). Each of these drugs is still in the experimental stage, and each, on its own, has shown itself to be of limited and unpredictable effectiveness against cancer. In combination, however, their potential may be greater than one might expect.

Interferon, of course, is the controversial drug derived from a naturally occurring chemical in the human body that was touted several years ago as the "magic bullet" scientists had been searching for as a miracle cancer cure. Its proven effectiveness has never equaled early expectations. "The prevailing opinion on interferon is that, alone, it will not be truly effective against tumors. The trend is to use it in combination with other drugs," Ratliff says.

DFMO has also, on its own, proven to be a drug of limited effectiveness. Ratliff explains that it is "very specific for the inhibition of a substance known as ODC, an enzyme required for the synthesis of polyamines, which are necessary for cell division. It's been shown in some tumors to inhibit their growth."

Interferon works in a similar way. As Ratliff explains, it "induces antiviral activity and inhibits cell division, possibly by inhibiting polyamine metabolism."

It was because of the similarity of the effect of DFMO and interferon that Ratliff and his associates decided to try the two drugs in combination as a treatment for kidney cancer.

They were surprised by the results.

In vitro (that is, working on cancer cells outside of a body), they found that, alone, DFMO had an insignificant effect on the growth of the cancer cells, while the effect of interferon

depended on the size of the dose; in its highest concentrations, interferon inhibited cell growth by about 45 percent when compared with the size of untreated cancer cells.

But when they combined interferon with DFMO, the success in controlling cancer growth was significant—much greater than the scientists could predict based on the effectiveness of the two agents separately. Ratliff characterizes the effect as "synergistic rather than additive. If substance A has a 10 percent effectiveness and substance B also has a 10 percent effectiveness, you might expect that together they would have a 20 percent effectiveness, whereas synergistically, the effect may be closer to 80 percent."

When they tried their experiment *in vivo* (in a living body) their results were similar: after 28 days of treatment, the average tumor in mice treated with DFMO and interferon was one-quarter the size of the average tumor in untreated mice.

It's important, Ratliff says, that they had the same results working *in vivo* as they had *in vitro*. "There are a lot of things that can occur *in vivo* that are not inherent *in vitro*. *In vitro*, you can use higher concentrations of a drug than you can *in vivo* because you don't have to worry about toxicity. *In vitro* you don't have to be concerned about a body metabolizing a chemical or about antagonistic substances changing or negating a drug's effect."

That the combination was equally effective *in vivo* as it was *in vitro* suggests to Ratliff that it may be valuable in treating the cancer in humans. But clinical use of DFMO with interferon, if it ever comes to pass, is still a long way off. Even experimental use of the drugs on humans is a year or more away, Ratliff says. Meanwhile, he and his associates will be laying the ground work for such use by trying combinations of DFMO with other types of interferon, which, Ratliff hopes, may be even more effective.)

But Ratliff's hope that his work may lead to an effective treatment for kidney cancer is tempered with caution. Too often, he says, people hear about preliminary, experimental success with a new drug and want to hurry the drug into the market. The reasons for this impatience are understandable. "Cancer strikes fear in people. When someone has a tumor and sees no hope for himself, he will grasp at straws."

The sad saga of laetrile offers one particularly instructive case in point. In the 1970s, laetrile was promoted as a cancer panacea, even though there were no well-controlled studies done using the substance to prove the claims of its proponents. Despite the lack of scientific evidence, an estimated 70,000 cancer patients (according to laetrile's promoters) were using the drug to treat their condition. When the federal government, yielding to considerable public pressure, finally subjected laetrile to rigorous tests, it found the drug to be totally ineffective against cancer.

Even interferon, a drug with a far more impressive medical and scientific pedigree, has caused its share of disappointment. In March, 1980, *Time* magazine featured a cover story on interferon which led many to believe that it was the long-anticipated "magic bullet" (a substance that can kill cancer cells, specifically, without harming other cells). Subsequent research, however, has not shown interferon to be the miracle cure-all that some hoped it would be.

Regarding his own research, Ratliff says, "I don't want to offer false hopes for anyone. You have to realize that our work is very preliminary. It's too early to tell about this."

Nevertheless, for future victims of this merciless disease, there is now a glimmer of hope.

Joseph Schuster is a writer living in St. Louis and is on the staff of St. Louis Magazine.

WHAT'S THE STORY ON THE SHORT STORY?

Is the short story the literary form of the future? Shannon Ravenel, who reads 1,500 stories a year, may be in a position to give us the answer.

by Cynthia Georges

“Writing the short story is a good way to begin writing seriously,” wrote Bernard Malamud in the preface to his most recently published collection of short fiction, *The Stories of Bernard Malamud*. Malamud may see the short story as a way of beginning a writing career, but in the case of many writers it can be an end in itself. The cinematic success of his novel, *The Natural*, notwithstanding, many critics feel that it is within the parameters of the short story, rather than in the novel, that Malamud displays his finest talents, and that his reputation rests more securely on the former.

If the short story has been viewed as a warm-up exercise for writers, it has done its job so well that the warm-up has become a workout of technical proficiency and provocative craftsmanship.

“Our literary fiction, at the moment, is tilting toward the short story and away from the novel,” says Shannon Ravenel, visiting professor of fiction at Washington University and editor of the annual *Best American Short Stories*. “Story writers seem to have more confidence in the form and its validity and in the possibility of publishing a collection.”

The genre has taken new form through the exploration of innovative writers such as minimalist/surrealist Donald Barthelme, frequent contributor to *The New Yorker* and author of eight short story collections; John Barth, self-reflective writer who often abandons story line to tease the reader with intriguing literary games; and Mary Caponegro, who deals in the daring, explicit, and avant garde.

Ravenel, also senior editor of the Bright Leaf Short Fiction series at Algonquin Books Inc. in Chapel Hill, N. C., reads some 1,500 short stories a year. As editor of the *Best American* collection, she culls 120 stories from American and Canadian periodicals and sends them off to the guest editor, a different writer or critic selected each year who will pare down the number to be anthologized to 20. The 1984 volume, which is due on the bookstands in October, will feature writer John Updike as guest editor.

“It’s not hard to pick 120 good stories,” says Ravenel. “More people have written more skillfully in the past 20 years than ever before.” The short story has become sleeker, more refined. It is like an automobile... a product of its time. One of the things it does best now is to extend intimacy. This attracts me. I want to be sitting at the same kitchen table with Raymond Carver’s people.”

Ravenel attributes the wealth of short fiction, in part, to the proliferation of writers’ programs which offer degrees in creative writing. “A lot of very good short stories are written in these programs,” she says.

The short story has developed as a reflection of its culture. “It is not the story conflicts that have changed, but rather the trappings or details,” says Ravenel. Contemporary fiction contains references to TV programs, drugs, divorce, the Vietnam War, and women in business.

Mary Robinson’s story, “While Home,” opens at the Lakebreeze Laundromat. A character relaxes with a

copy of *Variety* magazine; another dreams of replacing his Suzuki with a faster motocross bike. In the Deforest family’s living room, a television anchorwoman’s weather report is followed by an episode of “Hawaii Five-O.”

Writer and critic Stanley Elkin, Merle Kling Professor of Modern Letters at Washington University, says that short fiction collections are getting attention because of the success of Carver, Mary Robinson, and John Cheever’s collections. “The popular stories today are the minimal stories. Little teeny tiny slices of life which, in their very sketchiness, are supposed to contain a portentousness. You’re seeing macrocosms in one’s peanut butter sandwiches.”

Elkin, who teaches in the Writers’ Program at Washington University and reads manuscripts for the National Endowment for the Arts, asserts that while there are extraordinary writers publishing, there are more extraordinary imitators, those who ventriloquize other people’s work. There were 900 grant applicants this year “who have published as professional writers but who have come off the same sausage and salami machine,” he says. Of the Washington University Writers’ Program Elkin says, “We turn down more than 75 percent of the applicants.”

What constitutes good fiction? “First of all,” says Elkin, “You have to start out with a really tight, unique situation—not necessarily something that is off the wall, but something that’s unexpected.”

Ravenel says, “A story has to mean something. It’s usually at the end of the story that I say to myself, so what? If the

by Guido Weiss

Without Funding for Math, a Dim Future

Behind almost every scientific advance is an advance in mathematics; The current neglect of math threatens our whole scientific and technological future.

There are many reasons to be very concerned about the future of mathematics in the United States. Basic science cannot continue in a fruitful way without mathematical theory. Our country is still reaping the harvest of the investment of human and dollar resources it made during the post-Sputnik decade. However, the investments made since 1968 have not been adequate to ensure renewal of the field.

Support for mathematical science research in the United States has declined substantially in inflation-adjusted dollars and now is markedly out of balance with support for related scientific and technological efforts. Strong action must be taken by the administration, Congress, and universities as well as the mathematical sciences community to bring the support back into balance and provide for the future of the field.

These are some of the conclusions reached, after a two-and-a-half-year study, by the Committee on Resources for the Mathematical Sciences, an ad hoc committee appointed by the National Academy of Sciences to study the extent, nature, and adequacy of support for research in the mathematical sciences in the United States. The 17-person committee, headed by Edward E. David Jr., science adviser to former President Richard M. Nixon, made public its report June 6 urging immediate strong action.

Almost all mathematical research (more than 90 percent) is conducted in the universities. Research support for mathematics has come almost exclusively from the National Science Foundation, the Department of Defense and the universities. Legislation passed by Congress in 1969 caused the Defense Department to drop nearly all of its support of pure mathematical

research and parts of basic applied work as well.

This was followed two years later by a dramatic reduction in federal fellowships that removed practically all federal support of mathematics graduate students and postdoctoral fellows. These factors, together with the "explosion" of computer science (that should not be confused with mathematics), are the principal causes of the decline.

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To illustrate the severity of this problem:

► American universities granted doctorates in mathematics to 774 U.S. citizens in the academic year 1972-73; this number declined to 455 by 1982-83.

► Chemistry, physics, and mathematics have comparable numbers of faculty involved in research (between 5,000 and 6,000). Chemistry and physics each had about 3,300 faculty members with federal support in 1979; the mathematical sciences had 1,000 fewer federally supported faculty members.

This lack of balance is reflected more dramatically if one looks at the

number of postdoctorals in all graduate institutions:

► In 1980 the physical sciences had 4,261, the life sciences had 11,715, while mathematics had only 143 postdoctorals.

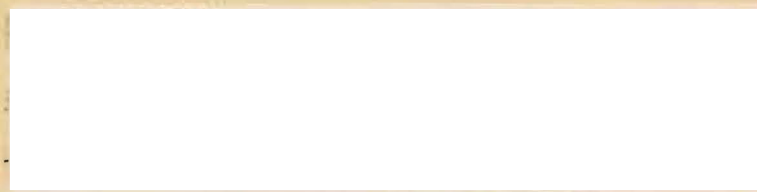
► During the last four academic years the number of mathematical researchers supported by a government grant has declined by more than 15 percent.

All these factors have contributed to a general feeling of discouragement among active mathematical research scientists. This discouragement is easily observed. Those mathematically gifted undergraduates who, in the past, would have chosen a mathematics career can see that their professors are not as enthusiastic as they once were, that they are not receiving the research support or the respect of those in the other sciences, and all this has an effect on the morale of everyone in the field. As a result, fewer continue into a mathematics career now than would have a few years ago.

The impact of developments in pure mathematics on the other sciences and on society in general is not immediately obvious. Nevertheless, after a certain time lag, many mathematical discoveries fundamentally influence other fields. A healthy scientific advance cannot be made without an accompanying healthy mathematical community. The United States, at present, has such a healthy community because of the previous investments mentioned above. Unless some strong action is taken in the very near future, however, the health of the mathematical community will be seriously impaired within 10 years.

Guido Weiss is Elinor Anheuser Professor of Mathematics at Washington University and was a member of the NAS study committee.





Llamas at Machu Picchu. Five hundred years ago a great empire rested on the backs of these "ships of the Andes."