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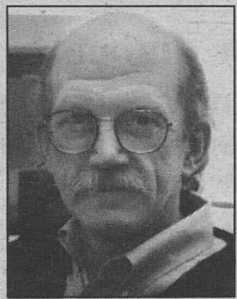
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Major grant aids effort to sequence human genome

The Washington University School of Medicine is one of six recipients of major grants from the National Center for Human Genome Research (NCHGR) at the National Institutes of Health.

The three-year award will allow the medical school's Genome Sequencing Center to systematically sequence parts of the human genome to uncover genes and other structures. The first year of funding will provide \$6.7 million. Funding for each of the two subsequent years has not fully been determined but is likely to exceed that of the first year.

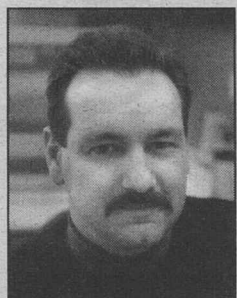
"Determining the sequences and precise locations of all the human genes will



Robert H. Waterston

have a profound effect on the detection and treatment of disease," said the project's principal investigator, Robert H. Waterston, M.D., Ph.D., the James S. McDonnell Professor of Genetics, head of the Department of Genetics and director of the Genome Sequencing Center. "It also will provide an invaluable framework for exploring normal biological functions."

"Under Bob Waterston's outstanding leadership, the genome sequencing program at Washington University School of Medicine has become as productive as



Richard K. Wilson

any in the world," said William A. Peck, M.D., executive vice chancellor for medical affairs and dean of the School of Medicine. "It will set the pace for the nation's effort to define the complete sequence of the human genome in a timely and efficient fashion. This project will have a great positive impact on science and medicine."

The five other recipients are: Whitehead Institute for Biomedical Research in Cambridge, Mass. (\$4.1 million); The Institute for Genomic Research in Rockville, Md. (\$3.2 million); Stanford University in California (\$2.5 million); the Baylor College of Medicine in Houston (\$1.3 million); and the University of Washington in Seattle (\$1 million).

The human genome — all of the DNA in one complete set of chromosomes — is the blueprint that guides human develop-

Continued on back page



Debate production gets under way

Chancellor Mark S. Wrighton, Ph.D., presents a T-shirt to Robert Asman, executive producer with the Commission on Presidential Debates, during a recent site visit by the commission's production team. On Sept. 25, Washington University will host the first 1996 presidential debate. The University was the site of the first 1992 presidential debate.

Computer-enhanced instruction

Internet becoming as common as chalkboard in chemistry classes

At the beginning of the 1995-96 academic year, Regina Frey, Ph.D., lecturer in undergraduate chemistry in Arts and Sciences, looked out at the sea of "Chemistry 111A" students and wondered nervously how it all was going to work out.

She and colleagues Maureen Donlin, Ph.D., chemistry laboratory development specialist, and Omar El-Ghazzawy, manager of the Chemistry Computing Facility, had put in a long, hot summer preparing for this moment. Now Frey was about to instruct 200 freshman chemistry students on how they would study chemistry this year — not solely by lecture, textbook and chalkboard but also by computer and the Internet.

"Right away, we asked how many had access to their own computers, and we were really relieved when about three-fourths of the students raised their hands," Frey recalled. "We had major concerns that there wouldn't be enough computers for the students or that they

might have limited knowledge of how the Internet works. But I could tell quickly that the students were much more familiar with the Internet than I'd thought, and it didn't take long to see that they pick up very quickly on the use of computer-based educational tools."

Beginning last fall, the Department of Chemistry began using cyberspace on a trial basis for students. In previous years, syllabuses, teacher information, problem-set solutions and other information was communicated via handouts. The chemistry department now has taken the bold step of instructing students on how to use the Internet to get this information. The department even provides on-line chemistry exercises and tutorials for students. Thus, "Chemistry 111A" not only has promoted computer-friendliness but also has showcased chemistry concepts in a novel, illuminating way.

The first hurdle was computer accessibility. The Arts and Sciences Computing Center was readied last summer with

dozens of Macintosh and personal computers. The Office of Academic Computing — overseen by Martin Dubetz, Ph.D., director of the Office of Network Coordinator and of the Arts and Sciences Computing Center — assured that workstations were available in the residence halls and Olin Library. In addition, students who own computers were able to connect to the Internet from their residence hall rooms for a small fee. And the Chemistry Computing Facility, located on the fourth floor of McMillen Laboratory, was stocked with Macintosh computers and was staffed by teaching assistants five hours daily.

Course information and some lessons now can be accessed through the chemistry department's World Wide Web home page. Undergraduate courses have home pages within the departmental one. Students can contact their professors and teaching assistants via electronic-mail. Help-session hours for students regularly are posted on the home pages.

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Thurtene Carnival organizers want children to 'let their imaginations flow'

Engineers show creativity, talent, humor in week of events

The School of Engineering and Applied Science's 125th anniversary celebration continued with a host of festivities during Student Engineering Week from March 27 to April 3.

Student engineers, their professors, alumni, advisers and staff members lunched, danced and competed in student design contests, autocross racing, airplane tosses and a challenging contest in which students tried to match professors with their baby pictures.

In addition, a steel bridge constructed by student members of the American Society of Civil Engineers was unveiled in

the Lopata Hall Gallery, and a bottling presentation, sponsored by the American Institute of Chemical Engineers, showed observers how their favorite beverages are put together.

When students needed a respite from the combination of celebrating and studying, they relaxed with refreshments at a study break sponsored by the National Society of Black Engineers and the Engineers' Council.

All of the activities incorporated engineering into their themes, but few had the panache — or zaniness — of the Engineering Pageant, sponsored by the Society

of Women Engineers and the Engineers' Council. Held in the Lopata Hall Gallery, the pageant followed an informal lunch and presentation by Dean Christopher I. Byrnes, Ph.D., on the school's history and future.

The pageant pitted four graduating seniors in a multifaceted spoof of beauty pageants to determine who best represents the quintessential engineer. Along the way, stereotypical notions of engineering and engineers were lampooned. Previously, the pageant winner was dubbed "Mr. Engineer," but in the past three years, women

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Medical Update



Causes for celebration

At an open house, Mae E. Gordon, Ph.D., right, associate professor in the Department of Ophthalmology and Visual Sciences, gives flowers to the department's assistant business manager, J. Gale Murphy, in appreciation of her hard work. The April 8 event celebrated the expansion of the Vision Research Coordinating Center (VRCC), which Gordon directs, and the end of the recruitment phase of the large national Ocular Hypertension Treatment Study. The VRCC expanded because it added another large study, the Collaborative Longitudinal Evaluation in Keratoconus.

A predisposition

Genetic factors may be key to symptoms of breast implant illness

Anecdotal reports of illness by some women with silicone gel breast implants eventually led the Food and Drug Administration in 1992 to ban their use pending a safety review. However, researchers still do not know why some women with implants, and not others, develop symptoms suggestive of an illness. Now, a study by School of Medicine researchers has concluded that genetic factors may play a role.

The study found that women with breast implants who had debilitating symptoms such as chronic fatigue, burning breast pain and muscle or joint pain were more likely to share genetic characteristics that differentiate them from women with implants who have no symptoms.

"To our surprise, we found that some women with implants may be genetically predisposed to develop symptoms," said lead researcher V. Leroy Young, M.D., professor of surgery.

Moreover, the researchers found that women with implants and symptoms also were more likely than others in the study to produce autoantibodies against their B cells. B cells are a key component of the immune system, and high frequencies of such autoantibodies are clearly abnormal, Young said.

"Autoantibodies to B cells may hold clues that will help explain why some women with implants develop symptoms," he said. The team reported its findings in the *Plastic and Reconstructive Surgery* journal in December 1995.

The researchers studied the genetic characteristics of 199 women — 77 with implants and symptoms, 37 with implants and no symptoms, 54 healthy women without implants and 31 women diagnosed with fibromyalgia, a disease defined by pain in connective tissues such as muscles, tendons and ligaments. Fibromyalgia is not known to be immune-mediated and has no known cause.

Women with fibromyalgia were included in the study to determine whether women with implants are prone to develop the rheumatological disorder. Symptoms of fibromyalgia are similar to those experienced by women with implants who develop symptoms. "At first, we thought implants might trigger fibromyalgia," Young said.

Women with implants and those with fibromyalgia averaged 46 years of age; those in the healthy comparison group were slightly younger, averaging 37 years of age. Virtually all of the women in the study were white.

Genetic characteristics were determined by analyzing blood samples. The researchers zeroed in on a group of proteins encoded by a collection of genes called the major histocompatibility complex (MHC), which is known to play an important role in immune response. They wanted to find out whether the MHC molecules of symptomatic women with implants differed from those of women with implants who did not have symptoms.

The investigators used HLA (human leukocyte antigen) typing to analyze blood samples; organ transplant teams use the same procedure to assess genetic similarities between organ donors and recipients.

Molecule could be a marker

Women with implants and symptoms and women with fibromyalgia were significantly more likely to have an HLA molecule called DR-53. The molecule was present in 68 percent of symptomatic breast implant patients and 65 percent of fibromyalgia patients, compared with 35 percent of the asymptomatic implant patients. Fifty-two percent of the healthy women also had the DR-53 molecule, which is similar to its natural frequency among white women. DR molecules play a critical immunoregulatory role because they control the interactions among the immune system's T cells, B cells and antigen-presenting cells.

Young and his colleagues initially suspected that women with implants and symptoms actually had fibromyalgia. But when they looked closer, they found that

42 percent of symptomatic women with implants formed antibodies against their own B cells. Only 2 percent of healthy women formed autoantibodies, compared with 14 percent of asymptomatic women with implants and 19 percent of fibromyalgia patients.

More striking, however, was the observation that 81 percent of the patients with implants who produced autoantibodies were DR-53 positive. This compares with 33 percent of fibromyalgia patients who were positive for both autoantibodies and DR-53.

"There's clearly a link between DR-53 and autoantibodies," Young said. "But we won't know what it means until we find out why these women are forming autoantibodies at such a high rate."

Women with symptoms had had their implants for an average of 12 years, compared with asymptomatic women who had had their implants for an average of 10 years. So it's possible that the latter group may develop symptoms over time.

Young and his co-workers now are trying to find out what is triggering the production of autoantibodies. If they are formed in response to silicone gel or one of its components, then the asymptomatic implant group also might be expected to have high frequencies. On the other hand, if the autoantibodies are somehow related to the presence of DR-53, fibromyalgia patients might be expected to have higher frequencies of B cell autoantibodies.

If the study's results are confirmed, DR-53 could be viewed as a marker for individuals who may be predisposed to develop an immune-mediated response or hypersensitivity reaction following silicone breast implantation.

But Young cautioned that it is too early for the information to be used clinically and that women with implants should not rush to their doctors and request HLA tissue typing, a test that costs about \$1,300. "The test is useful as a research tool but would not be helpful in making clinical decisions," Young explained.

"However, women with breast implants need regular follow-ups with their physicians."

— Caroline Decker

Benkovic to deliver Oliver Lowry Lecture

Steven J. Benkovic, Ph.D., the Evan Pugh Professor and holder of the Eberly Chair in Chemistry at Pennsylvania State University, will deliver the 19th annual Oliver Lowry Lecture at 4 p.m. Thursday, April 25, in Moore Auditorium. It is located on the first floor of the North Building, 4580 Scott Ave.

Benkovic is a world-renowned bio-organic chemist who has made many seminal contributions to the understanding of enzyme mechanisms. The title of his lecture is "Exploring Biological Catalysis."

Benkovic has received numerous awards, including the Pfizer Award in Enzyme Chemistry and the Gowland Hopkin Award. He is a member of the American Academy of Arts and Sciences and the National Academy of Sciences.

The Lowry lecture is held annually to honor the contributions of Oliver H. Lowry, M.D., Ph.D., Distinguished Professor Emeritus and lecturer, to science, to the Department of Molecular Biology and Pharmacology and to Washington University. Lowry, a biochemist and member of the National Academy of Sciences, was department head from 1947 to 1976 and from 1989 to 1990. He retired from daily laboratory work in 1995.

Funding for diabetes research now available

Faculty members who conduct research in the areas of diabetes and endocrinology may apply for funding through the Diabetes Research and Training Center (DRTC) at the School of Medicine.

Researchers from the Hilltop and Medical campuses are encouraged to apply for the two-year grants, which begin Dec. 1. They will range from \$5,000 to \$25,000. Applications from basic science, epidemiological and behavioral science departments are particularly encouraged.

The DRTC pilot and feasibility program fosters projects required to develop preliminary data that could lead to independent research supported by the National Institutes of Health, which awards three to four such grants at the medical school annually.

Those interested must submit letters of intent to the DRTC by June 17; proposals must be submitted by Aug. 12. For more information and application forms, call Melanie Puhar at 362-8290.

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Washington
WASHINGTON UNIVERSITY IN ST. LOUIS

Washington People

Weese helps build architecture's momentum

When Cynthia Weese, FAIA, came to Washington University in 1993 to serve as dean of the School of Architecture, her connection to the University and the school already had spanned more than 30 years.

Weese received bachelor's of science in architectural sciences and bachelor's of architecture degrees from the school in 1962 and 1965, respectively. She had served on the school's advisory board, the National Council, since 1988. She also made frequent campus visits — to lecture and teach a studio class — from her base in Chicago, where she was a principal in the Weese Langley Weese architectural firm.

As part of her involvement in the school, Weese helped in the search for Dean Constantine "Dinos" Michaelides' replacement. Michaelides, FAIA, announced in 1992 that he would retire the next year — after 20 years as dean and 30 years at the University.

Weese, however, never thought the search would end up at her door.

"I knew that being a dean was a very difficult job and a very complicated one," Weese said. "I never once, in the process of helping the search committee look for Dinos' replacement, imagined that I'd ever do it."

So when Robert Virgil, D.B.A., chair of the search committee and then dean of the John M. Olin School of Business, asked her to consider becoming a candidate, she was "amazed and honored." After thinking it over and talking with her family, Weese was ready to be considered as a candidate.

"When Bob first asked me to become a candidate, I was very surprised. My response was that we needed to have a larger discussion that would include Ben (her husband). As partners (in both life and career), this was a life-changing decision for both of us. After talking with Ben and the rest of our family, I saw that it was possible, and I was ready to be a candidate."

Weese not only became a candidate but was selected as the new dean.

Because of her nearly 30 years as a practicing architect, Weese brings an important perspective to the school. She has seen where the profession is heading and what it demands of graduates.

"The architecture profession has changed greatly; we as educators have to deal with that," Weese said. "Architecture schools need to be ahead of change, to anticipate change rather than react to it. The design process trains architects to be good at creative problem-framing, information organization, analysis and synthesis. These are qualities needed in many endeavors besides architecture."

Weese has worked to identify and communicate the benefits of an architecture education.

'Architects also make very good mayors'

Weese is a firm believer in the importance of design, of leadership and of collaboration. She likes to quote from social scientist and writer Herbert Simon, who said, "Everyone designs who changes an existing situation into a preferred one."

Weese believes it's important for architects to assume leadership positions "not only on the complex teams that make buildings but in their communities as well. I tell students that architects also make very good mayors. If the Senate and House had as many architects as lawyers, our cities might look different," she said.

Architecture students, Weese said, also need to learn how to work with others in a collaborative effort. Once an architecture student learns how he or she works individually, the student needs to discover how to meld that work style into a team setting.

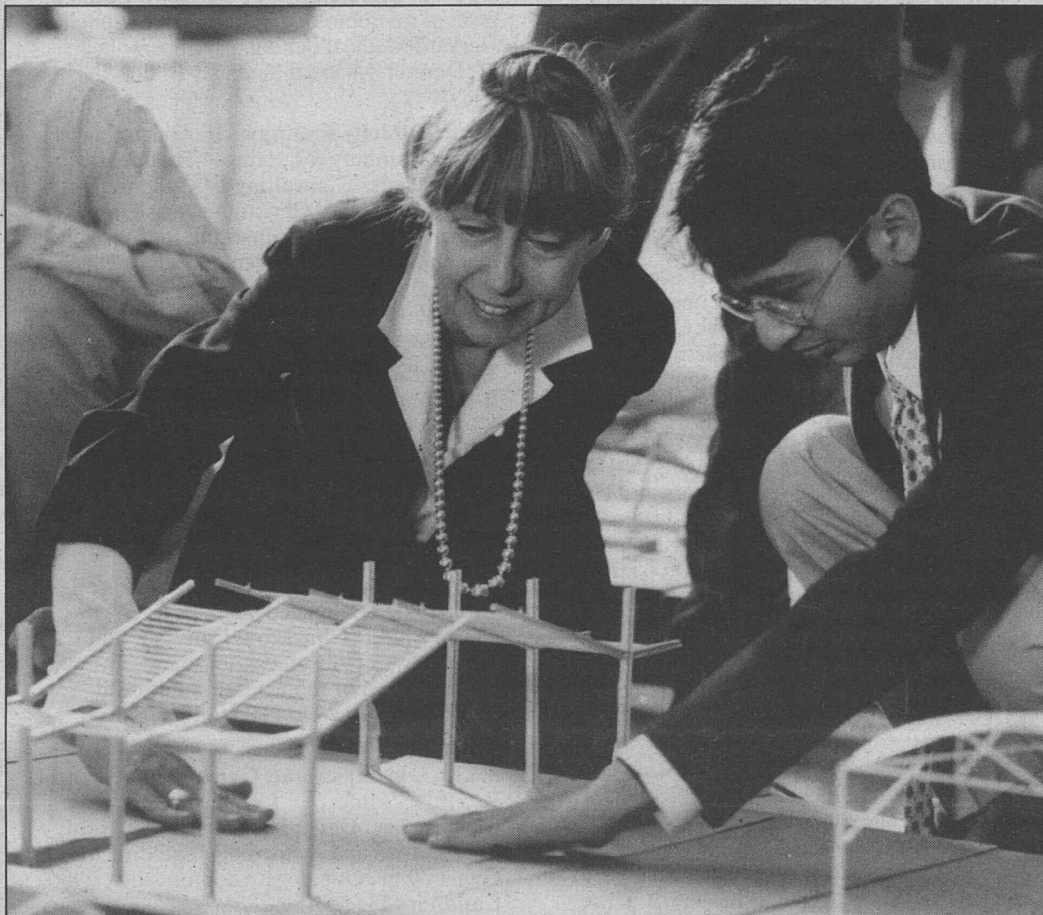
Weese's vision for the school also involves more outreach and partnerships with the city of St. Louis.

"I'd like to see us reach out to the rest of the University, to the city and to the world," Weese said. "There is a tremendous potential and lots of opportunities to revitalize the city, for example. Architects can help provide a vision and the expertise — the impetus — to help revitalize the city."

Some recent projects already have begun to involve working with the city. Associate Professor Jana Perea runs a studio class in a Washington Avenue loft near downtown St. Louis. The students have built their own studio space and are helping redesign parts of the building with the owner. Perea also has established a community design center in which she and architecture students will provide expertise to people in the city who can't afford professional architects.

David Block, a graduate student who is completing a combined degree in architecture and urban design, is working under the direction of John Hoal, director of urban design for the city of St. Louis and affiliate assistant professor of architecture, to help the city re-evaluate some of its neighborhoods to maximize usage in light of a declining city population size.

Weese also finds time to teach a year-long course for freshmen titled "Introduction to Architecture," in which students learn about the architecture school, the University and the history of design. Students take a tour of the city — led by Hoal — to understand its strengths and weaknesses.



Cynthia Weese, FAIA, critiques student Achyut Kantawala's design.

"I'd like to see us reach out to the rest of the University, to the city and to the world."

Throughout the year, Weese invites people from throughout St. Louis and the University to talk about design. Past guests have included Jean Ensminger, Ph.D., associate professor of anthropology in Arts and Sciences, who talked about the design of structures of the people she studies in East Africa; Ursula Goodenough, Ph.D., professor of biology in Arts and Sciences, who talked about the design in cells; and Joseph Loewenstein, Ph.D., associate professor of English in Arts and Sciences, who talked about design in an Edmund Spenser poem.

"Cynthia is a woman of action," said Donald Royse, Ph.D., professor of architecture. "She's incredibly well-organized and gets a lot done. She also encourages everyone to raise their own activities to the same level. She's been very good for the school."

Warren Shapleigh, chair of the school's National Council and the recent recipient of the Dean's Medal for Service, commended Weese for her leadership.

"Since accepting the position of dean, Cynthia Weese has focused much of her time on developing our strategic-planning process. Right now, there's a lot of momentum for progress, and the school is fortunate to have Cynthia as its leader," said Shapleigh, who also is president of the Spencer T. and Ann W. Olin Foundation and an emeritus trustee.

Weese and Washington University almost passed each other like ships in the night.

"I had no idea Washington University existed until we came to St. Louis in August for a family vacation when I was 17," said Weese, who grew up in Iowa. "My parents had always wanted to take me and my sister to the St. Louis Zoo, but it was so hot we only lasted about 20 minutes. So we went to the art museum, where it was wonderfully cool. Later, as we left the museum and drove down the hill, we saw this amazing place (the University), so we drove up the oak drive and saw the building that said 'Architecture' on it."

Weese three years earlier had decided she wanted to be an architect, so she and her family went to Givens Hall. "We came into the building, my father and I," Weese recalled. "We came up the steps and into this very

office (where she now sits). Joe Passonneau (then the dean) was there. He sat down right then and there to talk with us."

That visit marked the beginning of Weese's association with the architecture school and with Passonneau, FAIA, who continued to be her mentor for many years. "Joe was a counselor to everyone at the school. He always encouraged me, from the first time I met him," Weese said.

Weese met and married another mentor, Ben Weese, FAIA, while in architecture school. Ben Weese was a Chicago-based architect who taught for one semester in the urban research and design program.

"Ben has always supported me in my career," said Weese.

Their first date was April 4, 1963, and they were married three months later. But Weese was still in school, and her husband was back at his practice in Chicago, so they had a commuter marriage before commuter marriages existed.

On Friday afternoons, Weese would board a train in St. Louis and head to Chicago to spend weekends with her husband. Late on Sunday nights, she would board a Pullman sleeper in Chicago for the return trip to St. Louis. At about 6 on Monday mornings, the train would cross the Mississippi River via the lower level of the Eads Bridge. Weese was struck by the arches that helped support the upper portion of the bridge. Shortly thereafter, the train would roll into Union Station, under the great roof of the train shed.

"It was quite marvelous to come into the city that way," Weese recalled.

Now, 32 years and two children — Dan, 30, and Catharine, 29 — later, the couple have returned to another commuter relationship. This time, however, the airplane has replaced the train. Sometimes Ben comes to St. Louis, and sometimes Cynthia heads to Chicago. Weese quickly points out that it's much easier now after 30-plus years of marriage.

Developing her skills in Chicago

After graduating from the University in the mid-1960s, Weese started her own career in solo practice from a three-story townhouse on the near north side of Chicago. Most of her clients came from that neighborhood, where many people wanted to restore their homes. Her career was advanced by the many professional women who supported her and spread her name.

In 1970, Weese became a founding member of Chicago Women in Architecture, and in 1979, she became a founding member of the Chicago Architectural Club, whose members gather once a month to show each other their work and exchange ideas.

Weese has found inspiration and support from her fellow Chicago architects. "The whole architectural community has been an extremely important part of my life," she said.

She was a member of a "renegade" group of architects known as the "Chicago 7" (the "Chicago 11" when she joined). This group was "anti-Miesian." Ludwig Mies van der Rohe spawned a movement toward using lots of steel and glass in extremely large buildings, and he coined the term "less is more."

Weese also has been involved in the American Institute of Architects (AIA). She served as vice president and president of the Chicago chapter; as the Illinois regional director; and as vice president of the national organization. In fact, Weese had announced her candidacy for national president one week before being asked to be a candidate for dean of the architecture school. That plan, obviously, has been put on hold. In recognition of her contributions both to the profession and to the organization, she was named a fellow of the AIA in 1991.

Weese also has worked for several architectural firms, including one established by brother-in-law Harry Weese, FAIA. In 1977, Weese and her husband founded Weese Langley Weese, which still is in operation. Weese's son, Dan, also an architect, now works there.

Weese has designed a wide range of projects and has been recognized with numerous awards. Her projects have ranged from weekend and single-family homes to commercial projects, schools and high-rise apartments.

She is interested in the design concepts of light, scale (how the human body relates to the space) and the use of materials.

"Even though I had no idea of what it meant to be an architect back when I first decided to be one, I was clearly drawn to light, scale and space — even as a child," she said. "Over the years, my reasons (for wanting to be an architect) changed, but it was always what I wanted to do. I never chose anything else." — Debby Aronson

Calendar

April 18-27



Exhibitions

"Currents 66." Paintings and collages by Michael Byron, visiting artist in the School of Art. Through May 19. Gallery 337, Saint Louis Art Museum. 721-0072.

"M.F.A. Thesis Exhibition." Opening reception: 5-7 p.m. April 19. Gallery of Art, Steinberg Hall. Exhibit runs through May 5. Works are available for purchase. Hours: 10 a.m.-5 p.m. weekdays; 1-5 p.m. weekends. 935-4761.

"The Stanley Elkin Show." Through May 31. Special Collections, Olin Library, Level Five. Hours: 8:30 a.m.-5 p.m. weekdays. 935-5495.



Films

All Filmboard movies cost \$3 and are shown in Room 100 Brown Hall. For 24-hour hotline information, call 935-5983.

Thursday, April 18

7:30 p.m. French Film Series. "Madame De" (1953), with English subtitles. Room 162 McDonnell Hall. 726-1565.

Friday, April 19

7 and 9:30 p.m. Filmboard. "Smoke" (1995, B&W), starring William Hurt and Harvey Keitel. (Also April 20, same times, and April 21 at 7 p.m.)

Midnight. Filmboard. "The Pink Panther" (1964). (Also April 20, same time, and April 21 at 9:30 p.m.)

Monday, April 22

7 and 9 p.m. Filmboard. "I'm No Angel" (1933, B&W), starring Mae West and Cary Grant. (Also April 23, same times.)

Tuesday, April 23

7 p.m. Japanese Film Series. "Dreams" (1991), with English subtitles. Room 219 South Ridgley Hall. 935-5110.

Thursday, April 25

7:30 p.m. French Film Series. "La Double Vie de Veronique" (1991), with English subtitles. Room 162 McDonnell Hall. 726-1565.



Lectures

Thursday, April 18

9:30 a.m. Cardiovascular/vascular biology seminar. "The Oxidation Theory of Atherosclerosis — Fact or Fiction?" Joseph L. Witztum, prof. of medicine and director, Specialized Center of Research on Arteriosclerosis, U. of California, San Diego. Clopton Aud., 4950 Children's Place. 362-8908.

11:15 a.m. Social work seminar. "Report on the Landmark National UNOCCAP Project: Use, Need, Outcome, Costs, Child and Adolescent Project," Arlene R. Stiffman, assoc. prof. of social work. Room 353 West Campus Administrative Center. 935-5687.

1 p.m. Vision science seminar. "A Primate Model of Retinitis Pigmentosa," David Grosof, research asst. prof. of ophthalmology and visual sciences. East Pavilion Aud., Barnes Hospital. 362-3726.

1:15 p.m. Social work lecture. "Housing Issues in Kansas City Inner-city Neighborhoods," Turner Pettway, director of operations, Kansas City (Mo.) Neighborhood Alliance. Brown Hall Lounge. 935-7433.

2:30 p.m. Mechanical engineering seminar. "R.M.S. Titanic: Simple Answers to Hard Questions," Theodosios Korakianitis, assoc. prof. of mechanical engineering. Room 100 Cupples II Hall. 935-6055.

4 p.m. Biology seminar. "Patterns in Distribution and Abundance of Birds: Current Status and Future Directions," John Blake, asst. prof. of biology, U. of Missouri-St. Louis. Room 322 Rebstock Hall. 935-6860.

4 p.m. Central Institute for the Deaf research seminar. "Non-linear Cochlear Spectrum Analysis and Peak Detection in Human Hearing," Julius L. Goldstein, research prof. of electrical engineering in speech and hearing. Second Floor Aud., Clinics and Research Bldg., 909 S. Taylor Ave. 977-0000.

4 p.m. Chemistry seminar. "Electron Transfer Cleavage of 4-member Rings: DNA Photorepair and Other Cases," Daniel E. Falvey, assoc. prof. of chemistry, U. of Maryland, College Park. Room 311 McMillen Lab. 935-6530.

4 p.m. Earth and planetary sciences colloquium. "PHILLS/ORASIS: NRL's Modular Hyperspectral Sensors and Unsupervised Subpixel Demixing System," John Antoniadis, head, Plasma Instrumentation and Testing, Plasma Physics Division, Naval Research Laboratories, Washington, D.C. Room 362 McDonnell Hall. 935-5610.

4:15 p.m. Philosophy-neuroscience-psychology lecture. Topic to be announced. Paul Churchland, prof. of philosophy, U. of California, San Diego. Room 110 January Hall. 965-6700.

4:30 p.m. Math colloquium. "Matricial Methods and Stopping Times in Harmonic Analysis," Nets Katz, prof. of mathematics, Yale U. Room 199 Cupples I Hall. 935-6736.

6 p.m. Social work lecture. "Intergenerational Issues: The Ties That Bind," Nancy Morrow-Howell, assoc. prof. of social work; Novella Perrin, director, Central Missouri State U. Gerontology Institute; Bonnie Miller, lawyer, Rothman, Sokol, Adler and Sarachanpc; Joli Harris, social worker, Cardinal Ritter Institute; Linda Drapp, registered nurse, St. Jane Center; and Amy Lit, OASIS. Brown Hall Lounge. 935-4909.

6:15 p.m. German lecture. "Das Geständnis Liebe und Risiko in Rede und Schrift," Walter Haug, prof. of German, U. of Tübingen, Germany. Hurst Lounge, Room 201 Duncker Hall. 935-5106.

Friday, April 19

9:15 a.m. Pediatric Grand Rounds. "Gene Targeting to Define Natural Functions of Cytokines: New Actions of Lymphotoxin in Immune Responsiveness," David D. Chaplin, prof. of medicine, of genetics and of molecular microbiology and chief, Division of Allergy/Immunology. Clopton Aud., 4950 Children's Place. 454-6128.

Noon. Cell biology and physiology seminar. "Regulation of Meiotic and Early Embryonic Cell Cycles," James L. Maller, prof. of pharmacology and investigator, Howard Hughes Medical Institute, U. of Colorado School of Medicine. Room 426 McDonnell Medical Sciences Bldg. 362-6812.

3 p.m. African and Afro-American studies lecture. "A View From Capitol Hill: From Affirmative Action to the Million Man March," Phillip Davis, Washington correspondent. Room 219 McMillan Hall. 935-5690.

3 p.m. Art history and archaeology seminar. "From Winckelman to Wilde: Homosexuality and the 19th-century Debates on the Renaissance," James Saslow, assoc. prof., Queens College, City U. of New York. Room 200 Steinberg Hall. 935-5270.

7:30 p.m. Astronomy lecture. "Interplanetary Dust: Key to the Origin of the Planets," Scott Messenger, doctoral candidate, Dept. of Physics. Room 162 McDonnell Hall. 935-4614.

Monday, April 22

4 p.m. Cardiovascular biology seminar. "More to Lipase Than Lipolysis," Ira Goldberg, assoc. prof. of medicine, Columbia U., New York. Room 3907 South Bldg. 362-8908.

4 p.m. Psychology colloquium. "A Positive Feedback Bias to Minorities," Kent Harber, research fellow, Center for Health Behavior Research. Room 216, new psychology bldg. 935-6592.

4 p.m. Social work lecture. "Social Security in the 21st Century," Takanobu Kyogoku, president, Japan College of Social Work, Tokyo. Brown Hall Lounge. 935-4909.

Tuesday, April 23

11:45 a.m. Molecular microbiology/microbial pathogenesis seminar. "Salmonella Pathogenesis, Invasion and Gene Regulation: Does It Make Sense?" Catherine A. Lee, asst. prof. of microbiology and molecular genetics, Harvard Medical School. Room 775 McDonnell Medical Sciences Bldg. 362-3692.

4 p.m. Biology seminar. The 16th annual Viktor Hamburger Lecture. "The Identification of Genes Controlling Development in Flies and Fishes," Christiane Nüsslein-Volhard, Max-Planck Institute for Developmental Biology, Tübingen, Germany. Room 100 Brown Hall. (See story, page 6.) 935-6860.

4 p.m. Chemistry seminar. "Reactivity of Transition Metal Olefin Complexes With B-X Bonds: Routes to Metal Boryls and New Hydroboration Reactions of Ethylene," Milton R. Smith, asst. prof. of chemistry, Michigan State U., East Lansing. Room 311 McMillen Lab. 935-6530.

Wednesday, April 24

6:30 a.m. Anesthesiology Grand Rounds. Topic to be announced. Alex S. Evers, the Henry Eliot Mallinckrodt Professor and head, Dept. of Anesthesiology, and prof. of medicine and of molecular biology and pharmacology. Wohl Hospital Bldg. Aud. 362-6978.

8 a.m. Obstetrics and Gynecology Grand Rounds. "Molecular Genetics of Endometrial Cancer," David G. Mutch, assoc. prof. of obstetrics and gynecology and director, Gynecologic Oncology. Clopton Aud., 4950 Children's Place. 454-7886.

4 p.m. Biochemistry and molecular biophysics seminar. "Structure and Function of DNA Polymerases," Lorena Beese, asst. prof. of biochemistry, Duke U. Medical Center, Durham, N.C. Cori Aud., 4565 McKinley Ave. 362-0261.

4 p.m. Neurology and neurological surgery seminar. The Lucille P. Markey Special Emphasis Pathway in Human Pathobiology 1996 Spring Seminar Series. "Somatic Gene Transfer to the Adult Brain," Fred H. Gage, prof. of genetics, The Salk Institute for Biological Studies, La Jolla, Calif. West Pavilion Aud., Barnes Hospital. 362-3364.

Thursday, April 25

9:30 a.m. Pulmonary and critical care medicine lecture. The 20th annual I. Jerome Flance Visiting Professor of Medicine. "Cystic Fibrosis: Airway Epithelial Biology and Therapy," Richard Charles Boucher, prof. of medicine, U. of North Carolina, Chapel Hill. Clopton Aud., 4950 Children's Place. 362-8983.

1:10 p.m. Social work lecture. "Health-care Reform: Impact on Local Access and Delivery," William A. Peck, executive vice chancellor for medical affairs and dean, School of Medicine. Brown Hall Lounge. 935-6600.

4 p.m. Biology and biomedical sciences seminar. "Receptor-mediated Endocytosis Requires a Coat With a Collar," Sandra L. Schmid, assoc. member, depts. of Cell Biology and Molecular Biology, Scripps Research Institute, La Jolla, Calif. Cori Aud., 4565 McKinley Ave. 362-3364.

4 p.m. Chemistry seminar. "Twisting Helices: On the Balance Between α - and 3_{10} -Helix in Model Peptides," Glenn L. Millhauser, assoc. prof. of chemistry, U. of California, Santa Cruz. Room 311 McMillen Lab. 935-6530.

4 p.m. Earth and planetary sciences colloquium. "Isotope Hydrology of the Interaction Between Groundwater and Magmatic CO₂ in the Cascadia Volcanoes of California," M. Lee Davisson, isotope hydrologist, Isotope Sciences Division, Lawrence Livermore National Laboratory, Livermore, Calif. Room 362 McDonnell Hall. 935-5610.

4 p.m. Foreign languages and literatures lecture. "The New Subjectivity," Isabelle de Courtivron, chair, Dept. of Foreign Languages and Literatures, Massachusetts

Institute of Technology, and author of "New French Feminisms" and "Significant Others." Hurst Lounge, Room 201 Duncker Hall. 935-5175.

4 p.m. Political science honors lecture/convocation. Fifth annual Eliot Memorial Lecture and Honors Convocation. Speaker is Alan Abramowitz, prof. of American politics, Emory U., Atlanta. Eliot Lounge, Room 200 Eliot Hall. 935-5810.

4:15 p.m. Philosophy-neuroscience-psychology lecture. "Toward a Functional Anatomy of Mind: Maps and Metamaps of Brain Imagery Data," Dan Lloyd, assoc. prof. of philosophy, Trinity College, Hartford, Conn. Room 110 January Hall. 935-6670.

4:30 p.m. Math colloquium. Topic to be announced. Vakhtank Kokilashvili, prof. of mathematics, Rutgers U. Room 199 Cupples I Hall. 935-6726.

Friday, April 26

7:30 a.m. International affairs lecture. "Contemporary Issues: Continuity and Change," Peter Heath, assoc. prof. of Arabic language and literature and chair, Dept. of Asian and Near Eastern Languages and Literatures, will present a lecture on the Middle East. Alumni House living room. 935-6777.

9:15 a.m. Pediatric Grand Rounds. "Pediatric Heart Transplantation in 1996 — A Multi-institutional Perspective," Charles E. Canter, assoc. prof. of pediatrics. Clopton Aud., 4950 Children's Place. 454-6128.

Noon. Cell biology and physiology seminar. "A Signaling Molecule Modulating Cell Fate Selection," Raphael Kopan, asst. prof. of medicine and of molecular biology and pharmacology. Room 426 McDonnell Medical Sciences Bldg. 362-6950.

3 p.m. East Asian studies lecture. Third annual Stanley Spector Lecture on East Asian History and Civilization. "Sou-sheer Chi — Pursuing the Supernatural," James Crump, U. of Michigan, Ann Arbor. Room 162 McDonnell Hall. 935-4448.



Music

Saturday, April 20

8 p.m. Opera. Jeremy Gerard, graduate student in vocal performance, will perform "A Water Bird Talk," an opera in one act for male voice. Graham Chapel. 935-5581.

Sunday, April 21

3 p.m. Symphony Orchestra and Chamber Choir concert. Sixth annual Chancellor's Concert. Program: Carl Orff's "Carmina Burana," Mozart's Piano Concerto in B-flat Major, and George Gershwin's "Lullaby." Saint Louis Symphony Community Music School, 560 Trinity Ave. (See story, page 5.) 935-5581.

Wednesday, April 24

8 p.m. Jazz ensemble concert. "Travels," a tour through the world of jazz presented by the vocal jazz ensemble, directed by Christine Hitt. Program: music of Duke Ellington, New York Voices, Manhattan Transfer and others. Steinberg Hall Aud. 935-5574.

Thursday, April 25

8 p.m. "C.P.E. Bach Choral and Organ Works." Features organists Max Yount, Scott Schoonover and William Partridge and the Chamber Choir, directed by John Stewart, assoc. prof. of music. Bethel Evangelical Lutheran Church, Big Bend and Forsyth blvds. 935-5581.

Friday, April 26

8 p.m. Student recital. Graham Chapel. 935-5581.

8 p.m. "C.P.E. Bach Music for Harpsichord." Features the Concerto for Harpsichord, Fortepiano and Orchestra. Performed by Maryse Carlin, applied music instructor, and Seth Carlin, prof. of music. Memorial Presbyterian Church, Skinker and Wydown blvds. 935-5581.



Performances

Friday, April 19

8 p.m. The Performing Arts Dept. presents "Romeo and Juliet." (Also April 20, same time, and April 21 at 2 p.m.) Edison Theatre. Cost: \$8 for the general public; \$6 for senior citizens, students, and WU faculty and staff. 935-6543.

Thursday, April 25

8 p.m. Student playwright reading. The winners of the A.E. Hotchner Playwriting Competition will present staged readings of their works. (Continues April 27 at 2 and 8 p.m.) Drama Studio, Room 208 Mallinckrodt Center. (See story, this page.) 935-5858.

Saturday, April 27

8 p.m. Edison Theatre's "OVATIONS!" series presents Camerata of the 18th Century. Edison Theatre. Cost: \$20 for the general public; \$16 for senior citizens and WU faculty and staff; and \$11 for WU students. (See story, this page.) 935-6543.



Miscellany

Thursday, April 18

7:30 p.m. Faculty/graduate student feminist reading group book discussion. "Enlightened Women: Modernist Feminism in a Postmodern Age," by Alisson Assiter. Levy Lounge, Room 220 Busch Hall. 935-5102.

Saturday, April 20

9 a.m.-noon. Book arts workshop. "Pop-up Adventures," Bob Smith, prof. emeritus of art. (Continues April 27, same time.) Room 212 Bixby Hall. Cost: \$65. To register, call 935-4643.

9:30 a.m.-noon. Book arts workshop. "Preserving Family Stories," Cissy Lacks, photographer. Room 104 Bixby Hall. Cost: \$30. To register, call 935-4643.

10 a.m.-noon. Art history/music symposium. "Michelangelo's Poetry: Word, Music and Image." Saint Louis Art Museum Aud. 935-5270.

11 a.m.-8 p.m. Thurtene Carnival 1996. North Brookings Hall parking lot. (Continues April 21, same times.) (See story, page 6.) 935-2829.

1-4 p.m. Book arts workshop. "Basic Book-binding," Andrea Vadner, book artist. (Continues April 27, same time.) Room 104 Bixby Hall. Cost: \$65. To register, call 935-4643.

Sunday, April 21

10 a.m.-3 p.m. Hillel Center event. "Car Wash: We'll Scrub It 'Til You Love It!" Proceeds benefit social services in St. Louis, Israel and abroad through United Jewish Appeal. Hillel Center, 6300 Forsyth Blvd. Call 862-2080 to volunteer.

Monday, April 22

7-10 p.m. Continuing Medical Education conference. "Internal Medicine Review." The topic is oncology. Steinberg Amphitheater, The Jewish Hospital of St. Louis. 362-6891.

Wednesday, April 24

1 p.m. Cancer center panel discussion. "Building Partnerships for Breast Health Outreach: A National Teleconference." Eric P. Newman Education Center. 747-0359.

8 p.m. Fiction reading. Features Julia Hanna and Jeff Slater, graduating students in the M.F.A. writing program. Hurst Lounge, Room 201 Duncker Hall. 935-5120.

Thursday, April 25

National baroque music conference. "The Keyboard Music of C.P.E. Bach." Through April 27. For more info. on events and costs, call 935-5581.

Friday, April 26

7:30 a.m.-5 p.m. Continuing Medical Education conference. "Management of Chronic Pain." Eric P. Newman Education Center. 362-6891.

Saturday, April 27

10 a.m.-4 p.m. Tyson Research Center Family Day. Special guest is Steve Jerve, ABC-TV Channel 30 meteorologist. Tyson Research Center. Cost: \$2 per car; free for WU faculty, staff and students with valid ID. 935-8430.

Symphony Orchestra, Chamber Choir collaborate on Orff's 'Carmina Burana'

Just as a chorus of medieval fair maidens once uttered forth "a thousand joys," so too will the Washington University Symphony Orchestra and the Chamber Choir on Sunday, April 21, as they unleash the musical gusto of Carl Orff's "Carmina Burana."

The event that extols the auditory glory of Orff's popular 20th-century masterpiece is the sixth annual Chancellor's Concert, presented by the Symphony Orchestra. The downbeat begins at 3 p.m. in the Saint Louis Symphony Community Music School at the corner of Delmar Boulevard and Trinity Avenue.

In addition to "Carmina Burana," the program features Mozart's Piano Concerto in B-flat Major, performed by Karin Di Bella, a graduate student in piano performance, and "Lullaby" by George Gershwin. The concert is free and open to the public.

The collection of lusty medieval poems set to Orff's driving rhythms and powerful melodies are a pleasure for both performer and listener, said Dan Presgrave, lecturer in the Department of Music in Arts and Sciences and director of the orchestra.

"Much of the appeal comes from its rhythmic vitality," he said. "It's simple, straight-ahead and highly accessible. And, of course, the texts are very intriguing — all about the pleasures of the flesh."

The texts sing praise to such carnal "delights" as drinking, dancing, gambling and the coming of springtime when young men and women's thoughts turn to love. Orff's work is based on poems discovered in the early 1800s at the monastery of Bendiktbeuern, near the Bavarian Alps. Dating from the late 11th to the early 13th centuries, the bulk of the more than 200

poems were written in Latin, with some in German and French.

According to historians, most of the poems were penned and sung by troubadours and wayward clergy who roamed the countryside indulging in vice and glut. While most of the poems involve purely secular pursuits, a good number poke fun at church doctrines and conventions.

When Orff came upon the poems in the 1930s, he conceived his work as a theatrical piece. Since its debut in June 1937 in Frankfurt, Germany, "Carmina Burana" has taken many forms, including a fully staged medieval play and a ballet. It is most often performed in the concert setting.

Singers love to perform "Carmina Burana," said John Stewart, associate professor of music and director of the vocal program. "It's one of the most popular choral pieces of the 20th century," he said. "The music really illuminates and illustrates the text. It's full of love for life."

Stewart and Presgrave said they are looking forward to the first collaboration between the two University ensembles. The collaboration is made possible this year because of the orchestra's new, larger digs at the Saint Louis Symphony Community Music School. The orchestra formerly performed in the Saint Louis Art Museum Auditorium, which was too small to accommodate both the orchestra and chorus, Stewart noted.

The soloists are Jeanenne Lambert, soprano; Michael Oriatti, tenor; and Glen Guhr, baritone. Lambert and Oriatti are graduate students in vocal performance, and Guhr did some graduate studies in music here.

For more information, call 935-5581.

— Neal Learner

Camerata brings baroque music to Edison

The elegant and authentic sounds of classical baroque music will burst to life in a concert by the Camerata of the 18th Century at 8 p.m. April 27 in Edison Theatre.

The Camerata of the 18th Century makes its St. Louis premiere in a performance that concludes Edison's 1995-96 "OVATIONS!" series. The Camerata is presented in association with the Midwest Historical Keyboard Society.

Founded in 1991 by Konrad Hünteler, an internationally acclaimed soloist of baroque and classical flutes, the Camerata quickly established itself as one of the world's leading early music chamber ensembles. Based in Amsterdam, the Netherlands, the quartet divides its time between touring and recording.

Specializing in the music of Carl Philipp Emanuel Bach and his contemporaries, the Camerata re-creates the sounds of the 18th century by strictly adhering to original scorings and playing on traditional instruments of the period. Hünteler believes all music is best performed by following the performance guidelines of the time of the

composition. He believes much of the liveliness and expressive quality of 18th-century music has been buried under 19th- and 20th-century practices.

Tickets for the Camerata concert are \$20 for the general public; \$16 for senior citizens and University faculty and staff; and \$11 for University students. Tickets are available at the Edison Theatre box office (935-6543) or through Metrotix (534-1111).

The Camerata concert is the final event of a national conference titled "The Keyboard Music of C.P.E. Bach," which will take place on campus April 25-27. The conference includes a series of concerts featuring C.P.E. Bach works; lectures on the composer, his music and the historical setting during his life; demonstrations of historical keyboard instruments; and an extensive display of rare, historical instruments.

Registration for the lectures begins at 8:30 a.m. April 26 at the West Campus Conference Center. For registration and cost information on the conference, call 935-5581.

Staged readings set for Hotchner winners

The two winners of this year's A.E. Hotchner Playwriting Competition will bring their works to life in a series of staged readings.

Aspiring playwrights Mark Ferguson, a graduate student in playwriting and directing in Arts and Sciences, and Daniel Sullivan, a junior majoring in English in Arts and Sciences, will present their plays that won the annual competition open to all Washington University students and graduates of one year.

The staged readings — performed by students in the Performing Arts Department in Arts and Sciences — will take place in the Drama Studio, Room 208 Mallinckrodt Center. The staged readings of Ferguson's "Departure" will be performed at 8 p.m. April 25 and 27. The staged readings of Sullivan's "Oldies on the Rocks" will be performed at 2 p.m. April 27 and 28.

Ferguson's "Departure" tells a surreal story of a Kentucky backwoods family on its journey from confusion and schizophrenia to enlightenment and the discovery of its place in the universe.

Sullivan's "Oldies on the Rocks" tells

the story of what really transpires on prom night.

In a departure from past years, when the winning plays were fully produced and staged, the competition this year has focused more on the playwriting process itself, said Patricia Cobey, playwright-in-residence and facilitator of the competition. The staged readings will be dramatic and exciting but will contain minimal movement and virtually no sets, Cobey said. This form allows the audience to focus its attention entirely on the script, she said.

"We wanted to give the students the most professional guidance and support possible as they develop their plays," Cobey said. "The point is to polish and refine the works. We think the staged reading format is the most advantageous at this point in the process."

Both plays will be submitted for the possibility of being fully staged and produced by a faculty member next year.

Tickets to the staged readings are \$8 for the general public and \$6 for senior citizens and University faculty, staff and students. Tickets are available at the Edison Theatre box office (935-6543).

Sports

Compiled by Mike Wolf, director, and David Moessner, assoc. director, sports information.

Baseball team rebounds with three victories

After suffering its first back-to-back losses of the season, the Washington University baseball team bounced back with three victories and secured the school's third-consecutive 20-win season. The Bears, who climbed a season-high 14 games above .500, knocked off Greenville (Ill.) College 14-4. The Bears then took a doubleheader sweep of Maryville University 7-6 and 5-1.

Current record: 20-6

This week: 7 p.m. Wednesday, April 17, at Saint Louis University; 1 p.m. Saturday, April 20, at Missouri Baptist College (St. Louis) (2); 1 p.m. Sunday, April 21, at Rose-Hulman Institute of Technology (Terre Haute, Ind.) (2)

Track teams stride toward UAA meet

With the ninth annual University Athletic Association (UAA) Championships looming this weekend, the track squads performed well last week at the Western Illinois University Invitational in Macomb. Freshmen Emily Richard and Jonte Greer earned WU's only individual crowns, with Richard winning the 5,000-meter run (17 minutes, 41.92 seconds) and Greer soaring to the crown in the triple jump (42 feet, 7 inches). Stealing the show, though, was freshman Claudine Rigaud, who broke her own school record in the 100 (12.44 seconds) and charted the second-fastest time in Bear history in the 200 (25.63 seconds).

Both times provisionally qualify her for next month's NCAA Division III Championships.

This week: 10 a.m. Friday-Saturday, April 19-20, UAA Championships at Case Western Reserve University (Cleveland)

Men's tennis squad splits two matches

Following a 12-day layoff, the men's tennis team returned to the courts with a 6-1 victory over Greenville College last week. The Bears then dropped a 6-1 decision to NCAA Division II Southwest Baptist University (Bolivar, Mo.).

Current record: 3-4

This week: 4 p.m. Tuesday, April 16, vs. Principia College (Elsah, Ill.), Tao Tennis Center; 3:30 p.m. Wednesday, April 17, vs. Jefferson College (Hillsboro, Mo.) (exhibition), Tao Tennis Center; 9 a.m. Friday-Sunday, April 19-21, UAA Championships at University of Rochester (N.Y.)

Women's tennis team heads into UAAs

The women's tennis team last week topped Southern Illinois University at Edwardsville and Southwest Baptist University by 8-1 scores.

Current record: 8-5

This week: 4 p.m. Tuesday, April 16, at Principia College; 9 a.m. Friday-Sunday, April 19-21, UAA Championships at University of Rochester



Celebration weekend

Washington University student Prasanthi Gondi, far right, talks with prospective University students Bettina Lampkin, top left, Tameta Clark, top right, Richel Maxwell, bottom left, and Joyelle Jones, bottom center, at a welcome reception on Thursday, April 11. The prospective students attended Multicultural Celebration Weekend, which was held April 11-14 on campus and was designed to give admitted multicultural students a taste of life here. The celebration weekend was one component of April Welcome, the annual monthlong event in which about a thousand prospective students visit the campus.

Take Our Daughters to Work Day combines education, fun

Daughters ages 10 to 17 of Washington University employees are invited to visit their parents' workplace on Thursday, April 25, and they also may tour the campus, explore career options, hear from top female University leaders, and talk with students.

On Take Our Daughters to Work Day — the annual event sponsored by the Ms. Foundation for Women in New York — the University is having it all, and it isn't batting an eyelash at the juggling act required by departments and their employees to make the event a success.

"We're so excited to support young women as they not only see where their parents work but also start their career exploration," said Elizabeth George, an organizer of the event and director of admission and student resources at the George Warren Brown School of Social Work. "We want to give the girls an opportunity to view their day at Washing-

ton University as educational, academic and fun."

This year's theme is "Vote For Me!" — a timely appeal in an election year. Stating that to participate in the event is to cast a vote on behalf of girls, the Ms. Foundation further suggests that girls be encouraged to assume leading roles in student government, sports and other extracurricular activities; be the focus of mentoring programs; and be treated equitably.

The University constituency will weigh in favorably on all of these counts. At 9:30 a.m., sophomore Jennifer Dehne will talk on "Women in Engineering" and lead a tour of the School of Engineering and Applied Science. Girls will have the option of attending a skit presented by the Cultural Diversity Players, an undergraduate drama group also known as the CD Players.

At noon, the daughters will gather in the Women's Building Lounge for a brown-bag lunch, with drinks and dessert provided by

the University and entertainment provided by the Greenleaves, an all-female chorus. Highlighting the lunch hour will be University women leaders talking about their professions. Speakers include Shirley K. Baker, vice chancellor for information technology and dean of University Libraries; Enola K. Proctor, Ph.D., the Frank J. Bruno Professor of Social Work Research and director of the Center for Mental Health Services Research; Laurie Reitman, M.D., director of University Health Service; and Gloria W. White, vice chancellor for human resources.

After lunch, the Career Center will welcome visitors who wish to investigate career options and peruse related materials. Afterward, the girls will have the opportunity to discuss goals and winning teams with Nancy Fahey, women's head basketball coach, and members of her squad.

New to the national program is a \$60,000 scholarship sweepstakes established by the Ms. Foundation. Three girls selected in a nationwide random drawing will receive \$20,000 in U.S. savings bonds to be used for secondary education, continuing education or college. The school each winner attends will be awarded \$1,500 for its girls' or women's athletic program. Information on entering the sweepstakes may be obtained in the Women's Building during lunch or by calling 1-800-676-7780.

Take Our Daughters to Work Day was launched in 1993 in response to disturbing studies on girls conducted by Harvard University, the American Association of University Women and the Minnesota Women's Fund.

The research indicated that most girls experience a sudden drop in self-esteem at the start of adolescence.

University employees and their daughters are encouraged to register for the day's events. Those interested should consult their supervisors before making arrangements. To register for the program or for more information, call 935-6676.

— Cynthia Georges

Miracles to soar at Thurtene event

Members of the Thurtene junior honorary want to give St. Louis-area children a no-holds-barred opportunity to jump-start their imaginations.

The Washington University students are organizing the 1996 Thurtene Carnival, to be held from 11 a.m. to 8 p.m. Saturday, April 20, and Sunday, April 21, on the parking lot east of North Brookings Hall. There is no admission fee, although tickets will be sold for the rides. The theme for the event — the largest and oldest student-run carnival in the nation — is "Where the Miracles Fly."

The theme is the name of a popular song performed by The Floating Men, a trio of folk-rock musicians from Nashville, Tenn., who have performed in St. Louis. The theme emphasizes the honorary's focus on making Thurtene "a children's carnival," said Daniel A. Hirselj, the group's co-chair of publicity along with Robert E. Persaud. "We want the little kids attending the carnival to let their imaginations flow ... to dream about anything as much as they wish."

To coincide with the honorary's emphasis on children, the St. Louis Transitional Hope House Inc. will receive the net proceeds from this year's carnival. The charity helps families break the cycle of homelessness. According to Hope House officials, about 75 percent of their residents are children. The balance, with rare exceptions, are the children's single mothers. Children and parents from Hope House will attend the carnival from 1 to 4 p.m. April 20.

Highlights of the carnival include a visit by several members of the St. Louis Rams from noon to about 1 p.m. April 20; a welcome by Chancellor Mark S. Wrighton, Ph.D., at 2 p.m. April 20; and a 15-minute fireworks show, to be viewed near Brookings Hall outside the parking lot, at 8 p.m. April 20.

The carnival was scheduled to receive national exposure on ABC-TV's "Good Morning America." In a previously taped segment, Thurtene members shouted "Good morning, America!" and mentioned the carnival amid the backdrop of Francis Field. The taped segment was scheduled to air Monday, April 15.

Of course, the popular traditions of the carnival will continue with six facades, or scenic walls, from which students will perform skits; 14 major rides, including five children's rides; a host of food ranging from ethnic edibles to chocolate-covered bananas to shish kebabs; and more than 10 games. A new game debuting is the Phi Delta Theta armchair quarterback toss in which players attempt to make a "touch-down" while sitting in a reclining chair.

More than 30 sororities, fraternities and student groups have purchased carnival lot spaces, where, beginning April 15, they will build the facades as well as the food and game booths. The Thurtene honorary will present awards for the best performance at a facade, the best food and the best game booths, and the Burmeister Cup for best overall participation in the carnival.

The honorary also presents an award for the best construction, or physical makeup, of a facade. This year, the group has renamed the award the Daniel J. Buckley Construction Award in honor of Buckley, a 1995 University graduate who was killed last year. Buckley had served as his organization's construction chair for two years and spearheaded the members' efforts, which led to them winning the Burmeister Cup in 1994 and 1995.

For more information, call Hirselj at 935-2829.

— Carolyn Sanford

Campus Watch

The following incidents were reported to the University Police Department from April 8-14. Readers with information that could assist the investigation of these incidents are urged to call 935-5555. This release is provided as a public service to promote safety-awareness on campus.

April 8

11:24 p.m. — A student reported that two roller-hockey goals chained to a pipe outside the Mudd Law Building were stolen. The total value is estimated at \$120.

April 9

1:30 p.m. — A staff member reported that a table and software, valued at a total of \$5,100, were stolen from the Arts and Sciences Computing Center in Cupples I Hall.

April 10

4:12 p.m. — A student reported that two movie videos, valued at a total of \$35, were stolen from a suite in Chester Myers Residence Hall.

7:02 p.m. — A student reported that \$40 was stolen from Rutledge Residence Hall.

April 11

2:19 a.m. — University Police responded to a report of a bulletin board that was on fire near the Forsyth Boulevard pedestrian underpass. Police extinguished the fire, which caused minor damage.

10:45 a.m. — A staff member reported that a camcorder, valued at \$500, was stolen from Cupples I Hall.

11:05 a.m. — A staff member reported that \$40 was stolen from a purse in the Millbrook Building.

3:18 p.m. — A student reported that a compact disc player, valued at \$100, was stolen from a room in Liggett Residence Hall.

10:50 p.m. — University Police received a report that a bicyclist struck a parked car near Prince Hall and left the scene. The car received scratches and a broken rear window.

April 12

12:15 a.m. — A student member of the Thurtene honorary reported that a Thurtene banner, valued at \$200, was stolen during a promotional event at the Umrathskeller.

2:54 a.m. — A student reported a wrist/arm injury that occurred during a disturbance at a fraternity house. The incident is being referred to the judicial administrator.

1:21 p.m. — A staff member reported that license plate tabs, valued at \$8.50, were stolen from a vehicle parked near Brookings Hall.

5 p.m. — A student reported that a wallet containing credit and identification cards, \$20, and a room key was stolen from Olin Library.

April 14

3:55 a.m. — A student reported being struck in the face by a student in front of a fraternity house. The incident is being referred to the judicial administrator.

University Police also responded to two reports of telephone harassment at Umrath Residence Hall and at the Office of Residential Life and to two reports of vandalism at Chester Myers Residence Hall and at a fraternity house.

Nobel Prize winner to deliver lecture

One of the 1995 Nobel laureates in physiology or medicine will give the 16th annual Viktor Hamburger Lecture at 4 p.m. Tuesday, April 23, in Room 100 Brown Hall.

Christiane Nüsslein-Volhard, Ph.D., director of the Max-Planck Institute for Developmental Biology in Tübingen, Germany, will speak on "The Identification of Genes Controlling Development in Flies and Fishes."

Nüsslein-Volhard; Eric Weischaus, Ph.D., professor of biology at Princeton

University; and Ed Lewis, Ph.D., professor emeritus at the California Institute of Technology, shared the Nobel Prize in physiology or medicine last year for the pioneering work that led to the identification of a complex set of about 50 genes that interact sequentially to pattern the body of the fruit fly.

The lecture is given in honor of Viktor Hamburger, Ph.D., the Edward Mallinckrodt Distinguished Professor, emeritus, of biology.

For The Record

For The Record contains news about a wide variety of faculty, staff and student scholarly and professional activities.

Of note

Alison M. Goate, D.Phil., associate professor of psychiatry and of genetics, and **John W. Olney**, M.D., professor of psychiatry, received awards from the Academy of Science of St. Louis. Olney received the 1996 Peter H. Raven Lifetime Award for his exceptional career of service in science. Goate received a 1996 Innovative Award. Working with a team of molecular geneticists at the School of Medicine, she has earned a national reputation through her discovery of the first known cause of Alzheimer's disease — a mutation in the gene on chromosome 21. The professors received their awards during the academy's Outstanding St. Louis Scientists Awards dinner at the Missouri Botanical Garden. A co-presider over the event was **Thomas A. Woolsey**, M.D., professor of neurology and neurological surgery, of anatomy and neurobiology and of cell biology and

physiology. Woolsey is the academy's first vice president. ...

Rosalind J. Neuman, Ph.D., research assistant professor of mathematics in psychiatry, will be awarded the 1996 Woman of Valor Award on May 13 from the Jewish Federation of St. Louis' Business and Professional Women's Division. The award recognizes an outstanding Jewish career woman for her professional achievements and leadership in the St. Louis community. Neuman's community activities include serving as president of the St. Louis Hillel Center. ...

William E. Wallace, Ph.D., associate professor of art history and archaeology in Arts and Sciences, received a 1996-97 fellowship from the National Endowment for the Humanities. He will be a visiting scholar at the American Academy in Rome.

Speaking of

Victor T. Le Vine, Ph.D., professor of political science in Arts and Sciences, co-hosted a conference titled "Conflict Resolution and Ethnic Conflict in Central Eu-

rope," held in Prague, the Czech Republic. The conference, convened under the auspices of the Centre for International Understanding and the University of Ulster, brought together 25 specialists to examine the roots of intercommunal strife in the East and Central European regions. ...

A. Peter Mutharika, J.S.D., professor of law, participated in a symposium titled "Global Change, Human Rights and People-centered Development" at the Rutgers University School of Law in Newark, N.J. In addition, he moderated a panel on "Ethnic, Cultural, Religious Pluralism and Women's Rights" during a workshop titled "Constitutional Change and Democratization in Africa" at the City University of New York School of Law at Queens College. ...

Henry I. Schvey, Ph.D., professor of drama and of comparative literature and chair of the Performing Arts Department in Arts and Sciences, delivered two papers at the 17th annual Mid-America Theatre Conference in Chicago. He presented a paper on Louis Malle's film "Vanya on 42nd Street" for the Theatre History Sym-

posium. His second paper, for the Directing Symposium, was based on his direction of Richard Selzer's play "The Black Swan."

On assignment

Letha A. Chadiha, Ph.D., assistant professor of social work, is a member of the editorial advisory board of Collegiate Press.

To press

Wendy Auslander, Ph.D., associate professor of social work, wrote an article titled "Educational Options and AIDS-related Behaviors Among Troubled Adolescents" that was published in the Journal of Pediatric Psychology.

Guidelines for submitting copy:

Send your full name, complete title, department, phone number, and highest-earned degree, along with a typed description of your noteworthy activity, to For The Record, c/o Carolyn Sanford, Campus Box 1070, or p72245cs@wuvmd.wustl.edu. Items must not exceed 75 words. For more information, call Sanford at 935-5293.

Obituaries

Irving Engel, professor in School of Architecture

Irving Engel, professor of architecture, died of a heart attack Wednesday, April 10, 1996, in his Olivette home. He was 63.

A memorial service was held Monday, April 15, in Graham Chapel.

Engel came to Washington University in 1970 as an assistant professor of architecture and rose to full professor rank in 1984. Before joining the University, he was an assistant professor of architecture at Miami University in Oxford, Ohio.

He earned a bachelor's degree in architectural engineering in 1959 from Louisiana State University in Baton Rouge and a master's degree in architectural science in 1968 from Cornell University.

In May 1984, Prentice-Hall published his book on "Structural Principles," a textbook used in many architecture schools across the country. Prentice-Hall also published Engel's 1988 book on "Structural Steel in Architecture and Building Technology."

He taught structural design and structural principles courses throughout his tenure here.

Constantine E. Michaelides, FAIA, who served as dean of the School of Architecture from 1973 to 1993, noted that a large number of students took classes taught by Engel.

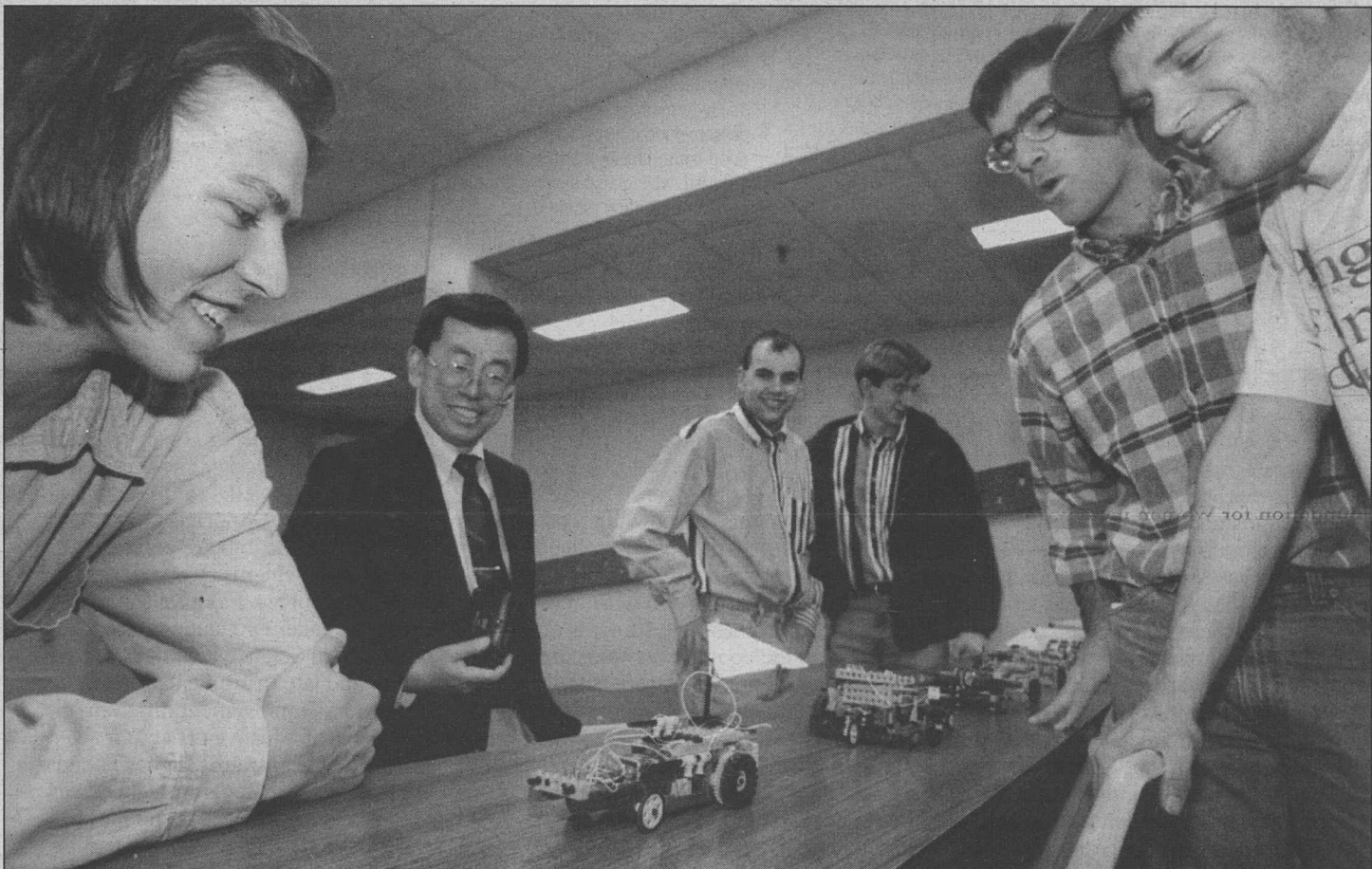
"He was the only faculty member teaching structures, so every student who received a professional degree from us from 1970 on took Irv's courses," Michaelides said. "You can think of architecture in terms of continuity and change. Change is what all the architecture design studios are about. But the analytical approach to structures — which Irv taught — provides the continuity to the curriculum. He was the anchor to the rational in the architecture curriculum."

Cynthia Weese, FAIA, professor and current dean of the architecture school, said former students have commended Engel for his teaching. Weese added that Engel's work and his teaching were known internationally as well.

Engel served on several University committees, including the University Judiciary Board, the Senate Council, the University Library Council, the University Provost Search Committee and the Tenure and Curriculum committees of the architecture school.

Engel is survived by his wife of 41 years, Margaret F. Engel of Olivette, and a brother and a sister.

In lieu of flowers, the family requests that memorial contributions be made to: the Irving Engel Scholarship Fund, Washington University School of Architecture, Campus Box 1210, 1 Brookings Drive, St. Louis, Mo., 63130-4899.



From left, engineering student Paul Sherman, Professor Dan Kimura, Ph.D., students Ben Wirz and James Hasler, Assistant Professor Philip Bayly, Ph.D., and student Erik Vee admire the entries in a competition in which engineering students designed and built computer-controlled Lego cars.

Five competitions put engineering students to the test — from page 1

have participated. The contestants were Renee Mere, only the second woman ever to enter the pageant, and Michael Dixon, Nick Nissing and Colin Thorne. The contestants sang, performed magic, juggled and did comedy skits.

They also were subjected to unrehearsed questions such as: If you could be any kind of vegetable, which would it be and how would it make you a better engineer?

Thorne took first place and received a Hewlett-Packard calculator. "The pageant is great; I consider it the crux of my career," said Thorne, who later earned two first-place finishes in the student design competitions. "I'm going to graduate school, where I hope I can enter more pageants."

Mere received a \$20 gift certificate from the St. Louis Bread Co. for second place. Dixon, who amazed the audience by juggling while riding a unicycle, took third and received a \$10 movie theater gift certificate.

The pageant drew about 100 students, a significant increase from previous years, said Jennifer Karlin, a sophomore in systems science and mathematics and a pageant planner.

"We changed time and location this year and increased the crowd incredibly," Karlin said. "Some of the intent is a chance to let go and be funny, but it's also a way to spoof what others seem to view us as. But this shows anybody that we

engineers are as creative, talented and funny as any other students."

Also during the week, 70 undergraduate and graduate students from across the school participated in five engineering design competitions held over two days. Nearly all of the student participants worked through the night on their projects.

The first project competition simulated a consulting challenge and was sponsored by Andersen Consulting Inc. in St. Louis. The challenge was based upon a real case the company addressed in the networking and communications area. Paul Min, Ph.D., assistant professor of electrical engineering, organized the project, which attracted 40 students divided into 12 teams. The winning team consisted of students Jim Barta, Bernie Favara, Jim Schelker and Chuck Turco, who each received a \$100 award. Christopher Goh, Socka Suppiah, Jeff Pershing, Alok Bisarya and Peter Fintschenko from Andersen participated in the project competition in a variety of functions.

Hiro Mukai, Ph.D., professor of systems science and mathematics, oversaw the second project in which students designed a computerized garden security system to analyze signals sensed by video cameras. Students T. Eugene Day, Lance Finney and Joseph Napoli won and split a team award of \$400.

Students on the third project were asked to design a restaurant waste-composting system. Rodolphe Motard,

D.Sc., professor of chemical engineering, planned this project. Students Mohan Khadilkar, Shantanu Roy and Robert Wu comprised the winning team and split a \$400 award.

Dan Kimura, Ph.D., professor of computer science, and Robert Morley, D.Sc., professor of electrical engineering, organized a project in which teams designed and built a computer-controlled Lego car. Each car was built using a Lego kit, two motors and a stamp processor. This was the only project that involved hands-on design, construction and testing. The student team of Paul Sherman, Thorne and Erik Vee split a first-place team award of \$375.

Theo Korakianitis, Sc.D., associate professor of mechanical engineering, organized the fifth project, which involved designing an electromechanical system to lift and store one car over another in a garage. The two-member team of Thorne and Max Yeh won and split a \$400 team prize.

The Andersen Consulting Inc. project was judged by a team of five engineers from Andersen; the other four projects were judged by engineering school faculty.

The 125th anniversary celebration will conclude May 3 with the school's 125th Anniversary Dinner and presentation of the Excellence in Engineering and Technology Award to Motorola Corp., and on May 17 with Commencement.

— Tony Fitzpatrick

Opportunities & personnel news

Hilltop Campus

The following is a partial list of positions available on the Hilltop Campus. Information regarding these and other positions may be obtained in the Office of Human Resources, Room 126 North Brookings Hall, or by calling 935-5990.

Department Secretary 960185. *Performing Arts Department.* Requirements: bachelor's degree preferred; typing 40 wpm with accuracy; proficiency with PCs and Microsoft Word; excellent verbal and written skills; excellent organizational skills; experience with copiers, fax machines and the campus telephone system; ability to handle multiple tasks and establish priorities under pressure; pleasant, professional manner with co-workers, faculty, students and visitors; professional telephone skills; ability to perform duties with minimal supervision; detail-oriented; two years secretarial experience preferred. Application required.

Administrative Aide 960198. *Engineering Student Services.* Requirements: high school graduate; enjoys working with people; pleasant; ability to work with frequent interruptions. Responsibilities include keeping a master schedule for undergraduate admissions, placement, dual-degree and co-op programs so

office runs smoothly; greeting visitors and answering phone inquiries; routing visitors and callers to student services administrators and other University offices; training, scheduling and assigning work for student workers; registering students and alumni for placement services; sorting and opening mail; and distributing information on scholarships available outside the University. Application required.

Indirect Cost Analyst 960200. *Accounting Services.* Requirements: bachelor's degree; master's degree in business administration and/or cost accounting experience is a plus; strong PC skills; experience with FoxPro or similar databases is a plus; database report writing experience is a plus; strong analytical skills with interest in analyzing detail while understanding the big picture; effective communication skills; excellent work ethic; high standards; ability to work independently. Application required.

Library Technical Assistant (Adaptive Cataloging) 960201. *Olin Library.* Requirements: bachelor's degree or equivalent work experience; relevant experience or course work in librarianship; ability to work with foreign languages; reading knowledge of one foreign language preferred; ability to work with details in an organized and accurate manner; typing at least 35 wpm; legible handwriting; physical stamina. Application required.

Secretary 960202. *Civil Engineering.* Requirements: high school graduate; well-organized self-starter who adapts quickly to a busy environment, works well with people and is able to interact with undergraduate and graduate students, faculty and staff. Responsibilities include providing all of the staff support to the Department of Civil Engineering. Schedule: part time. Application required.

Systems and Applications Manager 960207. *Computing and Communications.* Requirements: high school graduate; some college preferred; five years experience; ability to design, program and install retail business systems; ability to analyze and coordinate business processes and technologies in the development of applications; experience in technologies in numerous distributed computing environments; experience with Novell, Pick and Universe preferred; education in principles of computing sciences and business processes; project-management skills; successful track record in retail or university systems environments; ability to lead with imagination to guide store systems development in new ways; ability to manage complex processes; good interpersonal skills; good communication skills; service-oriented; willingness to work flexible hours. Application required.

Department Secretary 960211. *Chemical Engineering.* Requirement: high school graduate. Re-

sponsibilities include typing for departmental faculty; handling graduate student administration, including processing mailings to prospective graduate students, maintenance of application files, orientation of new students, maintenance of graduate student files, scheduling of seminars and exams, etc., and receptionist and miscellaneous routine office duties. Application required.

Administrative Assistant 960216. *Accounting Services.* Requirements: college degree from business or vocational school; accounting or bookkeeping experience a plus; five years secretarial experience; accurate typing, including statistical typing; excellent interpersonal skills, particularly on the phone; one year word processing experience, including WordPerfect for Windows; Lotus and e-mail experience; excellent grammar, punctuation and spelling; ability to maintain confidential information; ability to participate as a team member. Application required.

Medical Campus

The following is a partial list of positions available at the School of Medicine. Employees who are interested in submitting a transfer request should contact the Human Resources Department of the medical school at 362-7197 to request

an application. External candidates may call 362-7195 for information regarding application procedures or may submit a résumé to the human resources office located at 4480 Clayton Ave., Campus Box 8002, St. Louis, MO, 63110. Please note that the medical school does not disclose salary information for vacancies, and the office strongly discourages inquiries to departments other than human resources.

Programmer Analyst II 960108-R. *Surgery.* Requirements: bachelor's degree in computer science; knowledge of C and C++. Responsibilities include developing and maintaining in-house software applications for data acquisition, analysis, 3-D graphical visualization and image processing in a Unix environment on silicon graphics workstations.

Programmer Analyst III 960391-R. *Genetics.* Requirements: knowledge of Unix and C language; Macintosh programming and PERL knowledge helpful. Responsibilities include the support and continued development of an object-oriented lab notebook database and software.

Research Patient Assistant 960564-R. *General Internal Medicine.* Requirements: some college-level courses; previous experience not necessary. Responsibilities include interviewing patients, reviewing medical records and assisting in data analysis. The patient

interviews are part of a quality-of-life study about blood thinner (warfarin) for the prevention of stroke. Schedule: part time, about 15 hours per week; expansion into full-time position may be available in next academic year.

Medical Research Technologist 960675-R. *Internal Medicine.* Requirements: bachelor's degree; two to three years experience preferred with expertise in microinjection and familiarity with mouse models. Responsibilities include using transgenic and embryonic stem cell technologies and detailed analysis of gene-altered mice.

System Manager 960840-R. *Anatomy.* Requirements: bachelor's degree in computer science; experience with PC, Macintosh and Unix environments. Responsibilities include overseeing all levels of system management, including maintenance, networking, design and upgrading of departmental and laboratory computing systems.

Administrative Assistant 960846-R. *Psychiatry.* Requirements: bachelor's degree with one to two years experience preferred, or five to six years University experience in a similar setting. Responsibilities include assisting in the pre- and post-award grant process; assisting with guidelines and preparation of monthly expenditure reports; monitoring spending; verifying financial reports; and assisting with payroll/appointments and PHS usage.

Computers giving chemistry students experience they'll use later — from page 1

Beyond information, the Internet provides chemistry students with Quick Time movies and 3-D visualization exercises that make chemistry more accessible and realistic, if not fascinating.

Quick Time movies are computerized demonstrations of orbitals and molecules in three dimensions. The orbitals and molecules are rotated so students can visualize the actual structures. The shapes of the orbitals show how atoms combine to form molecules. The shapes of the molecules help determine their function. For example, the shape of a molecule is useful in determining its role as a drug.

In a lab course called "Chemistry 116," one computer graphics tutorial allows students to analyze iron in ferritin, a protein that stores iron and then releases it as the organism needs the element. In the lab, students strip off the protein's shell to see the amount of iron stored and then study the process of iron-release from the protein. The graphics enable the students to visualize the shell, the iron mineral stored inside and the process by which the iron leaves the protein.

"Ferritin in a lab manual looks pretty much like a bunch of oblongs," Frey noted. "The graphical tutorial allows the students to see protein structure the way

a practicing scientist sees it. The atoms can be colored green for carbon, red for oxygen, blue for nitrogen. They're to scale, so students see how big a protein really is compared to other molecules."

The software that renders the images is Insight II from Biosyn/MSI and runs on Unix machines. The students also can download the coordinates for molecules to display them on software called RASMOL, available for personal and Macintosh computers and Unix machines. It rotates models and displays them in various colors and shapes, such as sticks or ribbons, the shape most biochemists work with.

"Industry finds this valuable because students will come to them already prepared to work with computational chemistry, saving the company training time," said Frey.

A tutorial planned for "Chemistry 257" lets students examine the structures of esters they synthesized in lab. They also can process structural data of their esters from nuclear magnetic resonance, a powerful imaging tool. Esters are fragrant compounds — some exceptionally strong. This "smell tutorial" will enable students to develop the concept of how the 3-D shape of a compound determines its smell.

"We're introducing students to things they'll use in biology and other courses and industry as well," said Donlin, who is developing the tutorial.

Funding for computer-enhanced instruction in chemistry comes from a variety of sources. External sources such as the Whitaker Foundation in St. Louis, the National Science Foundation (NSF) Undergraduate Instrumentation and Laboratory Improvement Program, the NSF Undergraduate Curriculum Program, and the Howard Hughes Foundation have contributed. Internal sources such as the Parents' Fund and the Arts and Sciences Departmental Operating Budget also have helped. The instructional material was developed using computer software and equipment primarily intended and funded for faculty computational research.

"The development of undergraduate computer-based instruction did not occur in isolation," said Edward S. Macias, Ph.D., executive vice chancellor and dean of Arts and Sciences. "For instance, the ferritin tutorial came about through NSF money blended with the Parents' Fund, a donor fund by parents of students. These funds were used mainly for equipment. The chemistry building was networked for the Internet

from NSF funds and money from Arts and Sciences. Many of the images for the tutorials were done on research-class machines in the departmental computing facility, which was originally designed primarily for faculty research use."

The success of the program is owed to departmental cooperation, said El-Ghazzawy.

"This all works because it's a top-down operation," he said. "All of the teaching assistants, the professors, technical people and students have to be current with computer operations to make things happen."

And how successful is it? This spring, about 500 students in both sections of "Chemistry 112A" are learning from the Internet. Students have become so adept and familiar with the Internet that they use it away from Washington University to keep up to speed in ways their parents could only have dreamed about.

"At Thanksgiving, a student went home and realized she'd forgotten to bring a problem-set solution with her," Frey said. "She logged on at home to our home page and pulled it down. Just last year, she'd have been sunk."

— Tony Fitzpatrick

Success with roundworm led researchers to tackle human genome — from page 1

ment from egg to adult. Some of this DNA makes up genes, of which there may be 100,000.

Faulty genes cause 3,000 to 4,000 hereditary diseases, including Huntington's disease and cystic fibrosis. Genetic errors also contribute to cancer, heart disease and diabetes. Deciphering the complete genetic script will enable scientists to precisely determine the molecular causes of such disorders and to develop more effective methods for diagnosis and treatment.

The genome is made of 3 billion pairs of chemical building blocks called nucleotide bases. The St. Louis group already has sequenced more than 1 million base pairs of human DNA, including the region of chromosome 13 that contains breast cancer gene BRCA2.

The researchers decided to tackle the human genome after their successful application of large-scale DNA-sequencing techniques to the genome of the

roundworm *Caenorhabditis elegans*. The NCHGR awarded the School of Medicine a three-year \$3.8 million grant to directly support the roundworm research in 1990, followed by a five-year \$29.7 million grant in 1993.

In collaboration with John Sulston's group at the Sanger Centre in Cambridge, England, Waterston's group has sequenced nearly 40 million of the 100 million base pairs in the roundworm, with an accuracy level of 99.99 percent — just one error per 10,000 bases. This is a much greater amount of DNA sequenced than previously has been obtained from any organism. The recently sequenced genome of the bacterium *Haemophilus influenzae*, for example, has just 1.8 million base pairs.

In groups of three, nucleotide bases serve as code words for amino acids. The sequence of bases in a gene spells out the amino acid sequence of the corresponding protein.

By 1994, the researchers realized the worm project was yielding accurate data in a remarkably rapid fashion. They argued that the same techniques could be applied to the 30-fold-larger human genome.

Richard K. Wilson, Ph.D., associate director of the Genome Sequencing Center and research associate professor of genetics, attributes the group's success to teams of workers capable of handling large amounts of DNA. The group also has developed robots to perform repetitive tasks and computer software to assemble and interpret sequencing data. The planned completion date for the roundworm genome is Dec. 31, 1998. The National Institutes of Health hopes the human genome will be sequenced by the year 2005.

The researchers make all of their data freely available by immediately submitting sequences to GenBank, a repository

maintained by the National Center for Biotechnology Information in Bethesda, Md.

Some investigators have located genes by sequencing expressed sequence tags (ESTs) rather than genomic DNA. These snippets of DNA are partial copies of the RNA messages made during gene transcription. The Genome Sequencing Center has identified about 45,000 human genes this way and placed them into GenBank.

"But as more big EST projects have come along, it has become clear that there eventually is a diminishing return because some genes are expressed only in one cell type or for brief periods of time," Wilson said. "So while EST projects can quickly provide tags to a large number of genes, we believe that systematic sequencing of DNA from the genome is the only way to uncover all of the human genes and the elements that control their expression."

— Linda Sage