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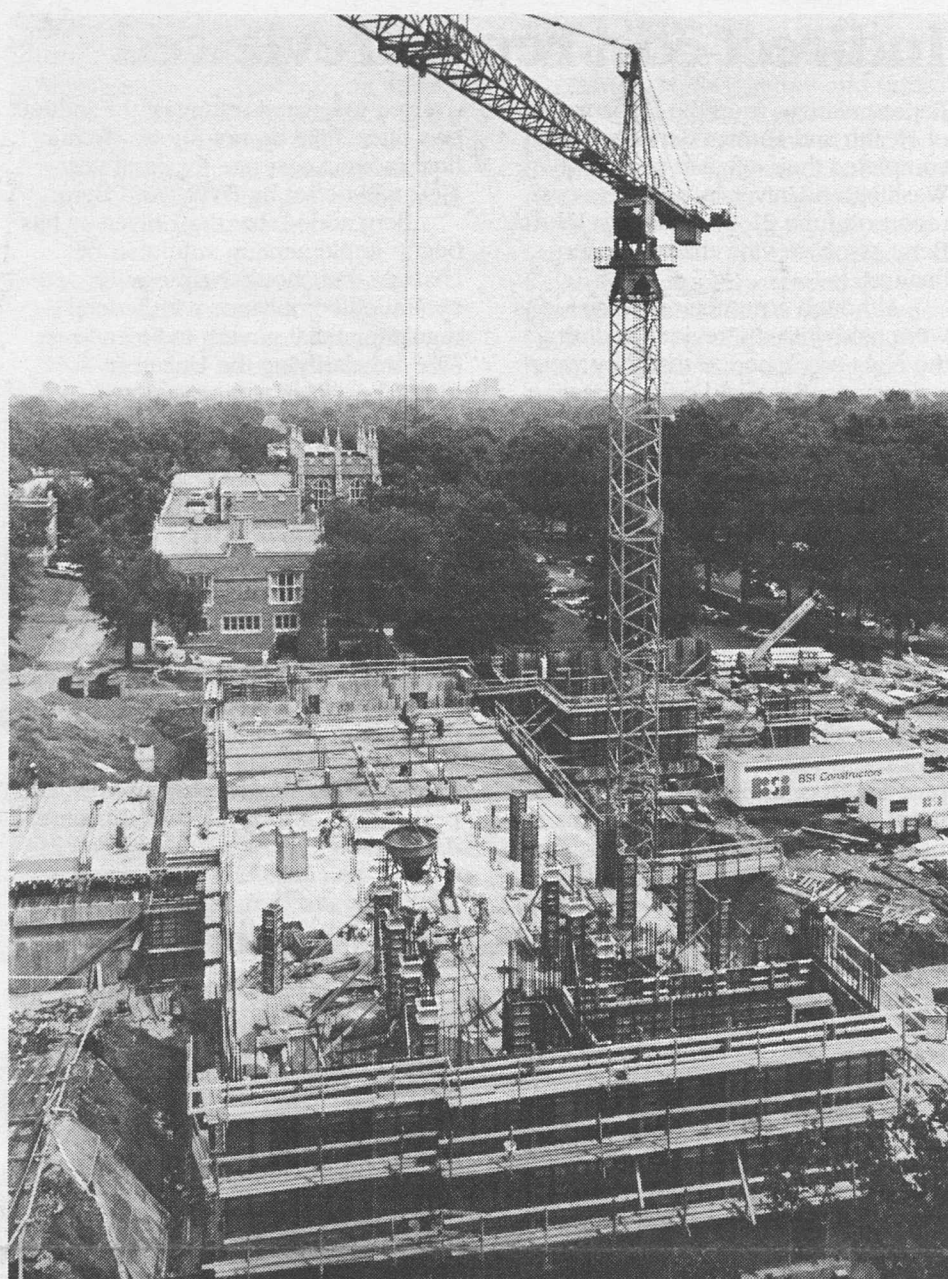
Washington University Record, August 1, 1991

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Right on schedule: Construction on the five-story building south of Wilson Hall should be completed by December 1992, according to Steve Rackers, project director. The building will provide office and research space for the Departments of Biology and Earth and Planetary Sciences, as well as classroom and lecture hall space for other University departments and schools.

Expert system paves way for computers that 'learn on job'

In the 1990s, instead of giving retiring employees a gold watch at their farewell dinner, corporations may start dedicating in their name a computer station containing the wealth of all their working knowledge.

This "expert system" would guide an employee's successor to correct conclusions about work situations as they arose on the factory floor, reflecting much of the experience the long-time employee had gained over the years. Thus, management's concern about "how will we ever replace him or her?" may be solved, in part, by a computer program.

Such a system, developed by Babu Joseph, Ph.D., professor of chemical engineering, in conjunction with scientists at Ethyl Corp. of St. Louis, draws upon the expertise of four multidisciplinary experts in a process that produces a petroleum additive for clean automobile fuel. It is one of the first complex expert systems to draw together so many disparate talents to address one process. And it is considered an advance in the beginning of a new age of artificial intelligence systems that soon will be able to "think on their feet and learn on the job."

"Unlike an experienced engineer, expert systems never get tired, sick, leave the company or retire," says Joseph. "As they grow older, they have a great potential to get better. Now that we have implemented the expert system at Ethyl Corp., we are experimenting with control systems that can learn on the job. One of the techniques we are exploring is the use of artificial neural networks.

"These systems mimic the activities of the human brain so that the system,

seeing a suddenly evolved problem, is able to make a decision based on imprecise data."

Conventional digital computers can act on the data they receive in an either/or manner. "Neural nets" can work in the gray areas. While the Ethyl Corp. system is not based on artificial neural networks, Joseph says it is serving as an impetus for ideas about future programs that will use them, revealing where neural networks are likely to work and where they will not. Expert systems and artificial neural networks are branches of computer science, discussed and implemented on a limited basis over the past 30 years. They fall under the general umbrella of artificial intelligence (AI). Artificial intelligence imparts to computers abilities to "recognize" and "reason" under certain circumstances — for example, recognizing speech patterns and reading texts. One of the most familiar examples of AI at work today is the "smart" weapon, such as the computer-driven Patriot and Tomahawk missiles that are programmed to recognize and destroy pre-selected targets.

Expert systems are software programs that can make decisions based on reason and deduction using knowledge expressed generally in the form of rules. Artificial neural networks, on the other hand, are not cognitive, or "thinking" machines, as such. They are based on calculations and patterned after the biological process of the human brain, the intricate and, as yet, largely enigmatic way the brain fires off billions of neurons through an elaborate network of synapses. A typical neural network is composed of a series

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Nemerov remembered

Long-time friend and noted poet Wilbur to read verse during memorial lecture

A memorial lecture honoring Howard Nemerov will be held at 11 a.m. Aug. 28 in Graham Chapel. Nemerov was the Edward Mallinckrodt Distinguished University Professor Emeritus of English and Distinguished Poet in Residence at Washington University, where he served on the faculty for 22 years. He died of cancer at his home in University City on July 5, 1991. Nemerov was 71.

A documentary about Nemerov's work and life, "Nemerov, Too," aired on the Higher Education Channel cable system at 7 p.m. July 28 and 30.

Richard Wilbur, poet laureate of the United States from 1987-88, will read selections of Nemerov's poetry, in addition to his own, during the memorial lecture. Wilbur won the 1989 Pulitzer Prize for his book *New and Collected Poems*, a highly praised collection that also was awarded the Los Angeles Times Award for poetry.

Nemerov and Wilbur were friends for nearly 40 years after meeting at Bennington College. "I knew Howard Nemerov from long, long ago. I'm extremely proud to read poetry in his honor. It means a great deal to me to be asked," said Wilbur.

Through the years, Wilbur and Nemerov corresponded and often saw each other at various speaking engagements. "I always felt encouraged by him, what he said to me, his approval of this or that poem I wrote. The good will of a poet you respect very much is more important than lots of prizes. I can't tell you how much Howard's dying has emptied the scene for me. It's not to say that there aren't a lot of good poets out there. It's just that he is a person with whom I felt a particular affinity.

"I look forward to reading his poetry and I hope he will be listening," Wilbur said.

Nemerov, considered one of the greatest literary figures in the country, served as poet laureate of the United States for two terms, in 1988-89 and 1989-90.

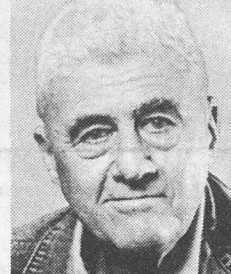
"Howard Nemerov was one of the most wise and talented people of this age," said Chancellor William H. Danforth. "He was a hero nationally and, also to the people of his city, St. Louis, who loved his charm, his humor, his wisdom, his affection and his courage. His many friends will miss

him, but remain thankful for his poetry, from which we will continue to learn better to understand the world and ourselves."

One of Nemerov's volumes, *The Collected Poems of Howard Nemerov* (1978), which contained all of his published poems from 1945 to 1975, won both a National Book Award and a Pulitzer Prize in the same week. He was the first recipient of the Aiken Taylor Award for American Poetry in 1987 from The Sewanee Review and the University of the South (1969), the Guggenheim Fellow (1969) and Yale University's Bollingen Prize in Poetry (1981).

His books of prose covered a wide variety of topics, including football, bugs, trees, people and science. He also wrote scholarly essays about Dante, Shakespeare, Blake and Proust. Inspiration for his poetry often came during a two-mile walk to and from work each day between his home in University City and his office in Duncker Hall. He walked unhurriedly, taking in the sights and sounds.

Nemerov wrote more than 25 books of poetry, short stories, essays and criticism.



Howard Nemerov

One of the nation's most prolific poets, his books of verse include *The Image and the Law* (1947), *Guide to the Ruins* (1950), *The Salt Garden* (1955), *Small Moment* (1957), *Mirrors and Windows* (1958), *New and Selected Poems* (1960), *The Next Room of the Dream: Poem and Two Plays* (1962), *Five American Poets* (1963), *The Blue Swallows* (1967), *A Sequence of Seven* (1967), *The Winter Lighting: Selected Poems* (1968), *The Painter Dreaming in the Scholar's House* (1968), *Gnomes and Occasions* (1972), *The Western Approaches* (1975), *The Collected Poems of Howard Nemerov* (1978), *Sentences* (1980), *Inside the Onion* (1984), *War Stories* (1987) and *A Howard Nemerov Reader* (1991).

His books of essays include *Journal of the Fictive Life* (1965), *Reflexions on Poetry and Poetics* (1972),

Continued on p. 2

Green parking permits offered in lottery

Executive Vice Chancellor Richard A. Roloff wrote recently to all Hilltop faculty, staff and students outlining planned changes in parking regulations for 1991-92. Increased fees for parking will be phased in over a three-year period. Other changes are highlighted below.

A new \$120 green parking permit will be offered in limited numbers (maximum 250) through a lottery for those who are unable to pay the fees for yellow permits and who need access to their cars during the day for family or similar responsibilities. The lottery is open to faculty, staff and graduate students. The green permits will allow parking at the easternmost ends of the large parking lots that border Skinker Boulevard, on the lot off Big Bend Boulevard immediately north of the Athletic Complex or in the South-40 lot along Wydown Boulevard. Details on how to enter the lottery will be mailed in mid-August. The deadline for entering the lottery will be 5 p.m. Thursday Aug. 22.

To help ensure that those who

have purchased permits will have a place to park, enforcement of the parking rules on the Hilltop Campus will be increased. Towing of cars with multiple unpaid tickets will be more strict and, in the future, those with multiple unpaid tickets will not be sold permits for the following year.

New parking meters will be added in a number of locations on campus to improve the availability of visitor parking. The gated pay lot along Forsyth Boulevard that is near Simon Hall, Prince Hall and the Mallinckrodt Center will continue to be available as well.

Daily parking permits may be purchased for \$1 at the Transportation Department Office in the Women's Building and at the Cashier's Office in North Brookings Hall. These permits may be a convenient alternative for those who park occasionally on campus.

All members of the campus community are urged to watch the mail in mid-August for instructions from the Transportation Department on how to obtain a parking permit.



Potential good listeners: Many varieties of plants will be sold during a giant plant sale from 10 a.m. to 4 p.m. Aug. 26 on the north terrace of Wohl Center. Proceeds from the sale, which is sponsored by the Women's Society, will help fund scholarships for Washington University students.

Former students give architecture professor Paris trip to celebrate 20 years of teaching

The awards had been given and the end-of-the-year business was completed at the School of Architecture's annual meeting last spring, but there was one more item on the agenda. Against the background of a slide show documenting his 20 years of teaching, an astonished Carl Safe was summoned to the podium, where he was presented with round-trip airline tickets to Paris for himself and his wife, along with two weeks' hotel accommodations and \$1,000 spending money. The surprise presentation was arranged, with the complicity of Safe's wife, Karen, by a group of Safe's former students and faculty colleagues to celebrate his 20th year at the University.

"My wife said it was the first time she'd ever known me to be speechless," said Safe, assistant professor of architecture, "but I was totally taken by surprise." Safe, who teaches design to students from sophomores through the graduate level, believes that the group "just decided it was time I went to Europe," and the 20th-year anniversary provided the opportunity for them to see that he did.

He's never been there, though he has spent a lot of time in South America, where he and his wife, a researcher in the Department of Obstetrics and Gynecology, served in the Peace Corps in Bolivia from 1966-68. "I know that I formed some of the values during that time that led me to teaching instead of a corporate kind of career," Safe said.

Teaching was clearly a congenial choice, if the letter-writing campaign that generated the gifts to underwrite the Paris trip is any evidence. "The cash gift and the trip are wonderful," says Safe, "but even better were the notes and letters telling me what people I've worked with are doing and their good wishes." One of those former students,

James Kishlar, a 1982 graduate of the School of Architecture, now lives and works in Paris and will serve as tour guide for the Safes during their visit, which begins Aug. 5. "I'm not even sure where we are staying," says Safe. "Every detail has been arranged."

"This is the first accolade of this sort, given at the initiative of the students themselves, that I know of," says Constantine Michaelides, dean of the School of Architecture. "It speaks eloquently of the high regard that Carl Safe's students have for him."

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Indirect cost report reviewed

Representatives from the Department of Health and Human Services (HHS) completed their detailed review of Washington University's indirect cost report on June 21, according to John A. Berg, associate vice chancellor for finance.

Although a number of discussions were held with the reviewers during the eight-week period that they were on campus, Berg said a final meeting and discussion concerning their detailed review "findings" may not occur for quite some time.

"Their review covered not only the details of the University's general administrative costs, but also the other categories of cost and cost allocations, such as equipment depreciation and space allocations, that are included in the indirect cost report and that are involved with its preparation," said Berg.

The next step in the review process, Berg understands, will be a meeting later this summer with members from HHS' Division of Cost Allocation — the negotiators who

oversee the actual setting of the indirect cost rates. "We do not know when a final indirect cost rate for fiscal year 1992 will be set by HHS," said Berg.

Berg added that the University has begun implementing a number of changes that should help ensure continued compliance with federal regulations that govern indirect costs. "We are clarifying the University's internal policies and procedures, making changes in the University's methods of assigning account codes, and planning for additional self-initiated or required reviews — internal and external — of our indirect and direct costs of federal research," said Berg.

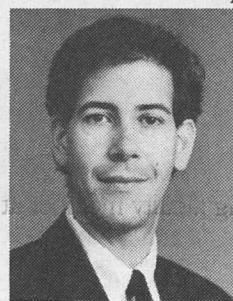
"Because the number of individuals throughout the University who code invoices and who complete various allocation reports is quite large, we are working on a number of fronts to communicate the University's policies and procedures and to improve the training of those who assist in the preparation of the various reports and data."

Assistant general counsel appointed

Attorney Gerard K. Rodriguez, J.D., has been appointed assistant general counsel at Washington University. He reports to Peter H. Ruger, J.D., general counsel.

Among Rodriguez's new responsibilities are health care and environmental law matters, as well as litigation. Rodriguez comes to Washington from the University of Missouri-Columbia, where he worked in the general counsel's office for the University of Missouri System. He also has worked as a litigation associate for the Popham, Conway, Sweeny, Fremont & Bundschu law firm in Kansas City, Mo., and as a law clerk for the Hoskins, King, McGannon & Hahn law firm located in the same city.

Rodriguez's professional affiliations include membership in the Kansas City Metropolitan Bar Association, Mis-



Gerard K. Rodriguez

souri Bar and the National Association of College and University Attorneys. He is a 1982 graduate of the University of Kansas, where he received a bachelor's degree

in political science and a law degree in 1985. A former University of Kansas Endowment Scholar, Rodriguez was a 1982 legislative intern for U.S. Sen. Bob Dole (R-Kan.) in Washington, D.C.

Nemerov — continued from p. 1

Figures of Thought (1978) and *The Oak in the Acorn* (1987).

He also wrote three novels, *The Melodramatists* (1949), *The Power of Love* (1954) and *The Homecoming Game* (1957), which later was made into a Hollywood movie titled "Tall Story" starring Jane Fonda and Tony Perkins.

Nemerov was a Chancellor of the Academy of American Poets, fellow of the American Academy of Arts and Sciences, and member of the American Academy and Institute of Arts and Letters.

In 1987, Nemerov was awarded the National Medal of the Arts by President Ronald Reagan during a White House ceremony. He was awarded the medal in recognition of his lifetime work. Public Broadcasting Service aired a documentary produced by KETC-TV about his life and writing titled "Howard Nemerov: Collected Sentences." The documentary was broadcast nationally in 1982.

As poet laureate, Nemerov advised the Library of Congress on its literary programs and acquisition of literature, as well as recommended new poets to be recorded in the library's Archive of Recorded Poetry and Literature.

Nemerov was born Feb. 29, 1920, in New York City to David and Gertrude (Russek) Nemerov. His father owned a prosperous department store on New York's Fifth Avenue. Nemerov's sister was the late renowned photographer Diane Arbus.

Nemerov received a bachelor's degree from Harvard University in 1941. Following graduation, he declined the offer to work in the family business.

Instead, he joined the Royal Canadian Air Force and journeyed to England, where he flew more than 57 combat missions in a fighter-bomber over the North Sea in World War II. Less than 24 hours after arriving in England, Nemerov met his future wife, Peggy, in a tea shop. Later, Nemerov transferred to the 8th Army Air Force, but continued to fly with the RAF.

Nemerov began his writing and teaching career shortly after the war. He taught at Hamilton College (1946-48), Bennington College (1948-1966), and Brandeis University (1966-68). He also served as a visiting professor at the University of Minnesota from 1958-59, and as poet-in-residence at Hollins College from 1962-63.

He became Fannie Hurst Professor of Creative Literature at Washington University in 1969. He was named the Edward Mallinckrodt Distinguished University Professor of English in 1976. In 1990, he received emeritus status, but continued teaching.

An honorary Phi Beta Kappa, Nemerov received the St. Louis Award in November 1990 in recognition of the acclaim the community has received because of his outstanding literary achievement.

Nemerov, who holds more than 10 honorary degrees, was awarded an honorary doctor of letters from Washington University in May 1991.

In addition to his wife, Margaret (Peggy) of University City, he is survived by three sons, David of St. Louis, Alexander of Washington, D.C., and Jeremy of Seattle, Wash.; and his mother, Gertrude, and a sister, Renee Sparkia, both of Albuquerque, N.M.

NOTABLES

Barbara Markus Briggs, director of risk management at the School of Medicine, gave a presentation titled "Health Care Risk Management in the U.S." to the Insurance Club of Denmark in Copenhagen. She was also interviewed by the editor of the magazine Danish Insurance Review.

Beverly A. Daniels, a University College student and an employee of the Campus Stores, has written a book titled *Leon Did You?* which sold more than 50 copies in its first three days and was on the store's best-seller list.

Matthew Diefenbach, head rowing coach, has been selected as assistant lightweight men's coach to the U.S. National Rowing Team. The team is training this summer in Massachusetts in preparation for the World Games in Geneva, Switzerland.

James O. Hepner, Ph.D., professor and director of the medical school's Graduate Health Administration Program, has been awarded the Air Force Medical Service Corps' Gold Medal for outstanding contributions to the pursuit of excellence and leadership. The presentation was made at Keesler Air Force Base following his paper on "The Art of Leadership in a Changing Healthcare Environment." Hepner, who has been a national consultant to the Air Force Surgeons General, is the first civilian to receive the Gold Medal in the history of the Air Force Medical Service.

Wendy Hyman, director of the English as a Second Language program, is serving as a visiting faculty member at Harvard University during the 1991 summer semester. She was invited to join the summer faculty to teach the materials from her new textbook, *Singing USA: Springboard to Culture*, published by Newbury House. The book will be on the market this fall.

Robert Landick, Ph.D., assistant professor of biology, presented seminars in the biology and genetics departments at the University and the microbiology department at the University of Alabama at Birmingham during the past year. He and his students attended two specialized meetings on the control of transcriptional elongation, one at Mountain Lake Lodge near Blacksburg, Va., and one at Keystone, Colo. At the Mountain Lake meeting, graduate student **Donna Lee** and postdoctoral student **Lucille London**, Ph.D., both members of Landick's lab, presented papers on their recent work. At the Keystone meeting Landick presented a paper titled "Termination-altering amino-acid changes in bacterial RNA polymerase." This summer Landick returned to his high school in Lansing, Mich., to deliver the school's commencement address.

Charles L. Leven, Ph.D., professor of economics, gave a seminar titled "Devolution of Governmental Fiscal Responsibilities" at the 25th annual meeting of the Pacific Northwest Economic Conference in Portland, Ore. He was the luncheon speaker at the conference's first meeting. Leven also spent two weeks as professor-in-residence at the University of Lodz in Poland.

Alessandra Luiselli, Ph.D., assistant professor of Spanish, presented a paper on Mexican pre-Columbian poetry titled "Icnocuichel: Cantos de angustia de la Literatura Precortesiana" at an international conference held in Merida, Venezuela. The conference, titled Language, Culture, and Society in the Americas, was sponsored by the University of South Florida and the Universidad de los Andes.

John A. McDonald, M.D., Ph.D., professor of internal medicine and director of the Respiratory and Critical Care Division, gave a presentation titled "Growth Factor and Matrix Gene Expression in Pulmonary Fibrosis" and chaired a session on "Provisional Extracellular Matrix" at the Keystone Symposia on Wound Healing, held in Keystone, Colo. He attended the 1991 meeting of the Federation of American Societies for Experimental Biology, held in Atlanta, Ga., where he gave a presentation titled "Cellular Receptors for Extracellular Matrix Molecules and Their Role in Lung Growth and Repair." McDonald has been invited to join the Pulmonary Disease Advisory Committee (PDAC) of the National Heart, Lung, and Blood Institute of the National Institutes of Health. The PDAC advises the institute's director on policy and funding priorities.

John Neal Middelkamp, M.D., professor of pediatrics, received the Citation of Merit from the University of Missouri-Columbia Medical Alumni Organization. The award is presented annually to a University of Missouri medical school alum in recognition of his or her contribution to the medical profession. Middelkamp, who is also director of ambulatory pediatrics, has been on the School of Medicine faculty since 1953.

Paul L. Molina, M.D., assistant professor of radiology, presented an invited lecture on "CT and MRI in Chest Imaging: Current Indications and Applications" at the James H. Scatliff, M.D., Symposium: 25 Years of Progress in Radiology, at the University of North Carolina in Chapel Hill. He also was an invited panel member in a panel discussion on "Selection of an Academic Career" as part of the Introduction to Research program at the American Roentgen Ray Society 91st annual meeting in Boston.

John C. Morris, M.D., assistant professor of neurology and pathology and associate neurologist-in-chief at Jewish Hospital, was a visiting professor at Akron General Medical Center in Ohio. While there, he presented the lecture "Advances in the Diagnosis and Management of Alzheimer's Disease."

William A. Murphy, M.D., professor of radiology and co-director of the musculoskeletal section at the Mallinckrodt Institute of Radiology, delivered the 18th annual Benjamin Felson Lecture at the University of Cincinnati College of Medicine. He discussed magnetic resonance imaging (MRI) of musculoskeletal masses and pathophysiology of inflammatory arthritis during the first day of his presentation. Murray spoke on bone marrow MRI and radiology in death investigation on the second day.

William D. Owens, M.D., Mallinckrodt Professor and Head of the Department of Anesthesiology at the School of Medicine, has been elected president of the Academy of Anesthesiology. In addition, Owens also has been named to the board of directors of the Foundation of Anesthesia for Education and Research.

Carlos A. Perez, M.D., professor of radiology and director of the Division of Radiation Oncology at the School of Medicine, gave three speeches at the 11th Annual Current Approaches to Radiation Oncology, Biology and Physics meeting in San Francisco, Calif. The title of the speeches were: "The Role of Radiation Therapy in the Treatment of Cancer of the Endometrium," "Radiation Therapy Alone in the Management of Carcinoma of the Uterine Cervix," which was the

Buschke Lecture, and "What Is the Role of Radiotherapy in Patients With Locally Advanced Non-small Cell Lung Cancer?"

Carter Revard, Ph.D., professor of English, gave a paper titled "Wynne and Wastoure as Fundraiser for the Black Prince in Chester in 1353" to the 26th International Conference on Medieval Studies at Kalamazoo, Mich. He gave a reading of his poetry in Tulsa, Okla., for the Literary Arts Festival of the Tulsa Arts and Humanities Council. Two of his poems, "What the Eagle Fan Says" and "Communing Before Supermarkets," will appear in Poetry East in fall 1991. A short story, *Never Quite a Hollywood Star*, first published in the Massachusetts Review in 1985, will be reprinted in a collection being published this fall by Dell.

Robert H. Salisbury, Ph.D., Sidney W. Souers Professor of American Government and chair of the Department of Political Science, will have two books published in 1992. The University of Pittsburgh Press will publish *Interests and Institutions: Substance and Structure in American Politics* and the Harvard University Press will publish *The Hollow Core: Private Interests and National Policy Making*, co-authored with John P. Heinz, Edward O. Laumann, and Robert L. Nelson. Also, the sixth edition of *Introduction to American Government*, which he co-authored, has been published by Harper Collins Publishers.

Woman's Club establishes scholarship program to aid working female students

The Woman's Club of Washington University has established a scholarship program to aid female students who are enhancing their work skills by attending the University. The first scholarship recipient is Donna C. Wahlig, a finance major at the John M. Olin School of Business who plans to graduate with a bachelor's degree in December 1991.

Wahlig is a 1990 graduate of the St. Louis Community College at Meramec, which she attended part time while working full time as an office manager and legal secretary. She also has taken evening courses through Washington's University College. The Woman's Club presented the scholarship to Wahlig at its annual spring luncheon May 3 at the Engineers Club of St. Louis.

The \$500 Woman's Club scholarship may be used toward a student's fees for books, meals, housing or coursework. The scholarship recipient must be a

Michael Sherberg, Ph.D., assistant professor of Italian, was the guest speaker at the June 2 dinner of the Italian Club of St. Louis. Sherberg's speech titled "To Dream of Italy, Then and Now" was the keynote address at this meeting, which is held annually to celebrate the Italian National Day and the founding of the Republic of Italy.

Jerry J.J. Yuan, M.D., resident in urologic surgery at the School of Medicine, received first place for clinical research at the 1991 Annual American Urological Association Resident Essay Contest. His paper was titled "Effects of Digital Rectal Examination, Prostate Massage, Transrectal Ultrasonography and Needle Biopsy of the Prostate on Serum Prostate Specific Antigen Level."

Have you done something noteworthy?

Have you: Presented a paper? Won an award? Been named to a committee or elected an officer of a professional organization? The Washington University Record will help spread the good news. Contributions regarding faculty and staff scholarly or professional activities are gladly accepted and encouraged. Send a brief note with your full name, highest-earned degree, current title and department along with a description of your noteworthy activity to Notables, Campus Box 1070, or by electronic mail to p72245SS at WUVMC. Please include a phone number.



Donna C. Wahlig

local student attending the University and must demonstrate financial need, according to Magdalin Szabo, president of the Woman's Club. She said recipients may be pursuing an undergraduate or graduate degree. Applicants for the scholarship are selected by Washington's financial aid office. The Woman's Club Scholarship Committee chooses a winner.

The Woman's Club created the scholarship program because members "wanted to help a female student who is upgrading her work skills by returning to school," said Szabo. "In addition, we have learned that females are less likely to receive tuition benefits at their places of employment, so our donation is particularly welcome," she said.

After graduation, Wahlig plans to enroll in the M.B.A. program at the John M. Olin School of Business. At Meramec, Wahlig was an Honors Program Scholar and a member of the Phi Theta Kappa National Honor Fraternity.

In addition to the scholarship program, the Woman's Club, founded in 1910, sponsors an annual lecture in the University's Assembly Series.

NEWSMAKERS

Washington University faculty and staff make news around the globe. Following is a digest of media coverage they have received during recent weeks for their scholarly activities, research and general expertise.

Heredity has the greatest impact on children's television viewing habits, a recent study states. Washington University biology professor Garland Allen, Ph.D., finds fault with the study according to articles that appeared in the *Chicago Tribune*, *Boston Herald*, *Lexington Herald-Leader* and the *Washington Times*. He says such traits are complex and cannot be traced to one gene or separated from environmental factors.

Gerald Early, Ph.D., associate professor of English and of African and Afro-American studies, appeared in several newspapers recently, including the *Washington Post*, *The New Republic* and the *Tuscaloosa News*. He reviewed *Talking at the Gates: A Life of James Baldwin*, by James Campbell. He was profiled in a Sunday magazine section, wrote an introduction and edited the book *My Soul's High Song: The Collected Writings of Countee Cullen, Voice of The Harlem Renaissance* and was a visiting lecturer at the National Endowment for the Humanities; Institute on African-American Literature and Culture.

CALENDAR

Aug. 1-31

LECTURES

Tuesday, Aug. 6

8-11:30 a.m. Division of Biology and Biomedical Sciences Presents Division of Comparative Medicine/Charles River Laboratories Seminar, "Rodent Transgenics and Health Monitoring," with Kenneth Boschert, WU Dept. of Comparative Medicine; Glenn Monastersky, Dept. of Genetics and Reproductive Biology, Charles River Laboratories; and Kathleen Murray, Dept. of Professional Services, Charles River Laboratories. Registration: 8-8:30 a.m. Cori Aud. 660 S. Euclid Ave. For more info., call 362-3365.

Friday, Aug. 9

9:15-10:30 a.m. Pediatric Grand Rounds, "Hypercoagulable Evaluation of the Child," Joseph P. Miletich, WU assoc. prof. of medicine and pathology. Clopton Aud., 4950 Audubon Ave.

Noon. Dept. of Cell Biology and Physiology Seminar, "Isoprenoid Modification of Low Molecular Mass GTP-binding Proteins in Mammalian Cells," William Maltese, The Weis Center for Research and Geisinger Clinic, Pennsylvania. Room 423 McDonnell Medical Sciences Bldg.

Friday, Aug. 23

9:15-10:30 a.m. Pediatric Grand Rounds, "It's Time to Forget About Torch Titers," Penelope G. Shackelford, WU prof. of pediatrics and assoc. prof. of molecular microbiology. Clopton Aud., 4950 Audubon Ave.

Wednesday, Aug. 28

11 a.m. Assembly Series Presents the Howard Nemerov Memorial Lecture with Richard Wilbur, 1987-88 U.S. poet laureate and 1989 Pulitzer Prize winner. Graham Chapel. For more info., call 889-4620.

EXHIBITIONS

"Washington University Art Collections." Through May 1992. Gallery of Art, upper and lower galleries, Steinberg Hall. Exhibit hours: 10 a.m.-5 p.m. weekdays; 1-5 p.m. weekends. For more info., call 889-5490.

The Gallery of Art will be closed to the public from Aug. 12-Sept. 2.

"The Scientific Journal: Landmark Articles." Through Sept. 6. Special Collections, Olin Library, Level 5. Exhibit hours: 8:30 a.m.-5 p.m. weekdays. For more info., call 889-5487.

"The Tooth Is a Sensible Bone." Through August. Glaser Gallery, Archives and Rare Books Division, Medical Library, 660 S. Euclid Ave. Exhibit hours: 8:30 a.m.-5 p.m. weekdays; 8:30 a.m.-6 p.m. Saturdays; and 1-10 p.m. Sundays. For more info., call 362-4234.

"The Political Arm." Through Aug. 11. Gallery of Art, upper gallery, Steinberg Hall. Exhibit hours: 10 a.m.-5 p.m. weekdays. For more info., call 889-5490.

SPORTS

Friday, Aug. 30

5 p.m. Men's Soccer. WU vs. Illinois College. Francis Field.

MISCELLANY

Tuesday, Aug. 6

4:30-6:30 p.m. Center for Communications and Networking Management Open House. At the CCNM facility, 1144 Hampton Ave. For reservations, call 726-4444.

Monday, Aug. 26

10 a.m.-4 p.m. Women's Society Plant Sale. Proceeds will assist in funding scholarships for WU students. North terrace, Wohl Center. For more info., call 935-5105.

Calendar Deadline

The deadline to submit items for the Aug. 29-Sept. 7 calendar of the Record is Aug. 23. Items must be typed and state time, date, place, nature of event, sponsor and admission cost. Incomplete items will not be printed. If available, include speaker's name and identification and the title of the event; also include your name and telephone number. Send items to Deborah Parker, calendar editor, Box 1070, or by electronic mail to p72245DP at WUVMC.

Expert system — *continued from p. 1*

of processors all connected by a finer network of "synapses" that ultimately can analyze imprecise information and decide if it matches a correct mathematical pattern.

Quality control — the industrial automation processes that enhance the quality of manufactured products — is vital to American industry and the lack of it is one of the key reasons economists and engineers believe the United States lags behind Germany and Japan in manufacturing high-quality products from toys to automobiles. American industry is beginning to show a keen interest in AI systems, and the Japanese government recently announced plans to launch a 10-year, \$1.5 billion international project to build improved artificial neural networks. Joseph says that developing expert systems and artificial neural network systems capable of self-diagnosing manufacturing processes instead of merely monitoring them will enable industries to produce better products, more efficiently and cheaply.

"There's a crying need for expert systems in American industry and more instances where industries are using them and saving lots of money," says Thomas McAvoy, Ph.D., professor of chemical engineering at the University of Maryland who has designed expert systems and, more recently, artificial neural networks. "At a recent National Science Foundation symposium I attended, there were a number of large industries reporting their use of neural networks that were saving them hundreds of thousands of dollars a year. The new interest in neural nets adds another dimension to expert systems. Future artificial intelligence systems may well use components of both systems. Joseph and his colleagues are making very important contributions to better understanding and implementation of artificial intelligence in industry."

Joseph explained the Ethyl Corp. expert system in his paper, "Knowledge Acquisition and Knowledge Representation in an Expert System for Control of a Batch Process," at the spring national meeting of the American Institute of Chemical Engineers on April 19, 1991. Co-authors were Peter J. Hanratty, a graduate research assistant at Washington University, and Nora Estopare and Martin West of Ethyl Corp.

Joseph and his colleagues developed an expert system to troubleshoot the quality control problems of Ethyl Corp.'s HiTEC 611, an automated, "batch" process that produces a petroleum additive to make a cleaner burning fuel. Before the expert system was implemented, when production or quality went awry with HiTEC 611, the process operator would look for quick-fix solutions. If none were available, a group meeting involving process engineers, operators and chemists was called to get the system running again.

"The problem with the committee troubleshooting approach is that it requires considerable time from a number of 'experts' who are needed for many other matters," Joseph notes. "As the experts move on — retirement, promotion or transfer — their knowledge and experience about the process is lost. Our expert system was built to overcome these problems."

To build an expert system, a scientist — called a "knowledge engineer" in computer jargon — must interview the expert and translate the expertise into computer code in the form of rules. Both are formidable tasks demanding many hours under

any circumstances, but the expert system for HiTEC 611 required several interviews of four different experts. Not only did this present a coordination problem, says Joseph, it also demanded that the knowledge engineer develop the journalistic skills of a Bob Woodward or Carl Bernstein.

"Without doubt, the greatest difficulty of building the expert system was the acquisition and organization of knowledge," says Joseph. "This required skillful interviewing techniques, the need to do 'homework' on the process to ask intelligent questions, and the ability to draw out information from people who know the process intimately, but may not necessarily be articulate on the topic. Later, after individual interviews, the knowledge engineer brought all the experts together for group interviews to streamline and hone the knowledge before inputting the information into rules.

"Who knows? If machines can do more for us reliably, maybe we will have more time to play."

— Babu Joseph

If the one-on-one interviews were daunting, the group sessions at times were chaotic, resembling the TV talk show forum "Firing Line," says Hanratty, who served as knowledge engineer and built the expert system.

"While all the experts were obviously familiar with the process, their perspectives differed and occasionally the interview would get out of hand," says Hanratty. "The chemist sees the operation at a different angle than the engineer, for instance. So, they'd argue now and then, and I'd have to use diplomacy to bring them back in line. In general, I found when they argued, they'd come up with new ideas. They were all very interested in making the expert system work — it was going to save them time on the job."

Hanratty devoted four months of the six-month project to the interview process, or "knowledge gathering." Once the interview data had been gathered, he arranged the information into a "knowledge tree," or flow diagram, a structure with which all the

experts were familiar. And from there the knowledge was translated into logic. Hanratty and the experts defined six quality control and production rate parameters essential to the process; if these parameters, dealing with such matters as raw material quality and mechanical problems, deviate significantly, the HiTEC 611 process is ineffective and must be repaired. The original six parameters spawned hundreds of additional parameters from temperature and pH to valve openings that need adjusting. All of them were programmed into the expert system.

The final implementation was to incorporate the knowledge into a readily accessible program. Joseph and his colleagues chose a system called LEVEL5, which allowed them to enter rules into the program in a language that is simple and direct. For instance, to troubleshoot a problem with the process, one of the rules might be: "If the temperature is too high then the cooler is fouled or the sensor might be faulty."

The HiTEC 611 expert system, up and running at Ethyl Corp., can troubleshoot the quality control variables of the HiTEC 611 process, explain the line of reasoning used to develop a diagnosis, and explain and expand upon questions the system asks of the user.

Far from proving threatening to the experts at Ethyl Corp., the expert system has freed employees so they can work on other projects. The process operator, for instance, no longer gets 3 a.m. phone calls asking how to get HiTEC 611 back on its feet again.

"The question is always asked: 'Will computers replace people?'" Joseph poses. "It should better be asked: How will computers aid people? On a larger scale in the United States, we should ask: How can expert systems and neural networks assist our industry and manufacturing to compete in an increasingly rugged international economy?"

"Expert systems and other artificial intelligence applications of computers will free up engineers from routine calculations and let them do more productive things. Twenty-five years ago, for instance, a person would spend one or two days designing heat exchanges; now that task is down to a few minutes on a computer. Ultimately, the hope is to optimize the use of resources, whether they are humans or machines. Who knows? If machines can do more for us reliably, maybe we will have more time to play."

— Tony Fitzpatrick

Missouri Humanities Council awards grant to Black Heartland Project

The Missouri Humanities Council (MHC) has awarded a \$10,150 grant to the African and Afro-American Studies Program to support a seminar this summer that enhances junior and senior high school teachers' understanding of the Midwestern influence on African-American culture.

The seminar, which began July 15 and continues through Aug. 9 at the University, also focuses on how African-Americans have shaped Midwestern culture. It is part of a continuing project titled "Black Heartland: The Growth and Development of African-American Culture in the Midwest." The project is being sponsored by the University's African and Afro-American Studies Program in partnership with the MHC, the state affiliate of the National Endowment for the Humanities.

Gerald L. Early, Ph.D., associate professor of English and of African and Afro-American studies, directs the project. The seminar participants — teachers

from across the state — were selected by a committee chaired by Early.

"This grant is enabling Washington University to provide the wider educational community of Missouri with instruction in the very vital area of Afro-American studies and regional history," said Early. "With this grant, we are fulfilling a very important aspect of our mission as an institution. Personally, it is allowing me to promote an intellectual interest I have had for a long time."

Early says that through a variety of readings from musicologists, historians and novelists, the seminar is showing junior and senior high school teachers the significance of African-Americans' presence in the Midwest. "Course participants will try to answer two questions: what is the Midwest, and how has the area affected African-American history and culture?" he said. Additionally, the seminar is featuring guest lectures and two film presentations.